ARINC

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

# PART 1

# FUNCTIONAL DESCRIPTION, ELECTRICAL INTERFACE, LABEL ASSIGNMENTS AND WORD FORMATS

## ARINC SPECIFICATION 429 PART 1-17

**PUBLISHED: May 17, 2004**

AN ARINC DOCUMENT

**Prepared by**
**AIRLINES ELECTRONIC ENGINEERING COMMITTEE**
**Published by**
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**2551 RIVA ROAD, ANNAPOLIS, MARYLAND 21401**

# ARINC Standard – Errata Report

## 1. Document Title

**ARINC Specification 429 Part 1-17:** *Mark 33 – Digital Information Transfer System (DITS)*
Published: May 17, 2004

## 2. Reference

Page Number: 70 Section Number: Att 2 , Table 2 Date of Submission: 18MAR07

## 3. Error

ARINC 429 Part 1, Table 2, BNR Data, (Label 335 reproduced in part):

**ARINC Specification 429 (May 17, 2004)**

| Label | Eqpt ID (HEX) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transmit Interval (msec) 2 | Max Transmit Interval (msec) 2 | Max Trans-Port Delay (msec) 3 | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 335 | 002 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 004 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 005 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 02F | | | | | | | | | | |
| | 038 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 03F | | | | | | | | | | |
| | 056 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 060 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 10A | | | | | | | | | | |
| | 10B | | | | | | | | | | |

## 4. Recommended Correction

ARINC 429 Part 1, Table 2, BNR Data (Label 335 reproduced in part). Changes are shaded in yellow.

**ARINC Specification 429 Part 1-17 REVISED**

| Label | Eqpt ID (HEX) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transmit Interval (msec) 2 | Max Transmit Interval (msec) 2 | Max Trans-Port Delay (msec) 3 | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 335 | 002 | Track Angle Rate | Deg/Sec | ± 32 | 11 | CW | 0.015 | 10 | 20 | | FMS |
| | 004 | Track Angle Rate | Deg/Sec | ± 32 | 11 | CW | 0.015 | 10 | 20 | | IRS |
| | 005 | Track Angle Rate | Deg/Sec | ± 32 | 11 | CW | 0.015 | 10 | 20 | | AHRS |
| | 02F | | | | | | | | | | |
| | 038 | Track Angle Rate | Deg/Sec | ± 32 | 11 | CW | 0.015 | 10 | 20 | | ADIRS |
| | 03F | | | | | | | | | | |
| | 056 | Track Angle Rate | Deg/Sec | ± 32 | 11 | CW | 0.015 | 10 | 20 | | GLNU |
| | 060 | Track Angle Rate | Deg/Sec | ± 32 | 11 | CW | 0.015 | 10 | 20 | | GNU |
| | 10A | | | | | | | | | | |
| | 10B | | | | | | | | | | |

## 5. Reason for Correction

Table 2 from ARINC Specification 429 Part 1 provides baseline definition of Label 335, Track Angle Rate data. “Notes” column is expanded to show the system acronym for each of the sources identified by the “Equipment ID”. Positivr sense is specified as CW (clockwise) to conform to ARINC 705, AHRS, and ARINC 718A, Transponder.

## 6. Submitter (Optional)

Robert H. (Bob) Saffell (Rockwell Collins) and Paul Prisaznuk (AEEC staff)

Comments should be directed to daniel.martinec@arinc.com.

Note: Items 2-5 may be repeated for additional errata. All recommendations will be evaluated by the staff. Any substantive changes will require submission to the relevant subcommittee for incorporation into a subsequent Supplement.

**[To be completed by IA Staff ]**

**Errata Report Identifier:** 07-051/ERR-005 **Engineer Assigned:** Dan Martinec

**Review Status:** ______________________________

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# ARINC SPECIFICATION 429 PART 1-17

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

## PART 1

## FUNCTIONAL DESCRIPTION, ELECTRICAL INTERFACE, LABEL ASSIGNMENTS AND WORD FORMATS

Published:  May 17, 2004

Prepared by the Airlines Electronic Engineering Committee

| | | |
|---|---|---|
| Specification 429 | Adopted by the Airlines Electronic Engineering Committee: | July 21, 1977 |
| Specification 429 | Adopted by the Industry: | September 15, 1977 |

Summary of Document Supplements

| Supplement | Adoption Date | Published |
|---|---|---|
| Specification 429-1 | April 11, 1978 | June 1, 1978 |
| Specification 429-2 | December 6, 1978 | March 1, 1979 |
| Specification 429-3 | August 31, 1979 | November 1, 1979 |
| Specification 429-4 | June 17, 1980 | August 1, 1980 |
| Specification 429-5 | March 12, 1981 | April 4, 1981 |
| Specification 429-6 | December 9, 1981 | January 22, 1982 |
| Specification 429-7 | November 4, 1982 | January 3, 1983 |
| Specification 429-8 | November 4, 1983 | December 3, 1984 |
| Specification 429-9 | October 11, 1984 | April 30, 1985 |
| Specification 429-10 | November 7, 1985 | November 17, 1986 |
| Specification 429-11 | June 15, 1988 | July 22, 1988 |
| Specification 429-12 | October 25, 1989 | July 1, 1990 |
| Specification 429-13 | October 8, 1991 | December 30, 1991 |
| Specification 429-14 | November 4, 1992 | January 4, 1993 |
| Specification 429-15 | April 18, 1995 | September 1, 1995 |
| Specification 429-16 | November 14, 2000 | September 27, 2001 |
| Specification 429-17 | May 5, 2004 | May 17, 2004 |

A description of the changes introduced by each supplement is included on goldenrod paper at the end of this document.

# FOREWORD

## Aeronautical Radio, Inc., the AEEC, and ARINC Standards

Aeronautical Radio, Inc. (ARINC) was incorporated in 1929 by four fledgling airlines in the United States as a privately-owned company dedicated to serving the communications needs of the air transport industry. Today, the major U.S. airlines remain the Company's principal shareholders. Other shareholders include a number of non-U.S. airlines and other aircraft operators.

ARINC sponsors aviation industry committees and participates in related industry activities that benefit aviation at large by providing technical leadership and guidance and frequency management. These activities directly support airline goals: promote safety, efficiency, regularity, and cost-effectiveness in aircraft operations.

The Airlines Electronic Engineering Committee (AEEC) is an international body of airline technical professionals that leads the development of technical standards for airborne electronic equipment-including avionics and in-flight entertainment equipment-used in commercial, military, and business aviation. The AEEC establishes consensus-based, voluntary form, fit, function, and interface standards that are published by ARINC and are known as ARINC Standards. The use of ARINC Standards results in substantial benefits to airlines by allowing avionics interchangeability and commonality and reducing avionics cost by promoting competition.

There are three classes of ARINC Standards:

a) ARINC Characteristics – Define the form, fit, function, and interfaces of avionics and other airline electronic equipment. ARINC Characteristics indicate to prospective manufacturers of airline electronic equipment the considered and coordinated opinion of the airline technical community concerning the requisites of new equipment including standardized physical and electrical characteristics to foster interchangeability and competition.

b) ARINC Specifications – Are principally used to define either the physical packaging or mounting of avionics equipment, data communication standards, or a high-level computer language.

c) ARINC Reports – Provide guidelines or general information found by the airlines to be good practices, often related to avionics maintenance and support.

The release of an ARINC Standard does not obligate any airline or ARINC to purchase equipment so described, nor does it establish or indicate recognition or the existence of an operational requirement for such equipment, nor does it constitute endorsement of any manufacturer's product designed or built to meet the ARINC Standard.

In order to facilitate the continuous product improvement of this ARINC Standard, two items are included in the back of this volume:

a) An Errata Report solicits any corrections to the text or diagrams in this ARINC Standard.

b) An ARINC IA Project Initiation/Modification (APIM) form solicits any recommendations for addition of substantive material to this volume which would be the subject of a new Supplement.

# ARINC SPECIFICATION 429
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## ARINC SPECIFICATION 429
## TABLE OF CONTENTS

# 1.0 INTRODUCTION

## 1.1 Purpose of this Document

This document defines the air transport industry's standards for the transfer of digital data between avionics systems elements. Adherence to these standards is desired for all inter-systems communications in which the system line replaceable units are defined as unit interchangeable in the relevant ARINC characteristics. Their use for intra-system communications in systems in which the line replaceable units are defined in the ARINC characteristics as system interchangeable is not essential, although it may be convenient.

## 1.2 Organization of ARINC Specification 429

ARINC Specification 429 was originally published in a single volume through version 14 (429-14). The size of the document and the need for improved organization dictated the division of the document into three parts. Those three parts include:

| | |
|---|---|
| Part 1 | Functional Description, Electrical Interface, Label Assignments and Word Formats |
| Part 2 | Discrete Word Data Formats |
| Part 3 | File Data Transfer Techniques |

c-15 Part 1 provides the basic description of the functions and the supporting physical and electrical interfaces for the data transfer system. Data word formats, standard label and address assignments, and application examples are defined. Part 2 lists discrete word bit assignments in label order. Part 3 describes protocols and message definitions for data transferred in large blocks and/or file format. For convenience of the user, the section and attachment numbering has been retained for the material moved from the original Specification to Part 3.

Updates to each part of future releases of ARINC 429 will be independent of the other parts to accommodate timely revisions as industry needs dictate. The dash numbers for each Part will NOT be synchronized with the other Parts as time passes. Users of ARINC Specification 429 should ensure that the latest version of each Part is used when designing or procuring equipment.

## 1.3 Relationship to ARINC Specification 419

ARINC Specification 419, "Digital Data System Compendium", is a catalog of the elements of the several digital data transmission systems that have found application during the "emergent" period of digital avionics technology. The maturing of this technology, now evident in the scope of its planned use on aircraft of the 1980s and beyond, has shown the need for a generally applicable digital information transfer system having capabilities not provided by any combination of the elements presently defined in Specification 419. In defining such a system, this document draws on the experience gained in the preparation of Specification 419 but is otherwise separate and distinct from it. Addition of the element specifications of the system defined herein to the Specification 419 catalog is not anticipated.

## 1.4 "Mark 33 Digital Information Transfer System" - Basic Philosophy

This "Mark 33 Digital Information Transfer System (DITS)" specification describes a system in which an avionics system element having information to transmit does so from a designated output port over a single twisted and shielded pair of wires to all other system elements having need of that information. Bi-directional data flow on a given twisted and shielded pair of wires is not permitted.

### 1.4.1 Numeric Data Transfer

The Mark 33 DITS numeric data transmission characteristics have been developed from those of successful predecessor air transport industry digital information transfer systems. Data for transmission, encoded in either twos complement fractional binary notation or binary coded decimal notation, is supplied from source systems at rates sufficiently high to ensure small incremental value changes between updates. Transmission is made "open loop", i.e., sinks are not required to inform sources that information has been received. A parity bit is transmitted as part of each data word to permit simple error checks to be performed by the sinks. These, together with data reasonableness checks which may also be performed by the sinks, may be used to prevent the display or other utilization of a erroneous or suspect word. The inherently high integrity of the twisted and shielded wire transmission medium ensures that such drop-outs are few. The low rates of change of the data ensure that when one does occur, it is of no consequence.

### 1.4.2 ISO Alphabet No. 5 Data Transfer

In addition to the transfer of BNR and BCD numeric data as just described, the Mark 33 DITS handles alpha and numeric data encoded per ISO Alphabet No. 5. The same "broadcast" transmission philosophy is used, although the "housekeeping" aspects of system operation differ in order to accommodate particular needs associated with this type of data. These differences will be addressed individually in this document as they arise. c-1

### 1.4.3 Graphic Data Transfer

A third type of data which may eventually be handled by the Mark 33 DITS is graphic data, i.e., the lines, circles, randomly positioned alpha/numeric text and other symbols used on CRT map and similar displays. The technique employed for this purpose can be basically similar to that used for ISO Alphabet No. 5 alpha/numeric data transfer. However, because a need for graphic data handling capability has not yet emerged, the air transport industry has decided not to be specific concerning this technique for the moment. When the need for graphic data handling is established, appropriate specification material will be developed. c-1

# 2.0 DIGITAL INFORMATION TRANSFER SYSTEM STANDARDS

## 2.1 Message Related Elements

This section describes the digital data transfer system elements considered to be principally related to the message itself or the manner in which it is handled.

### 2.1.1 Direction of Information Flow

The information output of an avionics system element should be transmitted from a designated port (or ports) to which the receiving ports of other system elements in need of that information are connected. In no case does information flow into a port designated for transmission.

COMMENTARY

A separate data bus (twisted and shielded pair of wires per Section 2.2.1) for each direction is used when data is required to flow both ways between two avionics systems elements.

### 2.1.2 Information Element

c-2 The basic information element is a digital word containing 32 bits. There are five application groups for such words, BNR data, BCD data, Discrete data, Maintenance data (general) and Acknowledgement, ISO Alphabet Number 5 and Maintenance (ISO Alphabet Number 5) data (AIM). Word formats for these different applications are depicted in Attachment 6 while the relevant data handling rules are set forth in Section 2.3.1. When less than the full data field is needed to accommodate the information conveyed in a word in the desired manner, the unused bit positions should be filled with binary zeros or, in the case of BNR/BCD numeric data, valid data bits. If valid data bits are used, the resolution possible for the information may exceed that called for in this Specification. The Commentary following Section 2.1.6 of this document refers.

COMMENTARY

c-1 To permit the use of identical error-checking hardware elements in the handling of BNR and BCD numeric data words, the format for the Mark 33 DITS BCD word differs from that used formerly for this type of data. Bit Number 32 is assigned to parity, Bit Numbers 31 and 30 to the sign/status matrix, Bit Number 29 is the most significant bit of the data field, and the maximum decimal value of the most significant character is 7. Previously, the BCD word contained no parity bit, the sign/status matrix occupied Bit Numbers 32 and 31, Bit Number 30 was the most significant data bit and the maximum decimal value of the most significant character was 3. This format made the word 8-bit byte oriented with respect to the data. This characteristic is not retained in the Mark 33 system.

c-1 Also, latitude and longitude can only be encoded in the Mark 33 DITS word with the formerly specified resolution of 0.1 minute of arc if Bit Numbers 9 and 10 are used for data rather than the SDI function described in Section 2.1.4 of this document, and the word is structured differently from the standard shown in Attachment 6. Restructuring the word involves limiting the maximum value of the most significant character to 1 and moving the remaining BCD characters towards the MSB by two bit positions. It is possible, however, that future latitude and longitude displays will not be the simple, dedicated read-out type for which BCD data is intended. More likely is the use of some form of multiple-message display, such as a CRT, which will be backed by its own data processor and prefer inputs of BNR data. If this proves to be the case, these special provisions for BCD-encoding will not be required. c-1

### 2.1.3 Information Identifier

The type of information contained in a word is identified by a six-character label. The first three characters are octal c-2 characters coded in binary in the first eight bits of the word. The eight bits will: c-4

a. identify the information contained within BNR and BCD numeric data words (e.g., DME distance, static air temperature, etc.) and c-2

b. identify the word application for Discrete, Maintenance and AIM data.

The last three characters of the six-character label are hexadecimal characters used to provide for identification of ARINC 429 bus sources. Each triplet of hexadecimal characters identifies a “black box” with one or more DITS ports. Each three character code (and black box) may have up to 255 eight bit labels assigned to it. The code is used administratively to retain distinction between unlike parameters having like labels assignments. c-12

COMMENTARY

Some users have expressed a desire to have means for identifying label sets and buses associated with a particular equipment ID code. Octal label 377 has been assigned for this purpose. (The code appears in the 3 LSDs of the BCD Word format). The transmission of the equipment identifier word on a bus will permit receivers attached to the bus to recognize the source of the DITS information. Since the transmission of the equipment identifier word is optional, receivers should not depend on that word for correct operation. c-4

Label code assignments are set forth in Attachment 1-1 to this document. c-2

**Special Note**:

In some ARINC 429 DITS applications, a bus will be dedicated to delivering a single information element from a source to one or more identical sink devices. In such circumstances, the sink device designer might be tempted to assume that decoding the word label is not necessary. Experience has shown, however, that system developments frequently occur that result in the need for additional information elements to appear on the bus. If a sink device designed for service prior to such a development cannot decode the original word label, it cannot differentiate between this word and the new data in the new situation. The message for sink designers should therefore be quite clear - provide label decoding from the outset, no matter how strong the temptation to omit it might be. c-1

## 2.0 DIGITAL INFORMATION TRANSFER SYSTEM STANDARDS

COMMENTARY

Adherence to the label code assignments of Attachment 1-1 is essential in inter-system communications and in intra-system communications where the system elements are defined as "unit interchangeable" per ARINC Report 403. The assignment of label codes for all such communications must be coordinated with the air transport industry if chaos is to be avoided. A manufacturer who finds that Attachment 1-1 does not specify the label he needs for such system application must not simply choose one from those unassigned and *drive on*. The user should contact AEEC Staff for assistance. A web page on the ARINC Website (ARINC.com) has been developed to assist you in contacting the AEEC Staff.

### 2.1.4 Source/Destination Identifier

c-1 Bit Numbers 9 and 10 of numeric data words should be reserved for a data source/destination identification function. They are not available for this function in alpha/numeric (ISO Alphabet Number 5) data words (see Section 2.3.1.3 of this document) or when the resolution needed for numeric (BNR/BCD) data necessitates their use of valid data. The source/destination identifier function may find application when specific words need to be directed to a specific system of a multi-system installation or when the source system of a multi-system installation needs to be recognizable from the word content. When it is used, a source equipment should encode its aircraft installation number in Bit Numbers 9 and 10 as shown in the table below. A sink equipment should recognize words containing its own installation number code and words containing code "00," the "all-call" code.

COMMENTARY

c-8 Equipment will fall into the categories of source only, sink only, or both source and sink. Use of the SDI bits by equipment functioning only as a source or only as a sink is described above. Both the source and sink texts above are applicable to equipment functioning as both a source and a sink. Such equipment should recognize the SDI bits on the inputs and should also encode the SDI bits, as applicable, on the outputs. DME, VOR, ILS and other sensors, are examples of source and sink equipment generally considered to be only source equipment. These are actually sinks for their own control panels. Many other types of equipment are also misconstrued as source only or sink only. A simple rule of thumb is: if a unit has a 429 input port and a 429 output port, it is a source and sink! With the increase of equipment consolidation, e.g., centralized control panels, the correct use of the SDI bits cannot be overstressed.

| Bit Number | | Installation Number |
|---|---|---|
| 10 | 9 | |
| 0 | 0 | See Note Below |
| 0 | 1 | 1 |
| 1 | 0 | 2 |
| 1 | 1 | 3 |

Note: In certain specialized applications of the SDI function the all-call capability may be forfeited so that code "00" is available as an "installation Number 4" identifier. When the SDI function is not used, binary zeros or valid data should be transmitted in Bit Numbers 9 and 10.

COMMENTARY

This document does not address the practical question of how the SDI bits will be set in those multi-installation systems in which the source/destination function is desired. One way would be to use program pins on the individual installation black boxes which would be wired to set up the appropriate code. The ARINC Characteristics devoted to the individual systems will define the method actually to be used. c-1

### 2.1.5 Sign/Status Matrix

This section describes the coding of the Sign/Status Matrix (SSM) field. In all cases the SSM field uses Bits 30 and 31. For BNR data words, the SSM field also includes Bit 29.

The SSM field may be used to report hardware equipment condition (fault/normal), operational mode (functional test), or validity of data word content (verified/no computed data).

The following definitions apply in this Specification:

Invalid Data - is defined as any data generated by a source system whose fundamental characteristic is the inability to convey reliable information for the proper performance of a user system. There are two categories of invalid data, namely, "No Computed Data" and "Failure Warning."

No Computed Data - is a particular case of data invalidity where the source system is unable to compute reliable data for reasons other than system failure. This inability to compute reliable data is caused exclusively by a definite set of events or conditions whose boundaries are uniquely defined in the system characteristic.

Failure Warning - is a particular case of data invalidity where the system monitors have detected one or more failures. These failures are uniquely characterized by boundaries defined in the system characteristic. c-12

The system indicators should always be flagged during a "Failure Warning" condition.

When a "No Computed Data" condition exists, the source system should annunciate its outputs to be invalid by setting the sign/status matrix of the affected words to the "No Computed Data" code, as defined in the subsections which follow. The system indicators may or may not be flagged, depending on system requirements.

While the unit is in the functional test mode, all output data words generated within the unit (i.e., pass through words are excluded) should be coded for "Functional Test." Pass through data words are those words received by the unit and retransmitted without alteration.

When the SSM code is used to transmit status and more than one reportable condition exists, the condition with the highest priority should be encoded in Bit Numbers 30 and 31. The order of condition priorities to be used is shown in the table below.

## 2.0 DIGITAL INFORMATION TRANSFER SYSTEM STANDARDS

### 2.1.5 Sign/Status Matrix (cont'd)

| | |
|---|---|
| Failure Warning | Priority 1 |
| No Computed Data | Priority 2 |
| Functional Test | Priority 3 |
| Normal Operation | Priority 4 |

Each data word type has its own unique utilization of the SSM field. These various formats are described in the following subsections.

### 2.1.5.1 BCD Numeric

When a failure is detected within a system which would cause one or more of the words normally output by that system to be unreliable, the system should stop transmitting the affected word or words on the data bus.

Some avionic systems are capable of detecting a fault condition which results in less than normal accuracy. In these systems, when a fault of this nature (for instance, partial sensor loss) which results in degraded accuracy is detected, each unreliable BCD digit should be encoded "1111" when transmitted on the data bus. For equipments having a display, the "1111" code should, when received, be recognized as representing an inaccurate digit and a "dash" or equivalent symbol should be displayed in place of the inaccurate digit. Parameters for which such a degraded mode of operation is possible are identified in the Note column of the tables in Attachment 2.

c-12 The sign (plus/minus, north/south, etc.) of BCD Numeric Data should be encoded in bit numbers 30 and 31 of the word as shown in the table below. Bit Numbers 30 and 31 of BCD Numeric Data words should be "zero" where no sign is needed.

The "No Computed Data" code should be annunciated in the affected BCD Numeric Data word(s) when a source system is unable to compute reliable data for reasons other than system failure.

When the "Functional Test" code appears in Bits 30 and 31 of an instruction input data word, it should be interpreted as a command to perform a functional test.

COMMENTARY

> A typical instruction input to a radio, for example, would be a channel change command word. When this command word is received with the "Functional Test" coding in the SSM field, the radio should exercise its functional test.

When the "Functional Test" code appears as a system output, it should be interpreted as advice that the data in the BCD Numeric Data word contents are the result of the execution of a functional test. A functional test should produce indications of 1/8 of positive full-scale values unless indicated otherwise in the associated ARINC Equipment Characteristic.

BCD NUMERIC SIGN/STATUS MATRIX

| Bit Number | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Plus, North, East, Right, To, Above |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Test |
| 1 | 1 | Minus, South, West, Left, From, Below |

### 2.1.5.2 BNR Numeric Data Words

The status of the transmitter hardware should be encoded in the Status Matrix field (Bit Numbers 30 and 31) of BNR Numeric Data words as shown in the table below.

A source system should annunciate any detected failure that causes one or more of the words normally output by that system to be unreliable by setting Bit Numbers 30 and 31 in the affected word(s) to the "Failure Warning" code defined in the table below. Words containing this code should continue to be supplied to the data bus during the failure condition.

The "No Computed Data" code should be annunciated in the affected BNR Numeric Data word(s) when a source system is unable to compute reliable data for reasons other than system failure.

When it appears as a system output, the "Functional Test" code should be interpreted as advice that the data in the word results from the execution of a functional test. A functional test should produce indications of 1/8 of positive full-scale values unless indicated otherwise in an ARINC equipment characteristic. c-12

If, during the execution of a functional test, a source system detects a failure which causes one or more of the words normally output by that system to be unreliable, it should immediately change the states of Bit Numbers 30 and 31 in the affected words such that the "Functional Test" annunciation is replaced with "Failure Warning" annunciation.

BNR STATUS MATRIX

| Bit Number | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Test |
| 1 | 1 | Normal Operation |

The sign (plus, minus, north, south, etc.) of BNR Numeric Data words should be encoded in the Sign Matrix field (Bit Number 29) as shown in the table below. Bit Number 29 should be "zero" when no sign is needed.

SIGN MATRIX

| Bit Number | Meaning |
|---|---|
| 29 | |
| 0 | Plus, North, East, Right, To, Above |
| 1 | Minus, South, West, Left, From, Below |

Some avionic systems are capable of detecting a fault condition which results in less than normal accuracy. In these systems, when a fault of this nature (for instance, partial sensor loss) which results in degraded accuracy is detected, the equipment should continue to report "Normal" for the sign status matrix while indicating the degraded performance by coding bit 11 as follows:

ACCURACY STATUS

| Bit Number | Meaning |
|---|---|
| 11 | |
| 0 | Nominal Accuracy |
| 1 | Degraded Accuracy |

This implies that degraded accuracy can be coded only in BNR words not exceeding 17 bits of data. Parameters for which such a degraded mode of operation is possible are identified in the notes column of the tables in Attachment 2. c-12

2.1.5.3 Discrete Data Words

A source system should annunciate any detected failure that
could cause one or more of the words normally output by
that system to be unreliable. Three methods are defined.
The first method is to set Bit Numbers 30 and 31 in the
affected word(s) to the "Failure Warning" code defined in
the table below. Words containing the "Failure Warning"
code should continue to be supplied to the data bus during
the failure condition. When using the second method, the
equipment may stop transmitting the affected word or words
on the data bus. Designers should use this method when the
c-15 display or use of the discrete data by a system is
undesirable. The third method applies to data words which
c-12 are defined such that they contain failure information within
the data field. For these applications, refer to the associated
ARINC equipment characteristic to determine proper SSM
c-15 reporting. Designers should preclude mixing operational
and BITE data in the same word.

The "No Computed Data" code should be annunciated in the affected Discrete Data word(s) when a source system is unable to compute reliable data for reasons other than system failure.

When the "Functional Test" code appears as a system output, it should be interpreted as advice that the data in the Discrete Data word contents are the result of the execution of a functional test. c-12

DISCRETE DATA WORDS

| Bit Number | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Verified Data, Normal Operation |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Test |
| 1 | 1 | Failure Warning |

2.1.6 Data Standards

The units, ranges, resolutions, refresh rates, number of significant bits, pad bits, etc. for the items of information to be transferred by the Mark 33 DITS are tabulated in Attachment 2 to this document.

COMMENTARY

Note that Section 2.3.1.1 of this document calls for numeric data to be encoded in BCD and binary, the latter using twos complement fractional notation. In this notation, the most significant bit of the data field represents one half of the maximum value chosen for the parameter being defined. Successive bits represent the increments of a binary fraction series. Negative numbers are encoded as the twos complements of positive value and the negative sign is annunciated in the sign/status matrix.

In establishing a given parameter's binary data standards for inclusion in Attachment 2, the units maximum value and resolution are first determined in that order. The least significant bit of the word is then given a value equal to the resolution increment, and the number of significant bits is chosen such that the maximum value of the fractional binary series just exceeds the maximum value of the parameter, i.e., equals the next whole binary number greater than the maximum parameter value less one least significant bit value. For example, if the Mark 33 DITS is required to transfer altitude in units of feet over a range of zero to 100,000 feet with a resolution of one foot, the number of significant bits is 17 and the maximum value of the fractional binary series is 131,071 (i.e., 131,072 - 1).

Note that because accuracy is a quality of the measurement process and not the data transfer process, it plays no part in the selection of word characteristics. Obviously, the resolution provided in the DITS word should equal or exceed the accuracy in order not to degrade it.

For the binary representation of angular data, the Mark
33 DITS employs "degrees divided by 180$^{o}$" as the
unit of data transfer and ±1 (semicircle) as the range c-1
for twos complement fractional notation encoding
(ignoring, for the moment, the subtraction of the least
significant bit value). Thus the angular range 0
through 359.XXX degrees is encoded as 0 through
±179.XXX degrees, the value of the most significant
bit is one half semicircle and there are no
discontinuities in the code.

This may be illustrated as follows. Consider encoding
the angular range $0^{o}$ to $360^{o}$ in $1^{o}$ increments. Per the
general encoding rules above, the positive semicircle
will cover the range $0^{o}$ to $179^{o}$ (one least significant bit
less than full range). All the bits of the code will be
"zeros" for $0^{o}$ and "ones" for $179^{o}$, and the sign/status
matrix will indicate the positive sign. The negative c-3
semicircle will cover the range $180^{o}$ to $359^{o}$. All the
bits will be "zeros" for $180^{o}$. The codes for angles
between $181^{o}$ to $359^{o}$ will be determined by taking the
twos complements of the fractional binary series for

## 2.0 DIGITAL INFORMATION TRANSFER SYSTEM STANDARDS

### 2.1.6 Data Standards (cont'd)

COMMENTARY (cont'd)

c-3 the result of subtracting each value from 360. Thus, the code for 181° is the twos complement of the code for 179°. Throughout the negative semicircle, which includes 180°, the sign/status matrix contains the negative sign.

**For convenience, all binary word ranges in Attachment 2 are shown as whole binary numbers rather than such numbers less one least significant bit value. Also, the resolutions shown are approximate only.** Accurate resolutions can be determined, if required, by reference to the range values and numbers of significant bits for the words of interest.

It should be noted that in all applications of the twos complement fractional notation, the maximum value of the word, once chosen, cannot be changed by the use of more bits in the data field. The number of bits in the word affects only the resolution of the data, not its range.

Binary Coded Decimal (BCD) data is encoded per the numeric subset of the ISO Alphabet #5 code (see Attachment 5 to this document) using Bit Numbers 1 through 4 of the seven-bit-per-character code. Alpha/numeric data is encoded using all seven bits per character of the ISO Alphabet #5 code and is transmitted using the special word format described in Section 2.3.1.3 of this document.

### 2.2 Electrically Related Elements

This section describes the digital transfer system elements considered to be principally related to the electrical aspects of the signal circuit.

### 2.2.1 Transmission System Interconnect

c-5 A data source should be connected to the data sink(s) by means of a single twisted and shielded pair of wires. The shields should be grounded at both ends to an aircraft ground close to the rack connector and at all production breaks in the cable.

COMMENTARY

In practical wire line digital information transmission systems, cable characteristics and electrical mismatches can produce distortion of the digital data pulses. Also, noise due to electrical interference perturbs digital signals.

The performance of a digital receiver depends upon the receiver input signal characteristics (data with distortion and noise) and the receiver design.

Prior to the selection of the voltage and impedance parameters set forth in this section of this document, the pulse distortion likely to be encountered in systems built around them in existing size commercial aircraft was evaluated and judged to be acceptable for a well-designed receiver. No restriction is placed by this specification, therefore, on the number or length of stubs for installations on aircraft no larger than those existing, e.g., B 747. See Appendix A to this document for a report of this investigation.

Tests have shown that some receivers continue decoding data properly when one side of the transmission line is open or shorted to ground. When this condition exists noise immunity decreases and intermittent operation may occur. c-4 Users desire protection against non-annunciated system operation in this mode. This protection may consist of additional circuitry to detect and annunciate the fault, or to increase the receiver threshold to above 5.5 volts, which is the maximum signal level under this one-wire fault condition. c-5

Most ARINC Characteristics now contain text specifying that DITS receivers should discontinue operation when the voltage thresholds fall into the undefined regions between "Null" and "Hi" or "Null" and "Lo." Manufacturers building DITS receivers are urged to incorporate this feature in their circuitry whether it is to be used in ARINC 7XX-series equipment or Non-ARINC devices. c-5

### 2.2.2 Modulation

RZ bipolar modulation should be used. This is tri-level state modulation consisting of "HI," "NULL" and "LO" states.

### 2.2.3 Voltage Levels

### 2.2.3.1 Transmitter Voltage Levels

The differential output signal across the specified output terminals (balanced to ground at the transmitter) should be as given in the following table when the transmitter is open circuit:

| | HI (V) | NULL (V) | LO (V) |
|---|---|---|---|
| Line A to Line B | +10 ±1.0 | 0 ±0.5 | -10 ±1.0 |
| Line A to Ground | +5 ±0.5 | 0 ±0.25 | -5 ±0.5 |
| Line B to Ground | -5 ±0.5 | 0 ±0.25 | +5 ±0.5 |

c-4

## 2.0 DIGITAL INFORMATION TRANSFER SYSTEM STANDARDS

### 2.2.3.2 Receiver Voltage Levels

The differential voltage presented at the receiver input terminals will be dependent upon line length, stub configuration and the number of receivers connected. In the absence of noise, the normal ranges of voltages presented to the receiver terminals (A and B) would be:

c-5

| | |
|---|---|
| "HI" | +7.25V to +11V |
| "NULL" | +0.5V to -0.5V |
| "LO" | -7.25V to -11V |

In practice, these nominal voltages will be perturbed by noise and pulse distortion. Thus, receivers should associate the following voltage ranges with the three states indicated:

c-4

| | |
|---|---|
| "HI" | +6.5V to 13V |
| "NULL" | +2.5V to -2.5V |
| "LO" | -6.5V to -13V |

COMMENTARY

Receiver reaction is currently undefined herein for voltages that fall in the range just above and below the "Null" range. Respective equipment characteristics should be referenced for desired receiver response in this range. However, it is desirable that all DITS receivers will discontinue operation when the voltage levels fall into the undefined regions. Manufacturers are urged, as new equipment is developed, to "design in" the rejection capability.

The opinion is held by some people that conditions on transmission lines will be encountered which will require receivers to operate with less than the above defined minimum difference of 4.0V between the NULL and HI and NULL and LO states. Receiver designers are encouraged to investigate the possibilities and problems of working with a minimum difference of 1 volt between these states and to report their findings.

c-4 Receiver input common mode voltages (terminal A to ground and terminal B to ground) are not specified because of the difficulties of defining ground with any satisfactory degree of precision. Receiver manufacturers are encouraged to work with the differential input voltage (line A to line B) and not line-to-ground voltages.

### 2.2.4 Impedance Levels

### 2.2.4.1 Transmitter Output Impedance

c-4 The transmitter output impedance should be 75 ±5 ohms, divided equally between line A and line B to provide an impedance balanced output. This output impedance should be present for the "HI," "NULL" and "LO" transmitter output conditions and also during transitions between these levels.

COMMENTARY

The output impedance of the transmitter is specified as 75 ± 5 ohms to provide an approximate match to the characteristic impedance of the cable. The match can only be approximate due to the wide range of characteristic impedances which may be encountered due to the variety of conductor wire gauges and insulation properties. Measurements on a few samples of wire showed a spread of characteristic impedance of 63 to 71 ohms. An extrapolation over the wire gauges 20 to 26 for wrapped and extruded insulation indicate an expected characteristic impedance spread of 60 to 80 ohms approx. Twisted shielded wire specifications do not control the characteristic impedance of the cable, thus future developments in insulation techniques may result in cables having characteristic impedances outside the range estimated.

### 2.2.4.2 Receiver Input Impedance

The receiver should exhibit the following characteristics, measured at the receiver input terminals:

Differential Input Resistance $R_I$ = 12,000 ohms minimum c-4
Differential Input Capacitance $C_I$ = 50pF maximum
Resistance to Ground $R_H$ and $R_G \geq$ 12,000 ohms
Capacitance to Ground $C_H$ and $C_G \leq$ 50pF.

The total receiver input resistance including the effects of $R_I$, $R_H$ and $R_G$ in parallel should be 8,000 ohms minimum (400 ohms minimum for twenty receiver loads). c-4

No more than twenty receivers should be connected on to one digital data bus and each receiver should incorporate isolation provisions to ensure that the occurrence of any reasonably probable failure does not cause loss of data to the others.

See Attachment 4 to this document for a pictorial representation of the input and output circuit standards.

COMMENTARY

The above characteristics apply to differential amplifier receivers. Opto-isolator technology is progressing and may soon find application in digital data receivers. Opto-isolator receivers impose slightly greater loads on data buses than differential amplifier receivers and the way in which they are characterized is different. It is probable, however, that a future revision of this Specification will include material specifically related to their use.

### 2.2.5 Fault Tolerance

### 2.2.5.1 Receiver External Fault Voltage Tolerance

Receivers should withstand without sustaining damage the following steady-state voltages being applied to their terminals, superimposed upon a normally operating bus. Operation within specification limits is not required under these conditions.

a. 30 Vac RMS applied across terminals A and B, or

b. ±29 Vdc applied between terminal A and ground, or c-4

c. ±29 Vdc applied between terminal B and ground.

#### 2.2.5.2 Transmitter External Fault Voltage

Transmitter failures caused by external fault voltages should not cause other transmitters or other circuitry in the unit to function outside of their specification limits or to fail.

#### 2.2.5.3 Transmitter External Fault Load Tolerance

Transmitters should indefinitely withstand without sustaining damage a short circuit applied:

a. across terminals A and B, or

b. from terminal A to ground, or

c. from terminal B to ground, or

d. b and c above, simultaneously.

### 2.2.6 Fault Isolation

#### 2.2.6.1 Receiver Fault Isolation

Each receiver should incorporate isolation provisions to ensure that the occurrence of any reasonably probable internal LRU or bus receiver failure does not cause any input bus to operate outside of its specification limits (both undervoltage or overvoltage).

#### 2.2.6.2 Transmitter Fault Isolation

Each transmitter should incorporate isolation provisions to ensure that it does not under any reasonably probable LRU fault condition provide an output voltage in excess of:

a. a voltage greater than 30 Vac RMS between terminal A and B, or

b. greater than ±29 Vdc between A and ground, or

c. greater than ±29 Vdc between B and ground.

## 2.3 Logic Related Elements

This section describes the digital transfer system elements considered to be principally related to the logic aspects of the signal circuit.

### 2.3.1 Digital Language

#### 2.3.1.1 Numeric Data

The Mark 33 DITS should accommodate numeric data encoded in two digital languages, (i) BNR expressed in twos complement fractional notation and (ii) BCD per the numerical subset of ISO Alphabet Number 5 (see Attachment 5 to this document). An information item encoded in both languages will be assigned a unique address for each (see Section 2.1.3 and Attachment 1-1). Word formats are illustrated in Attachment 6 to this document.

#### 2.3.1.2 Discretes

In addition to handling numeric data as specified above, the Mark 33 DITS should also be capable of accommodating discrete items of information either in the unused (pad) bits of data words or, when necessary, in dedicated words. Any discrete information contained in a numeric data word assigned a label in Attachment 1-1 is specified in the definition for that word in Attachment 6.

The rule to be followed in the assignment soft bits to discrete in numeric data words is to start with the least significant bit of the word and to continue towards the most significant bit available in the word. Attachment 6 shows its against the background of the generalized word structure.

There are two types of discrete words. These are general purpose discrete words, and dedicated discrete words. Seven labels (270 XXX-276 XXX) are assigned to the general purpose words in Attachment 1-1. These words should be used in ascending label order (starting with 270 XXX) when the system receiving the data can identify its source by reference to the port at which it arrives.

#### 2.3.1.3 Maintenance Data (General Purpose)

The general purpose maintenance words are assigned labels in sequential order as are the labels for the general purpose discrete words. The lowest octal value label assigned to the maintenance words should be used when only one maintenance word is transmitted. When more than one word is transmitted the lowest octal value label should be used first and the other labels used sequentially until the message has been completed. The general purpose maintenance words may contain discrete, BCD or BNR numeric data but should never contain ISO Alphabet Number 5 messages. The general purpose maintenance words should be formatted according to the layouts of the corresponding BCD/BNR/discrete data words shown in Attachment 2.

#### 2.3.1.4 AIM Data

The information previously contained in this section is no longer applicable to ARINC Specification 429. For reference purposes, the section header is retained and the original contents of this section are located in Part 3 of this Specification.

#### 2.3.1.5 File Data Transfer

This section previously described a character-oriented file data transfer protocol. This definition was used as guidance for the character-oriented file transfer protocol descriptions incorporated into many ARINC equipment characteristics. The original contents of this section are located in Part 3 of this Specification.

The protocol defined in Part 3 is preferred for new applications. The purpose of this bit-oriented communications protocol is to provide for the transparent transfer of data files using the ARINC 429 data bus.

COMMENTARY

> The data transparent protocol described in Part 3 was developed in order to facilitate the communications of the ACARS Management Unit (MU) and the Satellite Data Unit (SDU). Its viability as a universal protocol was recognized by the Systems Architecture and Interfaces (SAI) Subcommittee, which recommended its inclusion herein as the standard means of file data transfer.

c-14 The process for determining the protocol (character-oriented or bit-oriented) to be used in the interaction between two units, where this information is not pre-determined is described in Part 3 of ARINC 429.

### 2.3.1.5.1 Bit-Oriented Protocol Determination

The ALO word should be sent by any system which supports the bit-oriented Link Layer protocol just after the system powers-up, or performs a re-initialization for any reason. The ALO/ALR protocol process may also be used when a bit-oriented Link Layer protocol system needs to determine if any of its interfaces support the bit-oriented protocol. All systems which support the Link Layer bit-oriented protocol must be able to respond to the initiation of this process. Attachment 11C of Part 3 to ARINC 429, shows the ALO and ALR word formats. c-13

When a system with a bit-oriented Link Layer protocol has the need to make this determination, it should construct the ALO word and transmit this word to the device in question. The system should then wait for a maximum period of time defined by $T_{12}$. If the device in question has not responded within $T_{12}$, the initiating system should initiate another ALO word and again delay up to $T_{12}$. An initiating system will attempt a maximum of $N_6$ ALO word operations before declaring the device in question as “Not bit-oriented” or “Not able to respond.”

### 2.3.2 Transmission Order

The Least Significant Bit (LSB) and Least Significant Character (LSC) of each word should be transmitted first. It may be noted that the least significant bit of the word is the most significant bit of the label and that the label is transmitted ahead of the data in each case. This “reversed label” characteristic is a legacy from past systems in which the octal coding of the label field was, apparently, of no significance.

### 2.3.3 Data Bit Encoding Logic

A “HI” state after the beginning of the bit interval returning to a “NULL” state before the end of the same bit interval signifies a logic “one.”

A “LO” state after the beginning of the bit interval returning to a “NULL” state before the end of the same bit interval signifies a logic “zero.” This is represented graphically in Attachment 7 to this document.

### 2.3.4 Error Detection/Correction

c-5 The last bit of each word should be encoded such that word parity is rendered odd to allow error detection in receivers. Note that the parity calculation encompasses all 31 label and information bits of the word.

COMMENTARY

> Air transport industry experience with digital information transfer systems pre-dating the Mark 33 DITS has shown that the twisted shielded pair of wires can be regarded as a high integrity link unlikely to introduce bit errors into the data passing through it. It is for this reason that no means for error correction are specified in this document. The error detection capability specified above may be used as desired in receiving terminals. BNR data, for example, may be checked for parity by reference to the binary state of Bit Number 32 of each word. Also, the data may be submitted to reasonableness checks. BCD may be submitted to reasonableness checks. BCD data intended for human consumption in the cockpit is normally smoothed before transmission to ensure tolerable levels of display jitter. As this process eliminates any obviously wild data points, the need for further error detection is questionable. As pointed out in the Commentary following Section 2.1.2 of this document, the parity bit was added to the BCD word for reasons related to BCD/BNR transmitter hardware commonality, not because a need for it existed for error detection.

### 2.4 Timing Related Elements

This section describes the digital data transfer system elements considered to be principally related to the timing aspects of the signal circuit.

### 2.4.1 Bit Rate

### 2.4.1.1 High Speed Operation

The bit rate for high speed operation of the system should be 100 kilobits per second ±1%.

### 2.4.1.2 Low Speed Operation

The bit rate for low speed operation of the system should be within the range 12.0 to 14.5 kilobits per second. The selected rate should be maintained within 1%.

NOTE:

> High bit rate and low bit rate messages will not be intermixed on the same bus.

COMMENTARY

> Although the bit rates specified above should be held within the stated tolerances over the long term, individual bit lengths may fall outside the limits expected from these tolerances. Bit symmetry and jitter should be within the tolerances specified in Attachment 8.
>
> Also, notwithstanding the RFI performance of the ARINC 429 DITS reported in Appendix 1 to this document, system designers are advised to avoid selection of 13.6 kilobits per second for low speed operations and precisely 100 kilobits per second for high speed operations to ensure that the system is not responsible for interference to LORAN C systems with which the aircraft might be equipped. c-5

### 2.4.2 Information Rates

The minimum and maximum transmit intervals for each item of information transferred by the Mark 33 DITS are specified in the tables of Attachment 2. c-4 Words with like labels but with different SDI codes should be treated as unique items of information. Each and every unique item of information should be transmitted once during an interval bounded in length by the minimum and maximum c-5

## 2.0 DIGITAL INFORMATION TRANSFER SYSTEM STANDARDS

### 2.4.2 Information Rates (cont'd)

c-5 values specified in Attachment 2. Stated another way, a word having the same label and four different SDI codes should appear on the bus four times (once for each SDI code) during that time interval.

COMMENTARY

> There are no values given for refresh rates in this Specification. However, it is desirable that data be refreshed at least once per transmission. Those data actually requiring long processing times or a large number of samples are the only types not expected to be refreshed with every transmission.

Discretes contained within data words should be transferred at the bit rate and repeated at the update rate of the primary data. Words dedicated to discretes should be repeated continuously at the rates defined in Attachment 2.

COMMENTARY

> The time intervals between successive transmissions of a given BCD word specified in table 1 of Attachment 2 to this document are, in general, too short for the signal to be of use in driving a display device directly. If the signal was so used the least significant character of the display, would change too rapidly for human perception. Considerations other than human factors demand the time intervals specified. Thus, display designers should incorporate into their devices means for selecting those words to be used for updating the display from the greater quantity delivered.

### 2.4.3 Clocking Method

Clocking is inherent in the data transmission. The identification of the bit interval is related to the initiation of either a “HI” or “LO” state from a previous “NULL” state in a bipolar RZ code.

### 2.4.4 Word Synchronization

The digital word should be synchronized by reference to a gap of four bit times (minimum) between the periods of word transmissions. The beginning of the first transmitted bit following this gap signifies the beginning of the new word.

### 2.4.5 Timing Tolerances

The waveform timing tolerances should be as shown in Attachment 8 to this document.

COMMENTARY

> RF interference radiated by the Mark 33 DITS using the waveform characteristics specified in this section has been shown not to exceed that permitted by Figure 21-5 of RTCA Document DO-160, “Environmental Conditions and Test Procedures for Airborne Electronic/Electrical Equipment and Instruments.” Also, conducted RF interference is within the limits specified in Figure 21-2 of DO-160. Appendix 1 to this document refers.

# 3.0 MARK 33 DITS APPLICATIONS NOTES

## 3.1 Radio Systems Management

One special application of the Mark 33 DITS is to radio systems frequency selection and function switching. The following paragraphs set forth the rules which should be followed in the application of the DITS to ensure interchangeability of radios and control sources.

### 3.1.1 Word Format and Digital Language

The standard DITS 32-bit BCD word should be used, of which Bit Numbers 1 through 8 constitute the label, Bit Numbers 9 and 10 are reserved for a source/destination identifier code, bit Numbers 11 through 29 constitute the data, Bit Numbers 30 and 31 form the sign/status matrix and Bit Number 32 is the word parity bit. The data field should contain the frequency to which the radio defined by the label field is to tune encoded in BCD characters, together with the discretes required for function switching for that radio. Attachment 6 shows how the word should be structured for each radio system requiring the DITS management service.

### 3.1.2 Update Rate

The nominal update rate for all radio systems management words should be five times per second.

### 3.1.3 Sign/Status Matrix

Since sign is not a characteristic of radio systems management information, the normal states of the sign/status matrix bits will be binary “zeros.” However, the radios should recognize the codes for “functional test” and “no computed data,” (see Section 2.1.5 of this document). They should interpret the former as an instruction to perform a functional test or functional test sequence. They should regard the latter as an instruction to remain tuned to the frequency contained in the last valid word received until either another valid word is decoded or their primary power is removed.

### 3.1.4 Frequency Ranges and Switching Functions

#### 3.1.4.1 ADF

| | |
|---|---|
| Frequency Range: | 190kHz to 1750kHz |
| Frequency Selection Increment: | 0.5kHz |
| Characters encoded in DITS word: | 1000kHz, 100kHz, 10kHz, 1kHz |
| Switching Functions: | 0.5kHz on/off, BFO on/off, ADF/ANT mode selection |

#### 3.1.4.2 DME

| | |
|---|---|
| Frequency Range: (VOR/ILS) | 108.00MHz to 135.95MHz |
| Frequency Selection Increment: (VOR/ILS) | 50kHz |
| Characters encoded in DITS word: | 10Mhz, 1Mhz, 0.1MHz<br>0.05MHz (VOR/ILS only)<br>(100MHz character is 1 for VOR/ILS, 10MHz character is limited to 7) |
| Switching Functions: | VOR/ILS/MLS Frequency, DME modes, Directed Frequency Numbers, Display Control |

#### 3.1.4.3 HF Communications

| | |
|---|---|
| Frequency Range: | 2.8MHz to 24MHz |
| Frequency Selection Increment: | 1kHz or .1kHz |
| Characters encoded in DITS words: | 10MHz, 1MHz, 0.1MHz, |
| Switching Functions: | USB/LSB mode selection<br>SB/AM mode selection |

Note: Two words may be transmitted for HF frequency selection to facilitate frequency resolution of 0.1kHz.

#### 3.1.4.4 ILS

| | |
|---|---|
| Frequency Range: | 108.00MHz to 111.95MHz |
| Frequency Selection Increment: | 50kHz |
| Characters encoded in DITS words: | 10MHz, 1MHz, 0.1MHz, 0.01MHz, (100MHz character is always decimal 1) |
| Switching Functions: | None |

#### 3.1.4.5 VOR/ILS

| | |
|---|---|
| Frequency Range: | 108.00 MHz to 117.95MHz |
| Frequency Selection Increment: | 50kHz |
| Characters encoded in DITS words: | 10MHz, 1MHz, 0.1MHz, 0.01MHz, (100MHz character is always decimal 1) |
| Switching Functions: | ILS Mode |

#### 3.1.4.6 VHF Communications

c-17

| | |
|---|---|
| Frequency Range: | 117.975MHz to 137.000MHz |
| Frequency Selection Increment: | 25kHz or 8.33kHz |
| Characters encoded in DITS words: | 10MHz, 1MHz, 0.1MHz, 0.01MHz, (100MHz character is always decimal 1) |
| Switching Functions: | None |

#### 3.1.4.7 ATC Transponder

Note: The ATC Transponder operates on two frequencies (one receive and one transmit) which do not require selection. Reply code selection, however, is required and it is this that the Mark 33 DITS accommodates).

| | |
|---|---|
| Reply Code Ranges: | 0-7 in four independent groups |
| Code increments: | 1 decimal digit per group |
| Number of characters encoded in DITS words: | ALL |
| Switching Functions: | Ident. Pulse Select, Altitude Reporting On/Off, Altitude Source Select, X-pulse Select (reserved), VFR/IFR Select (reserved), IRS/FMC Input Select (reserved). |

# 3.0 MARK 33 DITS APPLICATIONS NOTES

## 3.2 AIM Information Transfer

The information previously contained in this section is no longer applicable to ARINC Specification 429. For reference purposes, the section header is retained and the original contents of this section are located in Part 3.

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 0 0 0 | 0 X X | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Not Used | | | | | |
| 0 0 1 | 0 0 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Distance to Go | | X | | | 6-25 |
| | 0 5 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Distance to Go | | X | | | |
| | 0 6 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Distance to Go | | X | | | |
| 0 0 2 | 0 0 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Time to Go | | X | | | 6-25 |
| | 0 5 6 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Time to Go | | X | | | |
| | 0 6 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Time to Go | | X | | | |
| | 1 1 5 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Time to Station | | X | | | |
| 0 0 3 | 0 0 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Cross Track Distance | | X | | | 6-25 |
| 0 0 4 | 0 0 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Runway Distance to Go | | X | | | |
| 0 0 5 | 0 D 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Engine Discrete | | | X | | |
| 0 0 6 | 0 D 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Engine Discrete | | | X | | |
| 0 0 7 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Spare | | | | | |
| 0 1 0 | 0 0 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Present Position - Latitude | | X | | | 6-25-1 |
| | 0 0 4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Present Position - Latitude | | X | | | |
| | 0 3 8 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Present Position - Latitude | | X | | | |
| 0 1 1 | 0 0 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Present Position - Longitude | | X | | | 6-25-1 |
| | 0 0 4 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Present Position - Longitude | | X | | | |
| | 0 3 8 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Present Position - Longitude | | X | | | |
| 0 1 2 | 0 0 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | | X | | | 6-25 |
| | 0 0 4 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | | X | | | |
| | 0 0 5 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | | X | | | |
| | 0 2 5 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | | X | | | |
| | 0 3 8 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | | X | | | |
| | 0 4 D | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | QTY-LD SEL (LB) | | X | | | |
| | 0 5 6 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | | X | | | |
| | 0 6 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | | X | | | |
| 0 1 3 | 0 0 2 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | | X | | | 6-25 |
| | 0 0 4 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | | X | | | |
| | 0 3 8 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | | X | | | |
| | 0 4 D | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | QTY-FLT Deck (LB) | | X | | | |
| | 0 B 8 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Control Word for TCAS/Mode S | | | X | | |
| 0 1 4 | 0 0 4 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | Magnetic Heading | | X | | | |
| | 0 0 5 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | Magnetic Heading | | X | | | |
| | 0 3 8 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | Magnetic Heading | | X | | | |
| 0 1 5 | 0 0 2 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | | X | | | |
| | 0 0 4 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | | X | | | |
| | 0 0 5 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | | X | | | |
| | 0 3 8 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | | X | | | |
| 0 1 6 | 0 0 4 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | Wind Direction - True | | X | | | |
| | 0 3 8 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | Wind Direction - True | | X | | | |
| | 0 B 8 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | Control Word for TCAS/Mode S | | | X | | |
| 0 1 7 | 0 1 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Selected Runway - True | | X | | | |
| | 0 4 D | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Total-FLT Deck (LB) | | X | | | |
| | 0 5 5 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Selected Runway Heading | | X | | | |
| | 0 A 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Selected Runway Heading | | X | | | |
| | 0 B 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Selected Runway Heading | | X | | | |
| 0 2 0 | 0 2 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | Selected Vertical Speed | | X | | | 6-25 |
| | 0 4 D | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | TNK-LD SEL (LB) | | X | | | |
| | 0 6 D | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | Landing Gear Position Infor & System Status | | | X | | |
| | 0 A 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | Selected Vertical Speed | | X | | | |
| 0 2 1 | 0 0 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Selected EPR | | X | | | 6-25 |
| | 0 0 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Selected N1 | | X | | | 6-25 |
| | 0 2 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Selected EPR | | X | | | |
| | 0 2 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Selected N1 | | X | | | |
| | 0 6 D | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Landing Gear Position Infor & System Status | | | X | | |
| | 0 A 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Selected EPR | | X | | | |
| | 0 A 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Selected N1 | | X | | | |
| 0 2 2 | 0 2 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Selected Mach | | X | | | 6-25 |
| | 0 4 D | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | QTY-LD SEL (KG) | | X | | | |
| | 0 6 D | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Landing Gear Position Infor & System Status | | | X | | |
| | 0 A 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Selected Mach | | X | | | |
| 0 2 3 | 0 2 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | Selected Heading | | X | | | 6-25 |
| | 0 4 D | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | QTY-LD SEL (KG) | | X | | | |
| | 0 6 D | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | Landing Gear Position Infor & System Status | | | X | | |
| | 0 A 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | Selected Heading | | X | | | |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 024 | 011 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Selected Course #1 | | X | | | 6-25 |
| | 020 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Selected Course #1 | | X | | | |
| | 06D | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Landing Gear Position Infor & System Status | | | X | | |
| | 0A1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Selected Course #1 | | X | | | |
| | 0B1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Selected Course #1 | | X | | | |
| 025 | 020 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Selected Altitude | | X | | | 6-25 |
| | 04D | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Load SEL Control | X | | | | |
| | 0A1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Selected Altitude | | X | | | |
| 026 | 003 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | Selected Airspeed | | X | | | 6-25 |
| | 020 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | Selected Airspeed | X | | | | |
| | 0A1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | Selected Airspeed | | X | | | |
| 027 | 002 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | TACAN Selected Course | | X | | | |
| | 011 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | Selected Course # 2 | | X | | | |
| | 020 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | Selected Course # 2 | | X | | | |
| | 04D | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | Total-FLT Deck (KG) | | X | | | |
| | 056 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | TACAN Selected Course | | X | | | |
| | 060 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | TACAN Selected Course | | X | | | |
| | 0A1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | Selected Course # 2 | | X | | | |
| | 0B1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | Selected Course # 2 | | X | | | |
| 030 | 020 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | VHF COM Frequency | | X | | | 6-45 |
| | 024 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | VHF COM Frequency | | X | | | |
| | 04D | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | TNK-LD SEL (KG) | | X | | | |
| | 0B6 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | VHF COM Frequency | | X | | | 6-45 |
| 031 | 020 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | Beacon Transponder Code | | | X | | 6-46 |
| | 0B8 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | Beacon Transponder Code | | | X | | |
| 032 | 012 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | ADF Frequency | | X | | | 6-40 |
| | 020 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | ADF Frequency | | X | | | 6-40 |
| | 0B2 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | ADF Frequency | | X | | | 6-40 |
| 033 | 002 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ILS Frequency | | X | | | 6-44 |
| | 010 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ILS Frequency | | X | | | |
| | 020 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ILS Frequency | | X | | | |
| | 055 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | Landing System Mode/Frequency | | X | | | Note 3 |
| | 056 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ILS Frequency | | X | | | |
| | 060 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ILS Frequency | | X | | | |
| | 0B0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ILS Frequency | | X | | | |
| 034 | 002 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | VOR/ILS Frequency | | X | | | 6-44-1 |
| | 006 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | Baro Correction (mb) #3 | | X | | | |
| | 011 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | VOR/ILS Frequency | | X | | | |
| | 020 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | VOR/ILS Frequency | | X | | | |
| | 025 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | VOR/ILS Frequency | | X | | | |
| | 056 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | VOR/ILS Frequency | | X | | | |
| | 060 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | VOR/ILS Frequency #1 | | X | | | |
| | 0B0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | VOR/ILS Frequency | | X | | | |
| 035 | 002 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | DME Frequency | | X | | | 6-41 |
| | 006 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | Baro Correction (ins of Hg) #3 | | X | | | |
| | 009 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | DME Frequency | | X | | | 6-41 |
| | 020 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | DME Frequency | | X | | | |
| | 025 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | DME Frequency | | X | | | |
| | 055 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | Paired DME Frequency | | X | | | |
| | 056 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | DME Frequency | | X | | | |
| | 060 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | DME Frequency #1 | | X | | | |
| | 0A9 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | DME Frequency | | X | | | |
| 036 | 002 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | MLS Frequency | | X | | | |
| | 020 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | MLS Frequency | | X | | | |
| | 055 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | MLS Channel Selection | | X | | | |
| | 056 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | MLS Frequency Channel | | X | | | |
| | 060 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | MLS Frequency Channel | | X | | | |
| | 0C7 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | MLS Frequency | | X | | | |
| 037 | 002 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | HF COM Frequency | | X | | | 6-42 |
| | 0B9 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | HF COM Frequency | | X | | | |
| 040 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | Spare | | | | | |
| 041 | 002 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Set Latitude | | X | | | |
| | 004 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Set Latitude | | X | | | |
| | 020 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Set Latitude | | X | | | |
| | 056 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Set Latitude | | X | | | |
| | 060 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Set Latitude | | X | | | |
| | 0A4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Set Latitude | | X | | | |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 0 4 2 | 0 0 2 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Set Longitude | | X | | | |
| | 0 0 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Set Longitude | | X | | | |
| | 0 2 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Set Longitude | | X | | | |
| | 0 5 6 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Set Longitude | | X | | | |
| | 0 6 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Set Longitude | | X | | | |
| | 0 A 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Set Longitude | | X | | | |
| 0 4 3 | 0 0 2 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Set Magnetic Heading | | X | | | |
| | 0 0 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Set Magnetic Heading | | X | | | |
| | 0 2 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Set Magnetic Heading | | X | | | |
| | 0 5 6 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Set Magnetic Heading | | X | | | |
| | 0 6 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Set Magnetic Heading | | X | | | |
| | 0 A 4 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Set Magnetic Heading | | X | | | |
| 0 4 4 | 0 0 4 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | True Heading | | X | | | |
| | 0 3 8 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | True Heading | | X | | | |
| 0 4 5 | 0 0 3 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Minimum Airspeed | | X | | | |
| 0 4 6 | 0 3 3 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | Engine Serial No. (LSDs) | | X | | | 6-15 |
| | 1 0 A | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | Engine Serial No. (LSDs) | | X | | | 6-15 |
| | 1 0 B | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | Engine Serial No. (LSDs) | | X | | | 6-15 |
| 0 4 7 | 0 2 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | VHF COM Frequency | | X | | | |
| | 0 2 4 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | VHF COM Frequency | | X | | | |
| | 0 3 3 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Engine Serial No. (MSDs) | | X | | | 6-16 |
| | 0 B 6 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | VHF COM Frequency | | X | | | |
| | 1 0 A | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Engine Serial No. (MSDs) | | X | | | 6-16 |
| | 1 0 B | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Engine Serial No. (MSDs) | | X | | | 6-16 |
| 0 5 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Spare | | | | | |
| 0 5 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | Spare | | | | | |
| 0 5 2 | 0 0 4 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Body Pitch Acceleration | X | | | | |
| | 0 3 7 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Longitude Zero Fuel CG | | X | | | |
| | 0 3 8 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Body Pitch Acceleration | X | | | | |
| 0 5 3 | 0 0 4 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Body Roll Acceleration | X | | | | |
| | 0 0 5 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Track Angle - Magnetic | | X | | | |
| | 0 3 8 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Body Roll Acceleration | X | | | | |
| 0 5 4 | 0 0 4 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | Body Yaw Acceleration | X | | | | |
| | 0 3 7 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | Zero Fuel Weight (KG) | X | | | | |
| | 0 3 8 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | Body Yaw Acceleration | X | | | | |
| 0 5 5 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Spare | | | | | |
| 0 5 6 | 0 0 2 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Estimated Time of Arrival | | X | | | |
| | 0 0 5 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Wind Direction - Magnetic | | X | | | |
| | 0 3 7 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Gross Weight (KG) | | X | | | |
| | 0 5 6 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | ETA (Active Waypoint) | | X | | | |
| | 0 6 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | ETA (Active Waypoint) | | X | | | |
| 0 5 7 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | Spare | | | | | |
| 0 6 0 | 0 2 5 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | S/G Hardware Part No | | X | | | 6-36 |
| | 0 3 7 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Tire Loading (Left Body Main) | | X | | | |
| | 0 3 C | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Tire Pressure (Left Inner) | X | | | | |
| 0 6 1 | 0 0 2 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | ACMS Information | X | | | | 6-29 |
| | 0 0 B | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Pseudo Range | X | | | | |
| | 0 2 5 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | S/G Software Configuration Part No. | | X | | | 6-37 |
| | 0 3 7 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Tire Loading (Right Body Main) | | X | | | |
| | 0 3 C | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Tire Pressure (Left Outer) | X | | | | |
| | 0 5 6 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | ACMS Information | X | | | | |
| | 0 6 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | ACMS Information | X | | | | |
| 0 6 2 | 0 0 2 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | ACMS Information | X | | | | 6-29 |
| | 0 0 B | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Pseudo Range Fine | X | | | | |
| | 0 3 7 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Tire Loading (Left Wing Main) | | X | | | |
| | 0 3 C | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Tire Pressure (Right Inner) | X | | | | |
| | 0 5 6 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | ACMS Information | X | | | | |
| | 0 6 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | ACMS Information | X | | | | |
| 0 6 3 | 0 0 2 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | ACMS Information | X | | | | 6-29 |
| | 0 0 B | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Range Rate | X | | | | |
| | 0 3 7 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Tire Loading (Right Wing Main) | | X | | | |
| | 0 3 C | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Tire Pressure (Right Outer) | X | | | | |
| | 0 5 6 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | ACMS Information | X | | | | |
| | 0 6 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | ACMS Information | X | | | | |
| 0 6 4 | 0 0 B | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Delta Range | X | | | | |
| | 0 3 7 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Tire Loading (Nose) | | X | | | |
| | 0 3 C | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Tire Pressure (Nose) | X | | | | |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 2 | 3 4 5 | 6 7 8 | | BNR | BCD | DISC | SAL | |
| 0 6 5 | 0 0 3 | 0 0 | 1 1 0 | 1 0 1 | Gross Weight | | X | | | |
| | 0 0 B | 0 0 | 1 1 0 | 1 0 1 | SV Position X | X | | | | |
| | 0 3 7 | 0 0 | 1 1 0 | 1 0 1 | Gross Weight | | X | | | |
| 0 6 6 | 0 0 2 | 0 0 | 1 1 0 | 1 1 0 | Longitudinal Center of Gravity | | X | | | |
| | 0 0 B | 0 0 | 1 1 0 | 1 1 0 | SV Position X Fine | X | | | | |
| | 0 3 7 | 0 0 | 1 1 0 | 1 1 0 | Longitudinal Center of Gravity | | X | | | |
| 0 6 7 | 0 3 7 | 0 0 | 1 1 0 | 1 1 1 | Lateral Center of Gravity | | X | | | |
| 0 7 0 | 0 0 2 | 0 0 | 1 1 1 | 0 0 0 | Reference Airspeed (Vref) | X | | | | |
| | 0 0 B | 0 0 | 1 1 1 | 0 0 0 | SV Position Y | X | | | | |
| | 0 2 9 | 0 0 | 1 1 1 | 0 0 0 | AC Frequency (Engine) | X | | | | |
| | 0 3 7 | 0 0 | 1 1 1 | 0 0 0 | Hard landing Magnitude #1 | X | | | | |
| | 0 5 6 | 0 0 | 1 1 1 | 0 0 0 | Reference Airspeed (Vref) | X | | | | |
| | 0 6 0 | 0 0 | 1 1 1 | 0 0 0 | Reference Airspeed (Vref) | X | | | | |
| | 0 C C | 0 0 | 1 1 1 | 0 0 0 | Brakes - Metered Hydraulic Pressure L (Normal) | X | | | | |
| 0 7 1 | 0 0 2 | 0 0 | 1 1 1 | 0 0 1 | Take-Off Climb Airspeed (V2) | X | | | | |
| | 0 0 B | 0 0 | 1 1 1 | 0 0 1 | SV Position Y Fine | X | | | | |
| | 0 2 9 | 0 0 | 1 1 1 | 0 0 1 | AC Frequency (Alt. Sources) | X | | | | |
| | 0 3 3 | 0 0 | 1 1 1 | 0 0 1 | VBV | X | | | | |
| | 0 3 7 | 0 0 | 1 1 1 | 0 0 1 | Hard Landing Magnitude #2 | X | | | | |
| | 0 C C | 0 0 | 1 1 1 | 0 0 1 | Brakes - Metered Hydraulic Pressure L (Alt) | X | | | | |
| 0 7 2 | 0 0 2 | 0 0 | 1 1 1 | 0 1 0 | VR (Rotation Speed) | X | | | | |
| | 0 0 B | 0 0 | 1 1 1 | 0 1 0 | SV Position Z | X | | | | |
| | 0 1 C | 0 0 | 1 1 1 | 0 1 0 | Stator Vane Angle | X | | | | |
| | 0 2 9 | 0 0 | 1 1 1 | 0 1 0 | AC Voltage (Engine) | X | | | | |
| | 0 2 F | 0 0 | 1 1 1 | 0 1 0 | Stator Vane Angle | X | | | | |
| | 0 3 3 | 0 0 | 1 1 1 | 0 1 0 | Stator Vane Angle | X | | | | |
| | 0 C C | 0 0 | 1 1 1 | 0 1 0 | Brakes - Metered Hydraulic Pressure R (Normal) | X | | | | |
| 0 7 3 | 0 0 2 | 0 0 | 1 1 1 | 0 1 1 | V1 (Critical Engine Failure Speed) | X | | | | |
| | 0 0 B | 0 0 | 1 1 1 | 0 1 1 | SV Position Z Fine | X | | | | |
| | 0 1 C | 0 0 | 1 1 1 | 0 1 1 | Oil Quantity | X | | | | |
| | 0 2 9 | 0 0 | 1 1 1 | 0 1 1 | Oil Quantity | X | | | | |
| | 0 A 2 | 0 0 | 1 1 1 | 0 1 1 | V2 (Critical Engine Failure Speed) | X | | | | |
| | 0 C C | 0 0 | 1 1 1 | 0 1 1 | Brakes - Metered Hydraulic Pressure R (Alt.) | X | | | | |
| | 0 D 0 | 0 0 | 1 1 1 | 0 1 1 | Engine Oil Quantity | X | | | | |
| 0 7 4 | 0 0 2 | 0 0 | 1 1 1 | 1 0 0 | Zero Fuel Weight | X | | | | |
| | 0 0 B | 0 0 | 1 1 1 | 1 0 0 | UTC Measure Time | X | | | | |
| | 0 2 C | 0 0 | 1 1 1 | 1 0 0 | Zero Fuel Weight | X | | | | |
| | 0 3 3 | 0 0 | 1 1 1 | 1 0 0 | LP Compressor Bleed Position (3.0) | X | | | | |
| | 0 3 7 | 0 0 | 1 1 1 | 1 0 0 | Zero Fuel Weight (lb) | X | | | | |
| | 0 5 6 | 0 0 | 1 1 1 | 1 0 0 | Zero Fuel Weight | X | | | | |
| | 0 6 0 | 0 0 | 1 1 1 | 1 0 0 | Zero Fuel Weight | X | | | | |
| | 1 1 4 | 0 0 | 1 1 1 | 1 0 0 | Zero Fuel Weight | X | | | | |
| 0 7 5 | 0 0 2 | 0 0 | 1 1 1 | 1 0 1 | Gross Weight | X | | | | |
| | 0 0 3 | 0 0 | 1 1 1 | 1 0 1 | Gross Weight | X | | | | |
| | 0 0 8 | 0 0 | 1 1 1 | 1 0 1 | Maximum Hazard Alert Level Output | | | X | | |
| | 0 0 B | 0 0 | 1 1 1 | 1 0 1 | Geodetic Altitude | X | | | | |
| | 0 2 9 | 0 0 | 1 1 1 | 1 0 1 | AC Voltage (Alt. Sources) | X | | | | |
| | 0 2 C | 0 0 | 1 1 1 | 1 0 1 | Gross Weight | X | | | | |
| | 0 3 7 | 0 0 | 1 1 1 | 1 0 1 | Gross Weight | X | | | | |
| | 0 3 E | 0 0 | 1 1 1 | 1 0 1 | Gross Weight | X | | | | |
| | 1 1 4 | 0 0 | 1 1 1 | 1 0 1 | Aircraft Gross Weight | X | | | | |
| 0 7 6 | 0 0 8 | 0 0 | 1 1 1 | 1 1 0 | Hazard Azimuth Output | | | X | | |
| | 0 0 B | 0 0 | 1 1 1 | 1 1 0 | GNSS Altitude (MSL) | X | | | | |
| | 0 2 9 | 0 0 | 1 1 1 | 1 1 0 | AC Voltage (Bus Bar) | X | | | | |
| | 0 3 7 | 0 0 | 1 1 1 | 1 1 0 | Longitudinal Center of Gravity | X | | | | |
| | 0 3 E | 0 0 | 1 1 1 | 1 1 0 | Longitudinal Center of Gravity | X | | | | |
| | 1 1 4 | 0 0 | 1 1 1 | 1 1 0 | Aircraft Longitudinal Center of Gravity | X | | | | |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 0 7 7 | 0 0 2 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Target Airspeed | X | | | | |
| | 0 0 8 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Hazard Azimuth Output | | | X | | |
| | 0 0 B | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | GPS Hor/Vert Deviation | X | | | | |
| | 0 2 9 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | AC Load (Engine) | X | | | | |
| | 0 3 7 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Lateral Center of Gravity | X | | | | |
| | 0 5 6 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Target Airspeed | X | | | | |
| | 0 6 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Target Airspeed | X | | | | |
| | 1 1 4 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Zero Fuel Center of Gravity | X | | | | |
| 1 0 0 | 0 0 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Selected Course #1 | X | | | | 6-27 |
| | 0 0 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Selected Course #1 | X | | | | |
| | 0 1 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Selected Course #1 | X | | | | |
| | 0 2 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Selected Course #1 | X | | | | |
| | 0 2 9 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | AC Load (Alt. Source) | X | | | | |
| | 0 3 7 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Gross Weight (Kilogram) | X | | | | |
| | 0 5 6 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Selected Course #1 | X | | | | |
| | 0 6 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Selected Course #1 | X | | | | |
| | 0 A 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Selected Course #1 | X | | | | |
| | 0 B 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Selected Course #1 | X | | | | |
| | 0 B B | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Outbound Flaps - PDU | X | | | | |
| 1 0 1 | 0 0 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Selected Heading | X | | | | 6-27 |
| | 0 0 B | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | HDOP | X | | | | |
| | 0 2 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Selected Heading | X | | | | |
| | 0 2 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Selected Heading | X | | | | |
| | 0 2 9 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | DC Current (TRU) | X | | | | |
| | 0 5 A | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | FQIC | X | | | | |
| | 0 A 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Selected Heading | X | | | | |
| | 0 B B | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Inboard Flaps - PDU | X | | | | |
| | 1 1 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | C/G Target | X | | | | |
| 1 0 2 | 0 0 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Selected Altitude | X | | | | 6-27 |
| | 0 0 B | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | VDOP | X | | | | |
| | 0 2 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Selected Altitude | X | | | | |
| | 0 2 9 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | DC Current (Battery) | X | | | | |
| | 0 5 6 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Selected Altitude | X | | | | |
| | 0 6 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Selected Altitude | X | | | | |
| | 0 A 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Selected Altitude | X | | | | |
| 1 0 3 | 0 0 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Selected Airspeed | X | | | | 6-27 |
| | 0 0 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Selected Airspeed | X | | | | |
| | 0 0 3 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Selected Airspeed | X | | | | |
| | 0 0 B | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | GNSS Track Angle | X | | | | |
| | 0 1 B | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Left/PDU Flap | X | | | | |
| | 0 2 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Selected Airspeed | X | | | | |
| | 0 2 9 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | DC Voltage (TRU) | X | | | | |
| | 0 5 6 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Selected Airspeed | X | | | | |
| | 0 6 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Selected Airspeed | X | | | | |
| | 0 A 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Selected Airspeed | X | | | | |
| | 0 B B | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Left Outboard Flap Position | X | | | | |
| 1 0 4 | 0 0 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Selected Vertical Speed | X | | | | 6-27 |
| | 0 0 2 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Selected Vertical Speed | X | | | | |
| | 0 1 B | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Right/PDU Flap | X | | | | |
| | 0 2 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Selected Vertical Speed | X | | | | |
| | 0 2 9 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | DC Voltage (Battery) | X | | | | |
| | 0 2 B | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Selected Vertical Speed | X | | | | |
| | 0 5 6 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Selected Vertical Speed | X | | | | |
| | 0 6 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Selected Vertical Speed | X | | | | |
| | 0 A 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Selected Vertical Speed | X | | | | |
| | 0 B B | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Right Outboard Flap Position | X | | | | |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 2 | 3 4 5 | 6 7 8 | | BNR | BCD | DISC | SAL | |
| 1 0 5 | 0 0 2 | 0 1 | 0 0 0 | 1 0 1 | Selected Runway Heading | X | | | | |
| | 0 1 0 | 0 1 | 0 0 0 | 1 0 1 | Selected Runway Heading | X | | | | |
| | 0 1 B | 0 1 | 0 0 0 | 1 0 1 | Left/PDU Slat | X | | | | |
| | 0 2 0 | 0 1 | 0 0 0 | 1 0 1 | Selected Runway Heading | X | | | | |
| | 0 2 9 | 0 1 | 0 0 0 | 1 0 1 | Oil Temperature Input (IDG/CSD) | X | | | | |
| | 0 5 5 | 0 1 | 0 0 0 | 1 0 1 | Selected Runway Heading | X | | | | |
| | 0 5 6 | 0 1 | 0 0 0 | 1 0 1 | Selected Runway Heading | X | | | | |
| | 0 6 0 | 0 1 | 0 0 0 | 1 0 1 | Selected Runway Heading | X | | | | |
| | 0 A 1 | 0 1 | 0 0 0 | 1 0 1 | Selected Runway Heading | X | | | | |
| | 0 B 0 | 0 1 | 0 0 0 | 1 0 1 | Selected Runway Heading | X | | | | |
| | 0 B B | 0 1 | 0 0 0 | 1 0 1 | Left Inboard Flap Position | X | | | | |
| 1 0 6 | 0 0 2 | 0 1 | 0 0 0 | 1 1 0 | Selected Mach | X | | | | 6-27 |
| | 0 1 B | 0 1 | 0 0 0 | 1 1 0 | Right/PDU Slat | X | | | | |
| | 0 2 0 | 0 1 | 0 0 0 | 1 1 0 | Selected Mach | X | | | | |
| | 0 2 9 | 0 1 | 0 0 0 | 1 1 0 | Oil Temperature Input (IDG/CSD) | X | | | | |
| | 0 5 6 | 0 1 | 0 0 0 | 1 1 0 | Selected Mach | X | | | | |
| | 0 6 0 | 0 1 | 0 0 0 | 1 1 0 | Selected Mach | X | | | | |
| | 0 A 1 | 0 1 | 0 0 0 | 1 1 0 | Selected Mach | X | | | | |
| | 0 B B | 0 1 | 0 0 0 | 1 1 0 | Right Inboard Flap Position | X | | | | |
| 1 0 7 | 0 0 2 | 0 1 | 0 0 0 | 1 1 1 | Selected Cruise Altitude | X | | | | |
| | 0 1 B | 0 1 | 0 0 0 | 1 1 1 | Flap/Slat Lever | X | | | | |
| | 0 3 7 | 0 1 | 0 0 0 | 1 1 1 | Longitude Zero Fuel C/G | X | | | | |
| | 0 5 6 | 0 1 | 0 0 0 | 1 1 1 | Selected Cruise Altitude | X | | | | |
| | 0 6 0 | 0 1 | 0 0 0 | 1 1 1 | Selected Cruise Altitude | X | | | | |
| | 0 B B | 0 1 | 0 0 0 | 1 1 1 | Flap Lever Position - Median Value | X | | | | |
| 1 1 0 | 0 0 1 | 0 1 | 0 0 1 | 0 0 0 | Selected Course #2 | X | | | | |
| | 0 0 2 | 0 1 | 0 0 1 | 0 0 0 | Selected Course #2 | X | | | | |
| | 0 0 B | 0 1 | 0 0 1 | 0 0 0 | GNSS Latitude | X | | | | |
| | 0 1 0 | 0 1 | 0 0 1 | 0 0 0 | Selected Course #2 | X | | | | |
| | 0 1 1 | 0 1 | 0 0 1 | 0 0 0 | Selected Course #2 | X | | | | |
| | 0 2 0 | 0 1 | 0 0 1 | 0 0 0 | Selected Course #2 | X | | | | |
| | 0 A 1 | 0 1 | 0 0 1 | 0 0 0 | Selected Course #2 | X | | | | |
| | 0 B 1 | 0 1 | 0 0 1 | 0 0 0 | Selected Course #2 | X | | | | |
| | 0 B B | 0 1 | 0 0 1 | 0 0 0 | Flap Lever Position - Center | X | | | | |
| 1 1 1 | 0 0 1 | 0 1 | 0 0 1 | 0 0 1 | Test Word A | | | X | | |
| | 0 0 B | 0 1 | 0 0 1 | 0 0 1 | GNSS Longitude | X | | | | |
| | 0 1 D | 0 1 | 0 0 1 | 0 0 1 | Test Word A | | | X | | |
| 1 1 2 | 0 0 2 | 0 1 | 0 0 1 | 0 1 0 | Runway Length | X | | | | |
| | 0 0 B | 0 1 | 0 0 1 | 0 1 0 | GNSS Ground Speed | X | | | | |
| | 0 A 1 | 0 1 | 0 0 1 | 0 1 0 | Selected EPR | X | | | | |
| | 0 A 1 | 0 1 | 0 0 1 | 0 1 0 | Selected N1 | X | | | | |
| | 0 B B | 0 1 | 0 0 1 | 0 1 0 | Flap Lever Position - Left | | | | | |
| 1 1 3 | 0 | 0 1 | 0 0 1 | 0 1 1 | Spare | | | | | |
| 1 1 4 | 0 0 2 | 0 1 | 0 0 1 | 1 0 0 | Desired Track | X | | | | 6-27 |
| | 0 2 9 | 0 1 | 0 0 1 | 1 0 0 | Brake Temperature (Left Inner L/G) | X | | | | |
| | 0 2 F | 0 1 | 0 0 1 | 1 0 0 | Ambient Pressure | X | | | | |
| | 0 3 F | 0 1 | 0 0 1 | 1 0 0 | Pamb Sensor | X | | | | |
| | 0 5 6 | 0 1 | 0 0 1 | 1 0 0 | Desired Track | X | | | | |
| | 0 6 0 | 0 1 | 0 0 1 | 1 0 0 | Desired Track | X | | | | |
| | 0 B B | 0 1 | 0 0 1 | 1 0 0 | Flap Lever Position - Right | X | | | | |
| | 0 C C | 0 1 | 0 0 1 | 1 0 0 | Wheel Torque Output | X | | | | |
| | 1 0 A | 0 1 | 0 0 1 | 1 0 0 | Selected Ambient Static Pressure | X | | | | |
| | 1 0 B | 0 1 | 0 0 1 | 1 0 0 | Selected Ambient Static Pressure | X | | | | |
| | 1 3 A | 0 1 | 0 0 1 | 1 0 0 | Ambient Pressure | X | | | | |
| 1 1 5 | 0 0 2 | 0 1 | 0 0 1 | 1 0 1 | Waypoint Bearing | X | | | | |
| | 0 2 9 | 0 1 | 0 0 1 | 1 0 1 | Brake Temperature (Left Outer L/G) | X | | | | |
| | 0 2 F | 0 1 | 0 0 1 | 1 0 1 | Fuel Temperature | X | | | | |
| | 0 3 F | 0 1 | 0 0 1 | 1 0 1 | Fuel Temperature | X | | | | |
| | 0 5 6 | 0 1 | 0 0 1 | 1 0 1 | Waypoint Bearing | X | | | | |
| | 0 6 0 | 0 1 | 0 0 1 | 1 0 1 | Waypoint Bearing | X | | | | |
| | 0 B C | 0 1 | 0 0 1 | 1 0 1 | Fuel Temperature | X | | | | |
| | 0 C C | 0 1 | 0 0 1 | 1 0 1 | Wheel Torque Output | X | | | | 6-26 |
| 1 1 6 | 0 0 2 | 0 1 | 0 0 1 | 1 1 0 | Cross Track Distance | X | | | | 6-27 |
| | 0 0 B | 0 1 | 0 0 1 | 1 1 0 | Horizontal GLS Deviation Rectilinear | X | | | | |
| | 0 2 9 | 0 1 | 0 0 1 | 1 1 0 | Brake Temperature (Right Inner L/G) | X | | | | |
| | 0 5 5 | 0 1 | 0 0 1 | 1 1 0 | Horizontal GLS Deviation Rectilinear | X | | | | |
| | 0 5 6 | 0 1 | 0 0 1 | 1 1 0 | Cross Track Distance | X | | | | |
| | 0 6 0 | 0 1 | 0 0 1 | 1 1 0 | Cross Track Distance | X | | | | |
| | 0 C C | 0 1 | 0 0 1 | 1 1 0 | Wheel Torque Output | X | | | | 6-26 |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 2 | 3 4 5 | 6 7 8 | | BNR | BCD | DISC | SAL | |
| 1 1 7 | 0 0 2 | 0 1 | 0 0 1 | 1 1 1 | Vertical Deviation | X | | | | 6-27 |
| | 0 0 B | 0 1 | 0 0 1 | 1 1 1 | Vertical GLS Deviation Rectilinear | X | | | | |
| | 0 2 9 | 0 1 | 0 0 1 | 1 1 1 | Brake Temperature (Right Inner L/G) | X | | | | |
| | 0 5 5 | 0 1 | 0 0 1 | 1 1 1 | Vertical GLS Deviation Rectilinear | X | | | | |
| | 0 5 6 | 0 1 | 0 0 1 | 1 1 1 | Vertical Deviation | X | | | | |
| | 0 6 0 | 0 1 | 0 0 1 | 1 1 1 | Vertical Deviation | X | | | | |
| | 0 C C | 0 1 | 0 0 1 | 1 1 1 | Wheel Torque Output | X | | | | 6-26 |
| 1 2 0 | 0 0 2 | 0 1 | 0 1 0 | 0 0 0 | Range to Altitude | X | | | | |
| | 0 0 B | 0 1 | 0 1 0 | 0 0 0 | GNSS Latitude Fine | X | | | | |
| | 0 2 9 | 0 1 | 0 1 0 | 0 0 0 | Pack Bypass Turbine Position | X | | | | |
| | 0 5 6 | 0 1 | 0 1 0 | 0 0 0 | Range to Altitude | X | | | | |
| | 0 6 0 | 0 1 | 0 1 0 | 0 0 0 | Range to Altitude | X | | | | |
| 1 2 1 | 0 0 2 | 0 1 | 0 1 0 | 0 0 1 | Horizontal Command Signal | X | | | | |
| | 0 0 B | 0 1 | 0 1 0 | 0 0 1 | GNSS Longitude Fine | X | | | | |
| | 0 2 5 | 0 1 | 0 1 0 | 0 0 1 | Pitch Limit | X | | | | |
| | 0 2 9 | 0 1 | 0 1 0 | 0 0 1 | Pack Outlet Temperature | X | | | | |
| | 0 5 6 | 0 1 | 0 1 0 | 0 0 1 | Horizontal Command Signal | X | | | | |
| | 0 6 0 | 0 1 | 0 1 0 | 0 0 1 | Horizontal Command Signal | X | | | | |
| 1 2 2 | 0 0 2 | 0 1 | 0 1 0 | 0 1 0 | Vertical Command Signal | X | | | | |
| | 0 2 9 | 0 1 | 0 1 0 | 0 1 0 | Pack Turbine Inlet Temperature | X | | | | |
| | 0 5 6 | 0 1 | 0 1 0 | 0 1 0 | Vertical Command Signal | X | | | | |
| | 0 6 0 | 0 1 | 0 1 0 | 0 1 0 | Vertical Command Signal | X | | | | |
| 1 2 3 | 0 0 2 | 0 1 | 0 1 0 | 0 1 1 | Throttle Command | X | | | | |
| 1 2 4 | 0 0 B | 0 1 | 0 1 0 | 0 1 1 | Digital Time Mark | | | X | | |
| | 0 A 5 | 0 1 | 0 1 0 | 0 1 1 | Client Device for GNSS Receiver | X | | | | 6-49 |
| | 1 E 2 | 0 1 | 0 1 0 | 1 0 0 | Horizontal Alarm Limit | X | | | | |
| 1 2 5 | 0 0 2 | 0 1 | 0 1 0 | 1 0 1 | Universal Time Coordinated (UTC) | | X | | | 6-25 |
| | 0 0 B | 0 1 | 0 1 0 | 1 0 1 | Universal Time Coordinated (UTC) | | X | | | |
| | 0 3 1 | 0 1 | 0 1 0 | 1 0 1 | Universal Time Coordinated (UTC) | | X | | | 6-25 |
| | 0 5 6 | 0 1 | 0 1 0 | 1 0 1 | Universal Time Coordinated (UTC) | | X | | | |
| | 0 6 0 | 0 1 | 0 1 0 | 1 0 1 | Universal Time Coordinated (UTC) | | X | | | |
| 1 2 6 | 0 0 2 | 0 1 | 0 1 0 | 1 1 0 | Vertical Deviation (wide) | X | | | | |
| | 0 2 6 | 0 1 | 0 1 0 | 1 1 0 | FWC Word | X | | | | |
| | 0 2 9 | 0 1 | 0 1 0 | 1 1 0 | Pack Flow | X | | | | |
| | 0 5 6 | 0 1 | 0 1 0 | 1 1 0 | Vertical Deviation (Wide) | X | | | | |
| | 0 6 0 | 0 1 | 0 1 0 | 1 1 0 | Vertical Deviation (Wide) | X | | | | |
| 1 2 7 | 0 0 2 | 0 1 | 0 1 0 | 1 1 1 | Selected Landing Altitude | X | | | | |
| | 0 1 B | 0 1 | 0 1 0 | 1 1 1 | Slat Angle | X | | | | 6-11 |
| | 0 3 3 | 0 1 | 0 1 0 | 1 1 1 | P14 | X | | | | |
| | 1 0 A | 0 1 | 0 1 0 | 1 1 1 | Fan Discharge Static Pressure | X | | | | |
| | 1 0 B | 0 1 | 0 1 0 | 1 1 1 | Fan Discharge Static Pressure | X | | | | |
| | 1 E 2 | 0 1 | 0 1 0 | 1 1 1 | Vertical Alarm Limit | X | | | | 6-50 |
| 1 3 0 | 0 0 B | 0 1 | 0 1 1 | 0 0 0 | Aut Horiz Integ Limit | X | | | | |
| | 0 1 A | 0 1 | 0 1 1 | 0 0 0 | Fan Inlet Total Temperature | X | | | | |
| | 0 1 C | 0 1 | 0 1 1 | 0 0 0 | Fan Inlet Total Temperature | X | | | | |
| | 0 2 F | 0 1 | 0 1 1 | 0 0 0 | Fan Inlet Total Temperature | X | | | | |
| | 0 3 5 | 0 1 | 0 1 1 | 0 0 0 | Intruder Range | X | | | | 6-21 |
| | 0 3 F | 0 1 | 0 1 1 | 0 0 0 | Fan Inlet Total Temperature | X | | | | |
| | 1 0 A | 0 1 | 0 1 1 | 0 0 0 | Selected Total Air Temperature | X | | | | |
| | 1 0 B | 0 1 | 0 1 1 | 0 0 0 | Selected Total Air Temperature | X | | | | |
| | 1 3 A | 0 1 | 0 1 1 | 0 0 0 | Inlet Temperature | X | | | | |
| 1 3 1 | 0 1 A | 0 1 | 0 1 1 | 0 0 1 | Fan Inlet Total Pressure | X | | | | |
| | 0 1 C | 0 1 | 0 1 1 | 0 0 1 | Fan Inlet Total Pressure | X | | | | |
| | 0 2 D | 0 1 | 0 1 1 | 0 0 1 | Fan Inlet Total Pressure | X | | | | |
| | 0 2 F | 0 1 | 0 1 1 | 0 0 1 | Fan Inlet Total Pressure | X | | | | |
| | 0 3 3 | 0 1 | 0 1 1 | 0 0 1 | Fan Inlet Total Pressure | X | | | | |
| | 0 3 5 | 0 1 | 0 1 1 | 0 0 1 | Intruder Altitude | X | | | | 6-22 |
| | 1 3 A | 0 1 | 0 1 1 | 0 0 1 | Inlet Pressure | X | | | | |
| 1 3 2 | 0 1 A | 0 1 | 0 1 1 | 0 1 0 | Exhaust Gas Total Pressure | X | | | | |
| | 0 1 C | 0 1 | 0 1 1 | 0 1 0 | Exhaust Gas Total Pressure | X | | | | |
| | 0 3 3 | 0 1 | 0 1 1 | 0 1 0 | Exhaust Gas Total Pressure | X | | | | |
| | 0 3 5 | 0 1 | 0 1 1 | 0 1 0 | Intruder Bearing | X | | | | 6-23 |
| 1 3 3 | 0 0 B | 0 1 | 0 1 1 | 0 1 1 | Aut Horiz Integ Limit | X | | | | |
| | 0 1 A | 0 1 | 0 1 1 | 0 1 1 | Thrust Lever Angle | X | | | | |
| | 0 2 F | 0 1 | 0 1 1 | 0 1 1 | Thrust Lever Angle | X | | | | |
| | 0 3 F | 0 1 | 0 1 1 | 0 1 1 | Thrust Lever Angle | X | | | | |
| | 1 0 A | 0 1 | 0 1 1 | 0 1 1 | Selected Throttle Lever Angle | X | | | | |
| | 1 0 B | 0 1 | 0 1 1 | 0 1 1 | Selected Throttle Lever Angle | X | | | | |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 134 | 01C | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Power Lever Angle | X | | | | |
| | 10A | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Throttle Lever Angle | X | | | | |
| | 10B | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Throttle Lever Angle | X | | | | |
| | 13A | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Throttle Lever Angle | X | | | | |
| 135 | 01C | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Engine Vibration #1 | X | | | | |
| | 029 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Engine Fan Vibration | X | | | | |
| | 05A | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | ACT 1 Fuel Quantity Display | | X | | | |
| 136 | 00B | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Vertical Figure of Merit | X | | | | |
| | 01C | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Engine Vibration #2 | X | | | | |
| | 029 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Engine Turbine Vibration | X | | | | |
| | 05A | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | ACT 2 Fuel Quantity Display | | X | | | |
| 137 | 01B | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Flap Angle | X | | | | 6-11 |
| | 02A | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Flap Angle | X | | | | 6-11 |
| | 02F | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Thrust Reverser Position Feedback | X | | | | |
| | 03F | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Thrust Reverser Position Feedback | X | | | | |
| | 05A | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Center+ACT1+ACT2 FQ Display | | X | | | |
| | 10A | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Selected Thrust Reverser Position | X | | | | |
| | 10B | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Selected Thrust Reverser Position | X | | | | |
| | 140 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Flap Angle | X | | | | 6-11 |
| 140 | 001 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Flight Director - Roll | X | | | | 6-27 |
| | 00B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | UTC Fine | X | | | | |
| | 025 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Flight Director - Roll | X | | | | |
| | 029 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Precooler Output Temperature | X | | | | |
| | 05A | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Actual Fuel Quantity Display | | X | | | |
| | 114 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Pump Contactor States | | | X | | |
| 141 | 001 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Flight Director - Pitch | X | | | | 6-27 |
| | 00B | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | UTC Fine Fractions | X | | | | |
| | 025 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Flight Director - Pitch | X | | | | |
| | 029 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Precooler Input Temperature | X | | | | |
| | 05A | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Preselected Fuel Quantity Display | | X | | | |
| | 114 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Pump Contactor and Pushbutton States | | | X | | |
| 142 | 002 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Flight Director - Fast/Slow | X | | | | 6-27 |
| | 003 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Flight Director - Fast/Slow | X | | | | |
| | 00B | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | UTC Fine Fractions | X | | | | |
| | 025 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Flight Director - Fast/Slow | X | | | | |
| | 05A | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Left Wing Fuel Quantity Display | | X | | | |
| | 114 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Pump Push Button and LP Switch State | | | X | | |
| 143 | 001 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | Flight Director - Yaw | X | | | | |
| | 041 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | HPA Command Word | X | | | | |
| | 05A | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | Center Wing Fuel Quantity Display | | X | | | |
| | 114 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | Pump LP Switch State and FCMC Commands | | | X | | |
| | 241 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | HPA Response Word | X | | | | |
| 144 | 02B | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | Altitude Error | X | | | | |
| | 041 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | ACU/BSU Contorl Word | X | | | | |
| | 05A | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | Right Wing Fuel Quantity Display | | X | | | |
| | 114 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | Valve Feedback | | | X | | |
| | 341 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | ACU/BSU Contorl Word | X | | | | |
| 145 | 002 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | TACAN Control | X | | | | 6-30 |
| | 025 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Discrete Status 2 EFIS | | | X | | |
| | 029 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Discrete Status 2 EFIS | | | X | | |
| | 0A1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | AFS DFDR Discretes #1 | | | X | | |
| | 114 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Valve Feedback | | | X | | |
| 146 | 025 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | Discrete Status 3 EFIS | | | X | | |
| | 029 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | Discrete Data #9 | | | X | | |
| | 0A1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | AFS DFDR Discretes #2 | | | X | | |
| | 112 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | TACAN Control | X | | | | 6-47 |
| | 114 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | Valve Feedback | | | X | | |
| 147 | 025 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | Discrete Status 4 EFIS | | | X | | |
| | 029 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | Discrete Data #10 | | | X | | |
| | 0A1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | AFS DFDR Discretes #3 | | | X | | |
| | 114 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | Valve Feedback | | | X | | |
| | 115 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | TACAN Control Word | X | | | | 6-48/Note 1 |
| 150 | 002 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | Universal Time Constant (UTC) | X | | | | 6-12/6-27 |
| | 00B | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | Universal Time Constant (UTC) | X | | | | |
| | 029 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | Cabin Altitude Rate | X | | | | |
| | 031 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | Universal Time Constant (UTC) | X | | | | 6-12/6-27 |
| | 056 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | Universal Time Coordinate | X | | | | |
| | 060 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | Universal Time Coordinate | X | | | | |
| | 114 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | FCMC Valve Commands | | | X | | |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 1 5 1 | 0 0 2 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Localizer Bearing (True) | X | | | | |
| | 0 2 7 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | MLS Azimuth Deviation | X | | | | |
| | 0 2 9 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Cabin Altitude | X | | | | |
| | 0 5 5 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | MLS Azimuth Deviation | X | | | | |
| | 0 5 6 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Localizer Bearing (True) | X | | | | |
| | 0 5 A | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | LB/KG Control Word | | | X | | |
| | 0 6 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Localizer Bearing (True) | X | | | | |
| | 1 1 4 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | FCMC Valve Commands | | | X | | |
| 1 5 2 | 0 2 7 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | MLS Elevation Deviation | X | | | | |
| | 0 2 9 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Cabin Pressure | X | | | | |
| | 0 3 8 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Cabin Pressure | X | | | | |
| | 0 4 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Open Loop Steering | X | | | | |
| | 0 5 5 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | MLS GP Deviation | X | | | | |
| | 0 A D | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Cabin Pressure | X | | | | |
| | 1 1 4 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Overhead Panel Switch/Pushbutton & Refuel Panel Battery Power Supply Switch States | | | X | | |
| | | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 777 Cabin Interphone System - System Address Label | | | | X | See Attachment 11 |
| 1 5 3 | 0 0 2 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maximum Altitude | X | | | | |
| | 0 2 7 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Flare | X | | | | |
| | 0 2 9 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Pressurization Valve Position (Gr. #1) | X | | | | |
| | 0 4 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Closed Loop Steering | X | | | | |
| | 0 5 5 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | MLS Selected Azimuth | X | | | | |
| | 1 1 4 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Level States | | | X | | |
| 1 5 4 | 0 0 2 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Runway Heading (True) | X | | | | |
| | 0 2 7 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | MLS Auxilliary Data | X | | | | |
| | 0 2 9 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Pressurization Valve Position (Gr. #2) | X | | | | |
| | 0 5 5 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | MLS Max Selectable GP | X | | | | |
| | 0 5 6 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Runway Heading (True) | X | | | | |
| | 0 6 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Runway Heading (True) | X | | | | |
| | 1 1 4 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Level States and Low Warning and Transfer Indications | | | X | | |
| 1 5 5 | 0 1 C | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Maintenance Data #6 | | | X | | |
| | 0 2 5 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Discrete Status 5 EFIS | | | X | | |
| | 0 2 7 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | MLS Selected GP Angle | | X | | | |
| | 0 2 9 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Discrete #1 | | | X | | |
| | 0 3 3 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Maintenance Data #6 | | | X | | |
| | 0 5 5 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | MLS Selected Glide Path | X | | | | |
| | 0 5 A | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | FQIC | | | X | | |
| | 0 B B | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Maintenance Data #6 | | | X | | |
| | 1 0 A | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Maintenance Data #6 | | | X | | |
| | 1 0 B | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Maintenance Data #6 | | | X | | |
| | 1 1 4 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | XFR Pump Faults & Wing Imbalance Warning | | | X | | |
| 1 5 6 | 0 1 C | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Maintnance Data #7 | | | X | | |
| | 0 2 7 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | MLS Dataword 1 | X | | | | |
| | 0 2 9 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Discrete #12 | | | X | | |
| | 0 3 3 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Maintenance Data #7 | | | X | | |
| | 0 4 D | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | L Tank Faults | | | X | | |
| | 0 5 5 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | MLS Basic Data Wd 1 | X | | | | |
| | 0 B B | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Maintenance Data #7 | | | X | | |
| | 1 0 A | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Maintenance Data #7 | | | X | | |
| | 1 0 B | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Maintenance Data #7 | | | X | | |
| | 1 1 4 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Refuel Panel Switch States | | | X | | |
| | | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | CVR #2 - System Address Label | | | | X | See Attachment 11 |
| 1 5 7 | 0 1 C | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | Maintenance Data #8 | X | | | | |
| | 0 2 7 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | MLS Dataword 2 | | | X | | |
| | 0 3 3 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | Maintenance Data #8 | | | X | | |
| | 0 4 D | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | R Tank Faults | | | X | | |
| | 0 5 5 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | MLS Basic Data Wd 2 | X | | | | |
| | 0 B B | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | Maintenance Data #8 | | | X | | |
| | 1 0 A | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | Maintenance Data #8 | | | X | | |
| | 1 0 B | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | Maintenance Data #8 | | | X | | |
| | 1 1 4 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | Trim Tank Probe Capacitance | | X | | | |
| | | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | CVR #1 - System Address Label | | | | X | See Attachment 11 |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 2 | 3 4 5 | 6 7 8 | | BNR | BCD | DISC | SAL | |
| 1 6 0 | 0 1 C | 0 1 | 1 1 0 | 0 0 0 | Maintenance Data #9 | | | X | | |
| | 0 2 5 | 0 1 | 1 1 0 | 0 0 0 | Discrete Status 6 EFIS | | | X | | |
| | 0 2 7 | 0 1 | 1 1 0 | 0 0 0 | MLS Dataword 3 | X | | | | |
| | 0 3 3 | 0 1 | 1 1 0 | 0 0 0 | Maintenance Data #9 | | | X | | |
| | 0 4 D | 0 1 | 1 1 0 | 0 0 0 | C Tank Faults | | | X | | |
| | 0 5 5 | 0 1 | 1 1 0 | 0 0 0 | MLS Basic Data Wd 3 | X | | | | |
| | 0 B B | 0 1 | 1 1 0 | 0 0 0 | Maintenance Data #9 | | | X | | |
| | 1 0 A | 0 1 | 1 1 0 | 0 0 0 | Maintenance Data #9 | | | X | | |
| | 1 0 B | 0 1 | 1 1 0 | 0 0 0 | Maintenance Data #9 | | | X | | |
| | 1 1 4 | 0 1 | 1 1 0 | 0 0 0 | Valve Feedback | | | X | | |
| 1 6 1 | 0 1 C | 0 1 | 1 1 0 | 0 0 1 | Maintenance Data #10 | | | X | | |
| | 0 2 5 | 0 1 | 1 1 0 | 0 0 1 | Discrete Status 7 EFIS | | | X | | |
| | 0 2 7 | 0 1 | 1 1 0 | 0 0 1 | MLS Dataword 4 | | | X | | |
| | 0 3 3 | 0 1 | 1 1 0 | 0 0 1 | Maintenance Data #10 | | | X | | |
| | 0 4 D | 0 1 | 1 1 0 | 0 0 1 | A Tank Faults | | | X | | |
| | 0 5 5 | 0 1 | 1 1 0 | 0 0 1 | MLS Basic Data Wd 4 | X | | | | |
| | 1 0 A | 0 1 | 1 1 0 | 0 0 1 | Maintenance Data #10 | | | X | | |
| | 1 0 B | 0 1 | 1 1 0 | 0 0 1 | Maintenance Data #10 | | | X | | |
| | 1 1 4 | 0 1 | 1 1 0 | 0 0 1 | Indicated Pump Status | | | X | | |
| 1 6 2 | 0 1 2 | 0 1 | 1 1 0 | 0 1 0 | ADF Bearing | X | | | | |
| | 0 2 5 | 0 1 | 1 1 0 | 0 1 0 | ADF Bearing Left/Right | X | | | | |
| | 0 2 7 | 0 1 | 1 1 0 | 0 1 0 | MLS Dataword 5 | X | | | | |
| | 0 2 9 | 0 1 | 1 1 0 | 0 1 0 | Crew Oxygen Pressure | X | | | | |
| | 0 5 5 | 0 1 | 1 1 0 | 0 1 0 | MLS Basic Data Wd 5 | X | | | | |
| | 0 D E | 0 1 | 1 1 0 | 0 1 0 | Stick Shaker Margin Proportional Signal | X | | | | |
| | 1 1 4 | 0 1 | 1 1 0 | 0 1 0 | Indicated Pump Status | | | X | | |
| | 1 4 0 | 0 1 | 1 1 0 | 0 1 0 | Density Altitude | X | | | | |
| 1 6 3 | 0 2 7 | 0 1 | 1 1 0 | 0 1 1 | MLS Dataword 6 | X | | | | |
| | 0 3 7 | 0 1 | 1 1 0 | 0 1 1 | Zero Fuel Weight (lb) | | X | | | |
| | 0 5 5 | 0 1 | 1 1 0 | 0 1 1 | MLS Basic Data Wd 6 | X | | | | |
| | 1 1 4 | 0 1 | 1 1 0 | 0 1 1 | Indicated Pump Status | | | X | | |
| | | 0 1 | 1 1 0 | 0 1 1 | 747 DFDR & A330/340 SSFDR - System Address Label | | | | X | See Attachment 11 |
| 1 6 4 | 0 0 2 | 0 1 | 1 1 0 | 1 0 0 | Minimum Descent Altitude (MDA) | X | | | | |
| | 0 0 3 | 0 1 | 1 1 0 | 1 0 0 | Target Height | X | | | | |
| | 0 0 7 | 0 1 | 1 1 0 | 1 0 0 | Radio Height | X | | | | 6-13/6-27 |
| | 0 2 5 | 0 1 | 1 1 0 | 1 0 0 | Radio Height | X | | | | 6-13/6-27 |
| | 0 2 7 | 0 1 | 1 1 0 | 1 0 0 | MLS Dataword 7 | X | | | | |
| | 0 3 B | 0 1 | 1 1 0 | 1 0 0 | Radio Height | X | | | | |
| | 0 5 5 | 0 1 | 1 1 0 | 1 0 0 | MLS ABS GP Angle | X | | | | |
| | 1 1 4 | 0 1 | 1 1 0 | 1 0 0 | Indicated Pump Status | | | X | | |
| 1 6 5 | 0 0 7 | 0 1 | 1 1 0 | 1 0 1 | Radio Height | | X | | | 6-25 |
| | 0 0 B | 0 1 | 1 1 0 | 1 0 1 | Vertical Velocity | X | | | | |
| | 0 2 7 | 0 1 | 1 1 0 | 1 0 1 | MLS Dataword 8 | X | | | | |
| | 0 5 5 | 0 1 | 1 1 0 | 1 0 1 | MLS ABS Azimuth Angle | X | | | | |
| | 1 1 4 | 0 1 | 1 1 0 | 1 0 1 | Indicated Valve Status | | | X | | |
| 1 6 6 | 0 0 7 | 0 1 | 1 1 0 | 1 1 0 | RALT Check Point Dev. | X | | | | |
| | 0 0 B | 0 1 | 1 1 0 | 1 1 0 | North/South Velocity | X | | | | |
| | 1 1 4 | 0 1 | 1 1 0 | 1 1 0 | Indicated Valve Status | | | X | | |
| 1 6 7 | 0 0 2 | 0 1 | 1 1 0 | 1 1 1 | EPU Estimate Position Uncertainty/ (ANP) Actual Navi. Perf. | X | | | | |
| | 1 1 4 | 0 1 | 1 1 0 | 1 1 1 | Indicated Valve Status | | | X | | |
| 1 7 0 | 0 2 5 | 0 1 | 1 1 1 | 0 0 0 | Decision Height Selected (EFI) | | X | | | 6-25 |
| | 0 C 5 | 0 1 | 1 1 1 | 0 0 0 | Decision Height Selected (EFI) | | X | | | 6-25 |
| | 1 1 4 | 0 1 | 1 1 1 | 0 0 0 | Wing Imbalance and FQI Failure Warning | | | X | | |
| | | 0 1 | 1 1 1 | 0 0 0 | DFDAU - System Address Label | | | | X | See Attachment 11 |
| 1 7 1 | 0 0 2 | 0 1 | 1 1 1 | 0 0 1 | RNP Required Navigation Performance | X | | | | |
| | 0 A 5 | 0 1 | 1 1 1 | 0 0 1 | Vertical Alarm Limit (VAL) and SBAS System Identifier | X | | | | |
| | X X X | 0 1 | 1 1 1 | 0 0 1 | Manufacturer Specific Status | | | | | See Attachment 10/Note 1 |
| 1 7 2 | X X X | 0 1 | 1 1 1 | 0 1 0 | Subsystem Identifier | | | | | 6-34/Note 1 |
| 1 7 3 | 0 1 0 | 0 1 | 1 1 1 | 0 1 1 | Localizer Deviation | X | | | | 6-6/6-27 |
| | 0 2 5 | 0 1 | 1 1 1 | 0 1 1 | Localizer Deviation | X | | | | 6-6/6-27 |
| | 0 2 9 | 0 1 | 1 1 1 | 0 1 1 | Hydraulic Quantity | X | | | | |
| | 0 3 B | 0 1 | 1 1 1 | 0 1 1 | Localizer Deviation | X | | | | |
| | 0 5 5 | 0 1 | 1 1 1 | 0 1 1 | Localizer Deviation | X | | | | |
| | 0 B D | 0 1 | 1 1 1 | 0 1 1 | Hydraulic Quantity | X | | | | |
| | 0 D 0 | 0 1 | 1 1 1 | 0 1 1 | Hydraulic Oil | X | | | | |
| | | 0 1 | 1 1 1 | 0 1 1 | SDU #2 - System Address Label | | | | X | See Attachment 11 |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 174 | 003 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Delayed Flap Approach Speed (DFA) | X | | | | |
| | 00B | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | East/West Velocity | X | | | | |
| | 010 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Glideslope Deviation | X | | | | 6-6/6-27 |
| | 029 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Hydraulic Pressure | X | | | | |
| | 03B | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Glideslope Deviation | X | | | | 6-6/6-27 |
| | 055 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Glideslope Deviation | X | | | | |
| | 0D0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Hydraulic Oil Pressure | X | | | | |
| | | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | RFU - System Address Label | | | | X | See Attachment 11 |
| 175 | 003 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Economical Speed | X | | | | |
| | 029 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | EGT (APU) | X | | | | |
| | 033 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Hydraulic Pump Case Drain Temperature | X | | | | |
| | | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | HGA/IGA HPA - System Address Label | | | | X | See Attachment 11 |
| 176 | 003 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Economical Mach | X | | | | |
| | 029 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | RPM (APU) | X | | | | |
| | 038 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Left Static Pressure Uncorrected, mb | X | | | | |
| | 05A | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Fuel Temperature - Set to Zero | X | | | | |
| | 0AD | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Static Pressure Left, Uncorrected, mb | X | | | | |
| | 114 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Left Outer Tank Fuel Temp & Advisory Warning | X | | | | |
| 177 | 003 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Economical Flight Level | X | | | | |
| | 029 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Oil Quantity (APU) | X | | | | |
| | 038 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Right Static Pressure Uncorrected, mb | X | | | | |
| | 055 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Distance to LTP/FTP | X | | | | |
| | 05A | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Fuel Temperature Left Wing Tank | X | | | | |
| | 0AD | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Static Pressure Right, Uncorrected, mb | X | | | | |
| | 114 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Inner Tank 1 Fuel Temp & Advisory Warning | X | | | | |
| | | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | LGA/HPA - System Address Label | | | | X | See Attachment 11 |
| 200 | 002 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Drift Angle | | X | | | |
| | 004 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Drift Angle | | X | | | |
| | 056 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Drift Angle | | X | | | |
| | 060 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Drift Angle | | X | | | |
| | 114 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Inner Tank 2 Fuel Temp & Advisory Warning | X | | | | |
| 201 | 009 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | DME Distance | | X | | | 6-1-1 |
| | 05A | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Fuel Temperature Right Wing Tank | X | | | | |
| | 112 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | TACAN Distance | | X | | | |
| | 114 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Inner Tank 3 Fuel Temp & Advisory Warning | X | | | | |
| | 115 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | DME | | X | | | 6-25 |
| | 140 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Mach Maximum Operation (Mmo) | X | | | | |
| | 142 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Projected Future Latitude | X | | | | |
| | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | GPS/GNSS Sensor - System Address Label | | | | X | See Attachment 11 |
| 202 | 002 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Energy Management (clean) | X | | | | |
| | 009 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | DME Distance | X | | | | 6-7/6-27 |
| | 029 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Cabin Compartment Temperature (Group #1) | X | | | | |
| | 05A | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Fuel Temperature - Set to Zero | X | | | | |
| | 114 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Inner Tank 4 Fuel Temp & Advisory Warning | X | | | | |
| | 140 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Mach Rate | X | | | | |
| | 142 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | Projected Future Latitude Fine | X | | | | |
| 203 | 002 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Energy Management Speed Brakes | X | | | | |
| | 006 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Altitude (1013.25mB) | X | | | | |
| | 018 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Altitude | X | | | | 6-24/6-27 |
| | 029 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Cabin Compartment Temperature (Group #2) | X | | | | |
| | 035 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Own A/C Altitude | X | | | | |
| | 038 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Altitude (1013.25mB) | X | | | | |
| | 05A | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Fuel Tank #6 Temperature | X | | | | |
| | 10A | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Ambient Static Pressure | X | | | | |
| | 10B | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Ambient Static Pressure | X | | | | |
| | 114 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Trim Tank Fuel Temp & Advisory Warning | X | | | | |
| | 140 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | Altitude | X | | | | |
| 204 | 002 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Utitlity Airspeed | X | | | | |
| | 006 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Baro Corrected Altitude #1 | X | | | | |
| | 029 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Cabin Duct Temperature (Group #1) | X | | | | |
| | 038 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Baro Corrected Altitude #1 | X | | | | |
| | 056 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Baro Altitude | X | | | | |
| | 05A | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Fuel Tank #7 Temperature | X | | | | |
| | 060 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Baro Altitude | X | | | | |
| | 114 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Right Outer Tank Fuel Temp & Advisory Warning | X | | | | |
| | 140 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | Baro Corrected Altitude | X | | | | |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 2 0 5 | 0 0 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | HF COM Frequency (New Format) | | X | | | 6-43 |
| | 0 0 6 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Mach | X | | | | 6-27 |
| | 0 1 A | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Mach | X | | | | 6-27 |
| | 0 2 9 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Cabin Duct Temperature (Group #2) | X | | | | |
| | 0 3 8 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Mach | X | | | | |
| | 0 5 A | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Fuel Tank #8 Temperature | X | | | | |
| | 0 B 9 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | HF COM Frequency (New Format) | | X | | | |
| | 1 0 A | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Mach Number | X | | | | |
| | 1 0 B | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Mach Number | X | | | | |
| | 1 4 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | Mach | X | | | | |
| 2 0 6 | 0 0 6 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Computed Airspeed | X | | | | 6-27 |
| | 0 1 8 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Altitude (Variable Resolution) | X | | | | 6-20 |
| | 0 2 9 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Cabin Temp. Reg. Valve Position (Group #1) | X | | | | |
| | 0 3 8 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Computed Airspeed | X | | | | 6-27 |
| | 0 5 6 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Computed Airspeed | X | | | | |
| | 0 6 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Computed Airspeed | X | | | | |
| | 0 C C | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Taxi Speed | X | | | | |
| | 1 4 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | Computed Airspeed (CAS) | X | | | | |
| 2 0 7 | 0 0 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | HF Control Word | | | X | | |
| | 0 0 6 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Max. Allowable Airspeed | X | | | | |
| | 0 0 A | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Max. Allowable Airspeed | X | | | | |
| | 0 2 5 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Operational Software Part Number | | X | | | 6-37 |
| | 0 2 9 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Cabin Temp. Reg. Valve Position (Group #2) | X | | | | |
| | 0 3 8 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Max. Allowable Airspeed | X | | | | |
| | 0 B 9 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | HF Control Word | | | X | | |
| | 1 4 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | Airspeed Maximum Operating (VMO) | X | | | | |
| 2 1 0 | 0 0 6 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | True Airspeed | X | | | | 6-27 |
| | 0 2 9 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | Cargo Compartment Temperature | X | | | | |
| | 0 3 8 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | True Airspeed | X | | | | 6-27 |
| | 1 4 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | True Airspeed | X | | | | |
| | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | FCMC Com A340-500/600 - System Address Label | | | | X | See Attachment 11 |
| 2 1 1 | 0 0 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Air Temperature | X | | | | 6-27 |
| | 0 0 3 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Air Temperature | X | | | | |
| | 0 0 6 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Air Temperature | X | | | | |
| | 0 1 A | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Air Temperature | X | | | | |
| | 0 2 9 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Cargo Duct Temperature | X | | | | |
| | 0 3 8 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Air Temperature | X | | | | |
| | 0 A D | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Air Temperature Indicated | X | | | | |
| | 1 0 A | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Fan Inlet Temperature | X | | | | |
| | 1 0 B | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Fan Inlet Temperature | X | | | | |
| | 1 4 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Total Air Temp (TAT) | X | | | | |
| | 1 4 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | Projected Future Longitude | X | | | | |
| | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | FCMC Mon A340-500/600 - System Address Label | | | | X | See Attachment 11 |
| 2 1 2 | 0 0 4 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Altitude Rate | X | | | | 6-27 |
| | 0 0 5 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Altitude Rate | X | | | | |
| | 0 0 6 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Altitude Rate | X | | | | |
| | 0 2 9 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Cargo Temp. Reg. Valve Position | X | | | | |
| | 0 3 8 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Altitude Rate | X | | | | |
| | 0 3 B | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Altitude Rate | X | | | | |
| | 0 5 6 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Altitude Rate | X | | | | |
| | 0 6 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Altitude Rate | X | | | | |
| | 1 4 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Altitude Rate | X | | | | |
| | 1 4 2 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Projected Future Longitude Fine | X | | | | |
| | | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | FCMC Int A340-500/600 - System Address Label | | | | X | See Attachment 11 |
| 2 1 3 | 0 0 2 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Static Air Temperature | X | | | | 6-27 |
| | 0 0 6 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Static Air Temperature | X | | | | 6-27 |
| | 0 3 8 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Static Air Temperature | X | | | | |
| | 0 8 D | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Fuel Used | X | | | | 6-27 |
| | 1 4 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Static Air Temp (SAT) | X | | | | |
| | 1 4 2 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Veritical Time Interval | X | | | | |
| 2 1 4 | X X X | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | ICAO Aircraft Address (Part 1) | | | X | | Note 1 |
| 2 1 5 | 0 0 6 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Impacted Pressure, Uncorrected, mb | X | | | | |
| | 0 1 A | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Impact Pressure | X | | | | |
| | 0 2 9 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | N1 Actual (EEC) | X | | | | |
| | 0 2 9 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | EPR Actual (EEC) | X | | | | |
| | 0 3 8 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Impacted Pressure, Uncorrected, mb | X | | | | |
| | 0 A D | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Impacted Pressure, Uncorrected, mb | X | | | | |
| | 1 4 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Impact Pressure Subsonic | X | | | | |
| 2 1 6 | X X X | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | ICAO Aircraft Address (Part 2) | | | X | | Note 1 |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 217 | 002 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Geometric Vertical Rate | X | | | | |
| | 006 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Static Pressure, Corrected (In. Hg) | X | | | | |
| | 029 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | N1 Limit (EEC) | X | | | | |
| | 029 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | EPR Actual (EEC) | X | | | | |
| | 038 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Static Pressure, Average, Corrected (In. Hg) | X | | | | |
| | 140 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Static Pressure Corrected (In. Hg) | X | | | | |
| 220 | 006 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | Baro Corrected Altitude #2 | X | | | | |
| | 038 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | Baro Corrected Altitude #2 | X | | | | |
| | 140 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | Baro Corrected Altitude #2 | X | | | | |
| | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | MCDU #1 - System Address label (Recipient) | | | | X | See Attachment 11 |
| 221 | 006 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Indicated Angle of Attack (Average) | X | | | | |
| | 038 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Indicated Angle of Attack (Average) | X | | | | |
| | 0AD | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Indicated Angle of Attack (Average) | X | | | | |
| | 12C | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Indicated Angle of Attack (Average) | | | | | |
| | 140 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | Angle of Attach Indicated Average | X | | | | |
| | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | MCDU #2 - System Address label (Recipient) | | | | X | See Attachment 11 |
| 222 | 006 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Indicated Angle of Attack (#1 Left) | X | | | | |
| | 011 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | VOR Omnibearing | X | | | | 6-10 |
| | 112 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | TACAN Bearing | X | | | | |
| | 115 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Bearing | X | | | | |
| | 12C | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Indicated Angle of Attack (#1 Left) | X | | | | |
| | 140 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | Angle of Attack, Indicated (#1 Left) | X | | | | |
| | | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | MCDU #3 - System Address Label | | | | X | See Attachment 11 |
| 223 | 006 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | Indicated Angle of Attack (#1 Right) | X | | | | |
| | 12C | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | Indicated Angle of Attack (#1 Right) | X | | | | |
| | 140 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | Angle of Attack, Indicated (#1 Right) | X | | | | |
| | | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | Printer #1 - System Address Label | | | | X | See Attachment 11 |
| 224 | 006 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Indicated Angle of Attack (#2 Left) | X | | | | |
| | 12C | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Indicated Angle of Attack (#2 Left) | X | | | | |
| | 140 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Angle of Attack, Indicated (#2 Left) | X | | | | |
| | | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | Printer #2 - System Address Label | | | | X | See Attachment 11 |
| 225 | 002 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Min. Maneuvering Airspeed | X | | | | |
| | 006 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Indicated Angle of Attack (#2 Right) | X | | | | |
| | 02B | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Compensated Altitude Rate | X | | | | |
| | 056 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Minimum Maneuvering Airspeed | X | | | | |
| | 060 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Minimum Maneuvering Airspeed | X | | | | |
| | 12C | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Indicated Angle of Attack (#2 Right) | X | | | | |
| | 140 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | Angle of Attack, Indicated (#2 Right) | X | | | | |
| | | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | HUD - System Address Label | | | | X | See Attachment 11 |
| 226 | 002 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | Min. Op. Fuel Temp (non-conflicting) | X | | | | |
| | | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | Data Loader - System Address Label (High Speed) | | | | X | See Attachment 11 |
| 227 | 019 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | CFDS Bite Command Summary for HFDR | | | X | | |
| | 03D | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | AVM Command | X | | | | 6-28 |
| | 053 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | CFDS Bite Command Summary for HFDR | | | X | | |
| | 07E | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | BITE Command Word | X | | | | |
| 230 | 006 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | True Airspeed | | X | | | 6-25 |
| | 038 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | True Airspeed | | X | | | 6-25 |
| | 114 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | Left Outer Probes Capacitance | | X | | | |
| | | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | MCDU #4 - System Address Label | | | | X | See Attachment 11 |
| 231 | 006 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | Total Air Temperature | | X | | | 6-25 |
| | 038 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | Total Air Temperature | | X | | | |
| | 114 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | Inner 2 Tank Probe Capacitance | | X | | | |
| 232 | 004 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | Altitude Rate | | X | | | 6-25 |
| | 005 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | Altitude Rate | | X | | | |
| | 006 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | Altitude Rate | | X | | | |
| | 055 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | GLS Airport ID | | | X | | |
| | 114 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | Inner 4 Tank Probe Capacitance | | X | | | |
| 233 | 002 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ACMS Information | X | | | | 6-31 |
| | 006 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | Static Air Temperature | | X | | | 6-25 |
| | 038 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | Static Air Temperature | | X | | | 6-25 |
| | 056 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ACMS Information | X | | | | |
| | 060 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | ACMS Information | X | | | | |
| | 114 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | Right Outer Probe Capacitance | | X | | | |
| 234 | 002 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | ACMS Information | X | | | | 6-31 |
| | 006 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | Baro Correction (mb) #1 | | X | | | |
| | 038 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | Baro Correction (mb) #1 | | X | | | |
| | 056 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | ACMS Information | X | | | | |
| | 060 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | ACMS Information | X | | | | |
| | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | EIVMU 1 - System Address Label | | | | X | See Attachment 11 |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 2 3 5 | 0 0 2 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | ACMS Information | X | | | | 6-31 |
| | 0 0 6 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | Baro Correction (ins. Hg) #1 | | X | | | 6-25 |
| | 0 3 8 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | Baro Correction (ins. Hg) #1 | | X | | | 6-25 |
| | 0 5 6 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | ACMS Information | X | | | | |
| | 0 6 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | ACMS Information | X | | | | |
| | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | EIVMU 2 - System Address Label | | | | X | See Attachment 11 |
| 2 3 6 | 0 0 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | ACMS Information | X | | | | 6-31 |
| | 0 0 6 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | Baro Correction (mb) #2 | | X | | | |
| | 0 3 8 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | Baro Correction (mb) #2 | | X | | | |
| | 0 5 6 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | ACMS Information | X | | | | |
| | 0 6 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | ACMS Information | X | | | | |
| | | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | EIVMU 3 - System Address Label | | | | X | See Attachment 11 |
| 2 3 7 | 0 0 2 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | ACMS Information | X | | | | |
| | 0 0 6 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | Baro Correction (ins. Hg) #2 | | X | | | |
| | 0 0 B | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | Horizontal Uncertainty Level | X | | | | |
| | 0 3 8 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | Baro Correction (ins. Hg) #2 | | X | | | |
| | 0 5 6 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | ACMS Information | X | | | | |
| | 0 6 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | ACMS Information | X | | | | |
| | | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | EIVMU 4 - System Address Label | | | | X | See Attachment 11 |
| 2 4 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | Spare | | | | | |
| 2 4 1 | 0 0 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Min. Airspeed for Flap Extension | X | | | | |
| | 0 0 6 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Corrected Angle of Attack | X | | | | |
| | 0 2 C | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Reserved (Special Use) | | | X | | |
| | 0 3 8 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Corrected Angle of Attack | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | FQIS System Data | X | | | | 6-35 |
| | 0 5 6 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Min. Airspeed for Flap Extension | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Min. Airspeed for Flap Extension | X | | | | |
| | 1 4 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Angle of Attack, Corrected | X | | | | |
| | 1 6 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | Tank Unit Data | X | | | | 6-38 |
| | | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | APM-MMR - System Address Label | | | | X | See Attachment 11 |
| 2 4 2 | 0 0 6 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Total Pressure | X | | | | |
| | 0 0 9 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Ground Station ID (Word #1) | | | X | | |
| | 0 1 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Ground Station ID (Word #1) | | | X | | |
| | 0 1 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Ground Station ID (Word #1) | | | X | | |
| | 1 1 2 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Ground Station ID (Word #1) | | | X | | |
| | 0 1 A | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Total Pressure | X | | | | |
| | 0 3 8 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Total Pressure | X | | | | |
| | 0 3 B | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Speed Deviation | X | | | | |
| | 0 A D | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Total Pressure, Uncorrected, mb | X | | | | |
| | 1 4 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | Total Pressure | X | | | | |
| | | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | MMR - System Address Label | | | | X | See Attachment 11 |
| 2 4 3 | 0 3 7 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Zero Fuel Weight (kg) | | X | | | |
| | 0 5 5 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | GLS Runway Selection | | | X | | |
| | X X X | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | Simulator to Avionics Control Word | X | | | | Note 1 |
| 2 4 4 | 0 0 9 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Ground Station ID (Word #2) | | | X | | |
| | 0 1 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Ground Station ID (Word #2) | | | X | | |
| | 0 1 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | VOR Ground Station Ident Word #2 | | | X | | |
| | 0 1 2 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Ground Station ID (Word #2) | | | X | | |
| | 0 1 C | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Fuel Flow (Engine Direct) | X | | | | |
| | 0 3 3 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Fuel Flow (Wf) | X | | | | |
| | 0 3 B | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Mach Error | X | | | | |
| | 0 8 D | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Fuel Flow Rate | X | | | | |
| | 1 0 A | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Fuel Mass Flow | X | | | | |
| | 1 0 B | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Fuel Mass Flow | X | | | | |
| | 1 4 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | Angle of Attack, Normalized | X | | | | |
| | | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | ILS - System Address Label | | | | X | See Attachment 11 |

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 245 | 002 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Minimum Airspeed | X | | | | |
| | 003 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Minimum Airspeed | X | | | | |
| | 00A | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Minimum Airspeed | X | | | | |
| | 029 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | N3 (Engine) | X | | | | |
| | 038 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Average Static Pressure mb, Uncorrected | X | | | | |
| | 03B | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | EPR Error | X | | | | |
| | 056 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Minimum Airspeed | X | | | | |
| | 060 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Minimum Airspeed | X | | | | |
| | 0AD | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Average Static Pressure mb, Uncorrected | X | | | | |
| | 140 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | Static Pressure, Uncorrected | X | | | | |
| | | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | MLS - System Address Label | | | | X | See Attachment 11 |
| 246 | 002 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | General Maximum Speed (VCMAX) | X | | | | |
| | 006 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | Average Static Pressure | X | | | | |
| | 009 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | DME Ground Station Ident Word #1 | | | X | | |
| | 01C | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | N1 (Engine Direct) | X | | | | |
| | 029 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | N1 (Engine Direct) | X | | | | |
| | 038 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | Average Static Pressure mb, Corrected | X | | | | |
| | 03B | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | Angle of Attack Error | X | | | | |
| | | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | AHRS - System Address Label | | | | X | See Attachment 11 |
| 247 | 002 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Control Minimum Speed (VCMIN) | X | | | | |
| | 009 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | DME Ground Station Ident Word #1 | | | X | | |
| | 00B | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Horizontal Figure of Merit | X | | | | |
| | 01F | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Total Fuel | X | | | | |
| | 02C | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Total Fuel | X | | | | |
| | 03B | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Speed Error | X | | | | |
| | 04D | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Total Fuel | X | | | | |
| | 056 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Control Minimum Speed (VCMIN) | X | | | | |
| | 05A | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Total Fuel | X | | | | |
| | 060 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Control Minimum Speed (VCMIN) | X | | | | |
| | 0EB | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Fuel to Remain | X | | | | |
| | 114 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Fuel on Board | X | | | | |
| | 140 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | Airspeed Minimum Vmc | X | | | | |
| | | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | High-Speed Data Unit #1 (HSDU #1) - SAL | | | | X | See Attachment 11 |
| 250 | 002 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Continuous N1 Limit | X | | | | |
| | 02B | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Maximum Continuous EPR Limit | X | | | | |
| | 02C | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Preselected Fuel Quantity | X | | | | |
| | 038 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Indicated Side Slip Angle | X | | | | |
| | 05A | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Preselected Fuel Quantity | X | | | | |
| | 0AD | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Indicated Side Slip Angle or AOS | X | | | | |
| | 114 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Preselected Fuel Quantity | X | | | | |
| | 12B | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | Temperature Rate of Change | X | | | | |
| | | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | High-Speed Data Unit #1 (HSDU #2) - SAL | | | | X | See Attachment 11 |
| 251 | 001 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | Distance to Go | X | | | | |
| | 002 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | Distance to Go | X | | | | |
| | 006 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | Baro Corrected Altitude #3 | X | | | | |
| | 01A | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | Flight Leg Counter | X | | | | 6-19 |
| | 038 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | Baro Corrected Altitude #3 | X | | | | |
| | | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | VDR #1 - System Address Label | | | | X | See Attachment 11 |
| 252 | 001 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Time to Go | X | | | | |
| | 002 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Time to Go | X | | | | |
| | 006 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Baro Corrected Altitude #4 | X | | | | |
| | 01A | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | EPR Idle | X | | | | |
| | 02F | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | EPR Idle Reference | X | | | | |
| | 038 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Baro Corrected Altitude #4 | X | | | | |
| | 03F | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | EPR Idle Reference | X | | | | |
| | 0EB | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | Time Until Jettison Complete | X | | | | |
| | | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | VDR #2 - System Address Label | | | | X | See Attachment 11 |
| 253 | 002 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Go-Around N1 Limit | X | | | | |
| | 01E | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Go-Around EPR Limit | X | | | | |
| | 038 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | Corrected Side Slip Angle | X | | | | |
| | | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | VDR #3 - System Address Label | | | | X | See Attachment 11 |
| 254 | 002 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | Cruise N1 Limit | X | | | | |
| | 012 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | ADF Ground Station Ident Word #1 | | | X | | |
| | 01E | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | Cruise EPR Limit | X | | | | |
| | 04D | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | Actual Fuel Quantity (test) | X | | | | |
| | 055 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | GBAS ID | | | X | | |
| | 13A | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | N1 Cruise | X | | | | |
| | 140 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | Altitude Rate | X | | | | |
| | | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | Network Server System (NSS) - System Address Label | | | | X | See Attachment 11 |

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 2 5 5 | 0 0 2 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Climb N1 Limit | X | | | | |
| | 0 1 2 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | ADF Ground Station Ident Word #2 | | | X | | |
| | 0 1 E | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Climb EPR Limit | X | | | | |
| | 0 2 F | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Max. Climb EPR Rating | X | | | | |
| | 0 3 F | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Max. Climb EPR Rating | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Fuel Quantity (gal) | X | | | | |
| | 0 5 5 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | GBAS ID/ Airport ID | | | X | | |
| | 0 8 E | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Spoiler Position | X | | | | |
| | 1 3 A | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | N1 Climb | X | | | | |
| | 1 4 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Impact Pressure | X | | | | |
| | | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | Electronic Flight Bag - Left - System Address Label | | | | X | See Attachment 11 |
| 2 5 6 | 0 0 2 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Time for Climb | X | | | | |
| | 0 0 A | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | V Stick Shaker | X | | | | |
| | 0 2 7 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | MLS Ground Station Ident Word #1 | | | X | | |
| | 0 2 C | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Fuel Quantity (Tanks) #1 | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Fuel Discretes | | | X | | |
| | 0 5 5 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | MLS Station ID #1 | | | X | | |
| | 0 5 6 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Time for Climb | X | | | | |
| | 0 5 A | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Fuel Quantity - Left Outer Cell | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Time for Climb | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Left Outer Tank Fuel Quantity | X | | | | |
| | 1 4 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Equivalent Airspeed | X | | | | |
| | | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | Electronic Flight Bag -Right - System Address Label | | | | | See Attachment 11 |
| 2 5 7 | 0 0 2 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | Time for Descent | X | | | | |
| | 0 2 7 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | MLS Ground Station Ident Word #2 | | | X | | |
| | 0 2 C | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | Fuel Quantity (Tanks) #2 | X | | | | |
| | 0 5 5 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | MLS Station ID #2 | | | | | |
| | 0 5 6 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | Time for Descent | X | | | | |
| | 0 5 A | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | Fuel Quantity Left W/T Tank | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | Time for Descent | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | Inner Tank 1 Fuel Quantity | X | | | | |
| | 1 4 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | Total Pressure (High Range) | X | | | | |
| 2 6 0 | 0 0 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Date/Flight Leg | | X | | | 6-8 |
| | 0 0 B | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Date | | X | | | |
| | 0 2 C | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Fuel Quantity (Tanks) #3 | X | | | | |
| | 0 3 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Date (No Flight Leg) | | X | | | 6-18 |
| | 0 3 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | T5 | X | | | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Date/Flight Leg | | X | | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Fuel Quantity Center Tank | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Date/Flight Leg | | X | | | 6-8 |
| | 0 A 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Date/Flight Leg | | X | | | 6-8 |
| | 1 0 A | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | LP Turbine Discharge Temperature | X | | | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | LP Turbine Discharge Temperature | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | Collector Cell 1 and 2 Fuel Quantity | X | | | | |
| 2 6 1 | 0 0 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Flight Number | | X | | | 6-9 |
| | 0 2 C | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Fuel Quantity (Tanks) #4 | X | | | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | P49 | X | | | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Flight Number (BCD) | | X | | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Fuel Quantity Right I/C or W/T Tank | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Flight Number (BCD) | | X | | | |
| | 0 A 2 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Flight Number | | X | | | 6-9 |
| | 1 0 A | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | LP Turbine Inlet Pressure | X | | | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | LP Turbine Inlet Pressure | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Fuel On Board At Engine Start | X | | | | |
| | 1 4 4 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | Range Ring Radius | X | | | | 6-52 |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 2 6 2 | 0 0 2 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Documentary Data | X | | | | 6-14 |
| | 0 0 A | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Predictive Airspeed Variation | X | | | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | LP Compressor Exist Pressure (PT3) | X | | | | |
| | 0 2 C | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Fuel Quantity (Tanks) #5 | X | | | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | LP Compressor Exist Pressure | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | T/U CAP-L Tank 1-4 | X | | | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Documentary Data | X | | | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Fuel Quantity - Right Outer Cell | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Documentary Data | X | | | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | HP Compressor Inlet Total Pressure | X | | | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | HP Compressor Inlet Total Pressure | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Center Tank Fuel Quantity | X | | | | |
| | 1 4 4 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | Display Range | X | | | | 6-51 |
| 2 6 3 | 0 0 2 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Minimum Airspeed for Flap Retraction | X | | | | |
| | 0 0 A | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Minimum Airspeed for Flap Retraction | X | | | | |
| | 0 1 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | ILS Ground Station Ident Word #1 | | | X | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | LP Compressor Exit Temperature | X | | | | |
| | 0 2 C | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Fuel Quantity (Tanks) #6 | X | | | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | LP Compressor Exit Temperature | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | T/U CAP-L Tank 5-8 | X | | | | |
| | 0 5 5 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Ground Station/Approach | | | X | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Minimum Airspeed For Flap Retraction | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Minimum Airspeed For Flap Retraction | X | | | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Selected Compressor Inlet Temperature (Total) | X | | | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Selected Compressor Inlet Temperature (Total) | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | Collector Cell 3 and 4 Fuel Quantity | X | | | | |
| 2 6 4 | 0 0 2 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Time to Touchdown | X | | | | |
| | 0 0 A | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Minimum Airspeed for Slats Retraction | X | | | | |
| | 0 1 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | ILS Ground Station Ident Word #2 | | | X | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | HP Compressor Exit Pressure | X | | | | |
| | 0 2 C | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Fuel Quantity (Tanks) #7 | X | | | | |
| | 0 2 F | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Burner Pressure | X | | | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | HP Compressor Exit Pressure | X | | | | |
| | 0 3 F | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Burner Pressure | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | T/U CAP-L Tank 9-12 | X | | | | |
| | 0 5 5 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Ground Station/Approach | | | X | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Time to Touchdown | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Time to Touchdown | X | | | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Selected Compressor Discharge Temperature | X | | | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Selected Compressor Discharge Temperature | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Fuel Quantity (Tanks) #7 | X | | | | |
| | 1 3 A | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | Burner Pressure | X | | | | |
| 2 6 5 | 0 0 2 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Minimum Buffet Airspeed | X | | | | |
| | 0 0 4 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Integrated Vertical Acceleration | X | | | | |
| | 0 0 A | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Maneuvering Airspeed | X | | | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | HP Compressor Exit Temperature (TT4.5) | X | | | | |
| | 0 2 C | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Fuel Quantity (Tanks) #8 | X | | | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | HP Compressor Exit Temperature | X | | | | |
| | 0 3 8 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Integrated Vertical Acceleration | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | T/U CAP-L Tank 13-14 | X | | | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Minimum Buffet Airspeed | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Minimum Buffet Airspeed | X | | | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Selected Compressor Discharge Temperature | X | | | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Selected Compressor Discharge Temperature | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | Inner Tank 3 Fuel Quantity | X | | | | |
| 2 6 6 | 0 0 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | Test Word B | | | X | | |
| | 0 1 D | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | Test Word B | | | X | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | T/U CAP-C Tank 1-4 | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | Inner Tank 2 Fuel Quantity | X | | | | |
| | | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | Cabin Video System - System Address Label | | | | X | See Attachment 11 |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 2 6 7 | 0 0 2 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | Maximum Maneuver Airspeed | X | | | | |
| | 0 0 A | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | Predictive Maximum Maneuver Speed | X | | | | |
| | 0 2 B | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | Throttle Position Command | X | | | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | Spare T/C | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | T/U CAP-C Tank 5-8 | X | | | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | Maximum Maneuver Airspeed | X | | | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | Maximum Maneuver Airspeed | X | | | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | HP Compressor Inlet Temperature (Total) | X | | | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | HP Compressor Inlet Temperature (Total) | X | | | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | Inner Tank 4 Fuel Quantity | X | | | | |
| 2 7 0 | 0 0 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 0 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 0 4 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 0 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 0 6 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 0 B | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 1 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 1 B | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 1 E | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 2 3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | GPWS Discrete | | | X | | |
| | 0 2 4 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | MU Output Data Word, Communication Link Status | | | X | | |
| | 0 2 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 2 7 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 2 9 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 2 F | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 7 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 8 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 9 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | MCDU Normal Discrete Word | | | X | | |
| | 0 3 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 B | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 D | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 E | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 3 F | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 4 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | SDU To ACARS MU/CMU Status Word | | | X | | |
| | 0 4 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | T/U CAP-C Tank 9 | X | | | | |
| | 0 5 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | VDR Status Word | | | X | | |
| | 0 5 3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | HFDL Status Word | | | X | | |
| | 0 5 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | MLS Discrete | | | X | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Status Discretes | | | X | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Intent Status | | | X | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Status Discretes | | | X | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 A 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 A 8 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 A D | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 0 C 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Unusable, and Empty Warning | | | X | | |
| | 1 1 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Stored TACAN Control Word | | | X | | |
| | 1 4 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Discrete Data #1 | | | X | | |
| | 1 4 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Aircraft Category (Disc Data 1) | | | X | | |
| | 1 4 4 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | Display Mode | | | X | | |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 2 7 1 | 0 0 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 0 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | AHRS Discrete | | | X | | |
| | 0 0 6 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 1 8 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 1 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 1 E | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 2 9 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 2 F | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 3 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 3 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 3 8 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 3 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 3 B | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 3 F | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 4 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | SDU To ACARS MU/CMU Join/Leave Message | | | X | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | T/U CAP-A Tank 1-4 | X | | | | |
| | 0 5 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | MMR Discrete | | | X | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Fuel Density | | | X | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 A 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 A 8 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 A D | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 0 C 5 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Fuel Transfer Indication | | | X | | |
| | 1 4 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Discrete Data #2 | | | X | | |
| | 1 4 2 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Altitude Filter Limits (Disc Data 2) | | | X | | |
| | 1 4 4 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | Altitude Filter Setting | | | X | | |
| 2 7 2 | 0 0 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 0 2 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 0 3 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 0 5 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Air Data AHARS | | | | | |
| | 0 1 8 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 1 A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 2 5 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 2 9 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 2 F | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 3 5 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 3 8 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 3 A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 3 B | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 3 F | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | T/U CAP-A Tank 5-8 | X | | | | |
| | 0 5 3 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | HFDL Slave (Disc Data 2) | | | X | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Fuel Density | | X | | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 A D | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 0 C 5 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Fuel Transfer Indication | | | X | | |
| | 1 4 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Discrete Data #3 | | | X | | |
| | 1 4 4 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | Target Selection Word | | | X | | |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 2 7 3 | 0 0 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 0 3 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 0 B | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | GNSS Sensor Status | | | X | | |
| | 0 1 8 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 2 5 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 2 9 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 2 F | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 3 5 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 3 B | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 3 F | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | T/U CAP-A Tank 9-11 | X | | | | |
| | 0 5 5 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | GNSS Status | | | X | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Sensor Valves Left Wing Tank | | X | | | |
| | 0 C 5 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Discrete Data #4 | | | X | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | Memos and Status | | | X | | |
| 2 7 4 | 0 0 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 0 3 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 0 A | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 1 8 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 2 5 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 2 9 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 2 F | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 3 3 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 3 5 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 3 B | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 3 F | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | T/U CAP-R Tank 1-4 | X | | | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Sensor Valves Center Wing Tank | | X | | | |
| | 0 C 5 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Discrete Data #5 | | | X | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | Fuel Transfer Indications | | | X | | |
| 2 7 5 | 0 0 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 0 2 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 0 3 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 1 8 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 1 C | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 2 5 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 2 9 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 2 B | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 2 F | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 3 5 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 3 8 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | IR Discrete Word #2 | | | X | | |
| | 0 3 B | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 3 F | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 4 A | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | T/U CAP-R Tank 5-8 | X | | | | |
| | 0 4 D | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 5 A | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Sensor Valves Right Wing Tank | | X | | | |
| | 0 5 6 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 0 6 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 1 0 A | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 1 0 B | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Discrete Data #6 | | | X | | |
| | 1 1 4 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | Miscellaneous Warning | | | X | | |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 276 | 002 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 018 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 01C | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 025 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Status 8 EFIS | | | X | | |
| | 029 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 02F | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 03F | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 04D | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | T/U CAP-R Tank 9-12 | X | | | | |
| | 050 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | VDR Mode | | | X | | |
| | 056 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 058 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Output Status Word #2 | | | X | | |
| | 05A | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 060 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 0BB | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 114 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | Discrete Data #7 | | | X | | |
| | 001 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | FCC to Simulator Control Word - Simulator Use Only | X | | | | |
| | 002 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | FMC to Simulator Control Word - Simulator Use Only | X | | | | |
| | 003 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | TCC to Simulator Control Word - Simulator Use Only | X | | | | |
| 277 | XXX | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | General Test Word | | | X | | Note 1 |
| | 004 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | IRS Maintenance Discrete | | | X | | |
| | 018 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Discrete Data #8 | | | X | | |
| | 038 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | IR Test | | | X | | |
| | 04D | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | T/U CAP-R Tank 13-14 | X | | | | |
| | 114 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | Fuel Transfer and CG Status | | | X | | |
| 300 | 001 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Application Dependent | | | X | | |
| | 01A | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Application Dependent | | | X | | |
| | 03D | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Application Dependent | | | X | | |
| | 05A | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Internal Parameter for SPATIAAL | X | | | | |
| | 10A | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | ECU Internal Temperature | X | | | | |
| | 10B | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | ECU Internal Temperature | X | | | | |
| | TBD | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Data Loader Address Label (Low Speed) | | | X | | |
| | | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | FMC 1 - System Address Label | | | | X | See Attachment 11 |
| 301 | 001 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Application Dependent | | | X | | |
| | 002 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Application Dependent | | | X | | |
| | 01A | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Application Dependent | | | X | | |
| | 056 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Application Dependent | | | X | | |
| | 05A | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Internal Parameter for SPATIAAL | X | | | | |
| | 060 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Application Dependent | | | X | | |
| | 10A | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Demanded Fuel Metering Valve Position | X | | | | |
| | 10B | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | Demanded Fuel Metering Valve Position | X | | | | |
| | | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | FMC 2 - System Address Label | | | | X | See Attachment 11 |
| 302 | 001 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Application Dependent | | | X | | |
| | 002 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Application Dependent | | | X | | |
| | 01A | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Application Dependent | | | X | | |
| | 056 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Application Dependent | | | X | | |
| | 05A | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Internal Parameter for SPATIAAL | X | | | | |
| | 060 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Application Dependent | | | X | | |
| | 10A | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Demanded Variable Stator Vane Position | X | | | | |
| | 10B | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | Demanded Variable Stator Vane Position | X | | | | |
| | | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | AIDS (DFDAU) - System Address Label | | | | X | See Attachment 11 |
| 303 | 001 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Application Dependent | | | X | | |
| | 002 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Application Dependent | | | X | | |
| | 01A | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Application Dependent | | | X | | |
| | 056 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Application Dependent | | | X | | |
| | 05A | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Internal Parameter for SPATIAAL | X | | | | |
| | 060 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Application Dependent | | | X | | |
| | 10A | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Demanded Variable Bleed Valve Position | X | | | | |
| | 10B | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | Demanded Variable Bleed Valve Position | X | | | | |
| | | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | CFDIU - System Address Label | | | | X | See attachment 11 |
| 304 | 001 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Application Dependent | | | X | | |
| | 01A | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Application Dependent | | | X | | |
| | 05A | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Internal Parameter for SPATIAAL | X | | | | |
| | 10A | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Demanded HPT Clearance Valve Position | X | | | | |
| | 10B | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | Demanded HPT Clearance Valve Position | X | | | | |
| | | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | ACARS - System Address Label | | | | X | See Attachment 11 |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 3 0 5 | 0 0 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Application Dependent | | | X | | |
| | 0 1 A | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Application Dependent | | | X | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Internal Parameter for SPATIAAL | X | | | | |
| | 1 0 A | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Demanded LPT Clearance Valve Position | X | | | | |
| | 1 0 B | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Demanded LPT Clearance Valve Position | X | | | | |
| | | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | Weight/Balance System - System Address Label | | | | X | See Attachment 11 |
| 3 0 6 | 0 0 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | Application Dependent | | | X | | |
| | 0 1 A | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | Application Dependent | | | X | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | Internal Parameter for SPATIAAL | X | | | | |
| | | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | TCAS - System Address Label | | | | X | See Attachment 11 |
| 3 0 7 | 0 0 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | Application Dependent | | | X | | |
| | 0 1 A | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | Application Dependent | | | X | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | Internal Parameter for SPATIAAL | X | | | | |
| | | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | Satellite Data Unit (SDU) - System Address Label | | | | X | See Attachment 11 |
| 3 1 0 | 0 0 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Present Position - Latitude | X | | | | 6-27 |
| | 0 0 4 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Present Position - Latitude | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Aileron Position | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Present Position - Latitude | X | | | | |
| | 0 4 D | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | COMP CAP - TANK | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Present Position Latitude | X | | | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Internal Parameter for SPATIAAL | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Present Postion Latitude | X | | | | |
| | 1 1 4 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | Right Outer Tank Fuel Quantity | X | | | | |
| | | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | GPWS - System Address Label | | | | X | See Attachment 11 |
| 3 1 1 | 0 0 2 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Present Position - Longitude | X | | | | 6-27 |
| | 0 0 4 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Present Position - Longitude | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Aileron Trim | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Present Position - Longitude | X | | | | |
| | 0 3 B | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Control Wheel Roll Force | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Present Postion Longitude | X | | | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Internal Parameter for SPATIAAL | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Present Position Longitude | X | | | | |
| | 1 1 4 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | Right Outer Tank Fuel Quantity | X | | | | |
| | | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | GNLU 1 - System Address Label | | | | X | See Attachment 11 |
| 3 1 2 | 0 0 2 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | X | | | | 6-27 |
| | 0 0 4 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Rudder Position | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | X | | | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Fuel Quantity ACT 1 | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Ground Speed | X | | | | |
| | 1 1 4 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | Additional Center Tank (Act 1) Fuel Quantity | X | | | | |
| | | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | GNLU 2 - System Address Label | | | | X | See Attachment 11 |
| 3 1 3 | 0 0 2 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | X | | | | |
| | 0 2 5 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Rudder Trim | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | X | | | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Fuel Quantity ACT 2 | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Track Angle - True | X | | | | |
| | 1 1 4 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | Additional Center Tank (Act 2) Fuel Quantity | X | | | | |
| | | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | GNLU 3 - System Address Label | | | | X | See Attachment 11 |
| 3 1 4 | 0 0 2 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | Stabilizer Position Indication (B747-400) | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | True Heading | X | | | | |
| | 0 2 5 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | True Heading | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | Elevator Position | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | True Heading | X | | | | |
| | 0 3 B | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | Control Wheel Pitch Force | X | | | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | Internal Parameter for SPATIAAL | X | | | | |
| | 1 1 4 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | Rear Center Tank (RCT) Fuel Quantity | X | | | | |
| | | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | GNU 1 - System Address Label | | | | X | See Attachment 11 |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 3 1 5 | 0 0 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Stabilizer Position | X | | | | |
| | 0 0 2 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Stabilizer Position | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | X | | | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Internal Parameter for SPATIAAL | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Wind Speed | X | | | | |
| | 0 A 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | Stabilizer Position | X | | | | |
| | | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | GNU 2 - System Address Label | | | | X | See Attachment 11 |
| 3 1 6 | 0 0 2 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Wind Direction (True) | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Wind Angle | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Oil Temperature (Engine) | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Wind Angle | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Wind Direction (True) | X | | | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Internal Parameter for SPATIAAL | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Wind Direction (True) | X | | | | |
| | 0 D 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Engine Oil Temperature | X | | | | |
| | 1 0 A | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Engine Oil Temperature | X | | | | |
| | 1 0 B | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | Engine Oil Temperature | X | | | | |
| | | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | GNU 3 - System Address Label | | | | X | See Attachment 11 |
| 3 1 7 | 0 0 2 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Track Angle - Magnetic | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Track Angle - Magnetic | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Track Angle - Magnetic | X | | | | |
| | 0 2 5 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Track Angle - Magnetic | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Oil Pressure (Engine) | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Track Angle - Magnetic | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Track Angle - Magnetic | X | | | | |
| | 0 5 A | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Internal Parameter for SPATIAAL | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Track Angle - Magnetic | X | | | | |
| | 0 D 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | Oil Pressure (Engine) | X | | | | |
| 3 2 0 | 0 0 4 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Magnetic Heading | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Magnetic Heading | X | | | | |
| | 0 2 5 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Magnetic Heading | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Engine Fuel Pressure | X | | | | |
| | 0 3 5 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Own Aircraft Magnetic Heading | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Magnetic Heading | X | | | | |
| | 0 4 D | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Density - Tank | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Magnetic Heading | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | Magnetic Heading | X | | | | |
| 3 2 1 | 0 0 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Drift Angle | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Drift Angle | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Drift Angle | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Engine Fuel Temperature | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Drift Angle | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Drift Angle | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Drift Angle | X | | | | |
| | 1 0 A | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Exhaust gas Temperature (Total) | X | | | | |
| | 1 0 B | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Exhaust gas Temperature (Total) | X | | | | |
| | | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | Autothrottle Computer - System Address Label | | | | X | See Attachment 11 |
| 3 2 2 | 0 0 2 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Flight Path Angle | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Flight Path Angle | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Flight Path Angle | X | | | | |
| | 0 2 9 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Engine Nacelle Temperature | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Flight Path Angle | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Flight Path Angle | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Flight Path Angle | X | | | | |
| | 1 0 A | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Total Compressor Discharge Temperature | X | | | | |
| | 1 0 B | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | Total Compressor Discharge Temperature | X | | | | |
| | | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | FCC 1 - System Address Label | | | | X | See Attachment 11 |

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 2 | 3 4 5 | 6 7 8 | | BNR | BCD | DISC | SAL | |
| 3 2 3 | 0 0 2 | 1 1 | 0 1 0 | 0 1 1 | Geometric Altitude | X | | | | |
| | 0 0 4 | 1 1 | 0 1 0 | 0 1 1 | Flight Path Acceleration | X | | | | 6-27 |
| | 0 0 5 | 1 1 | 0 1 0 | 0 1 1 | Flight Path Acceleration | X | | | | |
| | 0 3 8 | 1 1 | 0 1 0 | 0 1 1 | Flight Path Acceleration | X | | | | |
| | 0 5 6 | 1 1 | 0 1 0 | 0 1 1 | Geometric Altitude | X | | | | |
| | 0 6 0 | 1 1 | 0 1 0 | 0 1 1 | Geometric Altitude | X | | | | |
| | 1 0 A | 1 1 | 0 1 0 | 0 1 1 | Variable Stator Vane Position | X | | | | |
| | 1 0 B | 1 1 | 0 1 0 | 0 1 1 | Variable Stator Vane Position | X | | | | |
| | | 1 1 | 0 1 0 | 0 1 1 | FCC 2 - System Address Label | | | | X | See Attachment 11 |
| 3 2 4 | 0 0 4 | 1 1 | 0 1 0 | 1 0 0 | Pitch Angle | X | | | | |
| | 0 0 5 | 1 1 | 0 1 0 | 1 0 0 | Pitch Angle | X | | | | |
| | 0 2 5 | 1 1 | 0 1 0 | 1 0 0 | Pitch Angle | X | | | | |
| | 0 3 8 | 1 1 | 0 1 0 | 1 0 0 | Pitch Angle | X | | | | |
| | 0 4 D | 1 1 | 0 1 0 | 1 0 0 | Tank VSO Quantity | X | | | | |
| | 0 5 A | 1 1 | 0 1 0 | 1 0 0 | Effective Pitch Angle | X | | | | |
| | 1 0 A | 1 1 | 0 1 0 | 1 0 0 | Selected Fuel Metering Valve Position | X | | | | |
| | 1 0 B | 1 1 | 0 1 0 | 1 0 0 | Selected Fuel Metering Valve Position | X | | | | |
| | 1 1 4 | 1 1 | 0 1 0 | 1 0 0 | Effective Pitch Angle | X | | | | |
| | | 1 1 | 0 1 0 | 1 0 0 | FCC 3 - System Address Label | | | | X | See Attachment 11 |
| 3 2 5 | 0 0 4 | 1 1 | 0 1 0 | 1 0 1 | Roll Angle | X | | | | |
| | 0 0 5 | 1 1 | 0 1 0 | 1 0 1 | Roll Angle | X | | | | |
| | 0 1 A | 1 1 | 0 1 0 | 1 0 1 | Engine Control Trim Feedback | X | | | | |
| | 0 2 5 | 1 1 | 0 1 0 | 1 0 1 | Roll Angle | X | | | | |
| | 0 2 F | 1 1 | 0 1 0 | 1 0 1 | Stator Vane Feedback | X | | | | |
| | 0 3 8 | 1 1 | 0 1 0 | 1 0 1 | Roll Angle | X | | | | |
| | 0 3 F | 1 1 | 0 1 0 | 1 0 1 | Stator Vane Feedback | X | | | | |
| | 0 5 A | 1 1 | 0 1 0 | 1 0 1 | Effective Roll Angle | X | | | | |
| | 1 0 A | 1 1 | 0 1 0 | 1 0 1 | Selected Fuel Metering Vane Position | X | | | | |
| | 1 0 B | 1 1 | 0 1 0 | 1 0 1 | Selected Fuel Metering Vane Position | X | | | | |
| | 1 1 4 | 1 1 | 0 1 0 | 1 0 1 | Effective Roll Angle | X | | | | |
| | | 1 1 | 0 1 0 | 1 0 1 | APU - System Address Label | | | | X | See Attachment 11 |
| 3 2 6 | 0 0 4 | 1 1 | 0 1 0 | 1 1 0 | Body Pitch Rate | X | | | | |
| | 0 0 5 | 1 1 | 0 1 0 | 1 1 0 | Body Pitch Rate | X | | | | |
| | 0 3 8 | 1 1 | 0 1 0 | 1 1 0 | Body Pitch Rate | X | | | | |
| | 0 4 D | 1 1 | 0 1 0 | 1 1 0 | Uplift Quantity | X | | | | |
| | 0 5 A | 1 1 | 0 1 0 | 1 1 0 | Maintenance Word | X | | | | |
| | 1 0 A | 1 1 | 0 1 0 | 1 1 0 | Compressor Discharge Static Pressure | X | | | | |
| | 1 0 B | 1 1 | 0 1 0 | 1 1 0 | Compressor Discharge Static Pressure | X | | | | |
| | | 1 1 | 0 1 0 | 1 1 0 | APU Controller - System Address Label | | | | X | See Attachment 11 |
| 3 2 7 | 0 0 4 | 1 1 | 0 1 0 | 1 1 1 | Body Roll Rate | X | | | | |
| | 0 0 5 | 1 1 | 0 1 0 | 1 1 1 | Body Roll Rate | X | | | | |
| | 0 3 8 | 1 1 | 0 1 0 | 1 1 1 | Body Roll Rate | X | | | | |
| | 0 4 D | 1 1 | 0 1 0 | 1 1 1 | Uplift Density | X | | | | |
| | 1 0 A | 1 1 | 0 1 0 | 1 1 1 | Fuel Metering Valve Position | X | | | | |
| | 1 0 B | 1 1 | 0 1 0 | 1 1 1 | Fuel Metering Valve Position | X | | | | |
| | | 1 1 | 0 1 0 | 1 1 1 | Mode Control Panel (MCP) - System Address Label | | | | X | See Attachment 11 |
| 3 3 0 | 0 0 4 | 1 1 | 0 1 1 | 0 0 0 | Body Yaw Rate | X | | | | |
| | 0 0 5 | 1 1 | 0 1 1 | 0 0 0 | Body Yaw Rate | X | | | | |
| | 0 2 F | 1 1 | 0 1 1 | 0 0 0 | HC/TC Cooling Valve Position Feedback | X | | | | |
| | 0 3 8 | 1 1 | 0 1 1 | 0 0 0 | Body Yaw Rate | X | | | | |
| | 0 3 F | 1 1 | 0 1 1 | 0 0 0 | HC/TC Cooling Valve Position Feedback | X | | | | |
| | 1 0 A | 1 1 | 0 1 1 | 0 0 0 | Selected HPT Clearance Valve Postion | X | | | | |
| | 1 0 B | 1 1 | 0 1 1 | 0 0 0 | Selected HPT Clearance Valve Postion | X | | | | |
| | | 1 1 | 0 1 1 | 0 0 0 | FMC 3 - System Address Label | | | | X | See Attachment 11 |
| 3 3 1 | 0 0 4 | 1 1 | 0 1 1 | 0 0 1 | Body Longitudinal Acceleration | X | | | | |
| | 0 0 5 | 1 1 | 0 1 1 | 0 0 1 | Body Longitudinal Acceleration | X | | | | |
| | 0 2 F | 1 1 | 0 1 1 | 0 0 1 | LTC Cooling Valve Position Feedback | X | | | | |
| | 0 3 8 | 1 1 | 0 1 1 | 0 0 1 | Body Longitudinal Acceleration | X | | | | |
| | 0 3 F | 1 1 | 0 1 1 | 0 0 1 | LTC Cooling Valve Position Feedback | X | | | | |
| | 1 0 A | 1 1 | 0 1 1 | 0 0 1 | Selected LPT Clearance Valve Position | X | | | | |
| | 1 0 B | 1 1 | 0 1 1 | 0 0 1 | Selected LPT Clearance Valve Position | X | | | | |
| | | 1 1 | 0 1 1 | 0 0 1 | ATC Transponder - System Address Label | | | | X | See Attachment 11 |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 3 3 2 | 0 0 4 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | Body Lateral Acceleration | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | Body Lateral Acceleration | X | | | | |
| | 0 2 F | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | A/O Heat Exchanger Valve Postion Feedback | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | Body Lateral Acceleration | X | | | | |
| | 0 3 F | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | A/O Heat Exchanger Valve Postion Feedback | X | | | | |
| | | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | DADC - System Address Label | | | | X | See Attachment 11 |
| 3 3 3 | 0 0 4 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | Body Normal Acceleration | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | Body Normal Acceleration | X | | | | |
| | 0 2 F | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | Acceleration Fuel Flow Limit | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | Body Normal Acceleration | X | | | | |
| | 0 3 F | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | Acceleration Fuel Flow Limit | X | | | | |
| 3 3 4 | 0 0 4 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Platform Heading | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Platform Heading | X | | | | |
| | 0 2 F | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Fuel Flow Command | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Platform Heading | X | | | | |
| | 0 3 F | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | Fuel Flow Command | X | | | | |
| | | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | CTU - System Address Label | | | | X | See Attachment 11 |
| 3 3 5 | 0 0 2 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Track Angle Rate | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Track Angle Rate | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Track Angle Rate | X | | | | |
| | 0 2 F | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 2.5 Bld Actuator Postion | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Track Angle Rate | X | | | | |
| | 0 3 F | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 2.5 Bld Actuator Postion | X | | | | |
| | 0 5 6 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Track Angle Rate | X | | | | |
| | 0 6 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Track Angle Rate | X | | | | |
| | 1 0 A | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Selected Variable Bleed Valve Position | X | | | | |
| | 1 0 B | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | Selected Variable Bleed Valve Position | X | | | | |
| 3 3 6 | 0 0 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Maximum Climb Angle | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Inertial Pitch Rate | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Inertial Pitch Rate | X | | | | |
| | 0 1 A | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Engine Torque | X | | | | |
| | 0 2 F | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | N2 Corrected to Sta. 2.5 | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Inertial Pitch Rate | X | | | | |
| | 0 3 F | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | N2 Corrected to Sta. 2.5 | X | | | | |
| | 1 0 A | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Variable Bleed Value Position | X | | | | |
| | 1 0 B | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | Variable Bleed Value Position | X | | | | |
| 3 3 7 | 0 0 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | EPR - Required for Level Flight | X | | | | |
| | 0 0 2 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | N1 - Required for Level Flight | X | | | | |
| | 0 0 4 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Inertial Roll Rate | X | | | | |
| | 0 0 5 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Inertial Roll Rate | X | | | | |
| | 0 1 A | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Engine Rating | X | | | | |
| | 0 3 8 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | Inertial Roll Rate | X | | | | |
| | 1 0 A | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | HPT Clearance Valve Position | X | | | | |
| | 1 0 B | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | HPT Clearance Valve Position | X | | | | |
| 3 4 0 | 0 0 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | EPR Actual | X | | | | |
| | 0 0 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Inertial Yaw Rate | X | | | | |
| | 0 0 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Track Angle Rate | X | | | | |
| | 0 0 5 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Inertial Yaw Rate | X | | | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | EPR Actual | X | | | | |
| | 0 2 9 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | EPR Actual (Engine Direct) | X | | | | |
| | 0 2 D | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | EPR Actual | X | | | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | EPR Actual | X | | | | |
| | 0 3 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | EPR Actual | X | | | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | EPR Actual | X | | | | |
| | 1 3 A | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | N1 Take Off | X | | | | |
| | 1 4 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | Pressure Ratio (Pt/Ps) | X | | | | |
| | | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | HF DATA Radio/Data #1 - System Address Label | | | | X | See Attachment 11 |

## ATTACHMENT 1-1
## LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 3 4 1 | 0 0 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Target N1 | X | | | | |
| | 0 0 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | N1 Command | X | | | | |
| | 0 0 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | EPR Command | X | | | | |
| | 0 0 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Grid Heading | X | | | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | N1 Command | X | | | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | EPR Command | X | | | | |
| | 0 2 9 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | N1 Command (Engine) | X | | | | |
| | 0 2 9 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | EPR Command (Engine) | X | | | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | N1 Command | X | | | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | EPR Command | X | | | | |
| | 0 3 8 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Grid Heading | X | | | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | EPR Command | X | | | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | I/O S/W REV 1&2 | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Command Fan Speed | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Command Fan Speed | X | | | | |
| | 1 3 A | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | N1 Reference | X | | | | |
| | 1 4 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | Pressure Ratio (Ps/Pso) | X | | | | |
| 3 4 2 | 0 0 2 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | N1 Bug Drive | X | | | | |
| | 0 0 3 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | N1 Limit | X | | | | |
| | 0 0 3 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | EPR Limit | X | | | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | N1 Maximum | X | | | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | EPR Maximum | X | | | | |
| | 0 2 9 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | N1 Limit (TCC) | X | | | | |
| | 0 2 9 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | EPR Limit (TOC) | X | | | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Maximum Available EPR | X | | | | |
| | 0 3 B | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | N1 Limit | X | | | | |
| | 0 3 B | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | EPR Limit | X | | | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Maximum Available EPR | X | | | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | S/W Rev-Tank | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Maximum Allowed Fan Speed | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Maximum Allowed Fan Speed | X | | | | |
| | 1 4 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | Air Density Ratio | X | | | | |
| 3 4 3 | 0 0 3 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | N1 Derate | X | | | | |
| | 0 0 3 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | EPR Rate | X | | | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | N1 Demand | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | N1 Command vs. TLA | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | N1 Command vs. TLA | X | | | | |
| 3 4 4 | 0 1 A | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | N2 | X | | | | |
| | 0 1 C | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | N2 | X | | | | |
| | 0 2 9 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | N2 | X | | | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | N2 | X | | | | |
| | 0 3 3 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | N2 | X | | | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | N2 | X | | | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | Fuel Discretes | | | X | | |
| | 0 D 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | N2 | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | Selected Actual Core Speed | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | Selected Actual Core Speed | X | | | | |
| | 1 3 A | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | N2 Speed | X | | | | |
| | | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | HF DATA Radio/Data #2 - System Address Label | | | | X | See Attachment 11 |
| 3 4 5 | 0 0 2 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | NDB Effectivity | | X | | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Exhaust Gas Temperature | X | | | | |
| | 0 1 C | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Exhaust Gas Temperature | X | | | | |
| | 0 2 9 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Exhaust Gas Temperature | X | | | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Exhaust Gas Temperature | X | | | | |
| | 0 3 3 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Exhaust Gas Temperature | X | | | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Exhaust Gas Temperature | X | | | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Discretes Status 1&3 | | | X | | |
| | 0 D 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | EGT | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Selected Exhaust Gas Temperature (Total) | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Selected Exhaust Gas Temperature (Total) | X | | | | |
| | 1 3 A | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | EGT Trimmed | X | | | | |
| | | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | Remote Data Concentrator - System Address Label | | | | X | |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 2 | 3 4 5 | 6 7 8 | | BNR | BCD | DISC | SAL | |
| 3 4 6 | 0 0 3 | 1 1 | 1 0 0 | 1 1 0 | N1 Actual | X | | | | |
| | 0 1 A | 1 1 | 1 0 0 | 1 1 0 | N1 Actual | X | | | | |
| | 0 2 F | 1 1 | 1 0 0 | 1 1 0 | N1 Actual | X | | | | |
| | 0 3 3 | 1 1 | 1 0 0 | 1 1 0 | N1 Actual | X | | | | |
| | 0 3 F | 1 1 | 1 0 0 | 1 1 0 | N1 Actual | X | | | | |
| | 0 4 D | 1 1 | 1 0 0 | 1 1 0 | Cable Cap-Hi-Z | X | | | | |
| | 0 D 0 | 1 1 | 1 0 0 | 1 1 0 | N1 | X | | | | |
| | 1 0 A | 1 1 | 1 0 0 | 1 1 0 | Selected Actual Fan Speed | X | | | | |
| | 1 0 B | 1 1 | 1 0 0 | 1 1 0 | Selected Actual Fan Speed | X | | | | |
| | 1 3 A | 1 1 | 1 0 0 | 1 1 0 | N1 Speed Actual | X | | | | |
| 3 4 7 | 0 1 8 | 1 1 | 1 0 0 | 1 1 1 | Antenna Control | X | | | | |
| | 0 2 9 | 1 1 | 1 0 0 | 1 1 1 | Fuel Flow (Engine) | X | | | | |
| | 0 3 0 | 1 1 | 1 0 0 | 1 1 1 | Sector Control | X | | | | |
| | 0 3 5 | 1 1 | 1 0 0 | 1 1 1 | Antenna Control | X | | | | |
| | 0 D 0 | 1 1 | 1 0 0 | 1 1 1 | Fuel Flow | X | | | | |
| | 1 0 A | 1 1 | 1 0 0 | 1 1 1 | LPT Clearance Valve Position | X | | | | |
| | 1 0 B | 1 1 | 1 0 0 | 1 1 1 | LPT Clearance Valve Position | X | | | | |
| | 1 3 A | 1 1 | 1 0 0 | 1 1 1 | Fuel Flow | X | | | | |
| 3 5 0 | 0 0 3 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 0 4 | 1 1 | 1 0 1 | 0 0 0 | IRS Maintenance Discrete | | | X | | |
| | 0 0 6 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 0 B | 1 1 | 1 0 1 | 0 0 0 | GPS Test Word (manufacturer specific) | | | X | | |
| | 0 1 8 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 1 9 | 1 1 | 1 0 1 | 0 0 0 | CFDS Bite Fault Summary Word for HFDR | | | X | | |
| | 0 1 A | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 1 C | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 2 3 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 2 4 | 1 1 | 1 0 1 | 0 0 0 | MU Output Data Word Failure Status | | | X | | |
| | 0 2 5 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 2 7 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 2 9 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 2 F | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 3 2 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 3 5 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 3 8 | 1 1 | 1 0 1 | 0 0 0 | IRS Maintenance Word #1 | | | X | | |
| | 0 3 D | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 3 E | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 3 F | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 4 0 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 0 4 D | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data FQIS 1-3 | | | X | | |
| | 0 5 0 | 1 1 | 1 0 1 | 0 0 0 | VDR Fault Summary Word | | | X | | |
| | 0 5 3 | 1 1 | 1 0 1 | 0 0 0 | CFDS Bite Fault Summary Word for HFDR | | | X | | |
| | 0 5 5 | 1 1 | 1 0 1 | 0 0 0 | ILS Maintenance Word | | | X | | |
| | 1 0 A | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 1 0 B | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 1 1 4 | 1 1 | 1 0 1 | 0 0 0 | Fuel Density | | X | | | |
| | 1 1 5 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 1 4 0 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 1 4 4 | 1 1 | 1 0 1 | 0 0 0 | CDTI Fault Summary Word | | | X | | |
| | 2 4 1 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |
| | 3 4 1 | 1 1 | 1 0 1 | 0 0 0 | Maintenance Data #1 | | | X | | |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 3 5 1 | 0 0 6 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 0 B | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | SRU Test Word (manufacturer specific) | | | X | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 1 C | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 2 4 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | MU Output Data Word Failure Status | | | X | | |
| | 0 2 5 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 2 9 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 2 E | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 3 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 3 8 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | IRS Maintenance Word #2 | | | X | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data FQIS 1&3 | | | X | | |
| | 0 5 5 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | MMR Maintenance Word | | | X | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| | 1 1 4 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Inner Tank 1 Probe Capacitance | | X | | | |
| | 1 4 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | Maintenance Data #2 | | | X | | |
| 3 5 2 | 0 1 A | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #3 | | | X | | |
| | 0 1 C | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #2 | | | X | | |
| | 0 2 4 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Word | | | X | | |
| | 0 2 5 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #2 | | | X | | |
| | 0 2 E | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #2 | | | X | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #2 | | | X | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #2 | | | X | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data FQIS 1-4 | | | X | | |
| | 0 5 5 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | MLS Bite Status | | | X | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #2 | | | X | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #2 | | | X | | |
| | 1 1 4 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Center, ACT & RCT Probe Capacitance | | X | | | |
| | 1 4 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | Maintenance Data #3 Flight Count | X | | | | |
| 3 5 3 | 0 1 A | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data #4 | | | X | | |
| | 0 1 C | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data #4 | | | X | | |
| | 0 2 5 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data #4 | | | X | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data #4 | | | X | | |
| | 0 3 8 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | IRS Maintenance Word #3 | | | X | | |
| | 0 3 D | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data #4 | | | X | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data #4 | | | X | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data FQIS 1-4 | | | X | | |
| | 0 D 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Vibration | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data #4 | | | X | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Maintenance Data #4 | | | X | | |
| | 1 1 4 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | Inner Tank 1 Probe Capacitance | | X | | | |
| 3 5 4 | 0 0 2 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | X | | |
| | 0 1 A | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | X | | |
| | 0 1 C | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | X | | |
| | 0 2 F | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | X | | |
| | 0 3 D | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | N1 Vibration | X | | | | |
| | 0 3 F | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | X | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | FQIS Tank ID | | | X | | |
| | 0 5 6 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | | | |
| | 0 6 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | | | |
| | 0 B B | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | X | | |
| | 1 0 A | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | X | | |
| | 1 0 B | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | Maintenance Data #5 | | | X | | |
| 3 5 5 | 0 0 B | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | GNSS Fault Summary | | | X | | |
| | 0 2 7 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | MLS Maintenance Data | | | X | | |
| | 0 3 8 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | IRS Maintenance Word #4 | | | X | | |
| | 0 3 D | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | N2 Vibration | X | | | | |
| | 0 4 D | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Maintenance Data FQIS 2-4 | | | X | | |
| | X X X | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | Acknowledgement | | | X | | 6-5/Note 1 |

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 356 | 03D | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | N3 Vibration | X | | | | |
| | XXX | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | Maintenance ISO #5 Message | | | X | | 6-3/Note 1 |
| | YYY | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | BITE Status Word | X | | | | Note 1 |
| 357 | 002 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | ISO Alphabet #5 Message | | | X | | 6-3 |
| | 017 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | ISO Alphabet #5 Message | | | X | | |
| | 024 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | ISO Alphabet #5 Message | | | X | | |
| | 035 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | TCAS Intruder Data File | | | X | | |
| | 037 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | ISO Alphabet #5 Message | | | X | | |
| | 03D | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | BB Vibration | X | | | | |
| | 04D | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | Maintenance Data FQIS 2-3 | | | X | | |
| | 056 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | ISO Alphabet #5 Message | | | | | |
| | 05A | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | Part Number (Manufacturer - Specific) | | | X | | |
| | 060 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | ISO Alphabet #5 Message | | | | | |
| 360 | 002 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Flight Information | X | | | | 6-33 |
| | 004 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Potential Vertical Speed | X | | | | |
| | 005 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Potential Vertical Speed | X | | | | |
| | 038 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Potential Vertical Speed | X | | | | |
| | 03D | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | N1 Rotor Imbalance Angle | X | | | | |
| | 056 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Flight Information | X | | | | |
| | 060 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Flight Information | X | | | | |
| | 10A | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Throttle Rate of Change | X | | | | |
| | 10B | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | Throttle Rate of Change | X | | | | |
| | 142 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | RAIM Status Word | X | | | | |
| | | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | ACESS - System Address Label | | | | X | See Attachment 11 |
| 361 | 004 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | Altitude (Inertial) | X | | | | |
| | 005 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | Altitude (Inertial) | X | | | | |
| | 038 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | Altitude (Inertial) | X | | | | |
| | 03D | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | LPT Rotor Imbalance Angle (737 only) | X | | | | |
| | 10A | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | Derivative of Thrust vs. N1 | X | | | | |
| | 10B | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | Derivative of Thrust vs. N1 | X | | | | |
| | | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | EFIS - System Address Label | | | | X | See Attachment 11 |
| 362 | 004 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | Along Track Horizontal Acceleration | X | | | | |
| | 038 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | Along Track Horizontal Acceleration | X | | | | |
| | 10A | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | Derivative of Thrust vs. TLA | X | | | | |
| | 10B | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | Derivative of Thrust vs. TLA | X | | | | |
| | 115 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | Range Rate | X | | | | |
| | | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | PSS - System Address Label | | | | X | See Attachment 11 |
| 363 | 004 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | Cross Track Acceleration | X | | | | |
| | 038 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | Cross Track Acceleration | X | | | | |
| | 10A | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | Corrected Thrust | X | | | | |
| | 10B | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | Corrected Thrust | X | | | | |
| | | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | System Address Label for CSS | | | | X | See Attachment 11 |
| 364 | 004 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | Vertical Acceleration | X | | | | |
| | 005 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | Vertical Acceleration | X | | | | |
| | 038 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | Vertical Acceleration | X | | | | |
| | 13A | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | N1 APR Rating | X | | | | |
| | | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | AES - System Address Label | | | | X | See Attachment 11 |
| 365 | 004 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | Inertial Vertical Velocity (EFI) | X | | | | |
| | 005 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | Inertial Vertical Velocity (EFI) | X | | | | |
| | 038 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | Inertial Vertical Velocity (EFI) | X | | | | |
| | 13A | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | N1 Max Reverse | X | | | | |
| | | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | Engine Indication Unit - System Address Label | | | | X | See Attachment 11 |
| 366 | 004 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | North-South Velocity | X | | | | 6-2-1 |
| | 038 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | North-South Velocity | X | | | | |
| | 13A | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | IGV Position | X | | | | |
| | | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | Multicast - System Address Label | | | | X | See Attachment 11 |
| 367 | 004 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | East-West Velocity | X | | | | |
| | 038 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | East-West Velocity | X | | | | |
| | 13A | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | EGV Request | X | | | | |
| | | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | Bridge - System Address Label | | | | X | See Attachment 11 |
| 370 | 004 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | g | X | | | | |
| | 005 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | g | X | | | | |
| | 00B | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | GNSS Height WGS-84 (HAE) | X | | | | |
| | 025 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | Decision Height Selected (EFI) | X | | | | |
| | 0C5 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | Decision Height Selected (EFI) | X | | | | |
| 371 | 000 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | General Aviation Equipment Identifier | X | | | | See Attachment 9B |

# ATTACHMENT 1-1
# LABEL CODES

| Code No. (Octal) | Eqpt. ID (Hex) | Transmission Order Bit Position | | | | | | | | Parameter | Data | | | | Notes & Cross Ref. to Tables in Att. 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | BNR | BCD | DISC | SAL | |
| 3 7 2 | 0 0 5 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | Wind Direction - Magnetic | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | Actual Fan Speed | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | Actual Fan Speed | X | | | | |
| | | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | Cabin Terminal #3 - System Address Label | | | | X | See Attachment 11 |
| 3 7 3 | 0 0 5 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | North-South Velocity - Magnetic | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Actual Core Speed | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Actual Core Speed | X | | | | |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Cabin Terminal #4 - System Address Label | | | | X | See Attachment 11 |
| 3 7 4 | 0 0 5 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | East-West Velocity - Magnetic | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Left Thrust Reverser Position | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Left Thrust Reverser Position | X | | | | |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | Cabin Terminal #1 - System Address Label | | | | X | See Attachment 11 |
| 3 7 5 | 0 0 4 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Along Heading Acceleration | X | | | | |
| | 0 0 5 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Along Heading Acceleration | X | | | | |
| | 0 3 3 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Spare DC1 | X | | | | |
| | 0 3 8 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Along Heading Acceleration | X | | | | |
| | 1 0 A | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Right Thrust Reverser Position | X | | | | |
| | 1 0 B | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Right Thrust Reverser Position | X | | | | |
| | X X X | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | GPS Differential Correction Word A | X | | | | |
| | | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | Cabin Terminal #2 - System Address Label | | | | X | See Attachment 11 |
| 3 7 6 | 0 0 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Cross Heading Acceleration | X | | | | |
| | 0 0 5 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Cross Heading Acceleration | X | | | | |
| | 0 3 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Spare DC2 | X | | | | |
| | 0 3 8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | Cross Heading Acceleration | X | | | | |
| | X X X | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | GPS Differential Correction Word B | X | | | | |
| 3 7 7 | 0 3 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Equipment Identification | | | X | | |
| | X X X | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | Equipment Identification | | | X | | 6-17/Note 2 |

[1] XXX or YYY is applicable to all Equipment IDs.

[2] The preferred SSM encoding method for the Equipment Identification Word is according to the Discrete word guidelines. When this label was originally assigned, it was recognized as a non-BNR word. The SSM encoding was according to the BCD and DISC guidelines that were identical at that time. During development of Supplement 4, the SSM for DISC was revised to it current form to provide enhanced failure warning. When the SSM encoding was changed, some systems retained the BCD encoding for the Equipment Identification word and others changed to DISC encoding.

There are ARINC standards that are still active that have the SSM for Equipment Identification designated as BCD. You will need to check with the equipment manufacturer to determine the SSM format.

[3] The Label does not adhere to ARINC 429 Standard Signal Format and contains both BCD and BRN bit encoding depending on the selected mode.

## ATTACHMENT 1-2
## EQUIPMENT CODES

| Equip ID (Hex) | Equipment Type | |
|---|---|---|
| 000 | Not Used | |
| 001 | Flight Control Computer (701) | |
| 002 | Flight Management Computer (702) | |
| 003 | Thrust Control Computer (703) | |
| 004 | Inertial Reference System (704) | |
| 005 | Attitude and Heading Ref. System (705) | |
| 006 | Air Data System (706) | |
| 007 | Radio Altimeter (707) | |
| 008 | Airborne Weather Radar (708) | |
| 009 | Airborne DME (709) | |
| 00A | FAC (A310) | c-5 |
| 00B | Global Positioning System (743) | c-10 |
| 00C | | |
| 00D | AIDS Data Management Unit | c-7 |
| 00E | | |
| 00F | | |
| 010 | Airborne ILS Receiver (710) | |
| 011 | Airborne VOR Receiver (711) | |
| 012 | Airborne ADF System (712) | |
| 013 | | |
| 014 | | |
| 015 | | |
| 016 | Airborne VHF COM (716) | |
| 017 | DEFDARS-AIDS (717) | |
| 018 | ATC Transponder (718) | |
| 019 | Airborne HF/SSB System (719) | |
| 01A | Electronic Supervisory Control [1] | c-5 |
| 01B | Digital Slat/Flap Computer (A310) | |
| 01C | Engine Parameter Digitizer (Engine) | |
| 01D | A/P & F/D Mode Control Panel (757/767) | |
| 01E | Performance Data Computer (Boeing 737) | |
| 01F | Fuel Quantity Totalizer | |
| 020 | DFS System (720) | |
| 021 | | |
| 022 | | |
| 023 | Ground Prox. Warning System (723) | |
| 024 | ACARS (724) / CMU Mark 2 (758) | |
| 025 | Electronic Flt. Instruments (725) | |
| 026 | Flight Warning Computer (726) | |
| 027 | Microwave Landing System (727) | |
| 028 | | |
| 029 | ADDCS (729) and EICAS | |
| 02A | Thrust Management Computer | |
| 02B | Perf. Nav. Computer System (Boeing 737) | |
| 02C | Digital Fuel Gauging System (A310) | c-6 |
| 02D | EPR Indicator (Boeing 757) | c-5 |
| 02E | Land Rollout CU/Landing C & LU | c-6 |
| 02F | Full Authority EEC-A | c-7 |
| 030 | Airborne Separation Assurance System | |
| 031 | Chronometer (731) | |
| 032 | Pass. Entertainment Tape Reproducer (732) | c-6 |
| 033 | Propulsion Multiplexer (PMUX)(733) | |
| 034 | Fault Isolation & Detection System (734) | |
| 035 | TCAS (735) | |
| 036 | Radio Management System (736) | c-10 |
| 037 | Weight and Balance System (737) | |
| 038 | ADIRS (738) | |
| 039 | MCDU (739) | |
| 03A | Propulsion Discrete Interface Unit | c-11 |
| 03B | Autopilot Buffer Unit | c-6 |
| 03C | Tire Pressure Monitoring System | c-8 |
| 03D | Airborne Vibration Monitor (737/757/767) | c-9 |
| 03E | Center of Gravity Control Computer | c-7 |
| 03F | Full Authority EEC-B | |
| 040 | Cockpit Printer (740) | c-11 |
| 041 | Satellite Data Unit | |
| 042 | | |
| 043 | | |
| 044 | | |
| 045 | | |
| 046 | CTU | c-14 |
| 047 | Digital Flight Data Recorder | |
| 048 | | |
| 049 | | |
| 04A | Landing Gear Position Interface Unit | c-9 |
| 04B | Main Electrical System Controller | |
| 04C | Emergency Electrical System Controller | |
| 04D | Fuel Qty. Indicating System (757/767) | c-10 |
| 04E | Fuel Qty. Indicating System (747) | |
| 04F | | c-14 |
| 050 | VDR (750) | |
| 051 | | |
| 052 | | |
| 053 | HF Data Unit | |
| 054 | | |
| 055 | Multi-Mode Receiver (MMR) (755) | c-16 |
| 056 | GNSS Navigation Landing Unit (GNLU)(756) | |
| 057 | Cockpit Voice Recorder (CVR) (757) | |
| 058 | | |
| 059 | | |
| 05A | Fuel Quan. Indicating System (A320/A321) | c-10 |
| 05B | Cargo Smoke Detection Unit (A320) | |
| 05C | Cabin Pressure Unit (A320) | |
| 05D | Zone Controller (A320) | |
| 05E | Cargo Heat (A320) | |
| 05F | CIDS (A320) | |
| 060 | GNSS Navigation Unit (GNU) (760) | c-16 |
| 061 | High-Speed Data Unit (HSDU) | c-17 |
| 062 | | |
| 063 | | |
| 064 | | |
| 065 | | |
| 066 | | |
| 067 | | |
| 068 | | |
| 069 | | |
| 06A | AMU (A320) | c-10 |
| 06B | Battery Charge Limiter (A320) | |
| 06C | Flt. Cont. Data Concentrator (A320) | |
| 06D | Landing Gear Prox. Control (A320) | |
| 06E | Brake Steering Unit (A320) | |
| 06F | Bleed Air (A320) | |
| 070 | | |
| 071 | | |
| 072 | | |
| 073 | | |

c-5 [1] “Electronic Engine Control” and “Power Management Control” are two other names for equipment identified by “1A”.

## ATTACHMENT 1-2
## EQUIPMENT CODES

| | Equip ID (Hex) | Equipment Type |
|---|---|---|
| | 074 | |
| | 075 | |
| | 076 | |
| | 077 | |
| | 079 | |
| c-10 | 07A | APU Engine Control Unit (A320) |
| | 07B | Engine Interface Unit (A320) |
| | 07C | FADEC Channel A (A320) |
| | 07D | FADEC Channel B (A320) |
| | 07E | Centralized Fault Data Interface Unit |
| | 07F | Fire Detection Unit (A320) |
| | 080 | |
| | 081 | |
| | 082 | |
| | 083 | |
| | 084 | |
| | 085 | |
| | 086 | |
| | 087 | |
| | 088 | |
| | 089 | |
| c-10 | 08A | Window Heat Computer (A320) |
| | 08B | Probes Heat Computer (A320) |
| | 08C | Avionics Cooling Computer (A320) |
| | 08D | Fuel Flow Indicator (B747) |
| c-11 | 08E | Surface Position Digitizer (B747-400) |
| | 08F | Vacuum System Controller |
| | 090 | |
| | 091 | |
| | 093 | |
| | 094 | |
| | 095 | |
| | 096 | |
| | 097 | |
| | 098 | |
| | 099 | |
| | 09A | |
| | 09B | |
| | 09C | |
| | 09D | |
| | 09E | |
| | 09F | |
| | 0A0 | |
| | 0A1 | FCC Controller (701) |
| | 0A2 | FMC Controller (702) |
| | 0A3 | Thrust Rating Controller (703) |
| | 0A4 | IRS Controller (704) |
| | 0A5 | |
| | 0A6 | |
| | 0A7 | |
| | 0A8 | Airborne WXR Controller (708) |
| | 0A9 | Airborne DME Controller (709) |
| c-11 | 0AA | Generator Control Unit (A320) |
| | 0AB | Air Supply Control & Test Unit (B747-400) |
| | 0AC | Bus Control Unit (B747-400) |
| c-10 | 0AD | ADIRS Air Data Module |
| c-11 | 0AE | Yaw Damper Module (B747-400) |
| | 0AF | Stabilizer Trim Module (B747-400) |

| Equip ID (Hex) | Equipment Type | |
|---|---|---|
| 0B0 | Airborne ILS Controller (710) | |
| 0B1 | Airborne VOR Controller (711) | |
| 0B2 | Airborne ADF Controller (712) | |
| 0B3 | | |
| 0B4 | | |
| 0B5 | | |
| 0B6 | VHF COM Controller (716) | |
| 0B7 | | |
| 0B8 | ATC Transponder Controller (718) | |
| 0B9 | HF/SSB System Controller (719) | |
| 0BA | Power Supply Module (B747-400) | c-11 |
| 0BB | Flap Control Unit (B747-400)<br>Flap Slat Electronics Unit (B767-400) | c-16 |
| 0BC | Fuel System Interface Card (B747-400) | c-11 |
| 0BD | Hydraulic Quantity Monitor Unit (B747-400) | |
| 0BE | Hydraulic Interface Module (B747-400) | |
| 0BF | Window Heat Control Unit (B747-400) | |
| 0C0 | | |
| 0C1 | | |
| 0C2 | PVS Control Unit | c-11 |
| 0C3 | GPWS Controller (723) | c-10 |
| 0C4 | A429W SDU Controller | c-17 |
| 0C5 | EFI Controller (725) | |
| 0C6 | | |
| 0C7 | MLS Controller (727) | c-14 |
| 0C8 | | |
| 0C9 | | |
| 0CA | Brake Temperature Monitor Unit (B747-400) | c-11 |
| 0CB | Autostart (B747-400) | |
| 0CC | Brake System Control Unit (B747-400) | |
| 0CD | Pack Temperature Controller (B747-400) | |
| 0CE | EICAS/EFIC Interface Unit (B747-400) | |
| 0CF | Para Visual Display Computer (B747-400) | |
| 0D0 | Engine Instrument System (B737) | |
| 0D1 | | |
| 0D2 | | |
| 0D3 | Thermal Monitoring Unit (General) | c-14 |
| 0D4 | | |
| 0D5 | TCAS Control Panel | c-14 |
| 0D6 | | |
| 0D7 | | |
| 0D8 | | |
| 0D9 | | |
| 0DA | Prox. Switch Electronics Unit (B747-400) | c-11 |
| 0DB | APU Controller (B747-400) | |
| 0DC | Zone Temperature Controller (B747-400) | |
| 0DD | Cabin Pressure Controller (B747-400) | |
| 0DE | Windshear Computer (Sperry) | |
| 0DF | Equipment Cooling Card (B747-400) | |
| 0E0 | Crew Rest Temp. Controller (B747-400) | |
| 0E1 | | |
| 0E2 | | |
| 0E3 | | |
| 0E4 | | |
| 0E5 | | |
| 0E6 | | |
| 0E7 | | |
| 0E8 | | |

## ATTACHMENT 1-2
## EQUIPMENT CODES

| Equip ID (Hex) | Equipment Type | |
|---|---|---|
| 0E9 | | |
| 0EA | Misc. Environment Control (B747) | |
| 0EB | Fuel Jettison Control Card (B747) | |
| 0EC | Advance Cabin Entertainment Serv. Sys. | c-11 |
| 0ED | Fuel System Controller (MD-11) | |
| 0EE | Hydraulic System Controller (MD-11) | |
| 0EF | Environmental System Controller (MD-11) | |
| 0F0 | | |
| 0F1 | | |
| 0F2 | | |
| 0F3 | | |
| 0F4 | | |
| 0F5 | | |
| 0F6 | | |
| 0F7 | | |
| 0F8 | | |
| 0F9 | | |
| 0FA | Misc. System controller (MD-11) | |
| 0FB | Anti-Skid System (MD-11) | |
| 0FC | Cabin Pressure Control Sys. (MD-11) | c-11 |
| 0FD | Air Condition Control System (MD-11) | |
| 0FE | Pneumatic Control System (MD-11) | |
| 0FF | Manifold Failure Detection System (MD-11) | |
| 100 | | |
| 101 | | |
| 102 | | |
| 103 | | |
| 104 | | |
| 105 | | |
| 106 | | |
| 107 | | |
| 108 | Electronic Engine Control (EEC) Channel A (B737-700) | c-16 |
| 109 | Elect Eng Control (EEC) Channel B (B737-700) | |
| 10A | Full Authority Engine Control A (GE) | |
| 10B | Full Authority Engine Control B (GE) | |
| 10C | APU Controller | c-11 |
| 10D | Data Loader | |
| 10E | Fire Detection Unit (MD-11) | |
| 10F | Auto Brake Unit (MD-11) | |
| 110 | Multiplexer PES (A-320) | |
| 111 | | |
| 112 | TACAN Adapter Unit (TAU) | c-14 |
| 113 | Stall Warning Card (B747-400) | |
| 114 | Fuel Unit Management System (A330/A340) | |
| 115 | TACAN | |
| 116 | Eng Interface Vibration Monitoring Unit (A330/A340) | c-12 |
| 117 | Engine Control Unit Channel A (A330/A340) | |
| 118 | Engine Control Unit Channel B (A330/A340) | |
| 119 | Centralized Maintenance Computer (A330/A340) | |
| 11A | Multi-Disk Drive Unit (A330/A340) | |
| 11B | | |
| 11C | | |
| 11D | | |
| 11E | Integrated Static Probe | c-17 |
| 11F | | |
| 120 | Multifunction Air Data Probe | c-17 |
| 121 | | |
| 122 | Ground Auxiliary Power Unit (A320/319/321) | c-16 |
| 123 | Ground Power Control Unit (A330/A340) | |
| 124 | Fuel Management Computer (A330/A340) | |
| 125 | Center of Gravity Fuel Control Comp.(A330/A340) | |
| 126 | Circuit breakers Monitoring Unit (A330/A340) | c-12 |
| 127 | Electrical Contractor Management Unit (A330/A340) | |
| 128 | Hydraulic Electrical Generator Control Unit (A330/A340) | |
| 129 | Hydraulic System Monitoring Unit (A330/A340) | |
| 12A | Cargo Bay Conditioning Card (B747) | c-11 |
| 12B | Predictive Windshear System Sensor | |
| 12C | Angle of Attack Sensor | c-14 |
| 12D | Logic Drive Control Computer (B747/B767) | |
| 12E | Cargo Control Logic Unit (B767) | c-16 |
| 12F | Cargo Electronics Interface Unit (B767) | |
| 130 | Load Management Unit (LMU) Airbus | |
| 131 | | |
| 132 | | |
| 133 | | |
| 134 | | |
| 135 | | |
| 136 | Audio Management System | c-11 |
| 137 | | |
| 138 | | |
| 139 | | |
| 13A | Full Authority Engine Control (P&W) | c-14 |
| 13B | Audio Entertainment System (AES) Controller (Boeing) | c-16 |
| 13C | Boarding Music Machine (B777) | |
| 13D | Passenger In Flight Info Unit (Airshow) | c-14 |
| 13E | Video Interface Unit (B777) | |
| 13F | Camera Interface Unit (A340/B777) | c-16 |
| 140 | Supersonic Air Data Computer | |
| 141 | Satellite RF Unit | c-11 |
| 142 | ADS-B Link Display Processor Unit (LPDU) | c-16 |
| 143 | Vertical/Horizontal Gyro | |
| 144 | CDTI Display Unit | c-17 |
| 145 | | |
| 146 | | |
| 147 | | |
| 148 | | |
| 149 | | |
| 14A | Slide Slip Angle (SSA) | c-17 |
| 14B | | |
| 14C | | |
| 14D | | |
| 14E | | |
| 14F | | |
| 150 | AIMS Gen. Pur. Bus #1 (B777) | |
| 151 | AIMS Gen. Pur. Bus #2 (B777) | |
| 152 | AIMS Digital Comm. Mgmt. (B777) | |
| 153 | AIMS Gen. Pur. Bus #3 (B777) | |
| 154 | Central Maintenance Computer (B-777) | c-14 |
| 155 | AIMS EFIS Control Panel (B777) | |
| 156 | AIMS Display Unit (B777) | |
| 157 | AIMS Cursor Control Device (B777) | |
| 158 | AIMS General Purpose Bus #4 | c-16 |
| 159 | | |
| 15A | Flight Data Interface Unit (A330/A340) | |
| 15B | Flight Control Unit (A330/A340) | c-12 |
| 15C | Flight Control Primary Computer (A330/A340) | |

## ATTACHMENT 1-2
## EQUIPMENT CODES

| | Equip ID (Hex) | Equipment Type | |
|---|---|---|---|
| | 15D | Flight Control Secondary Computer (A330/A340) | |
| c-12 | 15E | Flight Mgmt Guidance Env Comp (A330/A340) | |
| | 15F | | |
| | 160 | Special Fuel Quan. Sys. (Boeing) | |
| | 161 | | |
| | 162 | | |
| | 163 | | |
| | 164 | | |
| | 165 | | |
| | 166 | | |
| | 167 | Air Traffic Service Unit (Airbus) | |
| | 168 | Integ Standby Instr System (A340/330,A320/319/321) | |
| c-16 | 169 | Data Link Control and Display Unit (A340/330) | |
| | 16A | Display Unit (A330/A340) | |
| | 16B | Display Management Computer (A330/A340) | |
| c-12 | 16C | Head-Up Display Computer (A330/A340) | |
| | 16D | ECAM Control Panel (A330/A340) | |
| | 16E | Clock (A330/A340) | |
| c-14 | 16F | Cabin Interphone System (B777) | |
| | 170 | Radio Tuning Panel (B777) | |
| c-17 | 171 | Electronic Flight Bag | |
| | 172 | | |
| | 173 | | |
| | 174 | | |
| | 175 | | |
| | 176 | | |
| | 177 | | |
| | 178 | | |
| | 179 | | |
| | 17A | Cabin Ventilation Controller (A330/A340) | |
| | 17B | Smoke Detection Control Unit (A330/A340) | |
| c-12 | 17C | Proximity Sensor Control Unit (A330/A340) | |
| | 17D | | |
| | 17E | | |
| | 17F | | |
| | 180 | | |
| | 181 | | |
| | 182 | | |
| | 183 | | |
| | 184 | | |
| | 185 | | |
| | 186 | | |
| | 187 | | |
| | 188 | | |
| | 189 | | |
| | 18A | Audio Control Panel (A330/A340) | |
| | 18B | Cockpit Voice recorder (A330/A340) | |
| | 18C | Passenger Entertainment Sys Main MUX (A330/A340) | |
| c-11 | 18D | Passenger Entertainment Sys Audio Repro.(A330/A340) | |
| | 18E | Pre-recorded Announcement Music Repro (A330/A340) | |
| | 18F | Video Control Unit (A330/A340) | |
| | 19F | Cade Environment System | c-16 |
| | 1E2 | ADS-B LDPU Controller | c-17 |
| | 200 | Versatile Integrated Avionics Unit (B717/MD-10) | |
| | 201 | Electronic Spoiler Control Unit (B717) | |
| | 202 | Brake Control Unit (B717) | |
| | 203 | Pneumatic Overheat Detection Unit (B717) | c-16 |
| | 204 | Proximity Switch Electronics Unit (B717) | |
| | 205 | APU Electronic Control Unit (B717) | |
| | 206 | Aircraft Interface Unit (MD-10) | |
| | 207 | Fuel Quantity Gauging Unit (MD-10) | |
| | 241 | High Power Amplifier | c-11 |
| | 341 | Satellite ACU | c-11 |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 1 - BCD DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Reso- lution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans- port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 0 0 1 | 0 0 2 | Distance to Go | N.M. | ±3999.9 | 5 | | 0.1 | 100 | 200 | | 6-25 |
| | 0 5 6 | Distance to Go | N.M. | ±3999.9 | 5 | | 0.1 | 100 | 200 | | |
| | 0 6 0 | Distance to Go | N.M. | ±3999.9 | 5 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 0 2 | 0 0 2 | Time to Go | Min | 0-399.9 | 4 | | 0.1 | 100 | 200 | | 6-25 |
| | 0 5 6 | Time to Go | Min | 0-399.9 | 4 | | 0.1 | 100 | 200 | | |
| | 0 6 0 | Time to Go | Min | 0-399.9 | 4 | | 0.1 | 100 | 200 | | |
| | 1 1 5 | Time to Station | Min | 0-399.9 | 4 | | 0.1 | 50 | 50 | | |
| | | | | | | | | | | | |
| 0 0 3 | 0 0 2 | Cross Track Distance | N.M. | 0-399.9 | 4 | | 0.1 | 100 | 200 | | 6-25 |
| | | | | | | | | | | | |
| 0 0 4 | 0 0 1 | Runway Distance to Go | Feet | 0-79900 | 3 | | 100.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 1 0 | 0 0 2 | Present Position - Latitude | Deg:Min | 180N-180S | 6 | N | 0.1 | 250 | 500 | | Section 2.1.2 |
| | 0 0 4 | Present Position - Latitude | Deg:Min | 180N-180S | 6 | N | 0.1 | 250 | 500 | | Section 2.1.2 |
| | 0 3 8 | Present Position - Latitude | Deg:Min | 180N-180S | 6 | N | 0.1 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 1 1 | 0 0 2 | Present Position - Longitude | Deg:Min | 180E-180W | 6 | E | 0.1 | 250 | 500 | | |
| | 0 0 4 | Present Position - Longitude | Deg:Min | 180E-180W | 6 | E | 0.1 | 250 | 500 | | |
| | 0 3 8 | Present Position - Longitude | Deg:Min | 180E-180W | 6 | E | 0.1 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 1 2 | 0 0 2 | Ground Speed | Knots | 0-7000 | 4 | | 1.0 | 250 | 500 | | 6-25 |
| | 0 0 4 | Ground Speed | Knots | 0-7000 | 4 | | 1.0 | 250 | 500 | | |
| | 0 4 D | Qty-LD SEL (LB) | Lbs. | 0-79999 | 5 | | 1.0 | | | | |
| | 0 0 5 | Ground Speed | Knots | 0-7000 | 4 | | 1.0 | 250 | 500 | | |
| | 0 2 5 | Ground Speed | Knots | 0-7000 | 4 | | 1.0 | 125 | 250 | | |
| | 0 3 8 | Ground Speed | Knots | 0-7000 | 4 | | 1.0 | 250 | 500 | | |
| | 0 5 6 | Ground Speed | Knots | 0-7000 | 4 | | 1.0 | 250 | 500 | | |
| | 0 6 0 | Ground Speed | Knots | 0-7000 | 4 | | 1.0 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 1 3 | 0 0 2 | Track Angle - True | Deg | 0-359.9 | 4 | | 0.1 | 250 | 500 | | 6-25 |
| | 0 0 4 | Track Angle - True | Deg | 0-359.9 | 4 | | 0.1 | 250 | 500 | | |
| | 0 4 D | Qty-Flt. Deck (LB) | Lbs. | 0-79999 | 5 | | 1.0 | | | | |
| | 0 3 8 | Track Angle - True | Deg | 0-359.9 | 4 | | 0.1 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 1 4 | 0 0 4 | Magnetic Heading | Deg | 0-359.9 | 4 | | 0.1 | 250 | 500 | | |
| | 0 0 5 | Magnetic Heading | Deg | 0-359.9 | 4 | | 0.1 | 250 | 500 | | |
| | 0 3 8 | Magnetic Heading | Deg | 0-359.9 | 4 | | 0.1 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 1 5 | 0 0 2 | Wind Speed | Knots | 0-799 | 3 | | 1.0 | 250 | 500 | | |
| | 0 0 4 | Wind Speed | Knots | 0-799 | 3 | | 1.0 | 250 | 500 | | |
| | 0 0 5 | Wind Speed | Knots | 0-799 | 3 | | 1.0 | 250 | 500 | | |
| | 0 3 8 | Wind Speed | Knots | 0-799 | 3 | | 1.0 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 1 6 | 0 0 4 | Wind Direction - True | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | 0 3 8 | Wind Direction - True | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 1 7 | 0 1 0 | Selected Runway Heading | Deg | 0-359.9 | 4 | | 0.1 | 167 | 333 | | |
| | 0 4 D | Total-Flt. Deck (LB) | Lbs. | 0-79999 | 5 | | 1.0 | | | | |
| | 0 5 5 | Selected Runway Heading | Deg | 0-359.9 | 4 | | 0.1 | | | | |
| | 0 A 0 | Selected Runway Heading | Deg | 0-359.9 | 4 | | 0.1 | 167 | 333 | | |
| | 0 B 0 | Selected Runway Heading | Deg | 0-359.9 | 4 | | 0.1 | 167 | 333 | | |
| | | | | | | | | | | | |
| 0 2 0 | 0 2 0 | Selected Vertical Speed | Ft/Min | ±6000 | 4 | | 1.0 | 100 | 200 | | 6-25 |
| | 0 4 D | Tnk-LD SEL (LB) | Lbs. | 0-79999 | 5 | | 1.0 | | | | |
| | 0 A 1 | Selected Vertical Speed | Ft/Min | ±6000 | 4 | Up | 1.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 2 1 | 0 0 2 | Selected EPR | EPR | 0-3 | 4 | | 0.001 | 100 | 200 | | |
| | 0 0 2 | Selected N1 | RPM | 0-3000 | 4 | | 1 | 100 | 200 | | |
| | 0 2 0 | Selected EPR | EPR | 0-3 | 4 | | 0.001 | 100 | 200 | | |
| | 0 2 0 | Selected N1 | RPM | 0-3000 | 4 | | 1 | 100 | 200 | | |
| | 0 A 1 | Selected EPR | EPR | 0-3 | 3 | | 0.001 | 100 | 200 | | |

# ATTACHMENT 2
# DATA STANDARDS

## TABLE 1 - BCD DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Reso- lution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans- port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | 0 A 1 | Selected N1 | RPM | 0-3000 | 4 | | 1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 2 2 | 0 2 0 | Selected Mach | Mach | 0-4 | 4 | | 0.001 | 100 | 200 | | |
| | 0 4 D | Qty-LD SEL (KG) | Kg | 0-79999 | 5 | | 1.0 | | | | |
| | 0 A 1 | Selected Mach | Mach | 0-4 | 4 | | 0.001 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 2 3 | 0 2 0 | Selected Heading | Deg | 0-359 | 3 | | 1.0 | 100 | 200 | | 6-25 |
| | 0 4 D | Qty-Flt Deck (KG) | Kg | 0-79999 | 5 | | 1.0 | | | | |
| | 0 A 1 | Selected Heading | Deg | 0-359 | 3 | | 1.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 2 4 | 0 1 1 | Selected Course #1 | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | 6-25 |
| | 0 2 0 | Selected Course #1 | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | 0 A 1 | Selected Course #1 | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | 0 B 1 | Selected Course #1 | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | | | | | | | | | | | |
| 0 2 5 | 0 2 0 | Selected Altitude | Feet | 0-50000 | 5 | | 1.0 | 100 | 200 | | 6-25 |
| | 0 A 1 | Selected Altitude | Feet | 0-50000 | 5 | | 1.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 2 6 | 0 0 3 | Selected Airspeed | Knots | 30-450 | 3 | | 1.0 | 100 | 200 | | 6-25 |
| | 0 2 0 | Selected Airspeed | Knots | 30-450 | 3 | | 1.0 | 100 | 200 | | |
| | 0 A 1 | Selected Airspeed | Knots | 30-450 | 3 | | 1.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 2 7 | 0 0 2 | TACAN Selected Course | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | 0 1 1 | Selected Course #2 | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | 0 2 0 | Selected Course #2 | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | 0 4 D | Total-Flt Deck (KG) | Kg | 0-79999 | 5 | | 1.0 | | | | |
| | 0 5 6 | TACAN Selected Course | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | 0 6 0 | TACAN Selected Course (BCD) | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | 0 A 1 | Selected Course #2 | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | 0 B 1 | Selected Course #2 | Deg | 0-359 | 3 | | 1.0 | 167 | 333 | | |
| | | | | | | | | | | | |
| 0 3 0 | 0 2 0 | VHF COM Frequency | | See Chapter 3 | | | | 100 | 200 | | 6-45 |
| | 0 2 4 | VHF COM Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 4 D | TNK-LD SEL (KG) | Kg | 0-79999 | 5 | | 1.0 | | | | |
| | 0 B 6 | VHF COM Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 3 1 | 0 2 0 | Beacon Transponder Code | | See Chapter 3 | | | | 100 | 200 | | 6-46 |
| | 0 B 8 | Beacon Transponder Code | | See Chapter 3 | | | | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 3 2 | 0 1 2 | ADF Frequency | | See Chapter 3 | | | | 100 | 200 | | 6-40 |
| | 0 2 0 | ADF Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 B 2 | ADF Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 3 3 | 0 0 2 | ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | 6-44 |
| | 0 1 0 | ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | 0 2 0 | ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | 0 5 6 | ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | 0 6 0 | ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | 0 B 0 | ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | | | | | | | | | | | |
| 0 3 4 | 0 0 2 | VOR/ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | 6-44-1 |
| | 0 0 6 | Baro Correction (mb) #3 | mb | 745-1050 | 5 | | 0.1 | 62.5 | 125 | | |
| | 0 1 1 | VOR/ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | 0 2 0 | VOR/ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | 0 5 6 | VOR/ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | 0 6 0 | VOR/ILS Frequency #1 | | See Chapter 3 | | | | 167 | 333 | | |
| | 0 B 0 | VOR/ILS Frequency | | See Chapter 3 | | | | 167 | 333 | | |
| | | | | | | | | | | | |
| 0 3 5 | 0 0 2 | DME Frequency | | See Chapter 3 | | | | 100 | 200 | | 6-41 |
| | 0 0 6 | Baro Correction (ins of Hg) #3 | ins Hg | 22-31 | 5 | | 0.001 | 62.5 | 125 | | |
| | 0 0 9 | DME Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 2 0 | DME Frequency | | See Chapter 3 | | | | 100 | 200 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 1 - BCD DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Reso-lution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | 0 5 5 | Paired DME Frequency | MHz | 108-135.9 | 4 | | 0.05 | | | | |
| | 0 5 6 | DME Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 6 0 | DME Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 A 9 | DME Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 3 6 | 0 0 2 | MLS Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 2 0 | MLS Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 5 5 | MLS Channel Selection | | 500-600 | 3 | | 1 | | | | |
| | 0 5 6 | MLS Frequency Channel | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 6 0 | MLS Frequency Channel | | See Chapter 3 | | | | 100 | 200 | | |
| | 0 C 7 | MLS Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 3 7 | 0 2 0 | HF COM Frequency | | See Chapter 3 | | | | 100 | 200 | | 6-42 |
| | 0 B 9 | HF COM Frequency | | See Chapter 3 | | | | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 4 1 | 0 0 2 | Set Latitude | Deg/Min | 180N/180S | 6 | N | 0.1 | 250 | 500 | | |
| | 0 0 4 | Set Latitude | Deg/Min | 180N/180S | 6 | N | 0.1 | 250 | 500 | | |
| | 0 2 0 | Set Latitude | Deg/Min | 180N/180S | 6 | N | 0.1 | 250 | 500 | | |
| | 0 5 6 | Set Latitude | Deg/Min | 180N/180S | 6 | N | 0.1 | 250 | 500 | | |
| | 0 6 0 | Set Latitude | Deg/Min | 180N/180S | 6 | N | 0.1 | 250 | 500 | | |
| | 0 A 4 | Set Latitude | Deg/Min | 180N/180S | 6 | N | 0.1 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 4 2 | 0 0 2 | Set Longitude | Deg/Min | 180E/180W | 6 | E | 0.1 | 250 | 500 | | |
| | 0 0 4 | Set Longitude | Deg/Min | 180E/180W | 6 | E | 0.1 | 250 | 500 | | |
| | 0 2 0 | Set Longitude | Deg/Min | 180E/180W | 6 | E | 0.1 | 250 | 500 | | |
| | 0 5 6 | Set Longitude | Deg/Min | 180E/180W | 6 | E | 0.1 | 250 | 500 | | |
| | 0 6 0 | Set Longitude | Deg/Min | 180E/180W | 6 | E | 0.1 | 250 | 500 | | |
| | 0 A 4 | Set Longitude | Deg/Min | 180E/180W | 6 | E | 0.1 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 4 3 | 0 0 2 | Set Magnetic Heading | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | 0 0 4 | Set Magnetic Heading | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | 0 2 0 | Set Magnetic Heading | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | 0 5 6 | Set Magnetic Heading | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | 0 6 0 | Set Magnetic Heading | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | 0 A 4 | Set Magnetic Heading | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 4 4 | 0 0 4 | True Heading | Deg | 0-359.9 | 4 | | 0.1 | 250 | 500 | | |
| | 0 3 8 | True Heading | Deg | 0-359.9 | 4 | | 0.1 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 4 5 | 0 0 3 | Minimum Airspeed | Knots | 0-259.9 | 4 | | 0.1 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 0 4 6 | 0 3 3 | Engine Serial No. (LSDs) | | | | | | 500 | 1000 | | 6-15 |
| | 1 0 A | Engine Serial No. (LSDs) | | | | | | 500 | 1000 | | 6-15 |
| | 1 0 B | Engine Serial No. (LSDs) | | | | | | 500 | 1000 | | 6-15 |
| | | | | | | | | | | | |
| 0 4 7 | 0 2 0 | VHF Com Frequency | See Chap. 3 | | | | | 100 | 200 | | |
| | 0 2 4 | VHF Com Frequency | See Chap. 3 | | | | | 100 | 200 | | |
| | 0 3 3 | Engine Serial No. (MSDs) | | | | | | 500 | 1000 | | 6-16 |
| | 1 0 A | Engine Serial No. (MSDs) | | | | | | 500 | 1000 | | 6-16 |
| | 1 0 B | Engine Serial No. (MSDs) | | | | | | 500 | 1000 | | 6-17 |
| | 0 B 6 | VHF Com Frequency | See Chap. 3 | | | | | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 5 2 | 0 3 7 | Long. Zero Fuel CG | % MAC | 0-100.00 | 5 | | 0.01 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 5 3 | 0 0 5 | Track Angle-Magnetic | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | | | | | | | | | | | |
| 0 5 6 | 0 0 2 | Estimated Time of Arrival | Hr:Min | 0-23.59.9 | 5 | | 0.1 | 250 | 500 | | |
| | 0 0 5 | Wind Direction - Magnetic | Deg | 0-359 | 3 | | 1.0 | 250 | 500 | | |
| | 0 3 7 | Gross Weight (Kilograms) | 100 kg | 0-19999 | 5 | | 1.0 | 100 | 200 | | |
| | 0 5 6 | ETA (Active Waypoint) | Hr:Min | 0-23.59.9 | 5 | | 0.1 | 250 | 500 | | |
| | 0 6 0 | ETA (Active Waypoint) | Hr:Min | 0-23.59.9 | 5 | | 0.1 | 250 | 500 | | |
| | | | | | | | | | | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 1 - BCD DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Reso- lution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans- port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 0 6 0 | 0 2 5 | S/G Hardware Part Number | | | 4 | | | | | | 6-36 |
| | 0 3 7 | Tire Loading (Left Body Main) | % | 0-299.9 | 4 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 6 1 | 0 2 5 | S/G Software Config. Part No. | | | 4 | | | | | | 6-37 |
| | 0 3 7 | Tire Loading (Right Body Main) | % | 0-299.9 | 4 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 6 2 | 0 3 7 | Tire Loading (Left Wing Main) | % | 0-299.9 | 4 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 6 3 | 0 3 7 | Tire Loading (Right Wing Main) | % | 0-299.9 | 4 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 6 4 | 0 3 7 | Tire Loading (Nose) | % | 0-299.9 | 4 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 6 5 | 0 0 3 | Gross Weight | 100 lb. | 0-12000 | 5 | | 1.0 | 100 | 200 | | |
| | 0 3 7 | Gross Weight | 100 lb. | 0-19999 | 5 | | 1.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 6 6 | 0 0 2 | Longitudinal Center of Gravity | % MAC | 0-100.00 | 5 | | 0.01 | 500 | 1000 | | |
| | 0 3 7 | Longitudinal Center of Gravity | % MAC | 0-100.00 | 5 | | 0.01 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 6 7 | 0 3 7 | Lateral Center of Gravity | % MAC | 0-100.00 | 5 | | 0.01 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 2 5 | 0 0 2 | Universal Time Coordinate | Hr-Min | 0-23.59.9 | 4 | | 0.1 | 100 | 200 | | 6-25 |
| | 0 0 B | UTC | Hr:Min | 0-23:59.9 | 5 | | 0.1 | 200 | 1200 | | |
| | 0 3 1 | Universal Time Coordinate | Hr:Min | 0-23.59.9 | 5 | | 0.1 | 100 | 200 | | |
| | 0 5 6 | Universal Time Coordinate | Hr-Min | 0-23.59.9 | 4 | | 0.1 | 100 | 200 | | |
| | 0 6 0 | Universal Time Coordinate (UTC) | Hr-Min | 0-23.59.9 | 4 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 3 5 | 0 5 A | ACT 1 Fuel Quan. Display | Kg/Lb | 0-9999 | 4 | | 100 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 3 6 | 0 5 A | ACT 2 Fuel Quan. Display | Kg/Lb | 0-9999 | 4 | | 100 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 3 7 | 0 5 A | Center+Act1+Act2 FQ Display | Kg/Lb | 0-9999 | 4 | | 100 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 4 0 | 0 5 A | Actual Fuel Quan. Display | Kg/Lb | 0-9999 | 4 | | 100 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 4 1 | 0 5 A | Preselect Fuel Quan. Display | Kg/Lb | 0-9999 | 4 | | 100 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 4 2 | 0 5 A | Left Wing Fuel Quan. Display | Kg/Lb | 0-9999 | 4 | | 100 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 4 3 | 0 5 A | Center Wing Fuel Quan. Display | Kg/Lb | 0-9999 | 4 | | 100 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 4 4 | 0 5 A | Right Wing Fuel Quan. Display | Kg/Lb | 0-9999 | 4 | | 100 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 5 5 | 0 2 7 | MLS Selected GP Angle | Deg | 0-359.9 | 4 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 5 7 | 1 1 4 | Trim Tank Probe Capacitance | pf | 0-400 | 4 | | 1.0 | | | | |
| | | | | | | | | | | | |
| 1 6 3 | 0 3 7 | Zero Fuel Weight (lb) | Lbs. | 0-19999 | 5 | | 1.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 6 5 | 0 0 7 | Radio Height | Feet | ±7999.9 | 5 | | 0.1 | 25 | 200 | | 6-25 |
| | | | | | | | | | | | |
| 1 7 0 | 0 2 5 | Decision Height Selected (EFI) | Feet | ±7000 | 4 | | 1.0 | 100 | 200 | | 6-25 |
| | 0 C 5 | Decision Height Selected (EFI) | Feet | ±7000 | 4 | | 1.0 | 100 | 200 | | 6-25 |
| | | | | | | | | | | | |
| 2 0 0 | 0 0 2 | Drift Angle | Deg | ±180 | 4 | | 0.1 | 100 | 200 | | |
| | 0 0 4 | Drift Angle | Deg | ±180 | 4 | | 0.1 | 100 | 200 | | |
| | 0 5 6 | Drift Angle | Deg | ±180 | 4 | | 0.1 | 100 | 200 | | |
| | 0 6 0 | Drift Angle | Deg | ±180 | 4 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 1 - BCD DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Transport Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 0 1 | 0 0 9 | DME Distance | N.M. | -1-399.99 | 5 | | 0.01 | 83.3 | 167 | | 6-1-1 |
| | 1 1 2 | TACAN Distance | N.M. | 0-399.99 | 5 | | 0.01 | 190 | 210 | | |
| | 1 1 5 | DME Distance | N.M. | 0-399.99 | 5 | | 0.01 | 50 | 50 | | |
| | | | | | | | | | | | |
| 2 0 5 | 0 0 2 | HF COM Freq (New Format) | | | | | | | | | |
| | 0 B 9 | HF COM Freq (New Format) | | | | | | | | | |
| | | | | | | | | | | | |
| 2 0 7 | 0 2 5 | Operational Software Parts | | | 4 | | | | | | 6-37 |
| | | | | | | | | | | | |
| 2 3 0 | 0 0 6 | True Airspeed | Knots | 100-599 | 3 | | 1.0 | 250 | 500 | | 6-25 |
| | 0 3 8 | True Airspeed | Knots | 100-599 | 3 | | 1.0 | 250 | 500 | | |
| | | | | | | | | | | | |
| 2 3 1 | 0 0 6 | Total Air Temperature | Deg C | -060+099 | 3 | | 1.0 | 250 | 500 | | |
| | 0 3 8 | Total Air Temperature | Deg C | -060+099 | 3 | | 1.0 | 250 | 500 | | |
| | 1 1 4 | Inner 2 Tank Probe Capacitance | pf | 0-400 | 4 | | 1.0 | | | | |
| | | | | | | | | | | | |
| 2 3 2 | 0 0 4 | Altitude Rate | Ft/Min | ±20000 | 4 | Up | 10.0 | 31.3 | 62.5 | | 6-25 |
| | 0 0 5 | Altitude Rate | Ft/Min | ±20000 | 4 | Up | 10.0 | 31.3 | 62.5 | | |
| | 0 0 6 | Altitude Rate | Ft/Min | ±20000 | 4 | Up | 10.0 | 31.3 | 62.5 | | |
| | 1 1 4 | Inner 4 Tank Probe Capacitance | pf | 0-400 | 4 | | 1.0 | | | | |
| | | | | | | | | | | | |
| 2 3 3 | 0 0 6 | Static Air Temperature | Deg C | -099 to +060 | 3 | | 1.0 | 250 | 500 | | 6-25 |
| | 0 3 8 | Static Air Temperature | Deg C | -099 to +060 | 3 | | 1.0 | 250 | 500 | | |
| | 1 1 4 | Right Outer Probe Capacitance | pf | 0-400 | 4 | | 1.0 | | | | |
| | | | | | | | | | | | |
| 2 3 4 | 0 0 6 | Baro Correction (mb) #1 | mb | 745-1050 | 5 | | 0.1 | 62.5 | 125 | | |
| | 0 3 8 | Baro Correction (mb) #1 | mb | 745-1050 | 5 | | 0.1 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 3 5 | 0 0 6 | Baro Correction (ins of Hg) #1 | ins Hg | 22-31 | 5 | | 0.001 | 62.5 | 125 | | 6-25 |
| | 0 3 8 | Baro Correction (ins of Hg) #1 | ins Hg | 22-31 | 5 | | 0.001 | 62.5 | 125 | | 6-25 |
| | | | | | | | | | | | |
| 2 3 6 | 0 0 6 | Baro Correction (mb) #2 | mb | 745-1050 | 5 | | 0.1 | 62.5 | 125 | | |
| | 0 3 8 | Baro Correction (mb) #2 | mb | 745-1050 | 5 | | 0.1 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 3 7 | 0 0 6 | Baro Correction (ins of Hg) #2 | ins Hg | 22-31 | 5 | | 0.001 | 62.5 | 125 | | |
| | 0 3 8 | Baro Correction (ins of Hg) #2 | ins Hg | 22-31 | 5 | | 0.001 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 4 3 | 0 3 7 | Zero Fuel Weight (kg) | Kg | 0-19999 | 5 | | 1.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 2 6 0 | 0 0 2 | Date/Flight Leg | N/A | | | | | 500 | 1000 | | |
| | 0 0 B | Date | dd:mo:yr | dd:mm:yr | 6 | | 4 | | | | |
| | 0 3 1 | Date | N/A | | | | | 100 | 200 | | 6-18 |
| | 0 5 6 | Date/Flight Leg | N/A | | | | | 500 | 1000 | | |
| | 0 6 0 | Date/Flight Leg | N/A | | | | | 500 | 1000 | | |
| | 0 A 2 | Date/Flight Leg | N/A | | | | | 500 | 1000 | | |
| | | | | | | | | | | | |
| 2 6 1 | 0 0 2 | Flight Number | N/A | 0-9999 | 4 | | 1.0 | 500 | 1000 | | 6-9 |
| | 0 A 2 | Flight Number | N/A | 0-9999 | 4 | | 1.0 | 500 | 1000 | | |
| | 0 5 6 | Flight Number | N/A | 0-9999 | 4 | | 1.0 | 500 | 1000 | | |
| | 0 6 0 | Flight Number | N/A | 0-9999 | 4 | | 1.0 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 2 7 2 | 0 5 A | Fuel Density | Kg/cu.m. | 0-9999 | 4 | | 0.0001 | 100 | 200 | | ARINC 429 P2 |
| | | | | | | | | | | | |
| 2 7 3 | 0 5 A | Sensor Values Left Wing Tank | pF | 0-100 | 3 | | 100 | 200 | | | |
| | | | | | | | | | | | |
| 2 7 4 | 0 5 A | Sensor Values Center Wing Tank | pF | 0-100 | 3 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 2 7 5 | 0 5 A | Sensor Values Right Wing Tank | pF | 0-100 | 3 | | 0.1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 3 4 5 | 0 0 2 | NDB Effectivity | | | | | | | 1000 | | |
| | | | | | | | | | | | |
| 3 5 0 | 1 1 4 | Fuel Density | kg/l | 0-.999 | 4 | | 0.01 | | | | ARINC 429 P2 |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 1 - BCD DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Reso-lution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 3 5 1 | 1 1 4 | Inner Tank 1 Probe Capacitance | pf | 0-400 | 3 | | 0.1 | | | | ARINC 429 P2 |
| | | | | | | | | | | | |
| 3 5 2 | 1 1 4 | Center, ACT &RCT Probe Capac. | pf | 0-400 | 3 | | 0.1 | | | | ARINC 429 P2 |
| | | | | | | | | | | | |
| 3 5 3 | 1 1 4 | Inner Tank 3 Probe Capacitance | pf | 0-400 | 3 | | 0.1 | | | | ARINC 429 P2 |
| | | | | | | | | | | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 0 0 5 | 0 D 0 | Engine Discrete | | | | | | | | | Bit 11-Chan. A/<br>Bit 12-Chan. B |
| | | | | | | | | | | | |
| 0 2 5 | 0 4 D | Load SEL Control | NA | 204700 | 11 | | 100 | | | | |
| | | | | | | | | | | | |
| 0 3 4 | 0 2 5 | VOR/ILS Frequency | | | | | | 125 | 250 | | |
| | | | | | | | | | | | |
| 0 3 5 | 0 2 5 | DME Frequency | | | | | | 125 | 250 | | |
| | | | | | | | | | | | |
| 0 5 2 | 0 0 4 | Body Pitch Acceleration | Deg/Sec$^2$ | ± 64 | 15 | | 0.002 | 50 Hz | 117 Hz | | |
| | 0 3 8 | Body Pitch Acceleration | Deg/Sec$^2$ | ± 64 | 15 | | 0.002 | 50 Hz | 117 Hz | | |
| | | | | | | | | | | | |
| 0 5 3 | 0 0 4 | Body Roll Acceleration | Deg/Sec$^2$ | ± 64 | 15 | | 0.002 | 50 Hz | 117 Hz | | |
| | 0 3 8 | Body Roll Acceleration | Deg/Sec$^2$ | ± 64 | 15 | | 0.002 | 50 Hz | 117 Hz | | |
| | | | | | | | | | | | |
| 0 5 4 | 0 0 4 | Body Yaw Acceleration | Deg/Sec$^2$ | ± 64 | 15 | | 0.002 | 50 Hz | 117 Hz | | |
| | 0 3 7 | Zero Fuel Weight (Kg) | Kg | 655360 | 15 | | 20 | 100 | 200 | | |
| | 0 3 8 | Body Yaw Acceleration | Deg/Sec$^2$ | ± 64 | 15 | | 0.002 | 50 Hz | 117 Hz | | |
| | | | | | | | | | | | |
| 0 6 0 | 0 3 C | Tire Pressure (Left Outer) | PSIA | 1024 | 10 | | 1.0 | 50 | 250 | | |
| | | | | | | | | | | | |
| 0 6 1 | 0 0 2 | ACMS Information | | | | | | | | | 6-29 |
| | 0 0 B | Pseudo Range | Meters | ± 268435456 | 20 | | 256 | 200 | 1200 | | |
| | 0 3 C | Tire Pressure (Left Inner) | PSIA | 1024 | 10 | | 1.0 | 50 | 250 | | |
| | 0 5 6 | ACMS Information | | | | | | | | | |
| | 0 6 0 | ACMS Information | | | | | | | | | |
| | | | | | | | | | | | |
| 0 6 2 | 0 0 2 | ACMS Information | | | | | | | | | 6-29 |
| | 0 0 B | Pseudo Rang Fine | Meters | 256 | 11 | | 0.125 | 200 | 1200 | | |
| | 0 3 C | Tire Pressure (Right Inner) | PSIA | 1024 | 10 | | 1.0 | 50 | 250 | | |
| | 0 5 6 | ACMS Information | | | | | | | | | |
| | 0 6 0 | ACMS Information | | | | | | | | | |
| | | | | | | | | | | | |
| 0 6 3 | 0 0 2 | ACMS Information | | | | | | | | | 6-29 |
| | 0 0 B | Range Rate | M/S | ± 4096 | 20 | | 0.0039 | 200 | 1200 | | |
| | 0 3 C | Tire Pressure (Right Outer) | PSIA | 1024 | 10 | | 1.0 | 50 | 250 | | |
| | 0 5 6 | ACMS Information | | | | | | | | | |
| | 0 6 0 | ACMS Information | | | | | | | | | |
| | | | | | | | | | | | |
| 0 6 4 | 0 0 B | Delta Range | Meters | ± 4096 | 20 | | 0.0039 | 200 | 1200 | | |
| | 0 3 C | Tire Pressure (Nose) | PSIA | 1024 | 10 | | 1.0 | 50 | 250 | | |
| | | | | | | | | | | | |
| 0 6 5 | 0 0 B | SV Position X | Meters | ±67108864 | 20 | | 64 | 200 | 1200 | | |
| | | | | | | | | | | | |
| 0 6 6 | 0 0 B | SV Position X Fine | Meters | 64 | 14 | | 0.0039 | 200 | 1200 | | |
| | | | | | | | | | | | |
| 0 7 0 | 0 0 2 | Reference Airspeed (Vref) | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 1000 | |
| | 0 0 B | SV Position X | Meters | ±67108864 | 20 | | 64 | 200 | 1200 | | |
| | 0 2 9 | AC Frequency (Engine) | Hz | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 3 7 | Hard Landing Magnitude #1 | Lbs. | | 12 | | - | 100 | 200 | | |
| | 0 5 6 | Reference Airspeed (Vref) | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 1000 | |
| | 0 6 0 | Reference Airspeed (Vref) | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 1000 | |
| | 0 C C | Brakes - Metered Hyd. Pres. L (Normal) | PSIG | 4096 | 12 | | 1 | 50 | 100 | | #1 & 2 coded in SDI |
| | | | | | | | | | | | |
| 0 7 1 | 0 0 2 | Take-Off Climb Airspeed (V2) | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 50 | |
| | 0 0 B | SV Position Y Fine | Meters | 64 | 14 | | 0.0039 | 200 | 1200 | | |
| | 0 2 9 | AC Frequency (Engine) | Hz | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 3 3 | VBV | Deg | 64 | 12 | | 0.016 | 150 | 250 | | |
| | 0 3 7 | Hard Landing Magnitude #2 | Lbs. | | 12 | | - | 100 | 200 | | |
| | 0 C C | Brakes-Metered Hyd.Pres.L (alt.) | PSIG | 4096 | 12 | | 1 | 50 | 100 | | #1 & 2 coded in SDI |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

# ATTACHMENT 2
# DATA STANDARDS

## TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 7 2 | 0 0 2 | Rotation Speed (VR) | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 1000 | Revised by Supp 11 |
| | 0 0 B | SV Position Z | Meters | ±67108864 | 20 | | 64 | 200 | 1200 | | |
| | 0 1 C | Stator Vane Angle | Deg/180 | ±180 | 11 | | 0.1 | 100 | 200 | | |
| | 0 2 9 | AC Voltage (Engine) | Volts | 256 | 10 | | 0.25 | 100 | 200 | | |
| | 0 2 F | Stator Vane Angle | Deg/180 | ±180 | 11 | | 0.1 | 100 | 200 | | |
| | 0 3 3 | Stator Vane Angle | Deg | 64 | 12 | | 0.016 | 150 | 250 | | See Note [4] |
| | 0 C C | Brakes-Metered Hyd.Pres.R (normal) | PSIG | 4096 | 12 | | 1 | 50 | 100 | | #1 &2 coded in SDI |
| | | | | | | | | | | | |
| 0 7 3 | 0 0 2 | V1 (critical engine failure speed) | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 0 B | SV Position Z Fine | Meters | 64 | 14 | | 0.0039 | 200 | 1200 | | |
| | 0 1 C | Oil Quantity | cc | 32768 | 8 | | 128 | 100 | 200 | | |
| | 0 2 9 | Oil Quantity | US Pint | 128 | 9 | | 0.25 | 100 | 200 | | |
| | 0 A 2 | V2 (critical engine failure speed) | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 C C | Brakes-Metered Hyd.Pres.R (alt.) | PSIG | 4096 | 12 | | 1 | 50 | 100 | | #1 & 2 coded in SDI |
| | 0 D 0 | Engine Oil Quantity | US Pint | 128 | 9 | | 0.25 | | | | SDI 1=L/SDI 2=R |
| | | | | | | | | | | | |
| 0 7 4 | 0 0 2 | Zero Fuel Weight | Lbs. | 1310720 | 15 | | 40 | 500 | 1000 | 1000 | |
| | 0 0 B | UTC Measure Time | Seconds | 10.0 | 20 | | 9.536743µs | 200 | 1200 | | |
| | 0 2 C | Zero Fuel Weight | Lbs. | 1310720 | 15 | | 40 | 100 | 400 | | |
| | 0 3 3 | LP Compressor Bleed Pos. (3.0) | Inches | 4 | 10 | | 0.004 | 100 | 200 | | See Note [5] |
| | 0 3 7 | Zero Fuel Weight (lb) | Lbs. | 1310720 | 15 | | 40 | 100 | 200 | | |
| | 0 5 6 | Zero Fuel Weight | Lbs. | 1310720 | 15 | | 40 | 500 | 1000 | 1000 | |
| | 0 6 0 | Zero Fuel Weight | Lbs. | 1310720 | 15 | | 40 | 500 | 1000 | 1000 | |
| | 1 1 4 | Zero Fuel Weight | Lbs. | 1310720 | 15 | | 40 | 100 | 400 | | |
| | | | | | | | | | | | |
| 0 7 5 | 0 0 2 | Gross Weight | Lbs. | 1310720 | 15 | | 40 | 100 | 200 | | |
| | 0 0 3 | Gross Weight | Lbs. | 1310720 | 15 | | 40 | 100 | 200 | | |
| | 0 0 B | Geodetic Altitude | Feet | 131072 | 17 | | 1.0 | 500 | 1000 | | |
| | 0 2 9 | AC Voltage (Alt. Sources) | Volts | 256 | 10 | | 0.25 | 100 | 200 | | |
| | 0 2 C | Gross Weight | Lbs. | 1310720 | 15 | | 40 | 100 | 200 | | |
| | 0 3 7 | Gross Weight | Lbs. | 1310720 | 15 | | 40 | 100 | 200 | | |
| | 0 3 E | Gross Weight | Lbs. | 1310720 | 15 | | 40 | 100 | 200 | | |
| | 1 1 4 | Aircraft Gross Weight | Lbs. | 1310720 | 15 | | 40 | 100 | 400 | | |
| | | | | | | | | | | | |
| 0 7 6 | 0 0 B | GPS Height Above Ref.Ellipsoid | Feet | 131072 | 17 | | 1.0 | 25 | 50 | | |
| | 0 0 B | GNSS Altitude (Msl) | Feet | ±131072 | 20 | | 0.125 | 200 | 1200 | | |
| | 0 2 9 | AC Voltage (Bus Bar) | Volts | 256 | 10 | | 0.25 | 100 | 200 | | |
| | 0 3 7 | Longitudinal Center of Gravity | % MAC | 163.84 | 14 | | 0.01 | 100 | 200 | | |
| | 0 3 E | Longitudinal Center of Gravity | % | 164 | 14 | | 0.01 | 100 | 200 | | |
| | 1 1 4 | Aircraft Longitudinal Center of Gravity | Percent | 163.84 | 14 | | 0.01 | 100 | 200 | | |
| | | | | | | | | | | | |
| 0 7 7 | 0 - - | Lateral Center of Gravity | MLb-in | 128 | 17 | | 0.001 | 100 | 200 | | |
| | 0 0 2 | Target Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 0 B | GPS Hor/Vert Deviation | % F.S. | 128 | 8 | | 0.8 | 25 | 50 | | Revised by Supp 11 |
| | 0 2 9 | AC Load (Engine) | % | 256 | 8 | | 1.0 | 100 | 200 | | |
| | 0 3 7 | Lateral Center of Gravity | % MAC | 131.072 | 17 | | 0.01 | 100 | 200 | | |
| | 0 5 6 | Target Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 6 0 | Target Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 1 1 4 | Zero Fuel Center of Gravity | Percent | 163.84 | 14 | | 0.01 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 0 0 | 0 0 1 | Selected Course #1 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | 6-27 |
| | 0 0 2 | Selected Course #1 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 1 1 | Selected Course #1 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 2 0 | Sleected Course #1 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 2 9 | AC Load (Alt. Source) | % | 128 | 8 | | 1.0 | 100 | 200 | | |
| | 0 5 6 | Selected Course #1 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 6 0 | Selected Course #1 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 3 7 | Gross Weight (Kilogram) | Kilograms | 655360 | 15 | | 20 | 100 | 200 | | |
| | 0 A 1 | Selected Course #1 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 B 1 | Selected Course #1 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 B B | Outboard Flaps - PDU | Deg/180 | ±180 | 12 | | 0.05 | 20 | 100 | | |
| | | | | | | | | | | | |
| 1 0 1 | 0 0 2 | Selected Heading | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 0 B | HDOP | N/A | 1024 | 15 | | 0.031 | 200 | 1200 | | |
| | 0 2 0 | Selected Heading | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 2 5 | Selected Heading | Deg/180 | ±180 | 12 | | 0.05 | 125 | 250 | | |
| | 0 2 9 | DC Current (TRU) | Amperes | 256 | 8 | | 1.0 | 100 | 200 | | |
| | 0 5 A | FQIC | Lbs | 4-65532 | 14 | | 4 | 900 | 1100 | | |
| | 0 A 1 | Selected Heading | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 B B | Inboard Flaps - PDU | Deg/180 | ±180 | 12 | | 0.05 | 20 | 100 | | |
| | 1 1 4 | C/G Target | % | 164 | 8 | | 0.01 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 0 2 | 0 0 2 | Selected Altitude | Feet | 65536 | 16 | | 1.0 | 100 | 200 | | 6-27 |
| | 0 0 B | VDOP | N/A | 1024 | 15 | | 0.031 | 200 | 1200 | | |
| | 0 2 0 | Selected Altitude | Feet | 65536 | 16 | | 1.0 | 100 | 200 | | |
| | 0 2 9 | DC Current (Battery) | Amperes | 256 | 8 | | 1.0 | 100 | 200 | | |
| | 0 5 6 | Selected Altitude | Feet | 65536 | 16 | | 1.0 | 100 | 200 | | |
| | 0 6 0 | Selected Altitude | Feet | 65536 | 16 | | 1.0 | 100 | 200 | | |
| | 0 A 1 | Selected Altitude | Feet | 65536 | 16 | | 1.0 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 0 3 | 0 0 1 | Selected Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | 6-27 |
| | 0 0 2 | Selected Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 0 3 | Selected Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 0 B | GNSS Track Angle | Deg | ±108 | 15 | | 0.0055 | 200 | 1200 | | |
| | 0 1 B | Left/PDU Flap | Deg/180 | ±180 | 18 | | 0.000687 | 100 | 200 | | |
| | 0 2 0 | Selected Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 2 9 | DC Voltage (TRU) | Volts | 128 | 9 | | 0.25 | 100 | 200 | | |
| | 0 5 6 | Selected Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 6 0 | Selected Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 A 1 | Selected Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 B B | Left Outboard Flap Position | Deg/180 | ±180 | 12 | | 0.05 | 20 | 100 | | |
| | | | | | | | | | | | |
| 1 0 4 | 0 0 1 | Selected Vertical Speed | Ft/Min | 16384 | 10 | UP | 16 | 100 | 200 | | 6-27 |
| | 0 0 2 | Selected Vertical Speed | Ft/Min | 16384 | 10 | UP | 16 | 100 | 200 | | |
| | 0 1 B | Right/PDU Flap | Deg/180 | ±180 | 18 | | 0.000687 | 100 | 200 | | |
| | 0 2 0 | Selected Vertical Speed | Ft/Min | 16384 | 10 | UP | 16 | 100 | 200 | | |
| | 0 2 9 | DC Voltage (Battery) | Volts | 128 | 9 | | 0.25 | 100 | 200 | | |
| | 0 2 B | Selected Vertical Speed | Ft/Min | 16384 | 14 | UP | 1 | 100 | 200 | | |
| | 0 5 6 | Selected Vertical Speed | Ft/Min | 16384 | 10 | UP | 16 | 100 | 200 | | |
| | 0 6 0 | Selected Vertical Speed | Ft/Min | 16384 | 10 | UP | 16 | 100 | 200 | | |
| | 0 A 1 | Selected Vertical Speed | Ft/Min | 16384 | 10 | UP | 16 | 100 | 200 | | |
| | 0 B B | Right Outboard Flap Position | Deg/180 | ±180 | 12 | | 0.05 | 20 | 100 | | |
| | | | | | | | | | | | |
| 1 0 5 | 0 0 2 | Selected Runway Heading | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 1 0 | Selected Runway Heading | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 1 B | Left/PDU Slat | Deg/180 | ±180 | 18 | | 0.000687 | 100 | 200 | | |
| | 0 2 0 | Selected Runway Heading | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 2 9 | Oil Temp. Input (IDG/CSD) | Deg C | 2048 | 12 | | 0.5 | 100 | 200 | | |
| | 0 5 5 | Selected Runway Heading | Deg | ±180 | 11 | | 0.1 | | | | |
| | 0 5 6 | Selected Runway Heading | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 6 0 | Selected Runway Heading | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 A 1 | Selected Runway Heading | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 B 0 | Selected Runway Heading | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 B B | Left Inboard Flap Position | Deg/180 | ±180 | 12 | | 0.05 | 20 | 100 | | |
| | | | | | | | | | | | |
| 1 0 6 | 0 0 2 | Selected Mach | Mach | 4096 | 12 | | 1 | 31.3 | 200 | | 6-27 |
| | 0 1 B | Right/PDU Slat | Deg/180 | ±180 | 18 | | 0.000687 | 100 | 200 | | |
| | 0 2 0 | Selected Mach | Mach | 4096 | 12 | | 0.5 | 100 | 200 | | |
| | 0 2 9 | Oil Temp. Input (IDG/CSD) | Deg C | 2048 | 12 | | 0.5 | 100 | 200 | | |
| | 0 5 6 | Selected Mach | Mach | 4096 | 12 | | 1 | 31.3 | 200 | | |
| | 0 6 0 | Selected Mach | Mach | 4096 | 12 | | 1 | 31.3 | 200 | | |
| | 0 A 1 | Selected Mach | Mach | 4096 | 12 | | 1 | 31.3 | 62.5 | | |
| | 0 B B | Right Inboard Flap Position | Deg/180 | ±180 | 12 | | 0.05 | 20 | 100 | | |
| | | | | | | | | | | | |
| 1 0 7 | 0 0 2 | Selected Cruise Altitude | Feet | 65536 | 16 | UP | 1 | 100 | 200 | | |
| | 0 1 B | Flap/Slat Lever | Deg/180 | ±180 | 18 | | 0.000687 | 100 | 200 | | |
| | 0 B B | Flap Lever Position-median value | Deg/180 | ±180 | 18 | | 0.000687 | 100 | 200 | | |

# ATTACHMENT 2
# DATA STANDARDS

## TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 3 7 | Long. Zero Fuel Ctr of Gravity | % MAC | 163.84 | 14 | | 0.01 | 100 | 200 | | |
| | 0 5 6 | Selected Cruise Altitude | Feet | 65536 | 16 | UP | 1 | 100 | 200 | | |
| | 0 6 0 | Selected Cruise Altitude | Feet | 65536 | 16 | UP | 1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 1 0 | 0 0 1 | Selected Course #2 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 0 2 | Selected Course #2 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 0 B | GNSS Latitude | Deg | ±180 | 20 | | 0.000172 | 200 | 1200 | | |
| | 0 1 0 | Selected Course #2 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 1 1 | Selected Course #2 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 2 0 | Selected Course #2 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 A 1 | Selected Course #2 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 B 1 | Selected Course #2 | Deg/180 | ±180 | 12 | | 0.05 | 167 | 333 | | |
| | 0 B B | Flap Lever Position - Center | Deg/180 | 180 | 18 | | 0.000687 | 80 | 160 | | |
| | | | | | | | | | | | |
| 1 1 1 | 0 0 B | GNSS Longitude | Deg | ±180 | 20 | | 0.000172 | 200 | 1200 | | |
| | | | | | | | | | | | |
| 1 1 2 | 0 0 2 | Runway Length | Feet | 20480 | 11 | | 10 | 250 | 500 | | |
| | 0 0 B | GNSS Ground Speed | Knots | 4096 | 15 | | 0.125 | 200 | 1200 | | |
| | 0 A 1 | Selected EPR | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 A 1 | Selected N1 | RPM | 4096 | 12 | | 1 | 100 | 200 | | |
| | 0 B B | Flap Lever Position - Left | Deg/180 | ±180 | 18 | | 0.000687 | 80 | 160 | | |
| | | | | | | | | | | | |
| 1 1 4 | 0 0 2 | Desired Track | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | 6-27 |
| | 0 2 9 | Brake Temp. (Left Inner L/G) | Deg C | 2048 | 11 | | 1 | 100 | 200 | | |
| | 0 2 F | Ambient Pressure | PSIA | 32 | 14 | | 0.002 | 100 | 200 | | |
| | 0 3 F | Pamb Sensor | PSIA | 32 | 14 | | 0.002 | 100 | 200 | | |
| | 0 5 6 | Desired Track | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | |
| | 0 6 0 | Desired Track | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | |
| | 0 B B | Flap Lever Position - Right | Deg/180 | ±180 | 18 | | 0.000687 | 80 | 160 | | |
| | 0 C C | Wheel Torque Output | Lb./Ft. | 16384 | 12 | | 4 | 50 | 100 | | No. 5 to 8 in SDI |
| | 1 0 A | Selected Ambient Static Pressure | PSIA | 1.5-20.0 | 11 | | 0.016 | 100 | 500 | | |
| | 1 0 B | Selected Ambient Static Pressure | PSIA | 1.5-20.0 | 11 | | 0.016 | 100 | 500 | | |
| | 1 3 A | Ambient Pressure | PSIA | 32 | 14 | | 0.002 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 1 5 | 0 0 2 | Waypoint Bearing | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 2 9 | Brake Temp. (Left Outer L/G) | Deg C | 2048 | 11 | | 1 | 100 | 200 | | |
| | 0 2 F | Fuel Temperature | Deg C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 3 F | Fuel Temperature | Deg C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 5 6 | Waypoint Bearing | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 6 0 | Waypoint Bearing | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 B C | Fuel Temperature | Deg C | 256 | 8 | | 1 | 500 | 1000 | | |
| | 0 C C | Wheel Torque Output | Lb./Ft. | 16384 | 12 | | 4 | 50 | 100 | | No. 1 to 4 in SDI – 6-26 |
| | | | | | | | | | | | |
| 1 1 6 | 0 0 2 | Cross Track Distance | N.M. | 128 | 15 | | 0.004 | 31.3 | 62.5 | | 6-27 |
| | 0 0 B | Horizontal GLS Deviation Rectilinear | Feet | 24000 | 18 | | 0.00915 | | 100 | | |
| | 0 2 9 | Brake Temp. (Right Inner L/G) | Deg C | 2048 | 11 | | 1 | 100 | 200 | | |
| | 0 5 5 | Horizontal GLS Deviation Rectilinear | Feet | 24000 | 18 | | 0.00915 | | 100 | | |
| | 0 5 6 | Cross Track Deviation | N.M. | 128 | 15 | | 0.004 | 31.3 | 62.5 | | |
| | 0 6 0 | Cross Track Deviation | N.M. | 128 | 15 | | 0.004 | 31.3 | 62.5 | | |
| | 0 C C | Wheel Torque Output | Lb./Ft. | 16384 | 12 | | 4 | 50 | 100 | | No. 9 to 12 in SDI – 6-26 |
| | | | | | | | | | | | |
| 1 1 7 | 0 0 2 | Vertical Deviation | Feet | 2048 | 11 | | 1.0 | 31.3 | 62.5 | | 6-27 |
| | 0 0 B | Vertical GLS Deviation Rectilinear | Feet | 1024 | 14 | | 0.0625 | | 100 | | |
| | 0 2 9 | Brake Temp. (Right Outer L/G) | Deg C | 2048 | 11 | | 1 | 100 | 200 | | |
| | 0 5 5 | Vertical GLS Deviation Rectilinear | Feet | 1024 | 14 | | 0.0625 | | 100 | | |
| | 0 5 6 | Vertical Deviation | Feet | 2048 | 11 | | 1.0 | 31.3 | 62.5 | | |
| | 0 6 0 | Vertical Deviation | Feet | 2048 | 11 | | 1.0 | 31.3 | 62.5 | | |
| | 0 C C | Wheel Torque Output | Lb./Ft. | 16384 | 12 | | 4 | 50 | 100 | | No. 13 to 16 in SDI – 6-26 |
| | | | | | | | | | | | |
| 1 2 0 | 0 0 2 | Range to Altitude | N.M. | 512 | 15 | | 0.016 | 25 | 50 | | |
| | 0 0 B | GNSS Latitude Fine | Deg | 0.000172 | 11 | | 8.38-E-8 | 200 | 1200 | | |
| | 0 5 6 | Range to Altitude | N.M. | 512 | 15 | | 0.016 | 25 | 50 | | |
| | 0 6 0 | Range to Altitude | N.M. | 512 | 15 | | 0.016 | 25 | 50 | | |
| | | | | | | | | | | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 2 1 | 0 0 2 | Horizontal Command Signal | Deg/180 | ±180 | 14 | | 0.01 | 50 | 100 | | |
| | 0 0 B | GNSS Longitude Fine | Degrees | 0.000172 | 11 | | 8.38-E-8 ° | 200 | 1200 | | |
| | 0 2 5 | Pitch Limit | Deg/180 | ±180 | 14 | | 0.01 | 125 | 250 | | |
| | 0 5 6 | Horizontal Command Signal | Deg/180 | ±180 | 14 | | 0.01 | 50 | 100 | | |
| | 0 6 0 | Horizontal Command Signal | Deg/180 | ±180 | 14 | | 0.01 | 50 | 100 | | |
| | | | | | | | | | | | |
| 1 2 2 | 0 0 2 | Vertical Command Signal | Deg/180 | ±180 | 12 | | 0.05 | 500 | 100 | | |
| | 0 5 6 | Vertical Command Signal | Deg/180 | ±180 | 12 | | 0.05 | 500 | 100 | | |
| | 0 6 0 | Vertical Command Signal | Deg/180 | ±180 | 12 | | 0.05 | 500 | 100 | | |
| | | | | | | | | | | | |
| 1 2 3 | 0 0 2 | Throttle Command | Deg/Sec | 256 | 18 | | 0.001 | 50 | 100 | | |
| | | | | | | | | | | | |
| 1 2 4 | 0 A 5 | Client Device for GNSS Receiver | Meters | 8192 | 13 | | 1 | | 200 | | 6-49 |
| | 1 E 2 | Horizontal Alarm Limit | Meters | 0-8190 | 13 | | 1 | 800 | 1200 | | |
| | | | | | | | | | | | |
| 1 2 6 | 0 0 2 | Vertical Deviation (wide) | Feet | 32768 | 15 | above sel alt | 1.0 | 31.3 | 62.5 | | |
| | 0 5 6 | Vertical Deviation | Feet | 32768 | 15 | above sel alt | 1.0 | 31.3 | 62.5 | | |
| | 0 6 0 | Vertical Deviation | Feet | 32768 | 15 | above sel alt | 1.0 | 31.3 | 62.5 | | |
| | | | | | | | | | | | |
| 1 2 7 | 0 0 2 | Selected Landing Altitude | Feet | 65536 | 16 | UP | 1 | 100 | 200 | | |
| | 0 1 B | Slat Angle | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | 6-11 |
| | 0 3 3 | P14 | PSIA | 32 | 14 | | 0.002 | 100 | 200 | | |
| | 1 0 A | Fan Discharge Static Pressure | PSIA | 1.5 - 30.0 | 11 | | 0.016 | 100 | 500 | | |
| | 1 0 B | Fan Discharge Static Pressure | PSIA | 1.5 - 30.0 | 11 | | 0.016 | 100 | 500 | | |
| | 1 E 2 | Vertical Alarm Limit | Meters | 0-255 | 8 | | 1 | 800 | 1200 | | 6-50 |
| | | | | | | | | | | | |
| 1 3 0 | 0 0 B | Aut Horiz Integ Limit | N.M. | 16 | 17 | | 1.2E-4 | 200 | 1200 | | |
| | 0 1 A | Fan Inlet Total Temperature | Deg C | 128 | 11 | | 0.06 | 100 | 200 | | |
| | 0 1 C | Fan Inlet Total Temperature | Deg C | 128 | 11 | | 0.06 | 100 | 200 | | |
| | 0 2 F | Fan Inlet Total Temperature | Deg C | 128 | 11 | | 0.06 | 100 | 200 | | |
| | 0 3 5 | Intruder Range | | | | | | | 500 | | 6-21 and ARINC 735 |
| | 0 3 F | Fan Inlet Total Temperature | Deg C | 128 | 11 | | 0.06 | 100 | 200 | | |
| | 1 0 A | Selected Total Air Temperature | Deg C | -80 to 90 | 10 | | 0.125 | 100 | 500 | | |
| | 1 0 B | Selected Total Air Temperature | Deg C | -80 to 90 | 10 | | 0.125 | 100 | 500 | | |
| | 1 3 A | Inlet Temperature | Deg C | 128 | 11 | | 0.0625 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 3 1 | 0 1 A | Fan Inlet Total Pressure | PSIA | 32 | 13 | | 0.004 | 100 | 200 | | |
| | 0 1 C | Fan Inlet Total Pressure | PSIA | 32 | 13 | | 0.004 | 100 | 200 | | |
| | 0 2 D | Fan Inlet Total Pressure | PSIA | 32 | 13 | | 0.004 | 100 | 200 | | |
| | 0 2 F | Fan Inlet Total Pressure | PSIA | 32 | 13 | | 0.004 | 100 | 200 | | |
| | 0 3 3 | Fan Inlet Total Pressure | PSIA | 32 | 13 | | 0.004 | 100 | 200 | | |
| | 0 3 5 | Intruder Altitude | | | | | | | 500 | | 6-22 and ARINC 735 |
| | 1 3 A | Inlet Pressure | PSIA | 32 | 13 | | 0.004 | 100 | 200 | | |
| 1 3 2 | 0 1 A | Exhaust Gas Total Pressure | PSIA | 32 | 13 | | 0.004 | 100 | 200 | | |
| | 0 1 C | Exhaust Gas Total Pressure | PSIA | 32 | 13 | | 0.004 | 100 | 200 | | |
| | 0 3 3 | Exhaust Gas Total Pressure | PSIA | 32 | 14 | | 0.002 | 100 | 250 | | |
| | 0 3 5 | Intruder Bearing | | | | | | | 500 | | 6-23 and ARINC 735 |
| | | | | | | | | | | | |
| 1 3 3 | 0 0 B | Aut Vert Integ Limit | Feet | 32,768 | 18 | | 0.125 | 200 | 1200 | | |
| | 0 1 A | Thrust Lever Angle | Deg/180 | ±180 | 12 | | 0.05 | 100 | 250 | | |
| | 0 2 F | Thrust Lever Angle | Deg/180 | ±180 | 12 | | 0.05 | 25 | 50 | | |
| | 0 3 F | Thrust Lever Angle | Deg/180 | ±180 | 12 | | 0.05 | 25 | 50 | | |
| | 1 0 A | Selected Throttle Lever Angle | Deg | 90 | 11 | | 0.088 | 31.3 | 100 | | |
| | 1 0 B | Selected Throttle Lever Angle | Deg | 90 | 11 | | 0.088 | 31.3 | 100 | | |
| | | | | | | | | | | | |
| 1 3 4 | 0 1 C | Power Lever Angle | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | |
| | 1 0 A | Throttle Lever Angle | Deg | ±128 | 11 | | 0.088 | 500 | 1000 | | |
| | 1 0 B | Throttle Lever Angle | Deg | ±128 | 11 | | 0.088 | 500 | 1000 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 3 A | Throttle Lever Angle | Deg/180 | ±180 | 12 | | 0.05 | 25 | 50 | | |
| | | | | | | | | | | | |
| 1 3 5 | 0 1 C | Engine Vibration #1 | in/sec | 8 | 12 | | 0.002 | 100 | 200 | | |
| | 0 2 9 | Engine Fan Vibration | % FS | 128 | 7 | | 1 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 3 6 | 0 0 B | Vertical Figure of Merit | Feet | 32,768 | 18 | | 0.125 | 200 | 1200 | | |
| | 0 1 C | Engine Vibration #2 | in/sec | 8 | 12 | | 0.002 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 3 7 | 0 1 B | Flap Angle | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | 6-11 |
| | 0 2 A | Flap Angle | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | 6-11 |
| | 0 2 F | Thrust Reverser Position Feedback | % | 128 | 12 | | 0.03 | 100 | 200 | | |
| | 0 3 F | Thrust Reverser Position Feedback | % | 128 | 12 | | 0.03 | 100 | 200 | | |
| | 1 0 A | Selected Thrust Reverser Position | % | -5 to 105 | 11 | | 0.063 | 62.5 | 250 | | |
| | 1 0 B | Selected Thrust Reverser Position | % | -5 to 105 | 11 | | 0.063 | 62.5 | 250 | | |
| | 1 4 0 | Flap Angle | Deg | 180 | 12 | | 0.05 | 62.5 | 200 | | 6-11 |
| | | | | | | | | | | | |
| 1 4 0 | 0 0 1 | Flight Director - Roll | Deg/180 | ±180 | 12 | | 0.05 | 50 | 100 | | 6-27 |
| | 0 0 B | UTC Fine | Seconds | 1 | 20 | | 0.953674µs | 200 | 1200 | | |
| | 0 2 5 | Flight Director - Roll | Deg/180 | ±180 | 10 | | 0.02 | 125 | 250 | | |
| | | | | | | | | | | | |
| 1 4 1 | 0 0 1 | Flight Director - Pitch | Deg/180 | ±180 | 12 | | 0.05 | 50 | 100 | | |
| | 0 0 B | UTC Fine Fractions | Seconds | 0.9536743µs | 10 | | 0.931225ns | 200 | 1200 | | |
| | 0 2 5 | Flight Director - Pitch | Deg/180 | ±180 | 10 | | 0.02 | 125 | 250 | | |
| | | | | | | | | | | | |
| 1 4 2 | 0 0 2 | Flight Director - Fast/Slow | Knots | 32 | 12 | | 0.008 | 31.3 | 62.5 | | 6-27 |
| | 0 0 3 | Flight Director - Fast/Slow | Knots | 32 | 12 | | 0.008 | 31.3 | 62.5 | | |
| | 0 2 5 | Flight Director - Fast/Slow | Knots | 32 | 8 | | 0.125 | 125 | 250 | | |
| | | | | | | | | | | | |
| 1 4 3 | 0 0 1 | Flight Director - Yaw | Deg/180 | ±180 | 12 | | 0.05 | 50 | 100 | | |
| | 0 4 1 | HPA Command Word | | | | | | | | | See ARINC 741 |
| | 2 4 1 | HPA Response Word | | | | | | | | | See ARINC 741 |
| | | | | | | | | | | | |
| 1 4 4 | 0 2 B | Altitude Error | Feet | 8192 | 14 | Above Cmd Alt | 1.0 | 25 | 50 | | |
| | 0 4 1 | ACU/BSU Control Word | | | | | | | | | See ARINC 741 |
| | 3 4 1 | ACU/BSU Response Word | | | | | | | | | See ARINC 741 |
| | | | | | | | | | | | |
| 1 4 5 | 0 0 2 | TACAN Control | See Sec. 3.1.4 | | | | | 180 | 220 | | 6-30 |
| | | | | | | | | | | | |
| 1 4 6 | 1 1 2 | TACAN Control | See Sec. 3.1.4 | | | | | 180 | 220 | | |
| | | | | | | | | | | | |
| 1 4 7 | X X X | TACAN Control Word | | | | | | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 5 0 | 0 0 2 | Universal Time Coordinate | | | | | | | | | 6-12 |
| | 0 0 B | UTC | Hr:Min:S | ±23:59:59 | 17 | | 1.0sec | 200 | 1200 | | |
| | 0 3 1 | Universal Time Coordinate | | | | | | 100 | 200 | | 6-12 |
| | 0 5 6 | Universal Time Coordinate | | | | | | | | | 6-12 |
| | 0 6 0 | Universal Time Coordinate | | | | | | | | | 6-12 |
| | | | | | | | | | | | |
| 1 5 1 | 0 0 2 | Localizer Bearing (True) | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 2 7 | MLS Azimuth Deviation | | | | | | | | | |
| | 0 5 5 | MLS AZ Deviation | mV | ± 2400 | 15 | | 0.0732 | | | | |
| | 0 5 6 | Localizer Bearing (True) | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | 0 6 0 | Localizer Bearing (True) | Deg/180 | ±180 | 11 | | 0.1 | 167 | 333 | | |
| | | | | | | | | | | | |
| 1 5 2 | 0 2 7 | MLS Elevation Deviation | | | | | | | | | |
| | 0 3 8 | Cabin Pressure | mB | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | 0 4 1 | Open Loop Steering | | | | | | | | | See ARINC 741 |
| | 0 5 5 | MLS GP Deviation | mV | ± 2400 | 15 | | 0.0732 | | | | |
| | 0 A D | Cabin Pressure | mB | 2048 | 18 | | 0.008 | 20 | 200 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 5 3 | 0 0 2 | Maximum Altitude | Feet | 65536 | 16 | Above S.L. | 1 | 500 | 1000 | 100 | |
| | 0 4 1 | Closed Loop Steering | | | | | | | | | See ARINC 741 |
| | 0 5 5 | MLS Selected Azimuth | Deg | 0-359 | 9 | | 1 | | | | |
| | | | | | | | | | | | |
| 1 5 4 | 0 0 2 | Runway Heading (True) | N.M. | 512 | 16 | | 0.008 | 83.3 | 167 | | |
| | 0 2 7 | MLS Auxiliary Data | | | | | | | | | |
| | 0 5 5 | MLS Max Selectable GP | Deg | ± 51.1 | 9 | | 1 | | | | |
| | 0 5 6 | Runway Heading (True) | N.M. | 512 | 16 | | 0.008 | 83.3 | 167 | | |
| | 0 6 0 | Runway Heading (True) | N.M. | 512 | 16 | | 0.008 | 83.3 | 167 | | |
| | | | | | | | | | | | |
| 1 5 5 | 0 5 5 | MLS Selected Glide Path | Deg | ± 51.1 | 9 | | 0.01 | | | | |
| | | | | | | | | | | | |
| 1 6 2 | 0 1 2 | ADF Bearing | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 2 5 | ADF brg left/right | Deg/180 | ±180 | 12 | | 0.05 | 125 | 250 | | SDI-01=left/SDI-10=right |
| | 0 2 9 | Crew Oxygen Pressure | PSI | 4096 | 12 | | 1 | 100 | 200 | | |
| | 0 5 5 | MLS Basic Data Word 5 | N/A | N/A | N/A | | N/A | | | | |
| | 1 4 0 | Density Altitude | Feet | 1131072 | 16 | | 2 | 250 | 500 | | |
| | | | | | | | | | | | |
| 1 6 4 | 0 0 2 | Minimum Descent Altitude (MDA) | Feet | 8192 | 16 | | 0.125 | 500 | 1000 | | |
| | 0 0 3 | Target Height | Feet | 8192 | 16 | | 0.125 | 500 | 1000 | | |
| | 0 0 7 | Radio Height | Feet | 8192 | 16 | | 0.125 | 25 | 50 | | 6-13/6-27 |
| | 0 2 5 | Radio Height | Feet | 8192 | 12 | | 2.0 | 125 | 250 | | |
| | 0 3 B | Radio Height | VDC | 32 | 11 | | 0.015 | 150 | 250 | | Per ARINC 522A |
| | 0 5 5 | MLS ABS GP Angle | Deg | ± 41 | 15 | | 0.00125 | | | | |
| | | | | | | | | | | | |
| 1 6 5 | 0 0 B | Vertical Velocity | Feet/Min | ± 32768 | 15 | | 1.0 | 200 | 1200 | | |
| | 0 5 5 | MLS ABS Azimuth Angle | Deg | ± 82 | 16 | | 0.00125 | | | | |
| | | | | | | | | | | | |
| 1 6 6 | 0 0 7 | RALT Check Point Dev | Feet | 512 | 10 | | 0.5 | * | * | | |
| | 0 0 B | North/South Velocity | Knots | ± 4096 | 15 | | 0.125 | 200 | | | |
| | | | | | | | | | | | |
| 1 6 7 | 0 0 2 | EPU Estimate Position Uncertainty (ANP) Actual Navigation Perf. | N.M. | 0-128 | 16 | | 0.00195 | | | | |
| | | | | | | | | | | | |
| 1 7 1 | 0 0 2 | Required Navigation Performance (RNP) | N.M. | 0-128 | 16 | | 0.001953 | | | | |
| | 0 A 5 | Vertical Alarm Limit (VAL) and SBAS System Identifier | Meters | 256 | 8 | | 1 | | 200 | | |
| | X X X | Manu. Specific Status Word | | | | | | | | | See Attachment 10 |
| | | | | | | | | | | | |
| 1 7 3 | 0 1 0 | Localizer Deviation | DDM | 0.4 | 12 | | 0.0001 | 33.3 | 66.6 | | 6-6/6-27 |
| | 0 2 5 | Localizer Deviation | DDM | 0.4 | 10 | | 0.0004 | 125 | 250 | | |
| | 0 2 9 | Hydraulic Quantity | % | 128 | 7 | | 1 | 100 | 200 | | |
| | 0 3 B | Localizer Deviation | Dots | 4 | 11 | | 0.002 | 150 | 250 | | |
| | 0 5 5 | Localizer Deviation | DDM | ± 0.4 | 12 | | 0.0001 | | | | |
| | 0 B D | Hydraulic Quantity | % | 128 | 7 | | 1 | 500 | 1000 | | |
| | 0 D 0 | Hydraulic Oil Quantity | US Pint | 128 | 9 | | 0.25 | | | | SDI 1= A/SDI 2= B |
| | | | | | | | | | | | |
| 1 7 4 | 0 0 3 | Delayed Flap Approach Speed (DFA) | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 0 B | East/West Velocity | Knots | ± 4096 | 15 | | 0.125 | 200 | 1200 | | |
| | 0 1 0 | Glideslope Deviation | DDM | 0.8 | 12 | | 0.0002 | 33.3 | 66.6 | | 6-6/6-27 |
| | 0 2 9 | Hydraulic Pressure | PSI | 4096 | 12 | | 1 | 100 | 200 | | |
| | 0 3 B | Glideslope Deviation | Dots | 4 | 11 | | 0.0002 | 150 | 250 | | 6-6/6-27 |
| | 0 5 5 | Glide Slope Deviation | DDM | ± 0.8 | 12 | | 0.0002 | | | | |
| | 0 D 0 | Hydraulic Oil Pressure | PSI | 4096 | 12 | | 1.0 | | | | SDI 1= A/SDI 2= B |
| | | | | | | | | | | | |
| 1 7 5 | 0 0 3 | Economical Speed | Knots | 1024 | 14 | | 0.06 | 62.5 | 125 | | |
| | 0 2 9 | EGT (APU) | Deg C | 2048 | 11 | | 1 | 100 | 200 | | |
| | 0 3 3 | Hydraulic Pump Case Drain Temp | Deg C | 256 | 12 | | 0.06 | 100 | 200 | | |
| | | | | | | | | | | | |
| 1 7 6 | 0 0 3 | Economical Mach | Mach | 4096 | 13 | | 0.5 | 62.5 | 125 | | |
| | 0 2 9 | RPM (APU) | % RPM | 256 | 9 | | 0.5 | 100 | 200 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 3 8 | Left Static Pressure Uncorrected, mb | mb | 2048 | 18 | | 0.008 | 20 | 200 | | |
| | 0 5 A | Fuel Temperature - Set to Zero | Deg. C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 A D | Static Pressure Left, Uncorrected, mb | mb | 2048 | 18 | | 0.008 | 20 | 200 | | |
| | 1 1 4 | Left Outer Tank Fuel Temp & Advisory Warning | Deg | ± 512 | 11 | | 0.25 | | | | |
| | | | | | | | | | | | |
| 1 7 7 | 0 0 3 | Economical Flight Level | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 0 2 9 | Oil Quantity (APU) | US Pint | 128 | 9 | | 0.25 | 100 | 200 | | |
| | 0 3 8 | Right Static Pressure, Uncorrected, mb | mb | 2048 | 18 | | 0.008 | 20 | 200 | | |
| | 0 5 5 | Distance to LTP/FTP | Nmiles | ± 512 | 16 | | 0.007812 | | | | |
| | 0 5 A | Fuel Temp. Left Wing Tank | Deg C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 A D | Static Pressure Right, Uncorrected, mb | mb | 2048 | 18 | | 0.008 | 20 | 200 | | |
| | 1 1 4 | Inner Tank 1 Fuel Temp & Advisory Warning | Deg C | ± 512 | 11 | | 0.25 | | | | |
| | | | | | | | | | | | |
| 2 0 0 | 1 1 4 | Inner Tank 2 Fuel Temp & Advisory Warning | Deg C | ± 512 | 11 | | 0.25 | | | | |
| | | | | | | | | | | | |
| 2 0 1 | 0 5 A | Fuel Temp. Right Wing Tank | Deg C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 1 1 4 | Inner Tank 3 Fuel Temp & Advisory Warning | Deg C | ± 512 | 11 | | 0.25 | | | | |
| | 1 4 0 | Mach Maximum Operation (Mmo) | Mach | 4.096 | 12 | | 0.001 | 62.5 | 125 | | |
| | 1 4 2 | Projected Future Latitude | Deg | ± 180 | 20 | | 0.000172 | 150 | 400 | | |
| | | | | | | | | | | | |
| 2 0 2 | 0 0 2 | Energy Management (clean) | N.M. | 512 | 15 | | 0.016 | 100 | 200 | | |
| | 0 0 9 | DME Distance | N.M. | 512 | 16 | | 0.008 | 83.3 | 167 | | 6-7/6-27 |
| | 0 5 A | Fuel Temperature - Set to Zero | Deg C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 1 1 4 | Inner Tank 4 Fuel Temp & Advisory Warning | Deg C | ± 512 | 11 | | 0.025 | | | | |
| | 1 4 0 | Mach Rate | M/minute | 4.096 | 12 | | 0.001 | 62.5 | 125 | | |
| | 1 4 2 | Projected Future Latitude Fine | Deg | 0.000172 | 11 | | 2·E-32 | 150 | 400 | | |
| | | | | | | | | | | | |
| 2 0 3 | 0 0 2 | Energy Management Speed Brakes | N.M. | 512 | 15 | | 0.016 | 100 | 200 | | |
| | 0 0 6 | Altitude (1013.25 mb) | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | 6-24/6-27 |
| | 0 1 8 | Altitude | Feet | 131072 | 17 | | 1.0 | 20 | 40 | | |
| | 0 3 5 | Own A/C Altitude | Feet | 131072 | 17 | | 1.0 | 20 | 500 | | |
| | 0 3 8 | Altitude (1013.25 mb) | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 0 5 A | Fuel Tank #6 Temperature | Deg C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 1 0 A | Ambient Static Pressure | PSIA | 1.5 to 20.0 | 11 | | 0.016 | 500 | 1000 | | |
| | 1 0 B | Ambient Static Pressure | PSIA | 1.5 to 20.0 | 11 | | 0.016 | 500 | 1000 | | |
| | 1 1 4 | Trim Tank Fuel Temp & Advisory Warning | Deg C | ± 512 | 11 | | 0.25 | | | | |
| | 1 4 0 | Altitude | Feet | 131072 | 17 | | 1 | 31.25 | 62.5 | | |
| | | | | | | | | | | | |
| 2 0 4 | 0 0 2 | Utility Airspeed | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 50 | |
| | 0 0 6 | Baro Corrected Altitude #1 | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 0 3 8 | Baro Corrected Altitude #1 | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 0 5 6 | Baro Altitude | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 50 | |
| | 0 5 A | Fuel Tank #7 Temperature | Deg C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 6 0 | Baro Altitude | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 50 | |
| | 1 1 4 | Right Outer Tank Fuel Temp & Advisory Warning | Deg C | ± 512 | 11 | | 0.25 | | | | |
| | 1 4 0 | Baro Corrected Altitude | Feet | 131072 | 17 | | 1 | 31.25 | 62.5 | | |
| | | | | | | | | | | | |
| 2 0 5 | 0 0 6 | Mach | Mach | 4.096 | 16 | | 0.0000625 | 62.5 | 125 | | 6-27 |
| | 0 1 A | Mach | Mach | 4.096 | 16 | | 0.0000625 | 62.5 | 125 | | 6-27 |
| | 0 3 8 | Mach | Mach | 4.096 | 16 | | 0.0000625 | 62.5 | 125 | | 6-27 |
| | 0 5 A | Fuel Tank #8 Temperature | Deg C | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 1 0 A | Mach Number | Mach | 1 | 11 | | 0.002 | 100 | 500 | | |
| | 1 0 B | Mach Number | Mach | 1 | 11 | | 0.002 | 100 | 500 | | |
| | 1 4 0 | Mach | Mach | 4.096 | 16 | | 0.00000625 | 62.5 | 125 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 0 6 | 0 0 6 | Computed Airspeed | Knots | 1024 | 14 | | 0.0625 | 62.5 | 125 | | 6-27 |
| | 0 1 8 | Altitude (Variable Resolution) | Feet | Variable | 15 | | Variable | 31.3 | 62.5 | | 6-20 |
| | 0 3 8 | Computed Airspeed | Knots | 1024 | 14 | | 0.0625 | 62.5 | 125 | | |
| | 0 C C | Taxi Speed | Knots | 512 | 11 | | 0.25 | 50 | 100 | | |
| | 1 4 0 | Computed Airspeed (CAS) | Knots | 1024 | 14 | | 0.0625 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 0 7 | 0 0 6 | Maximum Allowable Airspeed | Knots | 1024 | 12 | | 0.25 | 62.5 | 125 | | |
| | 0 0 A | Maximum Allowable Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 3 8 | Maximum Allowable Airspeed | Knots | 1024 | 12 | | 0.25 | 62.5 | 125 | | |
| | 1 4 0 | Airspeed Maximum Operating (VMO) | Knots | 1024 | 12 | | 0.25 | 62.56 | 125 | | |
| | | | | | | | | | | | |
| 2 1 0 | 0 0 6 | True Airspeed | Knots | 2048 | 15 | | 0.0625 | 62.5 | 125 | | 6-27 |
| | 0 3 8 | True Airspeed | Knots | 2048 | 15 | | 0.0625 | 62.5 | 125 | | |
| | 1 4 0 | True Airspeed | Knots | 2048 | 15 | | 0.0625 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 1 1 | 0 0 2 | Total Air Temperature | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | 6-27 |
| | 0 0 3 | Total Air Temperature | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | |
| | 0 0 6 | Total Air Temperature | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | |
| | 0 1 A | Total Air Temperature | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | |
| | 0 3 8 | Total Air Temperature | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | |
| | 0 A D | Total Air Temperature Indicated | Deg C | 512 | 12 | | 0.125 | 250 | 500 | | |
| | 1 0 A | Total Fan Inlet Temperature | Deg C | -80 to 90 | 10 | | 0.125 | 500 | 1000 | | |
| | 1 0 B | Total Fan Inlet Temperature | Deg C | -80 to 90 | 10 | | 0.125 | 500 | 1000 | | |
| | 1 4 0 | Total Air Temperature (TAT) | Deg C | 512 | 12 | | 0.125 | 250 | 500 | | |
| | 1 4 2 | Projected Future Longitude | Deg | ± 180 | 20 | | 0.000172 | 250 | 500 | | |
| | | | | | | | | | | | |
| 2 1 2 | 0 0 4 | Altitude Rate | Ft/Min | 32768 | 11 | | 16 | 31.3 | 62.5 | | 6-27 |
| | 0 0 5 | Altitude Rate | Ft/Min | 32768 | 11 | | 16 | 31.3 | 62.5 | | |
| | 0 0 6 | Altitude Rate | Ft/Min | 32768 | 11 | | 16 | 31.3 | 62.5 | | |
| | 0 3 8 | Altitude Rate | Ft/Min | 32768 | 11 | | 16 | 31.3 | 62.5 | | |
| | 0 3 B | Altitude Rate | Ft/Min | 32768 | 11 | | 16 | 150 | 250 | | |
| | 1 4 0 | Altitude Rate | Ft/Min | 32768 | 11 | | 16 | 31.25 | 62.5 | | |
| | 1 4 2 | Projected Future Longitude Fine | Deg | 0.000172 | 11 | | 2E-32 Cir | 150 | 400 | | |
| | | | | | | | | | | | |
| 2 1 3 | 0 0 2 | Static Air Temperature | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | 6-27 |
| | 0 0 6 | Static Air Temperature | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | |
| | 0 3 8 | Static Air Temperature | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | |
| | 0 8 D | Fuel Used | Lbs. | 262144 | 18 | | 1 | 75 | 125 | | |
| | 1 4 0 | Static Air Temperature (SAT) | Deg C | 512 | 11 | | 0.25 | 250 | 500 | | |
| | 1 4 2 | Vertical Time Interval | Minute | 265 min | 10 | | 0.25 min | 500 | 2000 | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| 2 1 5 | 0 0 6 | Impacted Pressure | mb | 512 | 14 | | 0.03125 | 62.5 | 125 | | |
| | 0 1 A | Impact Pressure | mb | 512 | 14 | | 0.03125 | 62.5 | 125 | | |
| | 0 2 9 | N1 Actual (EEC) | % RPM | 256 | 14 | | 0.015 | 50 | 100 | | |
| | 0 2 9 | EPR Actual (EEC) | | 4 | 12 | | 0.001 | 50 | 100 | | |
| | 0 3 8 | Impacted Pressure, Uncorrected, mb | mb | 512 | 14 | | 0.03125 | 62.5 | 125 | | |
| | 0 A D | Impacted Pressure, Uncorrected, mb | mb | 512 | 16 | | 0.008 | 20 | 40 | | |
| | 1 4 0 | Impact Pressure Subsonic | mb | 512 | 14 | | 0.03125 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| 2 1 7 | 0 0 2 | Geometric Vertical Rate | Ft/Min | 20000 | 11 | | 16 | | | | |
| | 0 0 6 | Static Pressure, Corrected (In.Hg.) | in. Hg | 64 | 16 | | 0.001 | 62.5 | 125 | | |
| | 0 2 9 | N1 Limit (EEC) | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 2 9 | EPR Limit (EEC) | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 3 8 | Static Pressure, Average, Corrected (In. Hg.) | in. Hg | 64 | 16 | | 0.001 | 62.5 | 125 | | |
| | 1 4 0 | Static Pressure Corrected (In. Hg.) | in. Hg | 64 | 16 | | 0.001 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 2 0 | 0 0 6 | Baro Corrected Altitude #2 | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 0 3 8 | Baro Corrected Altitude #2 | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 1 4 0 | Baro Corrected Altitude #2 | Feet | 131072 | 17 | | 1 | 31.25 | 62.5 | | |
| | | | | | | | | | | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 2 1 | 0 0 6 | Indicated Angle of Attack (Avg) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 3 8 | Indicated Angle of Attack (Average) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 A D | Indicated Angle of Attack | Deg/180 | ±180 | 14 | | 0.01 | 31.3 | 200 | | |
| | 1 2 C | Indicated Angle of Attack (Avg.) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 1 4 0 | Angle of Attack Indicated Average | Deg | ±180 | 12 | | 0.05 | 31.25 | 62.5 | | |
| | | | | | | | | | | | |
| 2 2 2 | 0 0 6 | Indicated Angle of Attack (#1 Left) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 1 1 | VOR Omnibearing | Deg/180 | ±180 | 12 | | 0.05 | 50 | 100 | | |
| | 1 1 2 | TACAN Bearing | Deg/180 | ±180 | 12 | | 0.05 | 180 | 220 | | |
| | 1 1 5 | Bearing | Deg/180 | ±180 | 11 | | 0.1 | 50 | 50 | | |
| | 1 2 C | Indicated Angle of Attack (#1 Left) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 1 4 0 | Angle of Attack, Indicated #1 Left | Deg | ±180 | 12 | | 0.05 | 31.5 | 62.5 | | |
| | | | | | | | | | | | |
| 2 2 3 | 0 0 6 | Indicated Angle of Attack (#1 Right) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 1 2 C | Indicated Angle of Attack (#1 Right) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 1 4 0 | Angle of Attack, Indicated #1 Right | Deg | ±180 | 12 | | 0.05 | 31.5 | 62.5 | | |
| | | | | | | | | | | | |
| 2 2 4 | 0 0 6 | Indicated Angle of Attack (#2 Left) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 1 2 C | Indicated Angle of Attack (#2 Left) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 1 4 0 | Angle of Attack, Indicated #2 Left | Deg | ±180 | 12 | | 0.05 | 31.5 | 62.5 | | |
| | | | | | | | | | | | |
| 2 2 5 | 0 0 2 | Minimum Maneuvering Airspeed | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 50 | |
| | 0 0 6 | Indicated Angle of Attack (#2 Right) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 2 B | Compensated Altitude Rate | Ft/Min | 32768 | 11 | Increas-ing alt | 16.0 | 31.3 | 62.5 | | |
| | 0 5 6 | Minimum Maneuvering Air Speed | Knots | 512 | 11 | | 0.25 | 500 | 1000 | | |
| | 0 6 0 | Minimum Maneuvering Air Speed | Knots | 512 | 11 | | 0.25 | 500 | 1000 | | |
| | 1 2 C | Indicated Angle of Attack (#2 Right) | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 1 4 0 | Angle of Attack, Indicated #2 Right | Deg | ±180 | 12 | | 0.05 | 31.5 | 62.5 | | |
| | | | | | | | | | | | |
| 2 2 7 | 0 3 D | AVM Command | | | | | | | | | 6-28 |
| | 0 7 E | BITE Command Word | | | | | | | | | See ARINC 604 |
| | | | | | | | | | | | |
| 2 3 1 | 0 A D | Total Air Temperature | Deg C | 512 | 12 | | 0.125 | 20 | 200 | | |
| | | | | | | | | | | | |
| 2 3 3 | 0 0 2 | ACMS Information | | | | | | | | | 6-31 |
| | 0 5 6 | ACMS Information | | | | | | | | | |
| | 0 6 0 | ACMS Information | | | | | | | | | |
| 2 3 4 | 0 0 2 | ACMS Information | | | | | | | | | 6-31 |
| | 0 5 6 | ACMS Information | | | | | | | | | |
| | 0 6 0 | ACMS Information | | | | | | | | | |
| | | | | | | | | | | | |
| 2 3 5 | 0 0 2 | ACMS Information | | | | | | | | | 6-31 |
| | 0 5 6 | ACMS Information | | | | | | | | | |
| | 0 6 0 | ACMS Information | | | | | | | | | |
| | | | | | | | | | | | |
| 2 3 6 | 0 0 2 | ACMS Information | | | | | | | | | 6-31 |
| | 0 5 6 | ACMS Information | | | | | | | | | |
| | 0 6 0 | ACMS Information | | | | | | | | | |
| | | | | | | | | | | | |
| 2 3 7 | 0 0 2 | ACMS Information | | | | | | | | | |
| | 0 0 B | Horizontal Uncertainty Level | N.M. | 16 | 17 | | 0.000122 | | 1200 | | See ARINC 743A |
| | 0 5 6 | ACMS Information | | | | | | | | | |
| | 0 6 0 | ACMS Information | | | | | | | | | |
| | | | | | | | | | | | |
| 2 4 1 | 0 0 2 | Min. Airspeed for Flap Extension | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 50 | |
| | 0 0 6 | Corrected Angle of Attack | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 3 8 | Corrected Angle of Attack | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 4 D | FQIS System Data | | | | | | 500 | 1024 | | 6-35 |
| | 0 5 6 | Min. Airspeed for Flap Extension | Knots | 512 | 11 | | 0.25 | 500 | 1000 | | |
| | 0 6 0 | Min. Airspeed for Flap Extension | Knots | 512 | 11 | | 0.25 | 500 | 1000 | | |
| | 1 4 0 | Angle of Attack, Corrected | Deg | ±180 | 12 | | 0.05 | 31.5 | 62.5 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 4 2 | 0 0 6 | Total Pressure | mb | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | 0 1 A | Total Pressure | mb | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | 0 3 8 | Total Pressure | mb | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | 0 3 B | Speed Deviation | Dots | 4 | 11 | | 0.002 | 150 | 250 | | |
| | 0 A D | Total Pressure, Uncorrected, mb | mb | 2048 | 18 | | 0.008 | 20 | 200 | | |
| | 1 4 0 | Total Pressure | mb | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 4 3 | X X X | Simulator to Avcs Control Word | | | | | | 33 | 100 | | See ARINC Rpt 610 |
| | | | | | | | | | | | |
| 2 4 4 | 0 1 C | Fuel Flow (Engine Direct) | Lbs/hr | 32768 | 8 | | 128.0 | 100 | 200 | | |
| | 0 3 3 | Fuel Flow (Wf) | pph | 32768 | 16 | | 0.5 | 150 | 250 | | |
| | 0 3 B | Mach Error | Mach | 0.064 | 11 | | 0.00003 | 150 | 250 | | |
| | 0 8 D | Fuel Flow Rate | PPH | 32768 | 16 | | 0.5 | 75 | 125 | | |
| | 1 0 A | Fuel Mass Flow | MSEC | 256 | 15 | | 0.008 | 31.3 | 100 | | |
| | 1 0 B | Fuel Mass Flow | MSEC | 256 | 15 | | 0.008 | 31.3 | 100 | | |
| | 1 4 0 | Angle of Attack, Normalized | Ratio | 2 | 11 | | 0.001 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 4 5 | 0 0 2 | Minimum Airspeed | Knots | 256 | 12 | | 0.0625 | 62.5 | 125 | | |
| | 0 0 3 | Minimum Airspeed | Knots | 256 | 12 | | 0.0625 | 62.5 | 125 | | |
| | 0 0 A | Minimum Airspeed | Knots | 512 | 13 | | 0.0625 | 62.5 | 125 | | |
| | 0 2 9 | N3 (Engine) | % RPM | 256 | 14 | | 0.015 | 50 | 100 | | |
| | 0 3 8 | Avg. Static Pres. mb uncorrected | mb | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | 0 3 B | EPR Error | | 4 | 12 | | 0.001 | 150 | 250 | | |
| | 0 A D | Average Static Pressure mb Uncorrected | mb | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | 0 5 6 | Minimum Airspeed | Knots | 256 | 12 | | 0.0625 | 62.5 | 125 | | |
| | 0 6 0 | Minimum Airspeed | Knots | 256 | 12 | | 0.0625 | 62.5 | 125 | | |
| | 1 4 0 | Static Pressure, Uncorrected | mb | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 4 6 | 0 0 2 | Control Maximum Speed (VCMAX) | Knots | 512 | 11 | | 0.25 | 50 | 100 | 50 | |
| | 0 0 6 | Average Static Pressure | mb | 2048 | 16 | | 0.03 | 62.5 | 125 | | |
| | 0 1 C | N1 (Engine Direct) | RPM | 4096 | 12 | | 1.0 | 100 | 200 | | |
| | 0 2 9 | N1 (Engine Direct) | % RPM | 256 | 14 | | 0.015 | 50 | 100 | | |
| | 0 3 8 | Avg Static Pres mb Corrected | mb | 2048 | 16 | | 0.03125 | 62.5 | 125 | | |
| | 0 3 B | Angle of Attack Error | Deg/180 | ±180 | 14 | | 0.01 | 150 | 250 | | |
| 2 4 7 | 0 0 2 | Control Min. Speed (VCMIN) | Knots | 512 | 11 | | 0.25 | 50 | 100 | 50 | |
| | 0 0 B | Horizontal Figure of Merit | N.M. | 16 | 18 | | 6.1 E-5 | 200 | 1200 | | |
| | 0 1 F | Total Fuel | Lbs. | 655360 | 14 | | 40 | 500 | 1000 | | |
| | 0 2 C | Total Fuel | Lbs. | 655360 | 14 | | 40 | 500 | 1000 | | |
| | 0 3 B | Speed Error | Knots | 256 | 12 | | 0.06 | 150 | 250 | | |
| | 0 4 D | Total Fuel | Lbs. | 655360 | 14 | | 40 | 500 | 1000 | | |
| | 0 5 6 | Control Minimum Speed (Vcmin) | Knots | 512 | 11 | | 0.25 | 50 | 100 | | |
| | 0 5 A | Total Fuel | Lbs. | 655360 | 14 | | 40 | 100 | 200 | | |
| | 0 6 0 | Control Minimum Speed (Vcmin) | Knots | 512 | 11 | | 0.25 | 50 | 100 | | |
| | 0 E B | Fuel to Remain | Lbs. | 1638400 | 14 | | 100 | 100 | 125 | | |
| | 1 1 4 | Fuel on Board | Lbs. | 655320 | 13 | | 40 | | | | |
| | 1 4 0 | Airspeed Minimum Vmc | Knots | 512 | 11 | | 0.25 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 5 0 | 0 0 2 | Continuous N1 Limit | % RPM | 256 | 14 | | 0.015 | 50 | 200 | 200 | |
| | 0 2 B | Maximum Continuous EPR Limit | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 2 C | Preselected Fuel Quantity | Lbs. | 655360 | 14 | | 40 | 100 | 400 | | |
| | 0 5 A | Preselected Fuel Quantity | Lbs. | 655360 | 14 | | 40 | 100 | 200 | | |
| | 0 3 8 | Indicated Side Slip Angle | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | 0 A D | Indicated Side Slip Angle or AOS | Deg/180 | ±180 | 14 | | 0.01 | 31.3 | 200 | | |
| | 1 1 4 | Preselected Fuel Quantity | Lbs. | 655320 | 13 | | 40 | | | | |
| | | | | | | | | | | | |
| 2 5 1 | 0 0 1 | Distance to Go | N.M. | 4096 | 15 | | 0.125 | 100 | 200 | | |
| | 0 0 2 | Distance to Go | N.M. | 4096 | 15 | | 0.125 | 100 | 200 | | |
| | 0 0 6 | Baro Corrected Altitude #3 | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 0 1 A | Flight Leg Counter | | | | | | 75 | 175 | | 6-19 |
| | 0 3 8 | Baro Corrected Altitude #3 | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | | | | | | | | | | | |
| 2 5 2 | 0 0 1 | Time to Go | Min. | 512 | 9 | | 1.0 | 100 | 200 | | |
| | 0 0 2 | Time to Go | Min. | 512 | 9 | | 1.0 | 100 | 200 | | |

# ATTACHMENT 2
# DATA STANDARDS

## TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 0 6 | Baro Corrected Altitude #4 | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 0 1 A | EPR Idle | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 2 F | EPR Idle Reference | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 3 8 | Baro Corrected Altitude #4 | Feet | 131072 | 17 | | 1.0 | 31.3 | 62.5 | | |
| | 0 3 F | EPR Idle Reference | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 E B | Time Until Jettison Complete | Minutes | 64 | 6 | | 1 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 2 5 3 | 0 0 2 | Go-Around N1 Limit | % RPM | 256 | 14 | | 0.015 | 50 | 200 | 200 | |
| | 0 1 E | Go-Around EPR Limit | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 3 8 | Corrected Side Slip Angle | Deg/180 | ±180 | 12 | | 0.05 | 31.3 | 62.5 | | |
| | | | | | | | | | | | |
| 2 5 4 | 0 0 2 | Cruise N1 Limit | % RPM | 256 | 14 | | 0.015 | 50 | 200 | 200 | |
| | 0 1 E | Cruise EPR Limit | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 4 D | Actual Fuel Quan (test) | Lbs | 262144 | 15 | | 8 | 500 | 1000 | | |
| | 1 3 A | N1 Cruise | % N1 Nom | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 1 4 0 | Altitude Rate | Ft/Min | 131072 | 13 | | 16 | 31.25 | 62.5 | | |
| | | | | | | | | | | | |
| 2 5 5 | 0 0 2 | Climb N1 Limit | % RPM | 256 | 14 | | 0.015 | 50 | 200 | 200 | |
| | 0 1 E | Climb EPR Limit | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 2 F | Maximum Climb EPR Rating | N/A | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 3 F | Maximum Climb EPR Rating | N/A | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 4 D | Fuel Quantity (gal) | Gallons | 32768 | 15 | | 1.0 | 500 | 1000 | | |
| | 0 8 E | Spoiler Position | Deg/180 | +180 | 11 | | 0.1 | 50 | 100 | | |
| | 1 3 A | N1 Climb | % N1 Nom | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 1 4 0 | Impact Pressure | mb | 4096 | 17 | | 0.03125 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 5 6 | 0 0 2 | Time For Climb | Min. | 512 | 9 | | 1 | 100 | 200 | | |
| | 0 0 A | V Stick Shaker | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 2 C | Fuel Quantity (Tanks) #1 | Lbs. | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 0 5 6 | Time for Climb | Min. | 512 | 9 | | 1 | 100 | 200 | | |
| | 0 5 A | Fuel Quantity-Left Outer Cell | Lbs. | 131072 | 15 | | 4 | 100 | 200 | | Zero for A-321 |
| | 0 6 0 | Time for Climb | Min. | 512 | 9 | | 1 | 100 | 200 | | |
| | 1 1 4 | Left Outer Tank Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | 1 4 0 | Equivalent Airspeed | Knots | 1024 | 14 | | 0.0625 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 5 7 | 0 0 2 | Time For Descent | Min. | 512 | 9 | | 1 | 100 | 200 | | |
| | 0 2 C | Fuel Quantity (Tanks) #2 | Lbs. | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 0 5 6 | Time for Descent | Min. | 512 | 9 | | 1 | 100 | 200 | | |
| | 0 5 A | Fuel Quantity Left W/T Tank | Lbs. | 131072 | 15 | | 4 | 100 | 200 | | |
| | 0 6 0 | Time for Descent | Min. | 512 | 9 | | 1 | 100 | 200 | | |
| | 1 1 4 | Fuel Quantity (Tanks) #2 | Lbs. | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 1 4 0 | Total Pressure (High Range) | mb | 4096 | 17 | | 0.03125 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 2 6 0 | 0 2 C | Fuel Quantity (Tanks) #3 | Lbs. | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 0 5 A | Fuel Quantity Center Tank | Lbs. | 131072 | 15 | | 4 | 100 | 200 | | |
| | 0 3 3 | T5 | Deg C | 1024 | 12 | | 0.25 | 150 | 250 | | See Note [5] |
| | 1 0 A | LP Turbine Discharge Temp | Deg C | -55 to 850 | 11 | | 0.50 | 100 | 500 | | |
| | 1 0 B | LP Turbine Discharge Temperature | Deg C | -55 to 850 | 11 | | 0.50 | 100 | 500 | | |
| | 1 1 4 | Collector Cell 1 and 2 Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 2 6 1 | 0 2 C | Fuel Quantity (Tanks) #4 | Lbs. | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 0 3 3 | P49 | PSIA | 128 | 14 | | 0.008 | 150 | 250 | | |
| | 0 5 A | Fuel Qty Right I/C or W/T Tank | Lbs. | 131072 | 15 | | 4 | 100 | 200 | | |
| | 1 0 A | LP Turbine Inlet Pressure | PSIA | 2-120 | 11 | | 0.125 | 100 | 500 | | |
| | 1 0 B | LP Turbine Inlet Pressure | PSIA | 2-120 | 11 | | 0.125 | 100 | 500 | | |
| | 1 1 4 | Fuel on Board at Engine Start | Lbs. | 131072 | 15 | | 4 | | | | |
| | 1 4 4 | Range Ring Radius | NM | 512 | 15 | | 1/64 | 800 | 1200 | | 6-52 |
| | | | | | | | | | | | |
| 2 6 2 | 0 0 2 | Documentary Data | | | | | | 500 | 1000 | | 6-14 |
| | 0 0 A | Predicitive Airspeed Variation | Knots | 256 | 10 | | 0.25 | 100 | 200 | | |
| | 0 1 C | LP Compressor Exist Pres. (PT3) | PSIA | 64 | 13 | | 0.008 | 100 | 200 | | |
| | 0 2 C | Fuel Quantity (Tanks) #5 | Lbs. | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 0 3 3 | LP Compressor Exist Pressure | PSIA | 64 | 14 | | 0.004 | 150 | 250 | | |
| | 0 4 D | T/U Cap-L Tank 1-4 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 5 A | Fuel Quantity-Right Outer Cell | Lbs. | 131072 | 15 | | 4 | 100 | 200 | | |
| | 1 0 A | HP Compressor Inlet Total Pres. | PSIA | 2-50 | 11 | | 0.032 | 100 | 500 | | |
| | 1 0 B | HP Compressor Inlet Total Pres. | PSIA | 2-50 | 11 | | 0.032 | 100 | 500 | | |
| | 1 1 4 | Center Tank Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | 1 4 4 | Display Range | NM | 512 | 14 | | 1/32 | 800 | 1200 | | 6-51 |
| | | | | | | | | | | | |
| 2 6 3 | 0 0 2 | Min. Airspeed for Flap Retraction | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 50 | |
| | 0 0 A | Min. Airspeed for Flap Retraction | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 1 C | LP Compressor Exit Temperature | | 256 | 12 | | 0.06 | 100 | 200 | | |
| | 0 2 C | Fuel Quantity (Tanks) #6 | Lbs | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 0 3 3 | LP Compressor Exit Temperature | Deg C | 256 | 12 | | 0.063 | 150 | 250 | | |
| | 0 4 D | T/U Cap-L Tank 5-8 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | 0 5 6 | Min. Airspeed for Flap Retraction | Knots | 512 | 11 | | 0.25 | 500 | 1000 | | |
| | 0 6 0 | Min. Airspeed for Flap Retraction | Knots | 512 | 11 | | 0.25 | 500 | 1000 | | |
| | 1 0 A | Selected Compressor Inlet Temperature (Total) | Deg C | -55 to 160 | 11 | | 0.125 | 100 | 500 | | |
| | 1 0 B | Selected Compressor Inlet Temp (Total) | Deg C | -55 to 160 | 11 | | 0.125 | 100 | 500 | | |
| | 1 1 4 | Collector Cell 3 and 4 Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 2 6 4 | 0 0 2 | Time To Touchdown | Min. | 2048 | 11 | | 1 | 100 | 200 | 145 | |
| | 0 0 A | Min. Airspeed for Slats Retraction | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 1 C | HP Compressor Exit Pressure | | 512 | 14 | | 0.03 | 100 | 200 | | |
| | 0 2 C | Fuel Quantity (Tanks) #7 | Lbs. | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 0 2 F | Burner Pressure | PSIA | 512 | 14 | | 0.03 | 100 | 200 | | |
| | 0 4 D | T/U Cap-L Tank 9-12 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | 0 3 3 | HP Compressor Exit Pressure | PSIA | 512 | 14 | | 0.03 | 150 | 250 | | |
| | 0 3 F | Burner Pressure | PSIA | 512 | 14 | | 0.03 | 100 | 200 | | |
| | 0 5 6 | Time to Touchdown | Min. | 2048 | 11 | | 1 | 100 | 200 | | |
| | 0 6 0 | Time to Touchdown | Min. | 2048 | 11 | | 1 | 100 | 200 | | |
| | 1 0 A | Selected Compressor Dischg Pres. | PSIA | 5-600 | 11 | | 1.00 | 62.5 | 250 | | |
| | 1 0 B | Selected Compressor Dischg Pres. | PSIA | 5-600 | 11 | | 1.00 | 62.5 | 250 | | |
| | 1 3 A | Burner Pressure | PSIA | 512 | 14 | | 0.031 | 100 | 200 | | |
| | | | | | | | | | | | |
| 2 6 5 | 0 0 2 | Min. Buffet Airspeed | Knots | 512 | 11 | | 0.25 | 50 | 100 | 50 | |
| | 0 0 4 | Integrated Vertical Acceleration | Ft/Sec | ±256 | 20 | UP | 0.000244 | | 20 | | |
| | 0 0 A | Maneuvering Airspeed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 1 C | HP Compressor Exit Temp (TT4.5) | | 1024 | 12 | | 0.25 | 100 | 200 | | |
| | 0 2 C | Fuel Quantity (Tanks) #8 | Lbs. | 131072 | 15 | | 4 | 500 | 1000 | | |
| | 0 3 3 | HP Compressor Exit Temperature | Deg C | 1024 | 12 | | 0.25 | 150 | 250 | | |
| | 0 3 8 | Integrated Vertical Acceleration | Ft/Sec | ±256 | 20 | UP | 0.000244 | | 20 | | |
| | 0 4 D | T/U Cap-L Tank 13-14 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | 0 5 6 | Min. Buffet Airspeed | Knots | 512 | 11 | | 0.25 | 50 | 100 | | |
| | 0 6 0 | Min. Buffet Airspeed | Knots | 512 | 11 | | 0.25 | 50 | 100 | | |
| | 1 0 A | Selected Compressor Dischg Temp | Deg C | -55 to 650 | 11 | | 0.50 | 100 | 500 | | |
| | 1 0 B | Selected Compressor Dischg Temp | Deg C | -55 to 650 | 11 | | 0.50 | 100 | 500 | | |
| | 1 1 4 | Inner Tank 3 Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 2 6 6 | 0 4 D | T/U Cap-C Tank 1-4 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | 1 1 4 | Inner Tank 2 Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 2 6 7 | 0 0 2 | Maximum Maneuver Airspeed | Knots | 512 | 11 | | 0.25 | 500 | 1000 | 50 | |
| | 0 0 A | Predictive Max. Maneuver Speed | Knots | 512 | 11 | | 0.25 | 100 | 200 | | |
| | 0 2 B | Throttle Position Command | Deg/180 | ±180 | 12 | | 0.05 | 50 | 100 | | |
| | 0 4 D | T/U Cap-C Tank 5-8 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | 0 3 3 | Spare T/C | Deg C | 256 | 12 | | 0.063 | 150 | 250 | | |
| | 0 5 6 | Max. Maneuver Airspeed | Knots | 512 | 11 | | 0.25 | 500 | 1000 | | |
| | 0 6 0 | Max. Maneuver Airspeed | Knots | 512 | 11 | | 0.25 | 500 | 1000 | | |
| | 1 0 A | HP Compressor Inlet Temp. (total) | Deg C | -55 to 160 | 11 | | 0.125 | 500 | 1000 | | |
| | 1 0 B | HP Compressor Inlet Temperature | Deg C | -55 to 160 | 11 | | 0.125 | 500 | 1000 | | |
| | 1 1 4 | Inner Tank 4 Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 2 7 0 | 0 4 D | T/U Cap-C Tank 9 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | 1 1 5 | Stored TACAN Control Word | | | | | | 25 | 50 | | See ARINC 429P2 |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| 2 7 1 | 0 4 D | T/U Cap-A Tank 1-4 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | | | | | | | | | | | |
| 2 7 2 | 0 4 D | T/U Cap Tank 5-8 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | | | | | | | | | | | |
| 2 7 3 | 0 4 D | T/U Cap-A Tank 9-11 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | | | | | | | | | | | |
| 2 7 4 | 0 4 D | T/U Cap-R Tank 1-4 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | | | | | | | | | | | |
| 2 7 5 | 0 4 D | T/U Cap-R Tank 5-8 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | | | | | | | | | | | |
| 2 7 6 | 0 0 1 | FCC to Simulator Control Word | | | | | | 50 | 150 | | Used only in simulator |
| | 0 0 2 | FMC to Simulator Control Word | | | | | | 33 | 100 | | Used only in simulator |
| | 0 0 3 | TCC to Simulator Control Word | | | | | | 50 | 150 | | Used only in simulator |
| | 0 4 D | T/U Cap-R Tank 9-12 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | | | | | | | | | | | |
| 2 7 7 | 0 4 D | T/U Cap-R Tank 13-14 | PF | 655.35 | 16 | | 0.01 | TBD | TBD | | |
| | | | | | | | | | | | |
| 3 0 0 | 1 0 A | ECU Internal Temperature | Deg C | -55 to 125 | 11 | | 0.125 | 500 | 1000 | | |
| | 1 0 B | ECU Internal Temperature | Deg C | -55 to 125 | 11 | | 0.125 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 3 0 1 | 1 0 A | Demanded Fuel Metering Valve Pos | % | 100 | 11 | | 0.063 | 62.5 | 250 | | |
| | 1 0 B | Demanded Fuel Metering Valve Pos | % | 100 | 11 | | 0.063 | 62.5 | 250 | | |
| | | | | | | | | | | | |
| 3 0 2 | 1 0 A | Demanded Variable Stator Vane Pos | % | 100 | 11 | | 0.063 | 100 | 500 | | |
| | 1 0 B | Demanded Variable Stator Vane Pos | % | 100 | 11 | | 0.063 | 100 | 500 | | |
| | | | | | | | | | | | |
| 3 0 3 | 1 0 A | Demanded Variable Bleed Valve Pos | % | 100 | 11 | | 0.063 | 100 | 500 | | |
| | 1 0 B | Demanded Variable Bleed Valve Pos | % | 100 | 11 | | 0.063 | 100 | 500 | | |
| | | | | | | | | | | | |
| 3 0 4 | 1 0 A | Demanded HPT Clearance Valve Pos | % | 100 | 11 | | 0.063 | 250 | 1000 | | |
| | 1 0 B | Demanded HPT Clearance Valve Pos | % | 100 | 11 | | 0.063 | 250 | 1000 | | |
| | | | | | | | | | | | |
| 3 0 5 | 1 0 A | Demanded LPT Clearance Valve Pos | % | 100 | 11 | | 0.063 | 250 | 1000 | | |
| | 1 0 B | Demanded LPT Clearance Valve Pos | % | 100 | 11 | | 0.063 | 250 | 1000 | | |
| | | | | | | | | | | | |
| 3 1 0 | 0 0 2 | Present Position - Latitude | Deg/180 | 0-180N/ 0-180S | 20 | | 0.000172 | 100 | 200 | | 6-27 |
| | 0 0 4 | Present Position - Latitude | Deg/180 | 0-180N/ 0-180S | 20 | | 0.000172 | 100 | 200 | | |
| | 0 2 9 | Aileron Position | Deg/180 | ±180 | 11 | | 0.088 | 50 | 100 | | |
| | 0 3 8 | Present Position - Latitude | Deg/180 | 0-180N/ 0-180S | 20 | | 0.000172 | 100 | 200 | | |
| | 0 4 D | Comp Cap-Tank | PF | 327.67 | 15 | | 0.01 | TBD | TBD | | |
| | 0 5 6 | Present Position Latitude | Deg/180 | 0-180N/ 0-180S | 20 | | 0.000172 | 100 | 200 | | |
| | 0 6 0 | Present Position Latitude | Deg/180 | 0-180N/ 0-180S | 20 | | 0.000172 | 100 | 200 | | |
| | 1 1 4 | Right Outer Tank Fuel Quantity | Lbs. | 131068 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 3 1 1 | 0 0 2 | Present Position - Longitude | Deg/180 | 0-180E/ 0-180W | 20 | | 0.000172 | 100 | 200 | | |
| | 0 0 4 | Present Position - Longitude | Deg/180 | 0-180E/ 0-180W | 20 | | 0.000172 | 100 | 200 | | |
| | 0 2 9 | Aileron Trim | Deg/180 | ±180 | 11 | | 0.088 | 50 | 100 | | |
| | 0 3 8 | Present Position - Longitude | Deg/180 | 0-180E/ 0-180W | 20 | | 0.000172 | 100 | 200 | | |
| | 0 3 B | Control Wheel Roll Force | Lbs. | 64 | 10 | | 0.0625 | 150 | 250 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 5 6 | Present Position Longitude | Deg/180 | 0-180E/ 0-180W | 20 | | 0.000172 | 100 | 200 | | |
| | 0 6 0 | Present Position Longitude | Deg/180 | 0-180E/ 0-180W | 20 | | 0.000172 | 100 | 200 | | |
| | 1 1 4 | Trim Tank Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 3 1 2 | 0 0 2 | Ground Speed | Knots | 4096 | 15 | | 0.125 | 25 | 50 | | |
| | 0 0 4 | Ground Speed | Knots | 4096 | 15 | | 0.125 | 25 | 50 | | |
| | 0 0 5 | Ground Speed | Knots | 4096 | 15 | | 0.125 | 25 | 50 | | |
| | 0 2 9 | Rudder Position | Deg/180 | ±180 | 11 | | 0.088 | 50 | 100 | | |
| | 0 3 8 | Ground Speed | Knots | 4096 | 15 | | 0.125 | 25 | 50 | | |
| | 0 5 6 | Ground Speed | Knots | 4096 | 15 | | 0.125 | 25 | 50 | | |
| | 0 5 A | Fuel Quantity ACT 1 | Lbs. | 131072 | 15 | | 4 | 100 | 200 | | |
| | 0 6 0 | Ground Speed | Knots | 4096 | 15 | | 0.125 | 25 | 50 | | |
| | 1 1 4 | Additional Center Tank (Act 1) Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 3 1 3 | 0 0 2 | Track Angle - True | Deg/180 | ±180 | 12 | | 0.05 | 25 | 50 | | |
| | 0 0 4 | Track Angle - True | Deg/180 | ±180 | 15 | | 0.0055 | 25 | 50 | | |
| | 0 2 5 | Track Angle - True | Deg/180 | ±180 | 10 | | 0.2 | 125 | 250 | | |
| | 0 2 9 | Rudder Trim | Deg/180 | ±180 | 11 | | 0.088 | 50 | 100 | | |
| | 0 3 8 | Track Angle - True | Deg/180 | ±180 | 15 | | 0.0055 | 25 | 50 | | |
| | 0 5 6 | Track Angle - True | Deg/180 | ±180 | 12 | | 0.05 | 25 | 50 | | |
| | 0 5 A | Fuel Quantity ACT 2 | Lbs. | 131072 | 15 | | 4 | 100 | 200 | | |
| | 0 6 0 | Track Angle - True | Deg/180 | ±180 | 12 | | 0.05 | 25 | 50 | | |
| | 1 1 4 | Additional Center Tank (Act 2) Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 3 1 4 | 0 0 2 | Stabilizer Pos Indication (B747-400) | Deg/180 | ±180 | 12 | TE Down | 0.05 | 25 | 50 | 50 | |
| | 0 0 4 | True Heading | Deg/180 | ±180 | 15 | | 0.0055 | 25 | 50 | | |
| | 0 2 5 | True Heading | Deg/180 | ±180 | 10 | | 0.2 | 125 | 250 | | |
| | 0 2 9 | Elevator Position | Deg/180 | ±180 | 11 | | 0.088 | 50 | 100 | | |
| | 0 3 8 | True Heading | Deg/180 | ±180 | 15 | | 0.0055 | 25 | 50 | | |
| | 0 3 B | Control Wheel Pitch Force | Lbs. | 64 | 10 | | 0.0625 | 150 | 250 | | |
| | 1 1 4 | Rear Center tank (RCT) Fuel Quantity | Lbs. | 131072 | 15 | | 4 | | | | |
| | | | | | | | | | | | |
| 3 1 5 | 0 0 1 | Stabilizer Position | Deg/180 | ±180 | 12 | TE Down | 0.05 | 25 | 50 | | |
| | 0 0 2 | Wind Speed | Knots | 256 | 8 | | 1.0 | 50 | 100 | | |
| | 0 0 4 | Wind Speed | Knots | 256 | 8 | | 1.0 | 50 | 100 | | |
| | 0 0 5 | Wind Speed | Knots | 256 | 8 | | 1.0 | 50 | 100 | | |
| | 0 2 9 | Stabilizer Position | Deg/180 | ±180 | 11 | TE Down | 0.088 | 50 | 100 | | |
| | 0 3 8 | Wind Speed | Knots | 256 | 8 | | 1.0 | 50 | 100 | | |
| | 0 5 6 | Wind Speed | Knots | 256 | 8 | | 1.0 | 50 | 100 | | |
| | 0 6 0 | Wind Speed | Knots | 256 | 8 | | 1.0 | 50 | 100 | | |
| | 0 A 1 | Stabilizer Position | Deg/180 | ±180 | 12 | TE Down | 0.05 | 25 | 50 | | |
| | | | | | | | | | | | |
| 3 1 6 | 0 0 2 | Wind Direction (True) | Deg/180 | +180 | 12 | CW from north | 0.05 | 25 | 50 | 50 | |
| | 0 0 4 | Wind Angle | Deg/180 | ±180 | 8 | | 0.7 | 50 | 100 | | |
| | 0 2 9 | Oil Temperature (Engine) | Deg C | 2048 | 12 | | 0.5 | 100 | 200 | | |
| | 0 3 8 | Wind Angle | Deg/180 | ±180 | 8 | | 0.7 | 50 | 100 | | |
| | 0 5 6 | Wind Direction (True) | Deg/180 | +180 | 12 | CW from north | 0.05 | 25 | 50 | 50 | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 0 6 0 | Wind Direction (True) | Deg/180 | +180 | 12 | CW from north | 0.05 | 25 | 50 | 50 |  |
|  | 1 0 A | Engine Oil Temperature | Deg C | -55 to 170 | 11 |  | 1.00 | 250 | 1000 |  |  |
|  | 1 0 B | Engine Oil Temperature | Deg C | -55 to 170 | 11 |  | 1.00 | 250 | 1000 |  |  |
|  | 0 D 0 | Engine Oil Temperature | Deg C | 2048 | 12 |  | 0.5 |  |  |  | SDI 1=L SDI 2 =R |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 1 7 | 0 0 2 | Track Angle - Magnetic | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 0 4 | Track Angle - Magnetic | Deg/180 | ±180 | 15 |  | 0.0055 | 25 | 50 |  |  |
|  | 0 0 5 | Track Angle - Magnetic | Deg/180 | ±180 | 15 |  | 0.0055 | 25 | 50 |  |  |
|  | 0 2 5 | Track Angle - Magnetic | Deg/180 | ±180 | 10 |  | 0.2 | 125 | 250 |  |  |
|  | 0 2 9 | Oil Pressure (Engine) | PSI | 4096 | 12 |  | 1 | 50 | 100 |  |  |
|  | 0 3 8 | Track Angle - Magnetic | Deg/180 | ±180 | 15 |  | 0.0055 | 25 | 50 |  |  |
|  | 0 5 6 | Track Angle Magnetic | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 6 0 | Track Angle Magnetic | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 D 0 | Engine Oil Pressure | PSI | 4096 | 14 |  | 0.25 |  |  |  | SDI 1 = L/SDI 2 = R |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 2 0 | 0 0 4 | Magnetic Heading | Deg/180 | ±180 | 15 |  | 0.0055 | 25 | 50 |  |  |
|  | 0 0 5 | Magnetic Heading | Deg/180 | ±180 | 15 |  | 0.0055 | 25 | 50 |  |  |
|  | 0 2 5 | Magnetic Heading | Deg/180 | ±180 | 10 |  | 0.2 | 125 | 250 |  |  |
|  | 0 3 5 | Own A/C Magnetic Heading | Deg/180 | ±180 | 15 |  | 0.0055 | 25 | 500 |  | See ARINC 735 |
|  | 0 3 8 | Magnetic Heading | Deg/180 | ±180 | 15 |  | 0.0055 | 25 | 50 |  |  |
|  | 0 4 D | Density-Tank | Lb/Gal | 8.191 | 13 |  | 0.001 | TBD | TBD |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 2 1 | 0 0 2 | Drift Angle | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 0 4 | Drift Angle | Deg/180 | ±180 | 11 |  | 0.09 | 25 | 50 |  |  |
|  | 0 0 5 | Drift Angle | Deg/180 | ±180 | 11 |  | 0.09 | 25 | 50 |  |  |
|  | 0 3 8 | Drift Angle | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 5 6 | Drift Angle | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 6 0 | Drift Angle | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 1 0 A | Exhaust Gas Temperature (Total) | Deg C | -55 to 1100 | 11 |  | 1.00 | 500 | 1000 |  |  |
|  | 1 0 B | Exhaust Gas Temperature (Total) | Deg C | -55 to 1100 | 11 |  | 1.00 | 500 | 1000 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 2 2 | 0 0 2 | Flight Path Angle | Deg/180 | +180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 0 4 | Flight Path Angle | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 0 5 | Flight Path Angle | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 3 8 | Flight Path Angle | Deg/180 | ±180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 5 6 | Flight Path Angle | Deg/180 | +180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 0 6 0 | Flight Path Angle | Deg/180 | +180 | 12 |  | 0.05 | 25 | 50 |  |  |
|  | 1 0 A | Total Compressor Discharge Temp | Deg C | -55 to 650 | 11 |  | 0.50 | 500 | 1000 |  |  |
|  | 1 0 B | Total Compressor Discharge Temp | Deg C | -55 to 650 | 11 |  | 0.50 | 500 | 1000 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 2 3 | 0 0 2 | Geometric Altitude | Feet | 50000 | 17 |  | 1 |  |  |  |  |
|  | 0 0 4 | Flight Path Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  | 6-27 |
|  | 0 0 5 | Flight Path Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  | 0 3 8 | Flight Path Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  | 0 5 6 | Geometric Altitude | Feet | 50000 | 17 |  | 1 |  |  |  |  |
|  | 0 6 0 | Geometric Altitude | Feet | 50000 | 17 |  | 1 |  |  |  |  |
|  | 1 0 A | Variable Stator Vane Position | % | -5 to 105 | 11 |  | 0.063 | 500 | 1000 |  |  |
|  | 1 0 B | Variable Stator Vane Position | % | -5 to 105 | 11 |  | 0.063 | 500 | 1000 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 2 4 | 0 0 4 | Pitch Angle | Deg/180 | ±180 | 14 |  | 0.01 | 10 | 20 |  |  |
|  | 0 0 5 | Pitch Angle | Deg/180 | ±180 | 14 |  | 0.01 | 10 | 20 |  |  |
|  | 0 2 5 | Pitch Angle | Deg/180 | ±180 | 10 |  | 0.2 | 125 | 250 |  |  |
|  | 0 3 8 | Pitch Angle | Deg/180 | ±180 | 14 |  | 0.01 | 10 | 20 |  |  |
|  | 0 4 D | Tank VSO Quantity | Gal. | 32768 | 15 |  | 1.0 | TBD | TBD |  | See Att. 6 for SDI encoding |
|  | 0 5 A | Effective Pitch Angle | Deg./180 | ±180 | 14 |  | 0.01 |  |  |  |  |
|  | 1 0 A | Selected Fuel Metering Valve Pos | % | -5 to 105 | 11 |  | 0.063 | 62.5 | 250 |  |  |
|  | 1 0 B | Selected Fuel Metering Valve Pos | % | -5 to 105 | 11 |  | 0.063 | 62.5 | 250 |  |  |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 1 4 | Effective Pitch Angle | Deg | ±180 | 13 | | 0.02 | | | | |
| | | | | | | | | | | | |
| 3 2 5 | 0 0 4 | Roll Angle | Deg/180 | ±180 | 14 | | 0.01 | 10 | 20 | | |
| | 0 0 5 | Roll Angle | Deg/180 | ±180 | 14 | | 0.01 | 10 | 20 | | |
| | 0 1 A | Engine Control Trim Feedback | | | | | | | | | |
| | 0 2 5 | Roll Angle | Deg/180 | ±180 | 10 | | 0.2 | 125 | 250 | | |
| | 0 2 F | Stator Vane Feedback | Inches | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 3 8 | Roll Angle | Deg/180 | ±180 | 14 | | 0.01 | 10 | 20 | | |
| | 0 3 F | Stator Vane Feedback | Inches | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 5 A | Effective Roll Angle | Deg/180 | ±180 | 14 | | 0.01 | | | | |
| | 1 0 A | Selected Variable Stator Vane Pos | % | -5 to 105 | 11 | | 0.063 | 62.5 | 250 | | |
| | 1 0 B | Selected Variable Stator Vane Pos | % | -5 to 105 | 11 | | 0.063 | 62.5 | 250 | | |
| | 1 1 4 | Effective Roll Angle | Deg | ±180 | 13 | | 0.02 | | | | |
| | | | | | | | | | | | |
| 3 2 6 | 0 0 4 | Body Pitch Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 0 5 | Body Pitch Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 3 8 | Body Pitch Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 4 D | Uplift Quantity | Lbs | 1638400 | 14 | | 100 | TBD | TBD | | |
| | 1 0 A | Compressor Discharge Static Press | PSIA | 5-600 | 11 | | 1.00 | 500 | 1000 | | |
| | 1 0 B | Compressor Discharge Static Press | PSIA | 5-600 | 11 | | 1.00 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 3 2 7 | 0 0 4 | Body Roll Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 0 5 | Body Roll Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 3 8 | Body Roll Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 4 D | Uplift Density | Lbs/Gal | 8.181 | 13 | | 0.001 | TBD | TBD | | |
| | 1 0 A | Fuel Metering Valve Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |
| | 1 0 B | Fuel Metering Valve Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 3 3 0 | 0 0 4 | Body Yaw Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 0 5 | Body Yaw Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 2 F | HC/TC Cooling Valve Pos. Feedback | % | 128 | 12 | OPEN | 0.03 | 100 | 200 | | |
| | 0 3 8 | Body Yaw Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 3 F | HC/TC Cooling Valve Pos. Feedback | % | 128 | 12 | OPEN | 0.03 | 100 | 200 | | |
| | 1 0 A | Selected HPT Clearance Valve Position | % | -5 to 105 | 11 | | 0.063 | 250 | 1000 | | |
| | 1 0 B | Selected HPT Clearance Valve Pos | % | -5 to 105 | 11 | | 0.063 | 250 | 1000 | | |
| | | | | | | | | | | | |
| 3 3 1 | 0 0 4 | Body Longitudinal Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 0 5 | Body Longitudinal Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 2 F | LTC Cooling Valve Pos. Feedback | % | 128 | 12 | OPEN | 0.03 | 100 | 200 | | |
| | 0 3 8 | Body Longitudinal Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 3 F | LTC Cooling Valve Pos. Feedback | % | 128 | 12 | OPEN | 0.03 | 100 | 200 | | |
| | 1 0 A | Selected LPT Clearance Valve Pos | % | -5 to 105 | 11 | | 0.063 | 250 | 1000 | | |
| | 1 0 B | Selected LPT Clearance Valve | % | -5 to 105 | 11 | | 0.063 | 250 | 1000 | | |
| | | | | | | | | | | | |
| 3 3 2 | 0 0 4 | Body Lateral Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 0 5 | Body Lateral Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 2 F | A/O Heat Xchr Valve Pos. Feedback | % | 128 | 12 | OPEN | 0.03 | 100 | 200 | | |
| | 0 3 8 | Body Lateral Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 3 F | A/O Heat Xchr Valve Pos. Feedback | % | 128 | 12 | OPEN | 0.03 | 100 | 200 | | |
| | | | | | | | | | | | |
| 3 3 3 | 0 0 4 | Body Normal Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 0 5 | Body Normal Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 2 F | Acceleration Fuel Flow Limit | Lb/Hr | 32768 | 12 | | 8 | 100 | 200 | | |
| | 0 3 8 | Body Normal Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 3 F | Acceleration Fuel Flow Limit | Lb/Hr | 32768 | 12 | | 8 | 100 | 200 | | |
| | | | | | | | | | | | |
| 3 3 4 | 0 0 4 | Platform Heading | Deg/180 | ±180 | 11 | | 0.09 | 20 | 40 | | |
| | 0 0 5 | Platform Heading | Deg/180 | ±180 | 11 | | 0.09 | 20 | 40 | | |
| | 0 2 F | Fuel Flow Command | Lb/Hr | 32768 | 12 | | 8 | 100 | 200 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 3 8 | Platform Heading | Deg/180 | ±180 | 11 | | 0.09 | 20 | 40 | | |
| | 0 3 F | Fuel Flow Command | Lb/Hr | 32768 | 12 | | 8 | 100 | 200 | | |
| | | | | | | | | | | | |
| 3 3 5 | 0 0 2 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 0 0 4 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 0 0 5 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 0 2 F | 2.5 BLD Actuator Position | % | 128 | 12 | | 0.031 | 100 | 200 | | |
| | 0 3 8 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 0 3 F | 2.5 BLD Actuator Position | % | 128 | 12 | | 0.031 | 100 | 200 | | |
| | 0 5 6 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 0 6 0 | Track Angle Rate | Deg/Sec | 32 | 11 | | 0.015 | 10 | 20 | | |
| | 1 0 A | Selected Variable Bleed Valve Pos | % | -5 to 105 | 11 | | 0.063 | 100 | 500 | | |
| | 1 0 B | Selected Variable Bleed Valve Pos | % | -5 to 105 | 11 | | 0.063 | 100 | 500 | | |
| | | | | | | | | | | | |
| 3 3 6 | 0 0 2 | Max Climb Angle | Deg | 32 | 15 | Climb | 0.001 | 100 | 200 | | |
| | 0 0 4 | Inertial Pitch Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 0 5 | Inertial Pitch Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 1 A | Engine Torque | % | 256 | 12 | | 0.063 | 100 | 200 | | |
| | 0 2 F | N2 Corrected to Sta 2.5 | % | 128 | 12 | | 0.031 | 100 | 200 | | |
| | 0 3 8 | Inertial Pitch Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 3 F | N2 Corrected to Sta 2.5 | % | 128 | 12 | | 0.031 | 100 | 200 | | |
| | 1 0 A | Variable Bleed Valve Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |
| | 1 0 B | Variable Bleed Valve Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 3 3 7 | 0 0 2 | EPR - Required For Level Flight | Ratio | ±4 | 12 | | 0.001 | 100 | 200 | | Engine Types: P&W |
| | 0 0 2 | N1 - Required For Level Flight | % RPM | ±256 | 15 | | 0.015 | | | | Engine Types: GE |
| | 0 0 4 | Inertial Roll Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 0 5 | Inertial Roll Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 1 A | Engine Rating | % | 0-256 | 12 | | 0.063 | 100 | 200 | | |
| | 0 3 8 | Inertial Roll Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 1 0 A | HPT Clearance Valve Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |
| | 1 0 B | HPT Clearance Valve Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 3 4 0 | 0 0 3 | EPR Actual | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 0 4 | Inertial Yaw Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 0 4 | Track Angle Grid | Deg | ± 180 | 15 | | 0.0055 | 20 | 110 | | |
| | 0 0 5 | Inertial Yaw Rate | Deg/Sec | 128 | 13 | | 0.015 | 10 | 20 | | |
| | 0 1 A | EPR Actual | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 2 9 | EPR Actual (Engine Direct) | | 4 | 12 | | 0.001 | 50 | 100 | | |
| | 0 2 D | EPR Actual | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 2 F | EPR Actual | | 4 | 12 | | 0.001 | 25 | 50 | | |
| | 0 3 3 | EPR Actual | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 3 F | EPR Actual | | 4 | 12 | | 0.001 | 25 | 50 | | |
| | 1 3 A | N1 Take Off | % N1Nom | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 1 4 0 | Pressure Ratio (Pt/Ps) | Ratio | 16 | 14 | | 0.001 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 3 4 1 | 0 0 2 | Target N1 | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 0 3 | N1 Command | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 0 3 | EPR Command | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 0 4 | Grid Heading | Deg | ± 180 | 15 | | 0.0055 | 20 | 110 | | |
| | 0 1 A | N1 Command | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 1 A | EPR Command | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 2 9 | N1 Command (Engine) | % RPM | 256 | 14 | | 0.015 | 50 | 100 | | |
| | 0 2 9 | EPR Command (Engine) | | 4 | 12 | | 0.001 | 50 | 100 | | |
| | 0 2 F | N1 Command | % RPM | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 0 2 F | EPR Command | | 4 | 12 | | 0.001 | 25 | 50 | | |
| | 0 3 8 | Grid Heading | Deg | ± 180 | 15 | | 0.0055 | 20 | 110 | | |
| | 0 3 F | EPR Command | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 4 D | I/O S/W REV 1&2 | | (1) | 16 | | N/A | TBD | TBD | | |
| | 1 0 A | Command Fan Speed | % | 117.5 | 13 | | 0.032 | 31.3 | 100 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 0 B | Command Fan Speed | % | 117.5 | 13 | | 0.032 | 31.3 | 100 | | |
| | 1 3 A | N1 Reference | % N1Nom | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 1 4 0 | Pressure Ratio (Ps/Pso) | Ratio | 4 | 12 | | 0.001 | 62.5 | 125 | | |
| | | | | | | | | | | | |
| 3 4 2 | 0 0 2 | N1 Bug Drive | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 0 3 | N1 Limit | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 0 3 | EPR Limit | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 1 A | N1 Maximum | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 1 A | EPR Maximum | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 2 9 | N1 Limit (TCC) | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 2 9 | EPR Limit (TOC) | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 2 F | Maximum Available EPR | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 3 B | EPR Limit | | 4 | 12 | | 0.001 | 150 | 250 | | |
| | 0 3 B | N1 Limit | % RPM | 256 | 14 | | 0.015 | 150 | 250 | | |
| | 0 3 F | Maximum Available EPR | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 4 D | S/W REV-Tank | | (1) | 16 | | N/A | TBD | TBD | | |
| | 1 0 A | Max Allowed Fan Speed | % | 117.5 | 13 | | 0.032 | 100 | 500 | | |
| | 1 0 B | Max Allowed Fan Speed | % | 117.5 | 13 | | 0.032 | 100 | 500 | | |
| | 1 4 0 | Air Density Ratio | Ratio | 4 | 12 | | 0.001 | 250 | 500 | | |
| | | | | | | | | | | | |
| 3 4 3 | 0 0 3 | N1 Derate | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 0 3 | EPR Rate | | 4 | 12 | | 0.001 | 100 | 200 | | |
| | 0 1 A | N1 Demand | % RPM | 256 | 12 | | 0.063 | 20 | 50 | | |
| | 1 0 A | N1 Command vs. TLA | % | 117.5 | 13 | | 0.032 | 31.3 | 100 | | |
| | 1 0 B | N1 Command vs. TLA | % | 117.5 | 13 | | 0.032 | 31.3 | 100 | | |
| | | | | | | | | | | | |
| 3 4 4 | 0 1 A | N2 | % RPM | 256 | 14 | | 0.015 | 50 | 100 | | |
| | 0 1 C | N2 | % RPM | 256 | 14 | | 0.015 | 50 | 100 | | |
| | 0 2 9 | N2 | % RPM | 256 | 14 | | 0.015 | 50 | 100 | | |
| | 0 2 F | N2 | % RPM | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 0 3 3 | N2 | % RPM | 256 | 14 | | 0.015 | 50 | 200 | | |
| | 0 3 F | N2 | % RPM | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 1 0 A | Selected Actual Core Speed | % | 128 | 12 | | 0.063 | 31.3 | 100 | | |
| | 1 0 B | Selected Actual Core Speed | % | 128 | 12 | | 0.063 | 31.3 | 100 | | |
| | 1 3 A | N2 Speed | % RPM | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 0 D 0 | N2 | % RPM | 256 | 13 | | 0.03 | | | | SDI 1 = L/SDI 2 = R |
| | | | | | | | | | | | |
| 3 4 5 | 0 1 A | Exhaust Gas Temperature | Deg C | 2048 | 12 | | 0.5 | 100 | 200 | | |
| | 0 1 C | Exhaust Gas Temperature | Deg C | 2048 | 12 | | 0.5 | 100 | 200 | | |
| | 0 2 9 | Exhaust Gas Temperature | Deg C | 2048 | 12 | | 0.5 | 50 | 100 | | |
| | 0 2 F | Exhaust Gas Temperature | Deg C | 2048 | 12 | | 0.5 | 25 | 50 | | |
| | 0 3 3 | Exhaust Gas Temperature | Deg C | 2048 | 12 | | 0.5 | 100 | 200 | | |
| | 0 3 F | Exhaust Gas Temperature | Deg C | 2048 | 12 | | 0.5 | 25 | 50 | | |
| | 1 0 A | Selected Exhaust Gas Temp (Total) | Deg C | -55 to 1100 | 11 | | 1.00 | 62.5 | 250 | | |
| | 1 0 B | Selected Exhaust Gas Temp (Total) | Deg C | -55 to 1100 | 11 | | 1.00 | 62.5 | 250 | | |
| | 1 3 A | EGT Trimmed | Deg C | 2048 | 12 | | 0.5 | 25 | 50 | | |
| | 0 D 0 | EGT | Deg C | 2048 | 12 | | 0.5 | | | | SDI 1 = L/SDI 2 = R |
| | | | | | | | | | | | |
| 3 4 6 | 0 0 3 | N1 Actual | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 1 A | N1 Actual | % RPM | 256 | 14 | | 0.015 | 100 | 200 | | |
| | 0 2 F | N1 Actual | % RPM | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 0 3 3 | N1 Actual | % RPM | 256 | 14 | | 0.015 | 50 | 200 | | |
| | 0 3 F | N1 Actual | % RPM | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 0 4 D | Cable Cap-Hi-Z | PF | 65535 | 15 | | 2.0 | 100 | 200 | | |
| | 1 0 A | Selected Actual Fan Speed | % | 128 | 12 | | 0.063 | 31.3 | 100 | | |
| | 1 0 B | Selected Actual Fan Speed | % | 128 | 12 | | 0.063 | 31.3 | 100 | | |
| | 1 3 A | N1 Speed Actual | % N1Nom | 256 | 14 | | 0.015 | 25 | 50 | | |
| | 0 D 0 | N1 | % RPM | 256 | 13 | | 0.03 | | | | SDI 1 = L/SDI 2 = R |
| | | | | | | | | | | | |
| 3 4 7 | 0 2 9 | Fuel Flow (Engine) | Lbs/Hr | 32768 | 12 | | 8 | 50 | 100 | | |
| | 1 0 A | LPT Clearance Valve Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
|  | 1 0 B | LPT Clearance Valve Position | % | -5 to 105 | 11 |  | 0.063 | 500 | 1000 |  |  |
|  | 1 3 A | Fuel Flow | Lbs/Hr | 32768 | 14 |  | 2 | 50 | 100 |  |  |
|  | 0 D 0 | Fuel Flow | Lbs/Hr | 32768 | 12 |  | 8 |  |  |  | SDI 1 = L/SDI 2 = R |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 5 2 | 1 4 0 | Maintenance Flight Controller | Flights | 524, 287 | 19 |  | 1 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 5 3 | 0 D 0 | Vibration | Scalar | 5.12 | 8 |  | 0.02 |  |  |  | SDI 1 = L/SDI 2 = R |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 5 4 | 0 3 D | N1 Vibration | Scalar | 5.12 | 9 |  | 0.01 |  |  |  | Bit 11-Chan. A<br>Bit 12-Chan. B |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 5 5 | 0 3 D | N2 Vibration | Scalar | 5.12 | 9 |  | 0.01 |  |  |  | Bit 11-Chan. A<br>Bit 12-Chan. B |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 5 6 | 0 3 D | N2 Vibration | Scalar | 5.12 | 9 |  | 0.01 |  |  |  | Bit 11-Chan. A<br>Bit 12-Chan. B |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 5 7 | 0 3 D | BB Vibration | Scalar | 5.12 | 9 |  | 0.01 |  |  |  | Bit 11-Chan. A<br>Bit 12-Chan. B |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 6 0 | 0 0 2 | Flight Information |  |  |  |  |  |  |  |  | 6-33 |
|  | 0 0 4 | Potential Vertical Speed | Ft/Min | 32768 | 15 |  | 1.0 | 10 | 20 |  |  |
|  | 0 0 5 | Potential Vertical Speed | Ft/Min | 32768 | 15 |  | 1.0 | 25 | 50 |  |  |
|  | 0 3 8 | Potential Vertical Speed | Ft/Min | 32768 | 15 |  | 1.0 | 10 | 20 |  |  |
|  | 0 3 D | N1 Rotor Imbalance Angle | Deg. | ±180 | 9 |  | 1.0 |  |  |  | Bit 11-Chan. A<br>Bit 12-Chan. B |
|  | 0 5 6 | Flight Information |  |  |  |  |  |  |  |  | 6-33 |
|  | 0 6 0 | Flight Information |  |  |  |  |  |  |  |  | 6-33 |
|  | 1 0 A | Throttle Rate of Change | Deg/Sec | ±16 | 9/9 |  | 1.00 | 31.3 | 100 |  | See Notes [6] & [7] |
|  | 1 0 B | Throttle Rate of Change | Deg/Sec | ±16 | 9/9 |  | 1.00 | 31.3 | 100 |  | See Notes [6] & [7] |
|  | 1 4 2 | RAIM Status Word | N.M. | 16 | 13 |  | 0.00195 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 6 1 | 0 0 4 | Altitude (Inertial) | Feet | 131072 | 20 |  | 0.125 | 20 | 40 |  |  |
|  | 0 0 5 | Altitude (Inertial) | Feet | 131072 | 18 |  | 0.5 | 20 | 40 |  |  |
|  | 0 3 8 | Altitude (Inertial) | Feet | 131072 | 20 |  | 0.125 | 20 | 40 |  |  |
|  | 0 3 D | LPT Rotor Imbalance Angle (737 only) | Deg. | ±180 | 9 |  | 1.0 |  |  |  | Bit 11-Chan. A<br>Bit 12-Chan. B |
|  | 1 0 A | Derivative of Thrust vs. N1 | DFN/%N1 | 2000 | 11 |  | 2.0 | 62.5 | 250 |  | See Note [6] |
|  | 1 0 B | Derivative of Thrust vs. N1 | DFN/%N1 | 2000 | 11 |  | 2.0 | 62.5 | 250 |  | See Note [6] |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 6 2 | 0 0 4 | Along Track Horizontal Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  | 0 3 8 | Along Track Horizontal Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  | 1 0 A | Derivative of N1 vs. TLA | % N1/Deg | 12 | 11 |  | 0.008 | 62.5 | 250 |  | See Note [6] |
|  | 1 0 B | Derivative of N1 vs. TLA | % N1/Deg | 12 | 11 |  | 0.008 | 62.5 | 250 |  | See Note [6] |
|  | 1 1 5 | Range Rate | Knots | ±8192 | 13 |  | 1.0 | 50 | 50 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 6 3 | 0 0 4 | Cross Track Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  | 0 3 8 | Cross Track Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  | 1 0 A | Corrected Thrust | LBF | 64000 | 11 |  | 64.0 | 62.5 | 250 |  | See Note [6] |
|  | 1 0 B | Corrected Thrust | LBF | 64000 | 11 |  | 64.0 | 62.5 | 250 |  | See Note [6] |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 6 4 | 0 0 4 | Vertical Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  | 0 0 5 | Vertical Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  | 1 3 A | N1 APR Rating | % N1Nom | 256 | 14 |  | 0.015 | 100 | 200 |  |  |
|  | 0 3 8 | Vertical Acceleration | g | 4 | 12 |  | 0.001 | 10 | 20 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| 3 6 5 | 0 0 4 | Inertial Vertical Velocity (EFI) | Ft/Min | 32768 | 15 |  | 1.0 | 20 | 40 |  |  |
|  | 0 0 5 | Inertial Vertical Velocity (EFI) | Ft/Min | 32768 | 15 |  | 1.0 | 20 | 40 |  |  |
|  | 1 3 A | N1 Max Reverse | % N1Nom | 256 | 14 |  | 0.015 | 100 | 200 |  |  |
|  | 0 3 8 | Inertial Vertical Velocity (EFI) | Ft/Min | 32768 | 15 |  | 1.0 | 20 | 40 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

## ATTACHMENT 2
## DATA STANDARDS

### TABLE 2 - BNR DATA

| Label | Eqpt ID (Hex) | Parameter Name | Units | Range (Scale) | Sig Bits | Pos Sense | Resolution | Min Transit Interval (msec) 2 | Max Transit Interval (msec) 2 | Max Trans-port Delay (msec) 3 | Notes & Cross Ref. to Tables and Attachments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 6 6 | 0 0 4 | North-South Velocity | Knots | 4096 | 15 | | 0.125 | 50 | 100 | | 6-2-1 |
| | 1 3 A | IGV Position | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | |
| | 0 3 8 | North-South Velocity | Knots | 4096 | 15 | | 0.125 | 50 | 100 | | |
| | | | | | | | | | | | |
| 3 6 7 | 0 0 4 | East-West Velocity | Knots | 4096 | 15 | | 0.125 | 100 | 200 | | |
| | 1 3 A | IGV Request | Deg/180 | ±180 | 12 | | 0.05 | 100 | 200 | | |
| | 0 3 8 | East-West Velocity | Knots | 4096 | 15 | | 0.125 | 100 | 200 | | |
| | | | | | | | | | | | |
| 3 7 0 | 0 0 4 | g | 9 | 8 | 13 | UP | 0.001 | 100 | 200 | 110 | |
| | 0 0 5 | g | 9 | 8 | 13 | UP | 0.001 | 100 | 200 | 110 | |
| | 0 0 B | GNSS Height WGS-84 (HAE) | Feet | ± 131.072 | 20 | | 0.125 | | 1200 | | |
| | 0 2 5 | Decision Height Selected (EFI) | Feet | 8192 | 16 | | 0.125 | 100 | 200 | | |
| | 0 C 5 | Decision Height Selected (EFI) | Feet | 16384 | 17 | | 0.125 | 100 | 200 | | |
| | | | | | | | | | | | |
| 3 7 1 | X X X | Gen Aviation Equip. Identifier | | | | | | | | | |
| | | | | | | | | | | | |
| 3 7 2 | 0 0 5 | Wind Direction-Magnetic | Deg/180 | ±180 | 9 | | 0.35 | 50 | 100 | | |
| | 1 0 A | Actual Fan Speed | % | 128 | 12 | | 0.063 | 500 | 1000 | | |
| | 1 0 B | Actual Fan Speed | % | 128 | 12 | | 0.063 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 3 7 3 | 0 0 5 | North-South Velocity-Magnetic | Knots | 4096 | 15 | | 0.125 | 100 | 200 | | |
| | 1 0 A | Actual Core Speed | % | 128 | 12 | | 0.063 | 500 | 1000 | | |
| | 1 0 B | Actual Core Speed | % | 128 | 12 | | 0.063 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 3 7 4 | 0 0 5 | East-West Velocity-Magnetic | Knots | 4096 | 15 | | 0.125 | 100 | 200 | | |
| | 1 0 A | Left Thrust Reverser Position | % | -5+105 | 11 | | 0.063 | 500 | 1000 | | |
| | 1 0 B | Left Thrust Reverser Position | % | -5+105 | 11 | | 0.063 | 500 | 1000 | | |
| | | | | | | | | | | | |
| 3 7 5 | 0 0 4 | Along Heading Acceleration | Gs | 4 | 18 | | 1.53E-5 | 50 | 110 | | |
| | 0 0 5 | Along Heading Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 3 3 | Spare DC1 | VDC | 16 | 12 | | 0.004 | 150 | 250 | | |
| | 0 3 8 | Along Heading Acceleration | Gs | 4 | 18 | | 1.53E-5 | 50 | 110 | | |
| | 1 0 A | Right Thrust Reverser Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |
| | 1 0 B | Right Thrust Reverser Position | % | -5 to 105 | 11 | | 0.063 | 500 | 1000 | | |
| | X X X | GPS Differential Correction, Word A | | | | | | | | | See ARINC 743A |
| | | | | | | | | | | | |
| 3 7 6 | 0 0 4 | Cross Heading Acceleration | Gs | 4 | 18 | | 1.53E-5 | 50 | 110 | | |
| | 0 0 5 | Cross Heading Acceleration | g | 4 | 12 | | 0.001 | 10 | 20 | | |
| | 0 3 3 | Spare DC2 | VDC | 16 | 12 | | 0.004 | 150 | 250 | | |
| | 0 3 8 | Cross Heading Acceleration | Gs | 4 | 18 | | 1.53E-5 | 50 | 110 | | |
| | X X X | GPS Differential Correction, Word B | | | | | | | | | See ARINC 743A |

## TABLE 2 - BNR DATA

[1] The number entered into the Range Column for each parameter that is not angular in nature is the nearest whole binary number greater than the parameter range required. As explained in the Commentary following Section 2.1.6 of this document, the weight of the most significant bit of the twos complement fractional notation binary word will be one half this value, and the actual maximum value of the parameter capable of being encoded will be the number in the range column less one least significant bit value. The numbers entered in the RANGE column for angular parameters are the actual degree ranges required. The way in which these parameters are encoded is also explained in the Commentary following Section 2.1.6.

c-4 [2] Transmit intervals and the number of parameters to be transmitted are prime factors in bus loading. The interval for transmission of parameters should fall between the minimum and maximum specified intervals and nominally should be near the center of the range at equal intervals between transmissions. When heavy bus loading dictates a shift from the center of the range, the shift should be toward the maximum transmit interval.

c-5 When words with like labels and with different SDI codes are transmitted, each of those words is considered a unique item of information. The guidance given in this document for transmit intervals should be applied to those words as if each word were identified by a different label.

c-4 [3] Maximum transport delay is the worst case total delay between an input function and the output response.

COMMENTARY

> Since the nature of the data varies, the definition of transport delay will differ depending on the application. In the case of a sampling system, a sample is complete when the 32-bit word constituting the output data is complete. In the case of a system involving filtering, transport delay is the phase slope of the transfer function across the frequency band of interest.

There can be situations in which it is necessary to define which portions of an equipment are included in the transport delay term. Such definitions should appear in individual equipment Characteristics when needed.

c-7 [4] The values shown in parentheses are the preferred data standards for stator vane angle. However, a considerable portion of existing equipment use the other (non-parenthesized) values. Users should verify the data standards of the equipment they are or will be using.

[5] These labels can provide data in a degraded accuracy mode. See Section 2.1.5.1 and 2.1.5.2.

c-12 [6] Optionally transmitted.

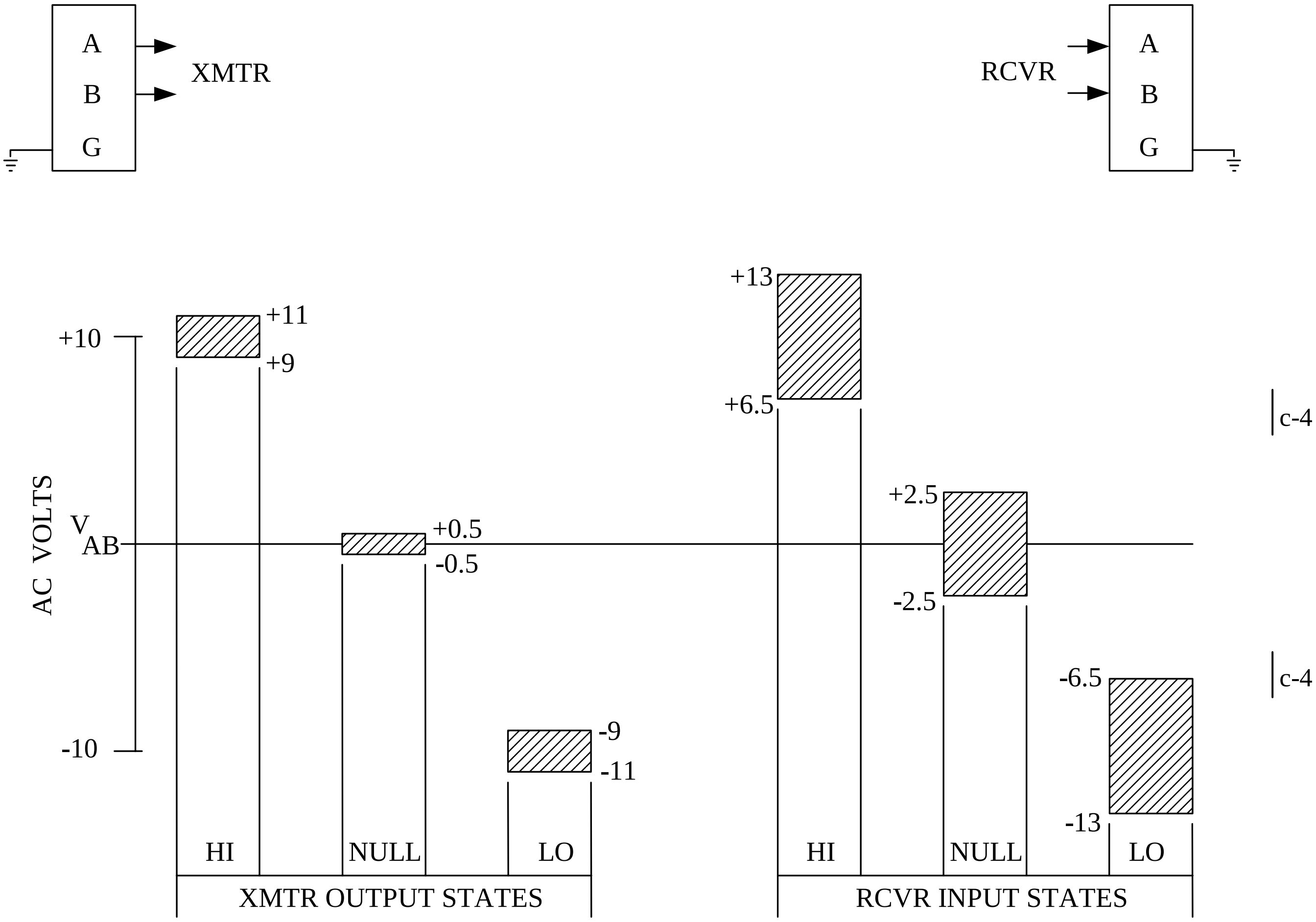
[7] Binary packed word consisting of:

Word 1 = Bits 11-19 (Range = 16)

Word 2 = Bits 20-28 (Range = 16)

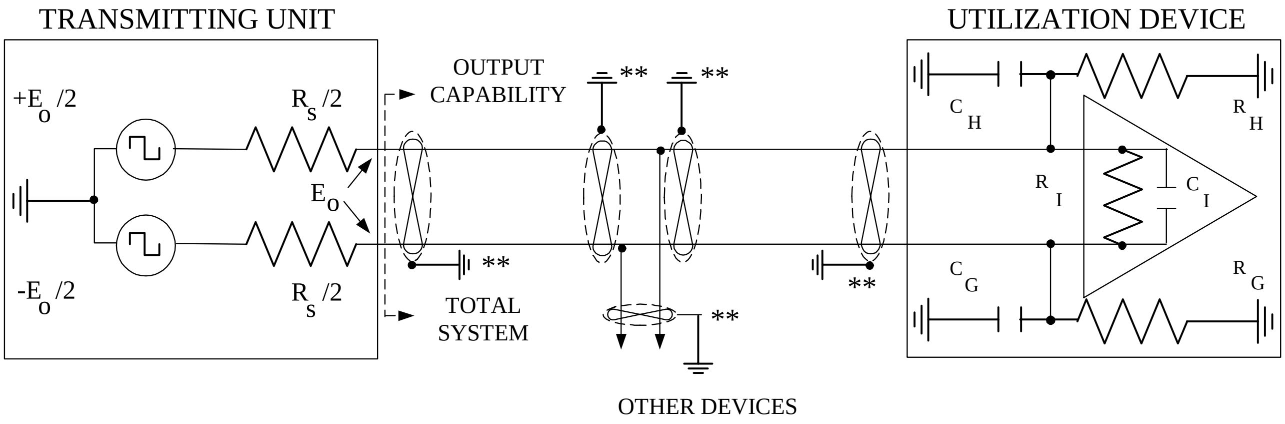
## ATTACHMENT 3

## VOLTAGE LEVELS



## ATTACHMENT 4
## INPUT/OUTPUT CIRCUIT STANDARDS

c-4



| OUTPUT (SYSTEM) CAPABILITY | | UTILIZATION DEVICE STANDARDS |
|---|---|---|
| c-4 Total System *Resistance | 400 to 8,000 ohms | $R_I \geq$ 12,000 ohms |
| Total System *Capacitance | 1,000 to 30,000 pF | $C_I \leq$ 50 pF |
| System Capacitance Unbalance | Not defined but unbalance due to aircraft interwiring should be held to a minimum | $R_H$ or $R_G \geq$ 12,000 ohms<br>$C_H$ and $C_G \leq$ 50 pF |

The total differential input impedance of the receiver should be limited to the values specified in Section 2.2.4.2.

c-16 This drawing describes total system characteristics rather than individual component parameters.

NOTES:

* Includes aircraft interwiring

** Shields to be grounded in aircraft at both ends of all “breaks.”

# ATTACHMENT 5
# INTERNATIONAL STANDARDS ORGANIZATION CODE #5

The ISO Alphabet No. 5 seven-unit code set is reproduced in the table below with the BCD subset outlined in column 3:

## STANDARD CODE

| **BIT 7 →**<br>**BIT 6 →**<br>**BIT 5 →** | | | | | **0**<br>**0**<br>**0** | **0**<br>**0**<br>**1** | **0**<br>**1**<br>**0** | **0**<br>**1**<br>**1** | **1**<br>**0**<br>**0** | **1**<br>**0**<br>**1** | **1**<br>**1**<br>**0** | **1**<br>**1**<br>**1** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIT 4 ↓** | **BIT 3 ↓** | **BIT 2 ↓** | **BIT 1 ↓** | **Column →**<br>**Row ↓** | **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** |
| **0** | **0** | **0** | **0** | **0** | **NUL** | **DLE** | **SP** | **0** | **@** | **P** | **`** | **p** |
| **0** | **0** | **0** | **1** | **1** | **SOH** | **DC1** | **!** | **1** | **A** | **Q** | **a** | **q** |
| **0** | **0** | **1** | **0** | **2** | **STX** | **DC2** | **"** | **2** | **B** | **R** | **b** | **r** |
| **0** | **0** | **1** | **1** | **3** | **ETX** | **DC3** | **#** | **3** | **C** | **S** | **c** | **s** |
| **0** | **1** | **0** | **0** | **4** | **EOT** | **DC4** | **$** | **4** | **D** | **T** | **d** | **t** |
| **0** | **1** | **0** | **1** | **5** | **ENQ** | **NAK** | **%** | **5** | **E** | **U** | **e** | **u** |
| **0** | **1** | **1** | **0** | **6** | **ACK** | **SYN** | **&** | **6** | **F** | **V** | **f** | **v** |
| **0** | **1** | **1** | **1** | **7** | **BEL** | **ETB** | **′** | **7** | **G** | **W** | **g** | **w** |
| **1** | **0** | **0** | **0** | **8** | **BS** | **CAN** | **(** | **8** | **H** | **X** | **h** | **x** |
| **1** | **0** | **0** | **1** | **9** | **HT** | **EM** | **)** | **9** | **I** | **Y** | **i** | **y** |
| **1** | **0** | **1** | **0** | **10** | **LF** | **SUB** | ***** | **:** | **J** | **Z** | **j** | **z** |
| **1** | **0** | **1** | **1** | **11** | **VT** | **ESC** | **+** | **;** | **K** | **[** | **k** | **{** |
| **1** | **1** | **0** | **0** | **12** | **FF** | **FS** | **´** | **<** | **L** | **** | **l** | **\|** |
| **1** | **1** | **0** | **1** | **13** | **CR** | **GS** | **-** | **=** | **M** | **]** | **m** | **}** |
| **1** | **1** | **1** | **0** | **14** | **SO** | **RS** | **•** | **>** | **N** | **ʌ** | **n** | **~** |
| **1** | **1** | **1** | **1** | **15** | **SI** | **US** | **/** | **?** | **O** | **—** | **o** | **DEL** |

NOTE: $b_8$ is used as a parity bit.

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLES

## 6.1. General Word Formats

**TABLE 6-1**

| 32 | 31 30 | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|
| P | SSM | DATA ⟶ ⟵ PAD ⟵ DISCRETES | SDI | LABEL |
| [5] | [4] | MSB [3] [2] LSB | [1] | |

Generalized BCD Word Format

**TABLE 6-1-1**

| P | SSM | BCD CH #2 | BCD CH #2 | BCD CH #3 | BCD CH #4 | BCD CH #5 | SDI | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|---|
| | | 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | | |
| 0 | 0 0 | 0 1 0 | 0 1 0 1 | 0 1 1 1 | 1 0 0 0 | 0 1 1 0 | 0 0 | 1 0 0 0 0 0 0 1 |
| Example | | 2 | 5 | 7 | 8 | 6 | | DME DISTANCE (201) |

BCD Word Format Example (No Discretes)

**TABLE 6-2**

| 32 | 31 30 | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|
| P | SSM | DATA ⟶ ⟵ PAD ⟵ DISCRETES | SDI | LABEL |
| [5] | [4] | MSB [3] [2] LSB | [1] | |

Generalized BNR Word Format

**TABLE 6-2-1**

| P | 31 30<br>SSM | 29 11<br>PAD<br>1/2 1/4 1/8 1/16 1/32 1/64 1/128 etc | SDI | 8 7 6 5 4 3 2 1<br>LABEL |
|---|---|---|---|---|
| 0 | 1 0 | 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0 0 | 0 1 1 0 1 1 1 1 |
| Example: | | 512 Knots (i.e., 1/8 x 4096 where 4096 is entry in range column of Table 2, Att. 2) | | N-S VELOCITY (366) |

BNR Word Format Example (No Discretes)

**TABLE 6-3**

| P | SSM<br>(01) | "STX" | UNIT<br>ADDRESS | WORD COUNT | LABEL<br>(357) |
|---|---|---|---|---|---|
| 32 | 31 30 | 29 23 | 22 17 | 16 BNR EQUIV. 9 | 8 1 |

Alpha Numeric (ISO Alphabet No. 5) Message – Initial Word Format

c-4

| P | SSM<br>(01) | "STX" | SPARES<br>(Zeroes) | WORD COUNT | LABEL<br>(356) |
|---|---|---|---|---|---|
| 32 | 31 30 | 29 23 | 22 17 | 16 BNR EQUIV. 9 | 8 1 |

Alpha Numeric (ISO Alphabet No. 5) Maintenance Data –Initial Word Format

| P | SSM<br>(00) | "DATA CH #3" | DATA CH #2 | DATA CH #1 | LABEL<br>(356, 357) |
|---|---|---|---|---|---|
| 32 | 31 30 | 29 P 23 | 22 L 16 | 15 A 9 | 8 1 |

Alpha Numeric (ISO Alphabet No. 5) Data – Intermediate Word Format

| P | SSM<br>(10) | "DATA CH #3" | DATA CH #2 | DATA CH #1 | LABEL<br>(356, 357) |
|---|---|---|---|---|---|
| 32 | 31 30 | 29 (BNR ZEROES) 23 | 22 A 16 | 15 H 9 | 8 1 |

Alpha Numeric (ISO Alphabet No. 5) Data – Final Word Format

(Taken together, the following example shows encoding of the word ALPHA into three successive data words)

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLE

**TABLE 6-4**

| P | SSM | DISCRETES | SDI | LABEL |
|---|---|---|---|---|
| | (00) | | | (See Below) |
| 32 | 31 30 | 29 MSB [2] LSB 11 | 10 9 | 8 1 |

| LABEL | USAGE SUBGROUP |
|---|---|
| 155 – 161 | Maintenance |
| 270 – 276 | Discretes |
| 350 – 354 | Maintenance |

Discrete Word Format

c-4

**TABLE 6-5**

| P | SSM | ACKNOWLEDGEMENT | WORD COUNT | LABEL |
|---|---|---|---|---|
| | (01) | (FORMAT NOT DEFINED) | | (355) |
| 32 | 31 30 | 29 17 | 16 BNR EQUIV. 9 | 8 1 |

Acknowledgement Word – Initial Word Format

**TABLE 6-5-1**

| P | SSM | ACKNOWLEDGEMENT | LABEL |
|---|---|---|---|
| | (00) | (FORMAT NOT DEFINED) | (355) |
| 32 | 31 30 | 29 9 | 8 1 |

Acknowledgement Word – Intermediate Word Format

**TABLE 6-5-2**

| P | SSM | ACKNOWLEDGEMENT | LABEL |
|---|---|---|---|
| | (10) | (FORMAT NOT DEFINED) | (355) |
| 32 | 31 30 | 29 9 | 8 1 |

Acknowledgement Word – Final Word Format

**TABLE 6-6**

| 32 | 31 30 | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|
| P<br>[5] | SSM<br>[4] | DATA ⟶ PADS [3] ⟶ * | SDI<br>[1] | LABEL<br>(173/174) |
| * Bit No. 11 takes on the binary state “one” to annunciate that the ILS receiver is in the “tune inhibit” condition. | | | | |

ILS Localizer/Glideslope Deviation Word

**TABLE 6-7**

| 32 | 31 30 | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|
| P<br>[5] | SSM<br>[4] | DATA FIELD ** * | SDI<br>[1] | LABEL<br>(202) |
| * Bit No. 11 is assigned to a memory on/off annunciation function (see Section 4.7 of ARINC 709)<br>** Bit No. 12 is set to “1” when data is for a foreground station in frequency scanning mode. | | | | 0 1 0 0 0 0 0 1 |

c-6

DME Distance Word

**TABLE 6-8**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARITY | SSM | | DATE | | | | | | | | | | | FLIGHT LEG | | | | PAD [3] | | | | SDI [1] | | LABEL (260) | | | | | | | |
| | | | Day | | | | | | Month | | | | | | | | | | | | | | | | | | | | | | |
| | | | x10 | | x1 | | | | x10 | x1 | | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | 1 | 8 | 4 | 2 | 1 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | | | | | | | | | | | | | | |
| | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| Example | | | 2 | | 3 | | | | 0 | 8 | | | | 5 | | | | | | | | | | 0 | | | 6 | | | 2 | |

Date/Flight Leg Word

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-9**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARITY | SSM | | FLIGHT NUMBER | | | | | | | | | | | | | | | | PAD | | | SDI | | LABEL (261) | | | | | | | |
| | | | x1000 | | | | x100 | | | | x10 | | | | x1 | | | | | | | | | | | | | | | | |
| | | | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | | | | | | | | | | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| Example | | | 0 | | | | 1 | | | | 1 | | | | 7 | | | | | | | | | 1 | | | 6 | | | 2 | |

Flight Number Word

**TABLE 6-10**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P [5] | SSM [4] | | MSB DATA LSB | | | | | | | | | | | | | PAD [3] | | | [6] | | | SDI [1] | | LABEL (222) | | | | | | | |

[6] Marker Beacon Output Discrete Bits

| Discrete | Bit | Bit State | |
|---|---|---|---|
| | | Discrete Grounded | Discrete Open |
| 400 Hz | 11 | 1 | 0 |
| 1300 Hz | 12 | 1 | 0 |
| 3000 Hz | 13 | 1 | 0 |

VOR Omnibearing

**TABLE 6-11**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P [5] | SSM [4] | | | MSB DATA LSB | | | | | | | | | | | | PAD | LEVER POSITION | | | | | SDI [1] | | LABEL (127/137) | | | | | | | |

c-4

| Lever | Bit | | | | |
|---|---|---|---|---|---|
| | 11 | 12 | 13 | 14 | 15 |
| Position 1 (Cruise) | 1 | 0 | 0 | 0 | 0 |
| Position 2 | 0 | 1 | 0 | 0 | 0 |
| Position 3 | 0 | 0 | 1 | 0 | 0 |
| Position 4 | 0 | 0 | 0 | 1 | 0 |
| Position 5 (Landing) | 0 | 0 | 0 | 0 | 1 |

Slat/Flap Angle Word

**TABLE 6-12**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P [5] | SSM [4] | | | HOURS 0-24 | | | | | MINUTES 0-60 | | | | | | SECONDS 0-60 | | | | | | * | SDI | | LABEL (150) | | | | | | | |
| *Bit 11 of label 150 should be encoded with a “1” when the GNSS system clock is being used as the source of time.<br>Otherwise, bit 11 should be encoded as “0”. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

c-16

UTC Binary Word

**TABLE 6-13**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P [5] | SSM [4] | | | DATA | | | | | | | | | | | | | | | | PAD | FTI | SDI [1] | | LABEL (164) | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| Note: When Bit 11 (Functional Test Inhibit) is a “1”, a functional test should not be performed. | | | | | | | | | | | | | | | | | | | | | | | | 4 | | | 6 | | | 1 | |

c-4

Radio Height Word

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLE

**TABLE 6-14**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 1 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | DOCUMENTARY DATA | | | | | | | | | | | | | | | | | | PAD | SDI | | LABEL | | | | | | | |
| | | | 4 | 2 | 1 | 4 | 2 | 1 | 4 | 2 | 1 | 4 | 2 | 1 | 4 | 2 | 1 | 4 | 2 | 1 | | | | (262) | | | | | | | |
| [5] | [4] | | Code 1 | | | Code 2 | | | Code 3 | | | Code 4 | | | Code 5 | | | Code 6 | | | | [1] | | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |

Documentary Data Word

[1] Source/Destination Identifier (SDI) Field

The purpose of the SDI field is explained in Section 2.1.4 of this document, as are also the limitations on its use. When the SDI function is not required, this field may be occupied by binary zero or valid data pad bits.

[2] Discretes

As discussed in Section 2.3.1.2 of this document, unused bits in a word may be assigned to discrete functions, one bit per variable. Bit #11 of the word should be the first to be so assigned, followed by bit #12 and so on, in ascending numerical order, until the data field is reached. In the absence of discretes, unused bit positions should be occupied by binary zero or valid data pad bits.

[3] Pad

All bit positions not used for data or discrete should be filled with binary zero or valid data pad bits. Section 2.1.2 of this document refers.

[4] Sign/Status Matrix (SSM)

Section 2.1.5 of this document describes the functions of the sign/status matrix and the ways in which the bits constituting it are encoded.

[5] Parity Bit

This bit is encoded to render word parity odd. Section 2.3.4 of this document refers.

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-15**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | PAD | | | 3rd Digit | | | | 2nd Digit | | | | LSD | | | | PAD | | | | SDI | | LABEL (046) | | | | | | | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| Example | | | | | | 6 | | | | 4 | | | | 9 | | | | | | | | | | 6 | | | 4 | | | 0 | |

Engine Serial Number (3LDs)

**TABLE 6-16**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | PAD | | | MSD | | | | 5th Digit | | | | 4th Digit | | | | PAD | | | | SDI | | LABEL (047) | | | | | | | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| Example | | | | | | 0 | | | | 3 | | | | 2 | | | | | | | | | | 7 | | | 4 | | | 0 | |

Engine Serial Number (3 MSDs)

**TABLE 6-17**

c-17

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | SPARE | | | | | | | MSD | | | | | | | | LSD | | | | SDI | | LABEL (377) | | | | | | | |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | 1 | | | | 0 | | | | D | | | | | | 7 | | | 7 | | | 3 | |

Equipment Identifier Word
(Example provided for 10D code)

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLE

**TABLE 6-18**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | DATE | | | | | | | | | | | | | | | | | | | SDI | | LABEL | | | | | | | |
| A | | | Day | | | | | | Month | | | | | Year | | | | | | | | | | (260 031) | | | | | | | |
| R | | | x10 | | x1 | | | | x10 | x1 | | | | x10 | | | | x1 | | | | | | Chronometer | | | | | | | |
| I | | | 2 | 1 | 8 | 4 | 2 | 1 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | | | Output Only | | | | | | | |
| T<br>Y | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| Example | | | 2 | | 3 | | | | 0 | 8 | | | | 8 | | | | 5 | | | | | | 0 | | | 6 | | | 2 | |

**TABLE 6-19**

| 32 | 31 30 | 29 | 28 27 26 25 24 23 22 21 20 19 18 17 | 16 15 14 13 | 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | D | PRIMARY COUNTER 0-4096 FLIGHT LEGS | 4096-65535 | PAD | SDI | LABEL |
| | (00) | | | LEGS | | | (251 01A) |
| | | | MSB LSB | MSB LSB | | | Electronic Supervisory Control |

Flight Leg Counter

**TABLE 6-20**

| 32 | 31 30 | 29 | 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 | 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|
| P | SSM | | ALTITUDE | SEE | SDI | LABEL |
| | (00) | | MSB LSB | BELOW | | (206 018) |
| | | | | | | Transponder |

| Bits | | | Range | Bits Used | App. Resolution |
|---|---|---|---|---|---|
| 13 | 12 | 11 | | | |
| 0 | 0 | 0 | 65536 | 15 | 4 |
| 0 | 0 | 1 | 65536 | 14 | 8 |
| 0 | 1 | 0 | 65536 | 13 | 16 |
| 0 | 1 | 1 | 51200 | 12 | 25 |
| 1 | 0 | 0 | 81920 | 14 | 10 |
| 1 | 0 | 1 | 51200 | 10 | 100 |

Altitude (Variable Reduction)

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### TCAS INTRUDER RANGE WORD

**TABLE 6-21**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM<br>[5] | | INTRUDER RANGE<br>[3] [4] | | | | | | | | | | | INTRUDER<br>SENSE LVL[2] | | | INTRUDER<br>NUMBER [1] | | | | | SDI | | LABEL<br>(130) | | | | | | | |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| | | | MSB | | | | | | | | | | LSB | MSB | | LSB | MSB | | | | LSB | | | LSB | | | | | | | MSB |
| | | | 5.25 NM | | | | | | | | | | | 2 | | | 5 | | | | | | | 0 | | | 3 | | | 1 | |

Note 1: Maximum number of intruders is 31.

Note 2: Intruder Sensitivity Level Status

| Bits | | | Meaning |
|---|---|---|---|
| 18 | 17 | 16 | |
| 0 | 0 | 0 | Not Reported |
| 0 | 0 | 1 | SL = 1 |
| 0 | 1 | 0 | SL = 2 |
| 0 | 1 | 1 | SL = 3 |
| 1 | 0 | 0 | SL = 4 |
| 1 | 0 | 1 | SL = 5 |
| 1 | 1 | 0 | SL = 6 |
| 1 | 1 | 1 | SL = 7 |

Note 3: Maximum range is 127-15/16 nautical miles.

Note 4: Intruder range may be reported in the form of horizontal range when intruder is available.

Note 5: Sign Status Matrix (SSM) [BNR]

| Bits | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Data |
| 1 | 1 | Normal Operation |

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLE

## TCAS INTRUDER ALTITUDE WORD

**TABLE 6-22**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | | RELATIVE ALTITUDE | | | | | | | I.V.S. | | FUTURE | | | | INTRUDER | | | | | SDI | | LABEL | | | | | | | |
| | [5] | [4] | | | | | | | | [3] | | [2] | SPARE | | | | NUMBER [1] | | | | | | | (131) | | | | | | | |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 |
| | | | S | MSB | | | | | LSB | | | | | | | | MSB | | | LSB | | | | LSB | | | | | | MSB | |
| | | | | 2500 FT | | | | | | | LEVEL | | | | | | 5 | | | | | | | 1 | | | 3 | | | 1 | |

Note 1: Maximum number of intruders is 31.

Note 2: Sense of Intruders VERTICAL RATE (Z SINT)

| Bits | | Meaning |
|---|---|---|
| 21 | 20 | |
| 0 | 0 | No Vertical Rate (Level Flight) |
| 0 | 1 | Climbing |
| 1 | 0 | Descending |
| 1 | 1 | No Data |

Note 3: Binary, Two’s Complement Range = ± 12700 Ft.

Note 4: The No Computed Data Report of the SSM field applies to relative altitude (Bits 29-22) only. See Note 5.

Note 5: Sign Status Matrix (SSM) [BNR]

| Bits | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Data |
| 1 | 1 | Normal Operation |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### TCAS INTRUDER BEARING WORD

**TABLE 6-23**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM [5] [4] | | | BEARING [3] | | | | | | | | | | DISPLAY MATRIX [2] | | | INTRUDER NUMBER [1] | | | | | SDI | | LABEL (132) | | | | | | | |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| | | | S | MSB | | | | | | | | LSB | | MSB | | LSB | MSB | | | LSB | | | | LSB | | | | | | MSB | |
| | | | | 0 | | | | | | | | | | NO THREAT | | | 1 | | | | | | | 2 | | | 3 | | | 1 | |

Note 1: Maximum number of intruders is 31.

Note 2: Display Matrix

| Bits | | | Meaning |
|---|---|---|---|
| 18 | 17 | 16 | |
| 0 | 0 | 0 | No Threat |
| 0 | 0 | 1 | Traffic Advisory |
| 0 | 1 | 0 | Resolution Advisory |
| 0 | 1 | 1 | Proximate Traffic |
| 1 | 0 | 0 | Not Used |
| 1 | 0 | 1 | Not Used |
| 1 | 1 | 0 | Not Used |
| 1 | 1 | 1 | Not Used |

Note 3: Binary, Fractional Binary;
Range = -180 to +180 Degrees

Note 4: The No Computed Data report in the SSM field applies to bearing information (Bits 29-19) only. See Note 5.

Note 5: Sign Status Matrix (SSM) [BNR]

| Bits | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Data |
| 1 | 1 | Normal Operation |

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLE

## TRANSPONDER ALTITUDE/TCAS OWN AIRCRAFT ALTITUDE

**TABLE 6-24**

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM [2] | | S | ALTITUDE | | | | | | | | | | | | | | | | | ALT [1] | PAD | | LABEL (203) | | | | | | | |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | | | | MSB | | | | | | | | | | | | | | | | LSB | | | | LSB | | | | | | | MSB |
| | | | | 21059 | | | | | | | | | | | | | | | | | 1 | | | 3 | | | 0 | | | 2 | |

S = Sign Bit see Section 2.1.5.2 of this Document.

Note 1: Altitude Resolution

| Bits | Meaning |
|---|---|
| 11 | |
| 0 | 1 Ft |
| 1 | 100 Ft |

Note 2: Sign Status Matrix (SSM) [BNR]

| Bits | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Data |
| 1 | 1 | Normal Operation |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### Table 6-25 BCD DATA ENCODING EXAMPLES

| Bit No. | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER (Label) | | SSM | | DATA FIELD [1] | | | | | | | | | | | | | | | | | | | SDI | | LABEL | | | | | | | |
| | | | | MSC | | | | | | | | | | | | | | | | | | LSC | | | | | | | | | | |
| | | | | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | | | 1 | 2 | 4 | 1 | 2 | 4 | 1 | 2 |
| Distance To Go (001)<br>+2750.4 NM | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Time To Go (002)<br>+145.3 Min. | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cross Track Distance (003)<br>225.6 NM | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ground Speed (012)<br>650 Knots | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Track Angle (True) (013)<br>165.5 Deg. | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Selected Vertical Speed (020)<br>-2200 Ft/Min | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected EPR (021)<br>2.05 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected N1 (021)<br>2750 RPM | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected Mach (022)<br>0.850 Mach | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected Heading (023)<br>177 Deg. | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected Course (024)<br>154 Deg. | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | P | P | P | P | P | P | P | P | | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Selected Altitude (025)<br>41000 Ft. | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Selected Airspeed (026)<br>423 Knots | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| Universal Time Constant (125)<br>1545.5 Hr. | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| Radio Height (165)<br>2450.5 Ft. | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| Decision Height Selected (170)<br>200 Ft. | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| DME Distance (201)<br>257.86 NM | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| True Airspeed (230)<br>565 Knots | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| Total Air Temp. (231)<br>-025 Deg. C [2] | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| Altitude Rate (232)<br>-15250 Ft/Min | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| Static Air Temp. (233)<br>+013 Deg. C [2] | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| Baroset (ins Hg) (235)<br>29.92 ins Hg | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | P | P | P | P | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |

NOTES:

[1] "P" denotes pad "zero" or valid data, see Section 2.1.2. Note possible use of pad bits for discrete functions per Section 2.3.1.2.

[2] Because of the actual maximum value of the most significant character of these quantities exceeds 7, it cannot be encoded in the most significant character position of the BCD word. For this reason, each quantity has been given an "artificial" MSC of zero and its actual MSC encoded in the next most significant character position of the word.

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLE

### Table 6-25-1 BCD ENCODING OF LATITUDE AND LONGITUDE

| Bit No. | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER (Label) | | SSM | | DATA FIELD | | | | | | | | | | | | | | | | | | | | | LABEL | | | | | | | |
| | | | | MSC | | | | | | | | | | | | | | | | | | | | LSC | | | | | | | | |
| | | | | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 8 | 4 | 2 | 1 | 1 | 2 | 4 | 1 | 2 | 4 | 1 | 2 |
| Present Position (Lat.)<br>N 75 Deg 59.9' (010) | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Present Position (Long)<br>W 169 Deg 25.8' (011) | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

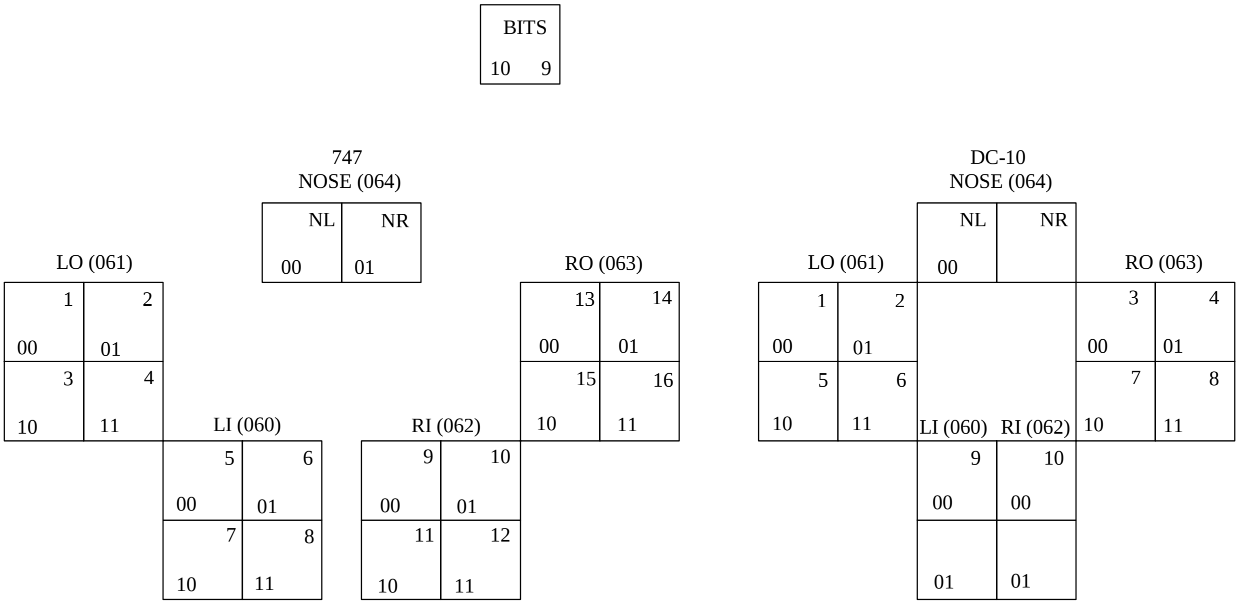
c-4

(See Commentary following Section 2.1.2 of this document for further information.)

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### TABLE 6-26

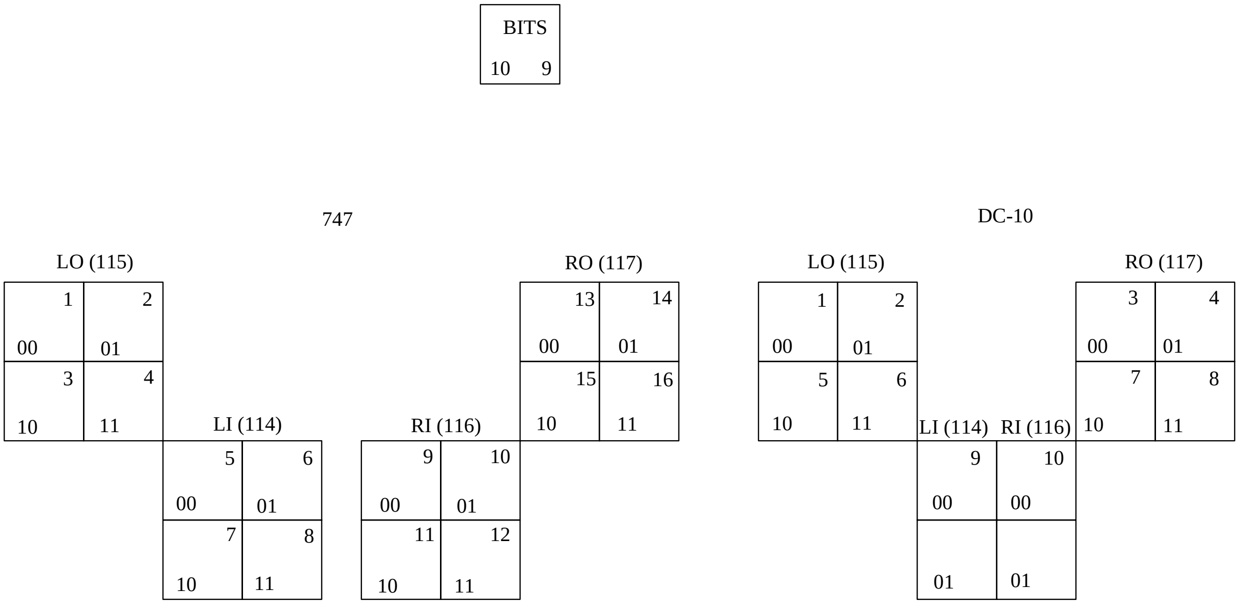
| Wheel 747 | Nos. DC-10 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Bit Nos. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PARITY | BNR | BCD | SPARES | | | MSB | | | | DATA | | | | | LSB | SPARE | SPARE | DIFF. LOW | THRESHOLD LOW | WHEEL FAULT | SYSTEM FAULT | WHEEL LABEL | | LABEL | | | | | | | | REF. ARINC OCT. |
| | | | | | | | | 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | | | | | | | | | | | | | | | | | |
| 1 | 1 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 115 |
| 2 | 2 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 115 |
| 13 | 3 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 117 |
| 14 | 4 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 117 |
| 3 | 5 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 115 |
| 4 | 6 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 115 |
| 15 | 7 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 117 |
| 16 | 8 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 117 |
| 5 | 9 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 114 |
| 9 | 10 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 116 |
| 6 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 114 |
| 7 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 114 |
| 8 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 114 |
| 10 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 116 |
| 11 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 116 |
| 12 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 116 |



# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLE

**TABLE 6-26-1**

| | | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | Bit Nos. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wheel 747 | Nos. DC-10 | PARITY | BNR | BCD | SPARES | | | DATA | | | | | | | | | | PREDICT | DIFF.TEMP. | WARM | HOT | BRAKE FAULT | SYSTEM | WHEEL LABEL | | LABEL | | | | | | | | REF. ARINC OCT. |
| | | | | | | | | MSB 512 | 256 | 128 | 64 | 32 | 16 | 8 | 4 | 2 | LSB 1 | | | | | | | | | | | | | | | | | |
| 1 | 1 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 115 |
| 2 | 2 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 115 |
| 13 | 3 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 117 |
| 14 | 4 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 117 |
| 3 | 5 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 115 |
| 4 | 6 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 115 |
| 15 | 7 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 117 |
| 16 | 8 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 117 |
| 5 | 9 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 114 |
| 9 | 10 | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 116 |
| 6 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 114 |
| 7 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 114 |
| 8 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 114 |
| 10 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 116 |
| 11 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 116 |
| 12 | | | 1 | 0 | | | | | | | | | | | | | | | | | | | | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 116 |



## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### Table 6-27 BNR DATA ENCODING EXAMPLES

| Bit No. | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER (Label) | P | SSM | | | DATA FIELD [1] | | | | | | | | | | | | | | | | | | SDI | | LABEL | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | 1 | 2 | 4 | 1 | 2 | 4 | 1 | 2 |
| Selected Course (100)<br>0 Deg. [3] | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Selected Heading (101)<br>150 Deg. [3] | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Selected Altitude (102)<br>41000 Ft. | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | P | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Selected Airspeed (103)<br>423.0 Knots | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| Selected Vertical Speed (104)<br>-2200 Ft/Min [2] | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Selected Mach (106)<br>800 m Mach | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| Desired Track (114)<br>275 Deg. [3] | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| Cross Track Distance (116)<br>51.0 NM | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| Vertical Deviation (117)<br>600 Ft. | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 |
| Flight Director Roll (140)<br>+30 Deg. | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Flight Director Pitch (141)<br>-10 Deg. [2] | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Fast/Slow (142)<br>+15 Knots | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 |
| UTC (150)<br>(18:57:20) | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| Radio Height (164)<br>2450 Ft. | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | P | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| Localizer Deviation (173)<br>+0.021 DDM | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 |
| Glide Slope Deviation (174)<br>-0.125 DDM [2] | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| DME Distance (202)<br>257.86 NM | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | P | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Altitude (29.92) (203)<br>45000 Ft. | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | P | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Mach (205)<br>0.8325 Mach | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | P | P | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Computed Airspeed (206)<br>425 Knots | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| True Airspeed (210)<br>565 Knots | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Static Air Temp (213)<br>+13 Deg. C | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| Total Air Temp (211)<br>-25 Deg. C [2] | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | P | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Altitude Rate (212)<br>-15250 Ft/Min [2] | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | P | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| Present Pos. Lat. (310)<br>N 81.5 Deg | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| Present Pos. Long. (311)<br>W 100.25 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| Ground Speed (312)<br>650 Knots | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| Flight Path Accel (323)<br>+2.50 g | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 |

NOTES:

[1] “P” denotes pad “zero” or valid data, see Section 2.1.2. Note possible use of pad bits for discrete functions per Section 2.3.1.2.

[2] Negative values are encoded as the two’s complements of positive values and the negative sign is annunciated in the sign/status matrix.

[3] Angles in the range 0 to 180° are encoded as positive numbers. Angles in the range 180° to 360° are subtracted from 360° and the resulting number encoded as a negative value per note 2. Arc minutes and seconds are encoded as decimal degrees.

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLE

### TABLE 6-28

AVM Command Word – Label 227 03D

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | Command/Control Bits | | | | | | | AVM Hex (Equipment) ID = 03D Hex | | | | | | | | | | | | PADS | | SDI | | Label (227) | | | | | | | |
| | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | | | | | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 |

| Bits | | Meaning |
|---|---|---|
| 10 | 9 | |
| 0 | 0 | Engine 4 (or All Call) {not used on 757} |
| 0 | 1 | Engine 1 (or Engine 1 and 2) |
| 1 | 0 | Engine 2 |
| 1 | 1 | Engine 3 (or Engine 3 and 4) |

| Bits | | | | | | | Parameter |
|---|---|---|---|---|---|---|---|
| 31 | 30 | 29 | 28 | 27 | 26 | 25 | |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | Not Used |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | Unit Self Test |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | Use Accelerometer A** |
| 0 | 0 | 0 | 0 | 0 | 1 | 1 | Use Accelerometer B** |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | PAD |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | Erase Fault History |
| 0 | 0 | 0 | 0 | 1 | 1 | 0 | Erase Flight History* |
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | Read Fault History |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | Read Flight History* |
| 0 | 0 | 1 | 0 | 0 | 1 | 0 | Reserved* |

*  737 Only
**  757 Only

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### ACMS INFORMATION

### ORIGIN AND DESTINATION

**TABLE 6-29**

Label 061 002

| 32 | 31 30 | 29 28 27 26 25 24 23 | 22 21 20 19 18 17 16 | 15 14 13 12 11 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|
| P | SSM | ORIGIN CHAR #3 | ORIGIN CHAR #2 | ORIGIN CHAR #1 | OCTAL LABEL 061 |

Label 062 002

| 32 | 31 30 | 29 28 27 26 25 24 23 | 22 21 20 19 18 17 16 | 15 14 13 12 11 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|
| P | SSM | DESTINATION CHAR #1 | ISO #5 CHAR “SPACE” | ORIGIN CHAR #4 | OCTAL LABEL 062 |

Label 063 002

| 32 | 31 30 | 29 28 27 26 25 24 23 | 22 21 20 19 18 17 16 | 15 14 13 12 11 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|
| P | SSM | DESTINATION CHAR #4 | DESTINATION CHAR #3 | DESTINATION CHAR #2 | OCTAL LABEL 063 |

NOTE: All characters are expressed in ISO #5 format, as defined in ARINC Specification 429.

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLE

**TABLE 6-30**

TACAN Control - Label 145 002

| | |
|---|---|
| RANGE | 126 |
| RESOLUTION | 1.0 |
| RATE | 5Hz ± 10% |

| Bit No. | Description | |
|---|---|---|
| 1 | 0 | |
| 2 | 1 | 1 |
| 3 | 1 | |
| 4 | 0 | |
| 5 | 0 | 4 |
| 6 | 1 | |
| 7 | 0 | |
| 8 | 1 | 5 |
| 9-10 | SDI | |
| 11-13 | Pad Zero | |
| 14 | VOR/TAC Select (TAC=1, VOR=0) | |
| 15 | TACAN Select (TAC 1=1, TAC 2=0) | |
| 16 | Pad Zero | |
| 17-20 | BCD Units Chan Cont (LSB=17) | |
| 21-24 | Hex Tens Chan Cont (LSB=24) | |
| 25 | Pad Zero | |
| 26 | X/Y Mode (X=1, Y=0) | |
| 27-28 | Mode Cont (see Table A) | |
| 29 | Pad Zero | |
| 30-31 | SSM (see Table B) | |
| 32 | Parity (Odd) | |

Table A – Mode Control

| Bits | | Description |
|---|---|---|
| 27 | 28 | |
| 0 | 0 | REC |
| 0 | 1 | A/A REC |
| 1 | 0 | T/R |
| 1 | 1 | A/A T/R |

Table B – SSM

| Bits | | Description |
|---|---|---|
| 30 | 31 | |
| 0 | 0 | Valid |
| 0 | 1 | Functional Test |
| 1 | 0 | No Computed Data |
| 1 | 1 | Not Used |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### ACMS INFORMATION FLIGHT NUMBER

**TABLE 6-31**

Label 233 EQ ID 002 MSB LSB MSB LSB

| 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 | 18 | 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | PAD ZERO | CHAR #2 | PAD ZERO | CHAR #1 | SDI | OCTAL LABEL 233 |

Label 234 EQ ID 002

| 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 | 18 | 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | PAD ZERO | CHAR #4 | PAD ZERO | CHAR #3 | SDI | OCTAL LABEL 234 |

Label 235 EQ ID 002

| 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 | 18 | 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | PAD ZERO | CHAR #6 | PAD ZERO | CHAR #5 | SDI | OCTAL LABEL 235 |

Label 236 EQ ID 002

| 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 | 18 | 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | PAD ZERO | CHAR #8 | PAD ZERO | CHAR #7 | SDI | OCTAL LABEL 236 |

c-16

Sign Matrix for BNR

| Bit | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed data |
| 1 | 0 | Functional Test |
| 1 | 1 | Normal Operation |

……

**TABLE 6-32**

Label 233 EQ ID 018 MSB LSB MSB LSB

| 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 | 18 | 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | PAD ZERO | CHAR #2 | PAD ZERO | CHAR #1 | SDI | OCTAL LABEL 233 |

Label 234 EQ ID 018

| 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 | 18 | 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | PAD ZERO | CHAR #4 | PAD ZERO | CHAR #3 | SDI | OCTAL LABEL 234 |

Label 235 EQ ID 018

| 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 | 18 | 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | PAD ZERO | CHAR #6 | PAD ZERO | CHAR #5 | SDI | OCTAL LABEL 235 |

Label 236 EQ ID 018

| 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 | 18 | 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P | SSM | PAD ZERO | CHAR #8 | PAD ZERO | CHAR #7 | SDI | OCTAL LABEL 236 |

Sign Matrix for BCD

| Bit | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Valid |
| 0 | 1 | No Computed data |
| 1 | 0 | Functional Test |
| 1 | 1 | Failure Warning |

NOTE: The following information is provided in order to clarify the confusion that existed in the Industry in regards to definition of the SSM for Label 233-236. It is expected that Flight ID will be sourced from FMC EQ ID of 002. Alternative implementation may include Mode “S” XPDR EQ ID 018. In this case the user cautioned that the SSM will be BCD format. See ARINC Characteristic 718A, “Mark 4 Air Traffic Control Transponder (ATCRB/MODE S)”, Attachment 3A for more detailed information.

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLE

TABLE 6-33

Label 360-002

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 0 | 1 | “STX” | | | | | | | PAD ZERO | | | | | | BINARY WORD COUNT | | | | | | | | OCTAL LABEL 360 | | | | | | | |
| | | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | | | | | | | | |

INITIAL WORD

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 0 | 0 | FLIGHT NUMBER CHAR #3 | | | | | | | FLIGHT NUMBER CHAR #2 | | | | | | | FLIGHT NUMBER CHAR #1 | | | | | | | OCTAL LABEL 360 | | | | | | | |

INTERMEDIATE WORD (SECOND)

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 0 | 0 | FLIGHT NUMBER CHAR #6 | | | | | | | FLIGHT NUMBER CHAR #5 | | | | | | | FLIGHT NUMBER CHAR #4 | | | | | | | OCTAL LABEL 360 | | | | | | | |

INTERMEDIATE WORD (THIRD)

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 0 | 0 | ORIGIN CHAR #1 | | | | | | | FLIGHT NUMBER CHAR #8 | | | | | | | FLIGHT NUMBER CHAR #7 | | | | | | | OCTAL LABEL 360 | | | | | | | |

INTERMEDIATE WORD (FOURTH)

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 0 | 0 | ORIGIN CHAR #4 | | | | | | | ORIGIN CHAR #3 | | | | | | | ORIGIN CHAR #2 | | | | | | | OCTAL LABEL 360 | | | | | | | |

INTERMEDIATE WORD (FIFTH)

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 0 | 0 | DESTINATION CHAR #3 | | | | | | | DESTINATION CHAR #2 | | | | | | | DESTINATION CHAR #1 | | | | | | | OCTAL LABEL 360 | | | | | | | |

INTERMEDIATE WORD (SIXTH)

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 0 | 0 | PAD ZEROS | | | | | | | PAD ZEROS | | | | | | | DESTINATION CHAR #4 | | | | | | | OCTAL LABEL 360 | | | | | | | |

INTERMEDIATE WORD (SEVENTH)

NOTE: All characters are expressed in ISO #5 format, as defined in Attachment 5.

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-34**

| 32 | 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 | 16 15 14 13 12 11 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|
| P | ← 0 → | SUBSYSTEM SAL<br>MSB | SUBSYSTEM ID<br>(LABEL 172) |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLE

### TABLE 6-35
FQIS System Data - Label 241 04D

| | |
|---|---|
| LABEL: | 241 |
| EQPT ID: | 04D |
| PARAMETER NAME: | FQIS System Data |
| UNITS: | (See Below) |
| RANGE (SCALE): | (See Below) |
| SIGNIFICANT DIGITS: | (See Below) |
| RESOLUTION: | (See Below) |
| MIN TRANS INTERVAL (msec): | 500 |
| MAX TRANS INTERVAL (msec): | 1024 |
| SOURCE DESTINATION IDENTIFIER: | 01 – LEFT MAIN TANK<br>10 – RIGHT MAIN TANK<br>11 – CENTER TANK |

Label 241 is transmitted approximately once per second. The data encoding depends on the sequence which it is transmitted. Label 241 transmitting sequence, as defined below, starts with the left main tank data followed by the right main tank and then the center tank. Once all the tank data has been transmitted (63 words of data), the sequence will repeat with word number 1, left main tank, and so on. To determine the data that is transmitted at any specific time requires knowing where in the following sequence the word is taken.

LABEL 241 WORD SEQUENCE

| Word | Signal | Units | Range | Sig. Dig. | Res | Data |
|---|---|---|---|---|---|---|
| 1 | LEFT MAIN TANK NO. 1 | pF | 319.922 | 12 | .078125 | BNR |
| 2 | LEFT MAIN TANK NO. 2 | pF | 319.922 | 12 | .078125 | BNR |
| 3 | LEFT MAIN TANK NO. 3 | pF | 319.922 | 12 | .078125 | BNR |
| 4 | LEFT MAIN TANK NO. 4 | pF | 319.922 | 12 | .078125 | BNR |
| 5 | LEFT MAIN TANK NO. 5 | pF | 319.922 | 12 | .078125 | BNR |
| 6 | LEFT MAIN TANK NO. 6 | pF | 319.922 | 12 | .078125 | BNR |
| 7 | LEFT MAIN TANK NO. 7 | pF | 319.922 | 12 | .078125 | BNR |
| 8 | LEFT MAIN TANK NO. 8 | pF | 319.922 | 12 | .078125 | BNR |
| 9 | LEFT MAIN TANK NO. 9 | pF | 319.922 | 12 | .078125 | BNR |
| 10 | LEFT MAIN TANK NO. 10 | pF | 319.922 | 12 | .078125 | BNR |
| 11 | LEFT MAIN TANK NO. 11 | pF | 319.922 | 12 | .078125 | BNR |
| 12 | LEFT MAIN TANK NO. 12 | pF | 319.922 | 12 | .078125 | BNR |
| 13 | LEFT MAIN TANK NO. 13 | pF | 319.922 | 12 | .078125 | BNR |
| 14 | LEFT MAIN TANK NO. 14 | pF | 319.922 | 12 | .078125 | BNR |
| 15 | LEFT MAIN BITE CAP. NO. 1 | pF | 319.922 | 12 | .078125 | BNR |
| 16 | LEFT MAIN COMPENSATOR | pF | 319.922 | 12 | .078125 | BNR |
| 17 | LOAD SELECT 10,000 | Lb | 0-90000 | 1 | 10000 | BCD |
| 18 | LOAD SELECT 1,000 | Lb | 0-9000 | 1 | 1000 | BCD |
| 19 | LOAD SELECT 100 | Lb | 0-900 | 1 | 100 | BCD |
| 20 | NO DATA TRANSMITTED DURING THIS WORD | | | | | |
| 21 | LEFT MAIN FUEL DENSITY | Lb/Gal | 8.000 | 12 | .000977 | BNR (1) |
| 22 | RIGHT MAIN TANK NO. 1 | pF | 319.922 | 12 | .078125 | BNR |
| 23 | RIGHT MAIN TANK NO. 2 | pF | 319.922 | 12 | .078125 | BNR |
| 24 | RIGHT MAIN TANK NO. 3 | pF | 319.922 | 12 | .078125 | BNR |
| 25 | RIGHT MAIN TANK NO. 4 | pF | 319.922 | 12 | .078125 | BNR |
| 26 | RIGHT MAIN TANK NO. 5 | pF | 319.922 | 12 | .078125 | BNR |
| 27 | RIGHT MAIN TANK NO. 6 | pF | 319.922 | 12 | .078125 | BNR |
| 28 | RIGHT MAIN TANK NO. 7 | pF | 319.922 | 12 | .078125 | BNR |
| 29 | RIGHT MAIN TANK NO. 8 | pF | 319.922 | 12 | .078125 | BNR |
| 30 | RIGHT MAIN TANK NO. 9 | pF | 319.922 | 12 | .078125 | BNR |
| 31 | RIGHT MAIN TANK NO. 10 | pF | 319.922 | 12 | .078125 | BNR |
| 32 | RIGHT MAIN TANK NO. 11 | pF | 319.922 | 12 | .078125 | BNR |
| 33 | RIGHT MAIN TANK NO. 12 | pF | 319.922 | 12 | .078125 | BNR |
| 34 | RIGHT MAIN TANK NO. 13 | pF | 319.922 | 12 | .078125 | BNR |
| 35 | RIGHT MAIN TANK NO. 14 | pF | 319.922 | 12 | .078125 | BNR |
| 36 | RIGHT MAIN COMPENSATOR | pF | 319.922 | 12 | .078125 | BNR |
| 37 | RIGHT MAIN BITE CAP. NO. 2 | pF | 319.922 | 12 | .078125 | BNR |
| 38 | LOAD SELECT 10,000 | Lb | 0-90000 | 1 | 10000 | BCD |
| 39 | LOAD SELECT 1,000 | Lb | 0-9000 | 1 | 1000 | BCD |
| 40 | LOAD SELECT 100 | Lb | 0-900 | 1 | 100 | BCD |
| 41 | NO DATA TRANSMITTED DURING THIS WORD | | | | | |
| 42 | RIGHT MAIN DENSITY | Lb/Gal | 8.000 | 12 | .000977 | BNR |
| 43 | CENTER TANK NO. 1 | pF | 319.922 | 12 | .078125 | BNR |
| 44 | CENTER TANK NO. 2 | pF | 319.922 | 12 | .078125 | BNR |
| 45 | CENTER TANK NO. 3 | pF | 319.922 | 12 | .078125 | BNR |
| 46 | CENTER TANK NO. 4 | pF | 319.922 | 12 | .078125 | BNR |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### TABLE 6-35 (cont'd)

LABEL 241 WORD SEQUENCE (cont'd)

| Word | Signal | Units | Range | Sig. Dig. | Res | Data |
|---|---|---|---|---|---|---|
| 47 | CENTER TANK NO. 5 | pF | 319.922 | 12 | .078125 | BNR |
| 48 | CENTER TANK NO. 6 | pF | 319.922 | 12 | .078125 | BNR |
| 49 | CENTER TANK NO. 7 | pF | 319.922 | 12 | .078125 | BNR |
| 50 | CENTER TANK NO. 8 | pF | 319.922 | 12 | .078125 | BNR |
| 51 | CENTER TANK NO. 9 | pF | 319.922 | 12 | .078125 | BNR |
| 52 | CENTER COMPENSATOR | pF | 319.922 | 12 | .078125 | BNR |
| 53 | CENTER BITE CAP. NO. 3 | pF | 319.922 | 12 | .078125 | BNR |
| 54 | NO DATA TRANSMITTED DURING THIS WORD | | | | | |
| 55 | NO DATA TRANSMITTED DURING THIS WORD | | | | | |
| 56 | NO DATA TRANSMITTED DURING THIS WORD | | | | | |
| 57 | NO DATA TRANSMITTED DURING THIS WORD | | | | | |
| 58 | NO DATA TRANSMITTED DURING THIS WORD | | | | | |
| 59 | LOAD SELECT 10,000 | Lb | 0-90000 | 1 | 10000 | BCD |
| 60 | LOAD SELECT 1,000 | Lb | 0-9000 | 1 | 1000 | BCD |
| 61 | LOAD SELECT 100 | Lb | 0-900 | 1 | 100 | BCD |
| 62 | NO DATA TRANSMITTED DURING THIS WORD | | | | | |
| 63 | CENTER TANK DENSITY | Lb/Gal | 8.000 | 12 | .000977 | BNR |

NOTES:

(1) Add 4 Lb/Gal adjustment to density data, i.e., 0000 = 4.0 Lb/Gal, FFF = 8.0 Lb/Gal.

FQIS (EQ ID 04D) SDI Encoding for Labels 012, 013, 020, 022, 023, 030, 255, 310, 320, 324, 342, 346, 354

| Bits | | Data |
|---|---|---|
| 9 | 10 | |
| 0 | 0 | Aux |
| 1 | 1 | Center |
| 1 | 0 | Left |
| 0 | 1 | Right |

FQIS (EQ ID 04D) SDI Encoding for Labels 156, 157, 160

| Bits | | Data |
|---|---|---|
| 9 | 10 | |
| 0 | 0 | #1 |
| 1 | 0 | #2 |
| 0 | 1 | #3 |
| 1 | 1 | #4 |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLE

### TABLE 6-36

S/G HARDWARE PART NO. – Label 060 025

| 32 | 31 30 | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 | 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|
| P | SSM | BCD CHARACTER *** | RESERVED | SDI | OCTAL LABEL<br>060 |

| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 10 | SDI (Indicates Sequence ID)* | Own P/N | Other P/N |
| 11 | RESERVED (Own P/N) | | |
| 12 | RESERVED (Position ID)** | | |
| 13 | RESERVED (Position ID)** | | |

| | |
|---|---|
| * | Refer to Table 1 below |
| ** | Refer to Table 2 below |
| *** | Unused Characters (Digits) are Pad Zero |

Table 1

| Bits | | Sequence ID |
|---|---|---|
| 10 | 9 | |
| 0 | 1 | First Three Digits |
| 1 | 0 | Next Four Digits |
| 1 | 1 | Last Three Digits |

Table 2

| Bits | | Position ID |
|---|---|---|
| 13 | 12 | |
| 0 | 0 | Left |
| 1 | 0 | Center As Left |
| 1 | 1 | Center As Right |
| 0 | 1 | Right |

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLES

## TABLE 6-37

S/G SOFTWARE PART NO. – Label 061 025

| 32 | 31 30 | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 | 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|
| P | SSM | BCD CHARACTER *** | RESERVED | SDI | OCTAL LABEL 061 |

| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 10 | SDI (Indicates Sequence ID)* | Own P/N | Other P/N |
| 11 | RESERVED (Own P/N) | | |
| 12 | RESERVED (Position ID)** | | |
| 13 | RESERVED (Position ID)** | | |

* Refer to Table 1 below

** Refer to Table 2 below

*** Unused Characters (Digits) are Pad Zero

Table 1

| Bits | | Sequence ID |
|---|---|---|
| 10 | 9 | |
| 0 | 1 | First Three Digits |
| 1 | 0 | Next Four Digits |
| 1 | 1 | Last Three Digits |

Table 2

| Bits | | Position ID |
|---|---|---|
| 13 | 12 | |
| 0 | 0 | Left |
| 1 | 0 | Center As Left |
| 1 | 1 | Center As Right |
| 0 | 1 | Right |

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLE

## TABLE 6-37

OP. SOFTWARE PART NO. – Label 207 025

| 32 | 31 30 | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 | 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|
| P | SSM | BCD CHARACTER *** | RESERVED | SDI | OCTAL LABEL<br>207 |

| Bit No | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 10 | SDI (Indicates Sequence ID)* | Own P/N | Other P/N |
| 11 | RESERVED (Own P/N) | | |
| 12 | RESERVED (Position ID)** | | |
| 13 | RESERVED (Position ID)** | | |

* Refer to Table 1 below
** Refer to Table 2 below
*** Unused Characters (Digits) are Pad Zero

Table 1

| Bits | | Sequence ID |
|---|---|---|
| 10 | 9 | |
| 0 | 1 | First Three Digits |
| 1 | 0 | Next Four Digits |
| 1 | 1 | Last Three Digits |

Table 2

| Bits | | Position ID |
|---|---|---|
| 13 | 12 | |
| 0 | 0 | Left |
| 1 | 0 | Center As Left |
| 1 | 1 | Center As Right |
| 0 | 1 | Right |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-38**

Tank Unit Data – Label 241 160

| Word Number | SDI | DESCRIPTION | UNITS |
|---|---|---|---|
| 1 | 1 | Tank Unit #1 | pF |
| 2 | 1 | Tank Unit #2 | pF |
| 3 | 1 | Tank Unit #3 | pF |
| 4 | 1 | Tank Unit #4 | pF |
| 5 | 1 | Tank Unit #5 | pF |
| 6 | 1 | Tank Unit #6 | pF |
| 7 | 1 | Tank Unit #7 | pF |
| 8 | 1 | Tank Unit #8 | pF |
| 9 | 1 | Tank Unit #9 | pF |
| 10 | 1 | Tank Unit #10 | pF |
| 11 | 1 | Tank Unit #11 | pF |
| 12 | 1 | Tank Unit #12 | pF |
| 13 | 1 | Tank Unit #13 | pF |
| 14 | 1 | Tank Unit #14 | pF |
| 15 | 1 | BITE Capacitor | pF |
| 16 | 1 | Compensator | pF |
| 17 | 1 | Load Select | Lbs. |
| 18 | 1 | Load Select | Lbs. |
| 19 | 1 | Load Select | Lbs. |
| 20 | 1 | Undefined | - |
| 21 | 1 | Fuel Density | Lbs/Gal |
| 22 | 2 | Tank Unit #1 | pF |
| 23 | 2 | Tank Unit #2 | pF |
| 24 | 2 | Tank Unit #3 | pF |
| 25 | 2 | Tank Unit #4 | pF |
| 26 | 2 | Tank Unit #5 | pF |
| 27 | 2 | Tank Unit #6 | pF |
| 28 | 2 | Tank Unit #7 | pF |
| 29 | 2 | Tank Unit #8 | pF |
| 30 | 2 | Tank Unit #9 | pF |
| 31 | 2 | Tank Unit #10 | pF |
| 32 | 2 | Tank Unit #11 | pF |
| 33 | 2 | Tank Unit #12 | pF |
| 34 | 2 | Tank Unit #13 | pF |
| 35 | 2 | Tank Unit #14 | pF |
| 36 | 2 | Compensator | pF |
| 37 | 2 | BITE Capacitor #2 | pF |
| 38 | 2 | Load Select | Lbs |
| 39 | 2 | Load Select | Lbs |
| 40 | 2 | Load Select | Lbs |
| 41 | 2 | Undefined | - |
| 42 | 2 | Fuel Density | Lbs/Gal |
| 43 | 3 | Tank Unit #1 | pF |
| 44 | 3 | Tank Unit #2 | pF |
| 45 | 3 | Tank Unit #3 | pF |
| 46 | 3 | Tank Unit #4 | pF |
| 47 | 3 | Tank Unit #5 | pF |
| 48 | 3 | Tank Unit #6 | pF |
| 49 | 3 | Tank Unit #7 | pF |
| 50 | 3 | Tank Unit #8 | pF |
| 51 | 3 | Tank Unit #9 | pF |
| 52 | 3 | Compensator | pF |
| 53 | 3 | BITE Capacitor #3 | pF |
| 54 | 3 | Undefined | - |
| 55 | 3 | Undefined | - |
| 56 | 3 | Undefined | - |
| 57 | 3 | Undefined | - |
| 58 | 3 | Undefined | - |
| 59 | 3 | Load Select | Lbs |
| 60 | 3 | Load select | Lbs |
| 61 | 3 | Load Select | Lbs |
| 62 | 3 | Undefined | - |
| 63 | 3 | Fuel Density | Lbs/Gal |

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLE

**TABLE 6-38-1**

Tank Unit Data – Label 241 160 (cont'd)

RAW DATA TABLE

All Data Entries are 12-bit Center Justified Words

| | |
|---|---|
| Table Organization: | Words 1-20 raw data for left tank<br>Word 1 = Tank Unit #1<br>Word 2 = Tank Unit #2<br>Word 3 = Tank Unit #3<br>Word 4 = Tank Unit #4<br>Word 5 = Tank Unit #5<br>Word 6 = Tank Unit #6<br>Word 7 = Tank Unit #7<br>Word 8 = Tank Unit #8<br>Word 9 = Tank Unit #9<br>Word 10 = Tank Unit #10<br>Word 11 = Tank Unit #11<br>Word 12 = Tank Unit #12<br>Word 13 = (Spare)<br>Word 14 = (Spare)<br>Word 15 = BITE Capacitor #1<br>Word 16 = Compensator<br>Word 17 = Load Select 10,000 Digit<br>Word 18 = Load Select 1,000 Digit<br>Word 19 = Load Select 100 Digit<br>Word 20 = None<br>Word 21-40 raw data for right tank<br>Word 21 = Tank Unit #1<br>Word 22 = Tank Unit #2<br>Word 23 = Tank Unit #3<br>Word 24 = Tank Unit #4<br>Word 25 = Tank Unit #5<br>Word 26 = Tank Unit #6<br>Word 27 = Tank Unit #7<br>Word 28 = Tank Unit #8<br>Word 29 = Tank Unit #9<br>Word 30 = Tank Unit #10<br>Word 31 = Tank Unit #11<br>Word 32 = Tank Unit #12<br>Word 33 = (Spare)<br>Word 34 = (Spare)<br>Word 35 = Compensator<br>Word 36 = BITE Capacitor #2<br>Word 37 = Load Select 10,000 Digit<br>Word 38 = Load Select 1,000 Digit<br>Word 39 = Load Select 100 Digit<br>Word 40 = None<br>Words 41-60 raw data for Center Tank<br>Word 41 = Tank Unit #1<br>Word 42 = Tank Unit #2<br>Word 43 = Tank Unit #3<br>Word 44 = Tank Unit #4<br>Word 45 = Tank Unit #5<br>Word 46 = Tank Unit #6<br>Word 47 = Tank Unit #7<br>Word 48 = Tank Unit #8<br>Word 49 = Tank Unit #9<br>Word 50 = Compensator<br>Word 51 = BITE Capacitor #3<br>Word 52 = (Spare)<br>Word 53 = (Spare)<br>Word 54 = (Spare)<br>Word 55 = (Spare)<br>Word 56 = (Spare)<br>Word 57 = Load Select 10,000 Digit<br>Word 58 = Load Select 1,000 Digit<br>Word 59 = Load Select 100 Digit<br>Word 60 = None |

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLES

c-17

**TABLE 6-39**

Note:

Bit examples for 24- bit ICAO address labels 24/216 have been moved to Part 2 of ARINC 429.

# ATTACHMENT 6
# GENERAL WORD FORMATS AND ENCODING EXAMPLES

## TABLE 6-40

RADIO SYSTEMS MANAGEMENT WORD FORMATS

| ADF<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 1000 kHz (1) | 100 kHz (0) | 10 kHz (5) | 1 kHz (7) | 0.5 kHz | SPARE | ANT | BFO | RESERVED (SDI) | LABEL ADF Frequency (032) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No.<br>Example | 32<br>1 | 31 30<br>0 0 | 29 28 27<br>0 0 1 | 26 25 24 23<br>0 0 0 0 | 22 21 20 19<br>0 1 0 1 | 18 17 16 15<br>0 1 1 1 | 14<br>1 | 13<br>0 | 12<br>0 | 11<br>0 | 10 9<br>0 0 | 8 7 6<br>0 1 0 | 5 6 4<br>1 1 0 | 2 1<br>0 0 |
| Notes | | | | | | | [1] | | [2] | [2] | | 2 | 3 | 0 |

[1] When bit no. 14 is “zero,” the radio should tune to the whole kilohertz frequency encoded in the word. When bit no. 14 is “one,”the radio should tune 0.5 kHz above this frequency.

[2]

| Bit | Zero | One |
|---|---|---|
| 11 | BFO off | BFO on |
| 12 | ADF Mode | ANT Mode |

## TABLE 6-41

c-4

| DME<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 10 MHz | 1 MHz | 0.1 MHz | 0.00/0.05 MHz | IDENT DISPLAY | MLS FREQ. | ILS FREQ. | DME Mode | SDI | LABEL DME Frequency (035) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No.<br>Example | 32<br>1 | 31 30<br>0 0 | 29 28 27<br>0 0 1 | 26 25 24 23<br>0 1 0 1 | 22 21 20 19<br>0 1 1 0 | 18<br>1 | 17 16<br>0 1 | 15<br>0 | 14<br>0 | 13 12 11<br>0 0 0 | 10 9<br>0 0 | 8 7 6<br>1 0 1 | 5 4 3<br>1 1 0 | 2 1<br>0 0 |
| Notes [1] [5] | | | | | | [2] | [7] | [3] | | [4] | | 5 | 3 | 0 |

[1] Directed Frequency #1, 115.65 MHz, VOR

[2] Bit 18 is used only for VOR & ILS frequencies and is limited to .00 or .05

[3] Bits 15 & 14 codes: VOR (0,0), ILS (0,1) or MLS (1,0), (1,1) is spare
.

[4] Refer to table in Section 4.1.2 of ARINC Characteristic 709 for mode codes
.

c-16 [5] Although not encoded in the tuning word all VOR & ILS frequencies have 1 as hundreds digit. Although not encoded in the tuning word all MLS frequencies have 5 as the thousand digit and 0 as the hundred digit. Add 5031 MHz to the coded value to obtain the MLS frequency.

c-10 [6] (Original note deleted)

c-4 [7] Bit 16 when equal to “one” specifies that a displayable BCD output is to be provided for that station, and when bit 17 is a “one,” an ident output is to be generated for that station.

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### TABLE 6-42

RADIO SYSTEMS MANAGEMENT WORD FORMATS

| HF COM Word #1 Function | PARITY (Odd) | SIGN/STATUS MATRIX | 10 MHz (2) | 1 MHz (3) | 0.1 MHz (5) | 0.01 MHz (7) | 0.001 MHz (9) | USB/LSB MODE SSM/AM MODE WORD IDENT. | LABEL HF COM Frequency (037) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 | 27 26 25 24 | 23 22 21 20 | 19 18 17 16 | 15 14 13 12 | 11 10 9 | 8 7 6 | 5 4 3 | 2 1 |
| Example | 0 | 0 0 | 1 0 | 0 0 1 1 | 0 1 0 1 | 0 1 1 1 | 1 0 0 1 | 0 0 0 | 1 1 1 | 1 1 0 | 0 0 |
| Notes | | | | | | | | [1] [2] | 7 | 3 | 0 |

[1] Bit no. 11 should be set to “zero” for LSB operation and “one” for USB operation.

[2] Bit no. 10 should be set to “zero” for AM operation and “one” for SSB operation.

### TABLE 6-42-1

c-4

| HF COM Word #2 Function | PARITY (odd) | SIGN/STATUS MATRIX | 0.1 kHz (5) | NOT USED | RESERVED WORD IDENT. | LABEL HF COM Frequency (037) | | |
|---|---|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 | 5 4 3 | 2 1 |
| Example | 0 | 0 0 | 0 1 0 1 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0 1 | 1 1 1 | 1 1 0 | 0 0 |
| | | | | | [1] | 7 | 3 | 0 |

[1] Bit No. 10 is reserved for CW mode select. The CW mode is selected when bit number 10 is a “one”. When the second word is transmitted, it should immediately follow the first HF word.

## ALTERNATE FORM

### TABLE 6-43

| HF COM Word #1 Function | PARITY (odd) | SIGN/STATUS MATRIX | 10MHz (2) | 1 MHz (3) | 0.1 MHz (5) | 0.01MHz (7) | 0.001MHz (9) | WORD IDENT. | SDI | LABEL HF COM Frequency (205) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 | 27 26 25 24 | 23 22 21 20 | 19 18 17 16 | 15 14 13 12 | 11 | 10 9 | 8 7 6 | 5 4 3 | 2 1 |
| Example | 0 | 0 0 | 1 0 | 0 0 1 1 | 0 1 0 1 | 0 1 1 1 | 1 0 0 1 | 0 | 0 1 | 1 0 1 | 0 0 0 | 0 1 |
| | | | | | | | | | | 5 | 0 | 2 |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-43-1**

| HF COM<br>Word #2<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 0.1 kHz (5) | NOT USED | WORD IDENT. | SDI | LABEL HF COM Frequency (205) | | |
|---|---|---|---|---|---|---|---|---|---|
| Bit No.<br>Example | 32<br>0 | 31 30<br>0 0 | 29 28 27 26<br>0 1 0 0 | 25 24 23 22 21 20 19 18 17 16 15 14 13 12<br>0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 11<br>1 | 10 9<br>0 0 | 8 7 6<br>1 0 1 | 5 4 3<br>0 0 0 | 2 1<br>0 1 |
| | | | | | | | 5 | 0 | 2 |

RADIO SYSTEMS MANAGEMENT WORD FORMATS

**TABLE 6-44**

c- 5

c- 3

| ILS<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 10 MHz (0) | 1 MHz (9) | 0.1 MHz (3) | 0.01 MHz (0) | SPARE | ILS CAT. | RES. (SDI) | LABEL Frequency (033) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No.<br>Example | 32<br>1 | 31 30<br>0 0 | 29 28 27<br>0 0 0 | 26 25 24 23<br>1 0 0 1 | 22 21 20 19<br>0 0 1 1 | 18 17 16 15<br>0 0 0 0 | 14 13<br>0 0 | 12 11<br>0 0 | 10 9<br>0 0 | 8 7 6<br>1 1 0 | 5 4 3<br>1 1 0 | 2 1<br>0 0 |
| | | | | | | | | | | 3 | 3 | 0 |

c- 5

| BIT POSITION | 12 | 11 |
|---|---|---|
| CATEGORY NOT | 0 | 0 |
| ILS CAT I | 0 | 1 |
| ILS CAT II | 1 | 0 |
| ILS CAT III | 1 | 1 |

**TABLE 6-44-1**

| VOR/ILS<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 10 MHz (0) | 1 MHz (9) | 0.1 MHz (3) | 0.01 MHz (0) | ILS MODE | SPARE | RES. (SDI) | LABEL VOR/ILS Frequency (034) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No.<br>Example | 32<br>1 | 31 30<br>0 0 | 29 28 27<br>0 0 0 | 26 25 24 23<br>1 0 0 1 | 22 21 20 19<br>0 0 1 1 | 18 17 16 15<br>0 0 0 0 | 14<br>0<br>[1] | 13 12 11<br>0 0 0 | 10 9<br>0 0 | 8 7 6<br>0 0 1 | 5 4 3<br>1 1 0 | 2 1<br>0 0 |
| | | | | | | | | | | 4 | 3 | 0 |

c- 2

[1] Bit number 14 should be set to “zero” for VOR frequencies and “one” for ILS frequencies by the tuning information sources.

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### TABLE 6-45

| VHF/COM<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 10 MHz (2) | 1 MHz (8) | 0.1 MHz (5) | 0.01 MHz (3) | 0.001 MHz (0) | RES (SDI) | LABEL VHF COM Frequency (030) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No.<br>Example | 32<br>1 | 31 30<br>0 0 | 29 28 27<br>0 1 0 | 26 25 24 23<br>1 0 0 0 | 22 21 20 19<br>0 1 0 1 | 18 17 16 15<br>0 0 1 1 | 14 13 12 11<br>0 0 0 0 | 10 9<br>0 0 | 8 7 6<br>0 0 0 | 5 4 3<br>1 1 0 | 2 1<br>0 0 |
| | | | | | | | | | 0 | 3 | 0 |

### TABLE 6-46

RADIO SYSTEMS MANAGEMENT WORD FORMATS

| ATC TRANSPONDER<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | Pilot Selected Mode A Reply Code | | | | Hijack Mode | Control Function | ALT. DATA SOURCE SEL. | Ident (SPI) | CONTROL FUNCTION | ALT. REP. ON/OFF | RES. (SDI) | LABEL Beacon Transponder Code (031) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0-7 (3)<br>A4 A2 A1 | 0-7 (6)<br>B4 B2 B1 | 0-7 (2)<br>C4 C2 C1 | 0-7 (0)<br>D4 D2 D1 | | | | | | | | | | |
| Bit No.<br>Example | 32<br>1 | 31 30<br>0 0 | 29 28 27<br>0 1 1 | 26 25 24<br>1 1 0 | 23 22 21<br>0 1 0 | 20 19 18<br>0 0 0 | 17<br>0 | 16 15<br>0 0 | 14<br>0 | 13<br>0 | 12<br>0 | 11<br>0 | 10 9<br>0 0 | 8 7 6<br>1 0 0 | 5 4 3<br>1 1 0 | 2 1<br>0 0 |
| Notes | | | | | | | | [2] | [1] | | [2] | [1] | | 1 | 3 | 0 |

[1]

c-17

| Bit | Zero | One |
|---|---|---|
| 11 | Altitude Report On | Altitude Reporting Off |
| 13 | Ident. (SPI) OFF | Ident. ON |
| 14 | Use #1 Alt. Data Source | Use #2 Alt. Data Source |

| Control Panel Function | | | |
|---|---|---|---|
| Function | 16 | 15 | 12 |
| DABS ON/<br>ASAS OFF | 0 | 0 | 1 |
| Reset Aural Warning Signal | 0 | 1 | 0 |

| LABEL_Beacon Transponder Code (031) New Bit Assignment | |
|---|---|
| Bit 17 | Meaning |
| 0 | Transponder IS NOT operating in the Hijack Mode |
| 1 | Transponder IS operating in the Hijack Mode |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-47**

TACAN Control – Label 146 112

| | |
|---|---|
| RANGE | 126 |
| RESOLUTION | 1.0 |
| RATE | 5Hz ±10% |

| Bit No. | Description | |
|---|---|---|
| 1 | 0 | |
| 2 | 1 | 1 |
| 3 | 1 | |
| 4 | 0 | 4 |
| 5 | 0 | |
| 6 | 1 | |
| 7 | 1 | 6 |
| 8 | 0 | |
| 9-10 | SDI | |
| 11 | Distance Memory (DIST MEM=1) | |
| 12 | Bearing Memory (BRG MEM=1) | |
| 13 | Pad Zero | |
| 14 | VOR/TAC Select (TAC=1, VOR=0) | |
| 15 | TACAN Select (TAC 1=1, TAC 2=0) | |
| 16 | Pad Zero | |
| 17-20 | BCD Units Chan Cont (LSB=17) | |
| 21-24 | Hex Tens Chan Cont (LSB=24) | |
| 25 | Pad Zero | |
| 26 | X/Y Mode (X=1, Y=0) | |
| 27-28 | Mode Cont (See Table A) | |
| 29 | Pad Zero | |
| 30-31 | SSM (See Table B) | |
| 32 | Parity (Odd) | |

RADIO SYSTEMS MANAGEMENT WORD FORMATS

Table A – Mode Control

| Bits | | Description |
|---|---|---|
| 27 | 28 | |
| 0 | 0 | REC |
| 0 | 1 | A/A REC |
| 1 | 0 | T/R |
| 1 | 1 | A/A T/R |

Table B - SSM

| Bits | | Description |
|---|---|---|
| 30 | 31 | |
| 0 | 0 | Valid |
| 0 | 1 | Functional Test |
| 1 | 0 | No Computed Data |
| 1 | 1 | Not Used |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### TABLE 6-48

TACAN Control Word – Label 147 115

| Bit No. | | Function | 1 | 0 | Note |
|---|---|---|---|---|---|
| 1 | 0 | 1 | | | |
| 2 | 1 | | | | |
| 3 | 1 | | | | |
| 4 | 0 | 4 Label Number (147) | | | |
| 5 | 0 | | | | |
| 6 | 1 | | | | |
| 7 | 1 | 7 | | | |
| 8 | 1 | | | | |
| 9 | | SEL | TACAN 1 | TACAN 2 | |
| 10 | | SEL | ANTENNA 2 | ANTENNA 1 | |
| 11 | | LOBE | ANTENNA LOBE | | |
| 12 | | AUTO/MAN TUNE | AUTOTUNE | MANUAL TUNE | |
| 13 | | A/A AGC Disable | ENABLE | DISABLE | |
| 14 | | Pad | | X | |
| 15 -16 | | TACAN/MLS Select | | | [1] |
| 17 | | (LSB) | | | |
| 18 | | BCD Channel Code Units | | | |
| 19 | | | | | |
| 20 | | (MSB) | | | |
| 21 | | (LSB) | | | |
| 22 | | HEX Channel Code Tens | | | |
| 23 | | | | | |
| 24 | | (MSB) | | | |
| 25 | | TST | TEST | NO TEST | |
| 26 | | X/Y | X | Y | |
| 27-28 | | Mode Control | | | [2] |
| 29 | | INT | NORMAL | INVERSE | |
| 30-31 | | SSM | | | [3] |
| 32 | | Parity (odds) | | | |

[1] TACAN/MLS Select

| Bits | | Description |
|---|---|---|
| 15 | 16 | |
| 0 | 0 | TACAN |
| 1 | 0 | MLS W |
| 0 | 1 | Not Used |
| 1 | 1 | MLS Z |

[2] Mode Control

| Bits | | Description |
|---|---|---|
| 27 | 28 | |
| 0 | 0 | REC |
| 1 | 0 | T/R |
| 0 | 1 | A/A REC |
| 1 | 1 | A/A T/R |

[3] SSM

| Bits | | Description |
|---|---|---|
| 30 | 31 | |
| 0 | 0 | Valid Data |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Test |
| 1 | 1 | Not Used |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### TABLE 6-49

Horizontal Alarm Limit/Horizontal Integrity Threshold (BNR) – Label 124 – IE2

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 7 6 | 5 4 3 | 2 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM [Note 1] | | | Horizontal Alarm Limit (HAL) /Horizontal Integrity Threshold [Notes 2, 3] | | | | | | | | | | | | | Pad [Note 4] | | Phase of Flight [Note 5] | | | | | Octal Label | | |
| | | | | | | | | | | | | | | | | | | | | | | | | 4 | 2 | 1 |
| | | | | | | | | | | | | | | | | | | | | | | | | 0 0 1 | 0 1 0 | 1 0 |

[1] SSM (Status Matrix):

| BITS | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data (NCD) |
| 1 | 0 | Functional Test |
| 1 | 1 | Normal Operation |

[2] Horizontal Alarm Limit (HAL) / Horizontal Integrity Threshold

The LDPU's optional internal GNSS receiver will generate a horizontal position integrity alarm when the EPU (Estimated Position Uncertainty) exceeds the Horizontal Alarm Limit for a period of time equal to the Time To Alarm for the current phase of flight. If the value of the HPL (Horizontal Protection Level, label 130) output from the internal GNSS receiver exceeds the horizontal integrity threshold specified in label 124, then horizontal integrity is deemed to be unavailable.

In the HAL field, the LSB (bit 16) has a weight of 1 meter, while the MSB (bit 28) has a weight of 4096 m.

[3] "All Ones" Value for HAL Field

If an "all ones" value is encoded into bits 28 to 18, the HAL value should be assumed to be the default value for the phase of flight specified in bits 13 to 11. If the HAL value is "all ones" (8191 meters) and the phase of flight code is "000" ("unspecified") then the SSM field should be set to NCD.

[4] Pad Bits

The pad bits, bits 15 and 14, should be set to 0.

[5] Phase of Flight

The "phase of flight" field, bits 13 to 11, informs an optional GNSS receiver within the LDPU of the current phase of flight, so that the GNSS receiver may adjust its internal parameters to meet requirements for that phase of flight.

| **BITS** | | | **Phase of Flight** | **Alarm Limit** | | **Time To Alarm** |
|---|---|---|---|---|---|---|
| 13 | 12 | 11 | | Horizontal | Vertical | |
| 0 | 0 | 0 | Not Specified | Unchanged | Unchanged | Unchanged |
| 0 | 0 | 1 | Oceanic | 4 NM (7408 m) | N/A | 8 s |
| 0 | 1 | 0 | En Route | 2 NM (3704 m) | N/A | 8 s |
| 0 | 1 | 1 | Terminal/Departure | 1 NM (1852 m) | N/A | 8 s |
| 1 | 0 | 0 | Non-Precision Approach | 0.3 NM (555.6 m) | N/A | 8 s |
| 1 | 0 | 1 | LNAV/VNAV Precision Appr. | As specified in bits 28 to 18 | As specified in Vertical Alarm Limit word, label TBD | 1 s |
| 1 | 1 | 0 | APV-II Precision Approach | | | 1 s |
| 1 | 1 | 1 | GLS Precision Approach | | | 1 s |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-50**

Vertical Alarm Limit / Vertical Integrity Threshold (BNR) – Label 127 – IE2

<table>
<tr><td>32</td><td>31</td><td>30</td><td>29</td><td>28</td><td>27</td><td>26</td><td>25</td><td>24</td><td>23</td><td>22</td><td>21</td><td>20</td><td>19</td><td>18</td><td>17</td><td>16</td><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8 7 6</td><td>5 4 3</td><td>2 1</td></tr>
<tr><td rowspan="3">P</td><td colspan="2" rowspan="3">SSM<br>Note 1</td><td rowspan="3"></td><td colspan="8" rowspan="3">Vertical Alarm Limit (VAL)<br>/Vertical Integrity Threshold<br>[Note 2]</td><td colspan="10" rowspan="3">Pad<br>[Note 3]</td><td colspan="2" rowspan="3"></td><td colspan="3">Octal Label</td></tr>
<tr><td>7</td><td>2</td><td>1</td></tr>
<tr><td>1 1 1</td><td>0 1 0</td><td>1 0</td></tr>
</table>

[1] SSM (Status Matrix):

| BITS | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Test |
| 1 | 1 | Normal Operation |

[2] Vertical Alarm Limit (VAL) / Vertical Integrity Threshold

The LDPU's optional internal GNSS receiver will generate a vertical position integrity alarm when the estimated error in vertical position exceeds the Vertical Alarm Limit for longer than the time-to-alarm for the current phase of flight. (The phase of flight is specified in label 124.) If the value of the VPL (Vertical Protection Level, label 130) output from the internal GNSS receiver exceeds the vertical alarm limit specified in bits 28-21, then vertical position integrity is defined to be "unavailable."

The LSB, bit 21, has a weight of 1 meter, while the MSB, bit 28, has a weight of 128 m.

[3] Pad Bits

The pad bits, bits 20 to 11, should be set to 0.

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-51**

CDTI Display Unit - Label 262 - 144

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | S | Display Range | | | | | | | | | | | | | | Spare | | | | SDI | | Octal Label |
| | 0 0 | | + | 20 NM | | | | | | | | | | | | | | | | | | 0 0 | | 2 6 2 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 010 011 01 |

| Bit | | Description | Notes |
|---|---|---|---|
| 1 | Label 1st digit | 1 | |
| 2 | Label 1st digit ___2 | 0 | |
| 3 | Label 2nd digit | 1 | |
| 4 | Label 2nd digit | 1 | |
| 5 | Label 2nd digit ___6 | 0 | |
| 6 | Label 3rd digit | 0 | |
| 7 | Label 3rd digit | 1 | |
| 8 | Label 3rd digit ___2 | 10 | |
| 9 | Reserved for SDI | 0 | |
| 10 | Reserved for SDI | 0 | |
| 11 | Reserved | 0 | |
| 12 | Reserved | 0 | |
| 13 | Reserved | 0 | |
| 14 | Reserved | 0 | |
| 15 | Display Range | LSB (1/32 NM) | [1] |
| 16 | Display Range | (1/16 NM) | [1] |
| 17 | Display Range | (1/8 NM) | [1] |
| 18 | Display Range | (1/4 NM) | [1] |
| 19 | Display Range | (1/2 NM) | [1] |
| 20 | Display Range | (1 NM) | [1] |
| 21 | Display Range | (2 NM) | [1] |
| 22 | Display Range | (4 NM) | [1] |
| 23 | Display Range | (8 NM) | [1] |
| 24 | Display Range | (16 NM) | [1] |
| 25 | Display Range | (32 NM) | [1] |
| 26 | Display Range | (64 NM) | [1] |
| 27 | Display Range | (128 NM) | [1] |
| 28 | Display Range | MSB (256 NM) | [1] |
| 29 | sign (always positive) 0 | | |
| 30 | SSM | | [2] |
| 31 | SSM | | [2] |
| 32 | Parity | | |

NOTES

[1] All zeroes = “Range is less than 1/32 NM,” All ones = “Range is 512 NM.”

[2] Sign/Status Matrix (SSM):

| **Bits** | | **Meaning** |
|---|---|---|
| **31** | **30** | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Test |
| 1 | 1 | Normal Operation |

## ATTACHMENT 6
## GENERAL WORD FORMATS AND ENCODING EXAMPLES

**TABLE 6-52**

Range Ring Radius – 261 144

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 7 6 | 5 4 3 | 2 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | | **Range Ring Radius** | | | | | | | | | | | | | | | **Spare** | | RR T | SDI | | Octal Label | | |
| | Valid | | | **2 NM** | | | | | | | | | | | | | | | | | | 0 0 | | 1 6 2 | | |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 100 | 011 | 01 |

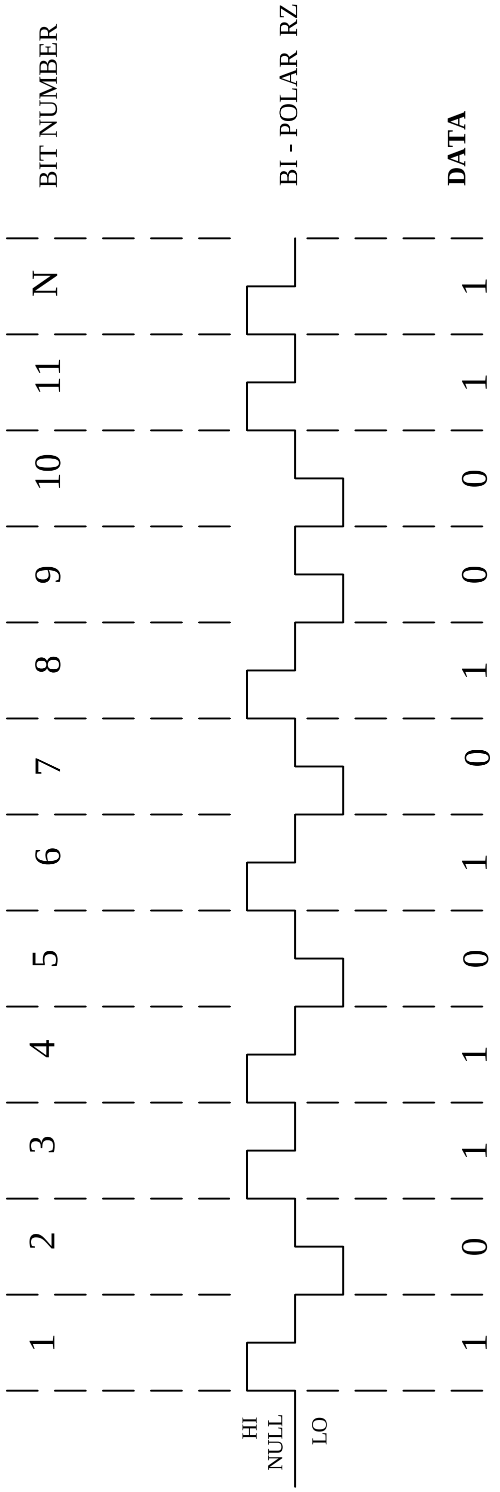
| **Bit** | | **Description** | **Notes** |
|---|---|---|---|
| 1 | Label 1st digit | 1 | |
| 2 | Label 1st digit ___2 | 0 | |
| 3 | Label 2nd digit | 1 | |
| 4 | Label 2nd digit | 1 | |
| 5 | Label 2nd digit ___6 | 0 | |
| 6 | Label 3rd digit | 0 | |
| 7 | Label 3rd digit | 0 | |
| 8 | Label 3rd digit ___1 | 1 | |
| 9 | Reserved for SDI | 0 | |
| 10 | Reserved for SDI | 0 | |
| 11 | RRT,Range Ring Type | (0 = floating, 1 = locked) | |
| 12 | Spare | 0 | |
| 13 | Spare | 0 | |
| 14 | Range ring radius | LSB (1/64 NM) | |
| 15 | Range ring radius | (1/32 NM) | |
| 16 | Range ring radius | (1/16 NM) | |
| 17 | Range ring radius | (1/8 NM) | |
| 18 | Range ring radius | (1/4 NM) | |
| 19 | Range ring radius | (1/2 NM) | |
| 20 | Range ring radius | (1 NM) | |
| 21 | Range ring radius | (2 NM) | |
| 22 | Range ring radius | (4 NM) | |
| 23 | Range ring radius | (8 NM) | |
| 24 | Range ring radius | (16 NM) | |
| 25 | Range ring radius | (32 NM) | |
| 26 | Range ring radius | (64 NM) | |
| 27 | Range ring radius | (128 NM) | |
| 28 | Range ring radius | MSB (256 NM) | |
| 29 | sign (always positive) 0 | | |
| 30 | SSM | | [1] |
| 31 | SSM | | [1] |
| 32 | Parity | | |

NOTES

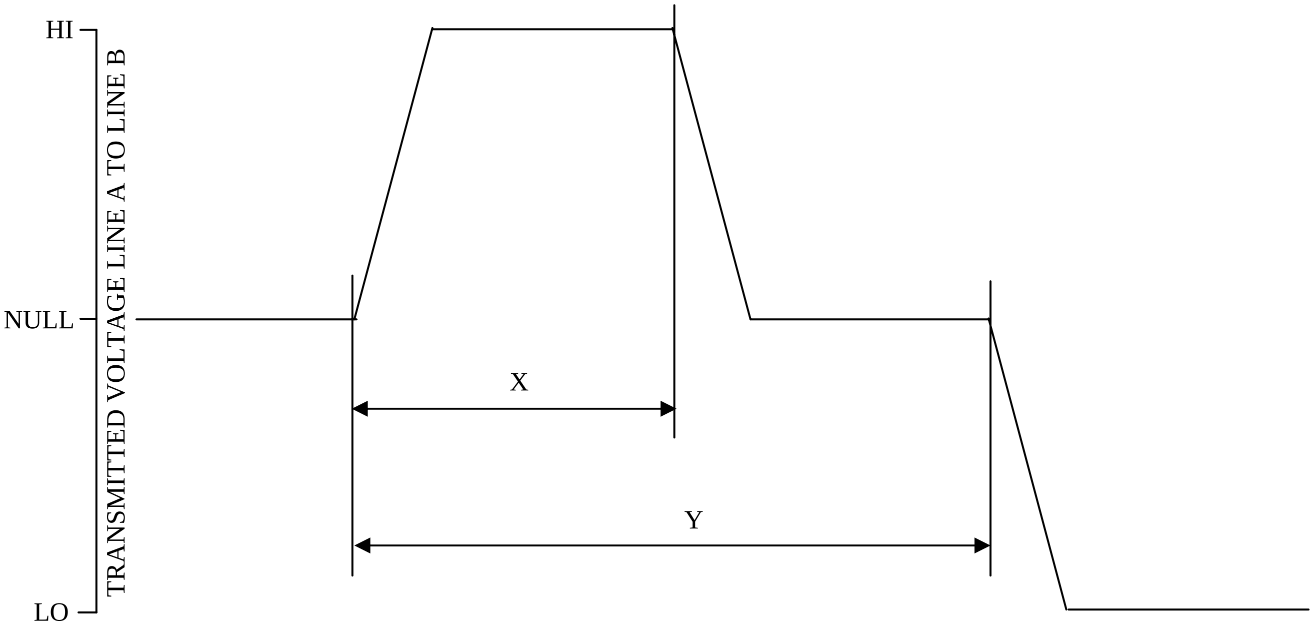
[1] Sign/Status Matrix (SSM)

| **Bits** | | **Meaning** |
|---|---|---|
| **31** | **30** | |
| 0 | 0 | Failure Warning |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Test |
| 1 | 1 | Normal Operation |

## ATTACHMENT 7
## DATA BIT ENCODING LOGIC



# ATTACHMENT 8
# OUTPUT SIGNAL TIMING TOLERANCES



| PARAMETER | HIGH SPEED OPERATION | LOW SPEED OPERATION |
|---|---|---|
| Bit Rate | 100k bps ± 1% | 12 – 14.5kbps |
| Time Y | 10 µsec ± 2.5% | Z* µsec ± 2.5% |
| Time X | 5 µsec ± 5% | Y/2 ± 5% |
| Pulse Rise Time** | 1.5 ± 0.5 µsec | 10 ± 5 µsec |
| Pulse Fall Time** | 1.5 ± 0.5 µsec | 10 ± 5 µsec |

* Z = 1 where R = bit rate selected from 12 – 14.5kbps range

** Pulse rise and fall times are measured between the 10% and 90% voltage amplitude points on the leading and trailing edges of the pulse and include permitted time skew between the transmitter output voltages A-to-ground and B-to-ground. These rise and fall times are for open circuit output measurements – Appendix 1 provides waveforms for typical test performance.

c-16

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## ATTACHMENT 9A
## GENERAL AVIATION LABELS AND DATA STANDARDS

The following labels and data standards provided by GAMA (General Aviation Manufacturers Association) are typically used by general aviation. Labels with a "G" or "P" suffix refer to GAMA standard, or GA industry PRIVATE bit structures, respectively. All others are ARINC standard words.

| LABEL (OCTAL) | EQPT. ID (HEX) | PARAMETER NAME | DATA TYPE | UNITS | RANGE | SIG BITS / DIGITS | POSITIVE SENSE | APPROX. RESOL | MIN XMIT INT (msec) | MAX XMIT INT (msec) | MAX UPDATE INT | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 0 1 | 0 2 | Distance to go | BCD | | | | Always Pos | | | | | |
| | 0 9 | Distance to go | BCD | N.M. | ±3999.9 | 5 | Always Pos | 0.1 | 100 | 200 | | |
| 0 0 2 | 0 2 | Time to go | BCD | | | | Always Pos | | | | | |
| | 0 9 | Time to go | BCD | Min. | 0-399.9 | 4 | Always Pos | 0.1 | 100 | 200 | | |
| 0 1 2 | 0 2 | Ground Speed | BCD | | | | Always Pos | | | | | |
| | 0 9 | Ground Speed | BCD | Knots | 0-2000 | 4 | Always Pos | 1.0 | 250 | 500 | | |
| 0 1 7 | 1 0 | Selected Runway Heading | BCD | Degrees | 0-359.9° | 4 | Always Pos | 0.1° | 167 | 333 | | |
| 0 2 4 G | 1 1 | Selected Course 1 | BCD | Degrees | 0-359° | 3 | Always Pos | 1.0° | 167 | 333 | | Bit 11 Non Std |
| 0 2 7 | 1 1 | Selected Course 2 | BCD | Degrees | 0-359° | 3 | Always Pos | 1.0° | 167 | 333 | | |
| 0 3 0 G | 0 2 | VHF COM Frequency | BCD | MHz | 118-135.975 | 5 | | | 0.025 | 100 | 200 | SSM Squelch |
| | 1 6 | VHF COM Frequency | BCD | MHz | 118-135.975 | 5 | | | 0.025 | 100 | 200 | SSM XMIT |
| 0 3 1 G | 0 2 | Beacon Transponder Code | BCD | Discrete | | | | | | 100 | 200 | |
| | 1 8 | Beacon Transponder Code | BCD | Discrete | | | | | | 100 | 200 | SSM Reply |
| 0 3 2 | 0 2 | ADF Frequency | BCD | KHz | 190-1750 | 5 | | 0.5 | 100 | 200 | | |
| | 1 2 | ADF Frequency | BCD | KHz | 190-1750 | 5 | | 0.5 | 100 | 200 | | |
| 0 3 3 | 0 2 | ILS Frequency | BCD | MHz | 108-111.95 | 4 | | 0.05 | 167 | 333 | | |
| | 1 0 | ILS Frequency | BCD | MHz | 108-111.95 | 4 | | 0.05 | 167 | 333 | | |
| 0 3 4 G | 0 2 | VOR/ILS Frequency | BCD | MHz | 108-117.95 | 4 | | 0.05 | 167 | 333 | | See Att. 9B |
| | 1 0 | VOR/ILS Frequency | BCD | MHz | 108-117.95 | 4 | | 0.05 | 167 | 333 | | See Att. 9B |
| | 1 1 | VOR/ILS Frequency | BCD | MHz | 108-117.95 | 4 | | 0.05 | 167 | 333 | | See Att. 9B |
| 0 3 5 G | 0 2 | DME Frequency | BCD | MHz | 108-135.95 | 4 | | 0.05 | 100 | 200 | | See Att. 9B |
| | 0 9 | DME Frequency | BCD | MHz | 108-134.95 | 4 | | 0.05 | 100 | 200 | | See Att. 9B |
| 0 4 1 | 0 2 | Set Position Latitude | BCD | Deg:Min | 180N-180S | 6 | North | 0.1 | 250 | 500 | | |
| 0 4 2 | 0 2 | Set Position Longitude | BCD | Deg:Min | 180E-180W | 6 | East | 0.1 | 250 | 500 | | |
| 0 4 3 | 0 2 | Set Magnetic Heading | BCD | Deg | 0-359° | 3 | | 1 .0° | 250 | 500 | | |
| 0 6 0 P | 0 2 | Omega Data Select | BNR | Discrete | | | | | 100 | 200 | | See Att. 9B |
| 0 6 1 P | 0 2 | Covariance Data | BNR | | | | | | 100 | 200 | | See Att. 9B |
| 0 7 4 G | 0 2 | Data Record Header | DSC | Discrete | | | | | See Note 1 | | | See Att. 9B |
| 0 7 5 G | 0 2 | Active WPT From/To Data | DSC | Discrete | | | | | See Note 1 | | | See Att. 9B |
| 1 0 0 G | 0 2 | Selected Course 1 | BNR | Deg/180 | ±180° | 12 | | 0.05° | 167 | 333 | | Bit 11 Non Std |
| 1 0 0 | 1 1 | Selected Course 1 | BNR | Deg/180 | ±180° | 12 | | 0.05° | 167 | 333 | | |
| 1 0 1 G | 0 2 | Selected Heading | BNR | Deg/180 | ±180° | 12 | | 0.05° | 31.3 | 62.5 | | Bit 11 Non Std |
| | 2 5 | Selected Heading | BNR | Deg/180 | ±180° | 12 | | 0.05° | 31.3 | 62.5 | | |
| 1 0 2 G | 0 2 | Selected Altitude | BNR | Feet | 65536 | 16 | Above S.L. | 1 | 100 | 200 | | See Att. 9B |
| 1 0 5 | 1 0 | Selected Runway Heading | BNR | Deg/180 | ±180° | 11 | | 0.1° | 167 | 333 | | |
| 1 1 0 | 1 1 | Selected Course 2 | BNR | Deg/180 | ±180° | 12 | | 0.05° | 167 | 333 | | |
| 1 1 3 G | 0 2 | Message Checksum | BNR | | | | | | See Note 2 | | | See Att. 9B |
| 1 1 4 | 0 2 | Desired Track (True) | BNR | Deg/180 | ±180° | 12 | | 0.05° | 31.3 | 62.5 | | |
| 1 1 5 | 0 2 | Waypoint Bearing (True) | BNR | Deg/180 | ±180° | 12 | A/C To WPT | 0.05° | 31.3 | 62.5 | | |
| 1 1 6 G | 0 2 | Cross Track Distance | BNR | Naut Mi | 128 | 18 | Fly Left | 0.0005 | 31.3 | 62.5 | | |
| 1 1 7 G | 0 2 | Vertical Deviation | BNR | Feet | 16384 | 14 | Fly Down | 1.0 | 31.3 | 62.5 | | See Att. 9B |
| 1 2 1 | 0 2 | HORIZ.CMD.(To Autopilot) | BNR | Deg/180 | ±180° | 14 | Fly Right | 0.01° | 50 | 100 | | |
| 1 2 2 G | 0 2 | VERT.CMD. (To Autopilot) | BNR | Deg/180 | ±180° | 12 | Fly Up | 0.05° | 50 | 100 | | |
| 1 2 3 | 0 2 | Throttle Command | BNR | Deg/sec | 2.56 | 18 | Inc. Power | 0.001° | 50 | 100 | | |
| 1 2 5 | 0 2 | Greenwich Mean Time | BCD | Hr/Min | 0-23.59.9 | 5 | | 0.1 | 100 | 200 | | |
| 1 4 7 G | 0 2 | Magnetic Variation | BNR | Deg/180 | ±180° | 12 | East | 0.05° | 500 | 1000 | | Bit 11 Non Std |
| 1 5 0 | 0 2 | Greenwich Mean Time | BNR | Hr:Min:Sec | 23:59:59 | 5:6:6 | | 1.0 sec | 50 | 100 | | See Att. 6 |
| 1 5 7 P | 0 6 | Normalized AOA | BNR | 1=Stall | ±2 | 12 | Upward | 0.0005 | 125 | 125 | 125 | |
| 1 6 2 G | 1 2 | ADF Bearing | BNR | Deg/180 | ±180° | 12 | | 0.05° | 31.3 | 62.5 | | Bit 11 Non Std |
| 1 6 3 G | 0 2 | Wind on Nose | BNR | Knots | 256 | 9 | Head Wind | 0.5 | 50 | 100 | | Bit 29 Non Std |
| 1 7 3 | 1 0 | Localizer Deviation | BNR | DDM | 0.4 | 12 | Fly Right | 0.0001 | 33.3 | 66.6 | | |
| 1 7 4 | 1 0 | Glideslope Deviation | BNR | DDM | 0.8 | 12 | Fly Down | 0.0002 | 33.3 | 66.6 | | |
| 2 0 2 | 0 2 | DME Distance | BNR | Naut Mi | 512 | 16 | Always Pos | 0.005 | 83.3 | 167 | | |
| | 0 9 | DME Distance | BNR | Naut Mi | 512 | 16 | Always Pos | 0.005 | 3.3 | 167 | | |
| 2 0 4 | 0 2 | Baro Corrected Alt.#1 | BNR | Feet | 131,072 | 17 | Above S.L. | 1.0 | 31.3 | 62.5 | | |
| 2 1 0 | 0 2 | True Airspeed | BNR | Knots | 2047.93 | 15 | Always Pos | 0.0625 | 62.5 | 125 | | |
| 2 1 3 | 0 2 | Static Air Temperature | BNR | Deg C | 512 | 11 | Above Zero | 0.25 | 250 | 500 | | |
| 2 2 2 P | 0 2 | VOR Radial | BNR | Deg/180 | ±180° | 12 | To Station | 0.044° | 50 | 100 | | See Att. 6 |
| 2 2 2 | 0 2 | VOR Omnibearing | BNR | Deg/180 | ±180° | 12 | From VOR | 0.044° | 50 | 100 | | More than one MKR beacon bit set is MKR self test. |
| | 1 0 | VOR Omnibearing | BNR | Deg/180 | ±180° | 12 | From VOR | 0.044° | 31.3 | 62.5 | | |
| | 1 1 | VOR Omnibearing | BNR | Deg/180 | ±180° | 12 | From VOR | 0.044° | 31.3 | 62.5 | | |
| 2 4 1 P | | Normalized AOA | BNR | 1-Stall | ±2 | 12 | Upward | 0.0005 | 125 | 125 | 125 | |
| 2 5 1 G | 0 2 | Distance To Go | BNR | Naut Mi | 4096 | 15 | Always Pos | 0.125 | 100 | 200 | | |
| 2 5 2 | 0 2 | Time-To-Go | BNR | Minutes | 512 | 9 | Always Pos | 1.0 | 100 | 200 | | |
| 2 6 0 G | 0 2 | Date | BCD | Discrete | | 6 | | 1 Day | 500 | 1000 | | See Att. 9B |
| 2 6 1 P | 0 2 | GPS Discrete Word 1 | DSC | Discrete | | | | | 1000 | 1000 | 1000 | |
| 2 7 5 G | 0 2 | LRN Status Word | DSC | Discrete | | | | | 200 | 400 | | See Att. 9B |
| 2 7 7 P | 0 2 | Cabin DSPY Cont DSC | DSC | Discrete | | | | | 200 | 200 | | |
| 3 0 0 G | 0 2 | STN MAG DEC, Type & Class | BNR | Discrete | | | | | See Note 2 | | | See Att. 9B |

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# ATTACHMENT 9A
# GENERAL AVIATION LABELS AND DATA STANDARDS

| LABEL (OCTAL) | EQPT. ID (HEX) | PARAMETER NAME | DATA TYPE | UNITS | RANGE | SIG BITS / DIGITS | POSITIVE SENSE | APPROX. RESOL | MIN XMIT INT (msec) | MAX XMIT INT (msec) | MAX UPDATE INT | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 0 1 G | 0 2 | Message Characters 7-9 | BNR | Discrete | | | | | See Note 2 | | | |
| 3 0 2 G | 0 2 | Message Characters 10-12 | BNR | Discrete | | | | | See Note 2 | | | |
| 3 0 3 G | 0 2 | Message Length / Type / Number | BNR | Discrete | | | | | See Note 2 | | | |
| 3 0 4 G | 0 2 | Message Characters 1-3 | BNR | Discrete | | | | | See Note 2 | | | |
| 3 0 5 G | 0 2 | Message Characters 4-6 | BNR | Discrete | | | | | See Note 2 | | | |
| 3 0 6 G | 0 2 | NAV/WPT/AP Latitude | BNR | Deg/280 | 180N-180S | 20 | North | .000172° | See Note 2 | | | |
| 3 0 7 G | 0 2 | NAV/WPT/AP Longitude | BNR | Deg/180 | 180E-180W | 20 | East | .000172° | See Note 2 | | | |
| 3 1 0 | 0 2 | Present Position Latitude | BNR | Deg/180 | 180N-180S | 20 | North | .000172° | 100 | 200 | | |
| 3 1 1 | 0 2 | Present Position Longitude | BNR | Deg/180 | 180E-180W | 20 | East | .000172° | 100 | 200 | | |
| 3 1 2 | 0 2 | Ground Speed | BNR | Knots | 4096 | 15 | Always Pos | 0.125 | 25 | 50 | | |
| 3 1 3 | 0 2 | Track Angle (True) | BNR | Deg/180 | ±180° | 12 | | 0.05 | 25 | 50 | | |
| 3 1 4 | 0 2 | True Heading | BNR | Deg/180 | ±180° | 15 | | 0.0055° | 25 | 50 | | |
| 3 1 5 | 0 2 | Wind Speed | BNR | Knots | 256 | 8 | Always Pos | 1.0 | 50 | 100 | | |
| 3 1 6 | 0 2 | Wind Angle (True) | BNR | Deg/180 | ±180° | 8 | | 0.7 | 50 | 100 | | |
| 3 2 0 | 0 2 | Magnetic Heading | BNR | Deg/180 | ±180° | 15 | | 0.0055° | 25 | 50 | | |
| 3 2 1 | 0 2 | Drift Angle | BNR | Deg/180 | ±180° | 12 | | 0.05° | 25 | 50 | | |
| 3 2 6 G | 0 2 | Lateral Scale Factor | BNR | Naut Mi | ±128 | 15 | | 0.0039 NM | 80 | 1200 | | |
| 3 2 7 G | 0 2 | Vertical Scale Factor | BNR | Feet | ±2048 | 15 | | 0.0625 Ft | 80 | 1200 | | |
| 3 5 1 G | 0 2 | Distance To Destination | BNR | Naut Mi | 32,768 | 18 | Always Pos | 0.125 | 500 | 1000 | | |
| 3 5 2 G | 0 2 | Est Time to Destinaiton | BNR | Minutes | 4096 | 12 | Always Pos | 1.0 | 500 | 1000 | | Via Flight Plan |
| 3 5 3 P | 0 2 | Dest Local Time Offset | BCD | Hour/Min | 23:59 | 5 | Always Pos | .01 Min | 1000 | 1000 | 1000 | Via Flight Plan |
| 3 7 1 G | 0 2 | Specific Equipment Ident | DSC | | | | | | 500 | 1000 | | See Att. 9B |
| | 0 9 | Specific Equipment Ident | DSC | | | | | | 500 | 1000 | | |
| | 1 0 | Specific Equipment Ident | DSC | | | | | | 500 | 1000 | | |
| | 1 1 | Specific Equipment Ident | DSC | | | | | | 500 | 1000 | | |
| | 1 2 | Specific Equipment Ident | DSC | | | | | | 500 | 1000 | | |
| | 1 6 | Specific Equipment Ident | DSC | | | | | | 500 | 1000 | | |
| | 1 8 | Specific Equipment Ident | DSC | | | | | | 500 | 1000 | | |

**NOTE 1:** These labels are transmitted once at the beginning of each flight plan/graphics map data transfer. Refer to the GAMA FMS Output Bus Standard for further information.

**NOTE 2:** These labels are used to make up the individual records that comprise a flight plan/graphics map data transfer. Not all labels are transmitted with each record. Ten records are transmitted in one second. Refer to the “FMS Waypoint/Navaid/Airport Data Transfer Protocol”, addendum 3.

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# ATTACHMENT 9B
# GENERAL AVIATION WORD EXAMPLES

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | See Chapter 3 | | | | | | | | | | | | | | | | See Below | | | SDI | | VOR/ILS Frequency<br>Label 034G | | | | | | | |

| | | |
|---|---|---|
| Bit 11 | Marker Sensitivity | “1” denotes high, “0” denotes low |
| Bit 12 | Last Tune Source | “1” denotes control head.  “0“ denotes other |
| Bit 13 | VOR Digital Filtering | “1” denotes no filter.  “0” denotes filter<br>(Normally “1” but “0” for Honeywell (Olathe) manufactured equipment) |

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | See Chapter 3 | | | | | | | | | | | | | | | | See Below | | | SDI | | DME Frequency<br>Label 035G | | | | | | | |

| Bit | 13 | 12 | 11 | DME Mode |
|---|---|---|---|---|
| | 0 | 0 | 0 | Standby |
| | 0 | 0 | 1 | Directed Freq #1 |
| | 0 | 1 | 0 | Directed Freq #2 |
| | 0 | 1 | 1 | Directed Freq #3 |
| | 1 | 0 | 0 | Hold Freq #1 |
| | 1 | 0 | 1 | Hold Freq #2 |
| | 1 | 1 | 0 | Not used |
| | 1 | 1 | 1 | Spare |

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | 0 | | | Relane | | Binary Address<br>MSB | | | | | | | | | | | | | | | | Omega Data Select<br>Label 060P | | | | | | | |

| *Specific user word | | |
|---|---|---|
| Bit 28 | Full Restart Bit | “1” denotes restart |
| Bit 27 | Rho Rho Updating | “1” inhibits update |

| Bit | 26 | 25 | Function |
|---|---|---|---|
| | 0 | 0 | No Action |
| | 0 | 1 | Relane |
| | 1 | 0 | Do Not Release |
| | 1 | 1 | Invalid Use |

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | Term<br>Indent | | - | Exponent (IEEE Flt. Pt.)<br>MSB | | | | | | | | Mantissa (IEEE Flt. Pt.) | | | | | | | | | | Coveriance Data*<br>Label 061P | | | | | | | |

| *Specific user word | | |
|---|---|---|
| Bit 27 | Sign | “1” denotes negative |

| Bit | 29 | 28 | Functions |
|---|---|---|---|
| | 0 | 0 | Term 1 |
| | 0 | 1 | Term 2 |
| | 1 | 0 | Term 3 |
| | 1 | 1 | Not Used |

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | Pad<br>(Zeros) | | | | | | | | | Pad<br>(Zeros) | | | | | Number of Records<br>MSB | | | | | | | Data Record Header<br>Lable 074G | | | | | | | |

| | | |
|---|---|---|
| Bit 21 | Prior Record Change | “1” denotes changed record |

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | 0 | From Waypoint<br>LS Byte | | | | To Waypoint<br>LS Byte | | | | From Waypoint<br>MS Byte | | | | To Waypoint<br>MS Byte | | | | See<br>Below | | | | Active Waypoint From/To Data<br>Label 075G | | | | | | | |

| | | | |
|---|---|---|---|
| Bit 9 | Auto/Leg/Man/Obs | “1” denotes Auto/Leg, “0” denotes Man/Obs | These are User Specific bits |
| Bit 10 | Mag/True Reference | “1” denotes True, “0” denotes Magnetic | |
| Bit 11 | Radar Waypoint Displayed | “1” inhibits display | |
| Bit 12 | Lat/Long/ILS Mode | “1” denotes ILS, “0“ denotes Lat/Long | |

| 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | Same as Attachment 2 | | | | | | | | | | | | | | | | | | | SDI | | Selected Altitude<br>Label 102G | | | | | | | |

| | | | |
|---|---|---|---|
| Bit 11 | Altitude Select Knob | “0” denotes “in motion” | User-specific bits |
| Bit 12 | Altitude Alert | “1” denotes “on” | |

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# ATTACHMENT 9B
# GENERAL AVIATION WORD EXAMPLES

<table>
<tr><th>32</th><th>31</th><th>30</th><th>29</th><th>28</th><th>27</th><th>26</th><th>25</th><th>24</th><th>23</th><th>22</th><th>21</th><th>20</th><th>19</th><th>18</th><th>17</th><th>16</th><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th></tr>
<tr><td>P</td><td colspan="2">SSM</td><td colspan="21">Check Sum</td><td colspan="8">Message Check Sum<br>Label 113G</td></tr>
</table>

**The message checksum is the two’s complement 21 but sum of all the other words transmitted in the group discarding the intermediate carry and replacing bit 32 with odd parity.**

<table>
<tr><th>32</th><th>31</th><th>30</th><th>29</th><th>28</th><th>27</th><th>26</th><th>25</th><th>24</th><th>23</th><th>22</th><th>21</th><th>20</th><th>19</th><th>18</th><th>17</th><th>16</th><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th></tr>
<tr><td>P</td><td colspan="2">SSM</td><td>+<br>-</td><td colspan="14">Data</td><td colspan="4">See<br>Below</td><td colspan="2">SDI</td><td colspan="8">Vertical Deviation<br>Label 117G</td></tr>
</table>

| | | | |
|---|---|---|---|
| Bit 14 | VNAV Arm Enable/Alert | “1” denotes enable | User Specific bits |
| Bit 13 | VNAV Bendover | “1” denotes “capture”, “0” denotes “track” | |
| Bit 12 | VNAV Bendover Direction | “1” denotes “fly up”, “0” denotes flydown” | |
| Bit 11 | Altitude with respect to 1000 ft. | “1” denotes “greater”, “0” denotes less | |

<table>
<tr><th>32</th><th>31</th><th>30</th><th>29</th><th>28</th><th>27</th><th>26</th><th>25</th><th>24</th><th>23</th><th>22</th><th>21</th><th>20</th><th>19</th><th>18</th><th>17</th><th>16</th><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th></tr>
<tr><td rowspan="2">P</td><td rowspan="2" colspan="2">SSM</td><td colspan="6">Day</td><td colspan="5">Month</td><td colspan="8">Year</td><td rowspan="2" colspan="2">SDI</td><td rowspan="2" colspan="8">Date<br>Label 260G</td></tr>
<tr><td colspan="2">10s</td><td colspan="4">1s</td><td>10s</td><td colspan="4">1s</td><td colspan="4">10s</td><td colspan="4">1s</td></tr>
</table>

<table>
<tr><th>32</th><th>31</th><th>30</th><th>29</th><th>28</th><th>27</th><th>26</th><th>25</th><th>24</th><th>23</th><th>22</th><th>21</th><th>20</th><th>19</th><th>18</th><th>17</th><th>16</th><th>15</th><th>14</th><th>13</th><th>12</th><th>11</th><th>10</th><th>9</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th></tr>
<tr><td>P</td><td colspan="2">SSM</td><td colspan="3">Spare</td><td></td><td></td><td></td><td colspan="7">Waypoint Number<br>(Binary)</td><td></td><td colspan="3">See<br>Below</td><td colspan="4">Words in<br>Message</td><td colspan="8">Message Length/Type/No.<br>Label 303G</td></tr>
</table>

| | | |
|---|---|---|
| Bit 16 | Date Record | “1” denotes “off route”, “0” denotes “on route” |

| | | |
|---|---|---|
| Bit 24 | FMS Plan Mode | “1” denotes “SELECT”, “0” denotes “not SELECT” |
| Bit 25 | WPT at Plan Center | “1” denotes “CENTER”, “0” denotes “not CENTER” |
| Bit 26 | Flight Plan GAP Follows | “1” denotes “GAP”, “0” denotes “no GAP” |

| Bit | 15 | 14 | 13 | WYPT/STATION TYPE |
|---|---|---|---|---|
| | 0 | 0 | 0 | Waypoint |
| | 0 | 0 | 1 | Nav Aid |
| | 0 | 1 | 0 | Airport |
| | 0 | 1 | 1 | NDB |
| | 1 | 0 | 0 | Altitude Profile Point |
| | 1 | 0 | 1 | No Symbol |
| | 1 | 1 | 0 | VOR |
| | 1 | 1 | 1 | Intersection |

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## ATTACHMENT 9B
## GENERAL AVIATION WORD EXAMPLES

| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 1 | Label<br>261G 02<br>LRN Status | x | |
| 2 | | | x |
| 3 | | x | |
| 4 | | x | |
| 5 | | | x |
| 6 | | | x |
| 7 | | | x |
| 8 | | x | |
| 9 | SDI | | |
| 10 | | | |
| 11 | Spare | | Pad Zero |
| 12 | | | |
| 13 | Reserved | | |
| 14 | | | |
| 15 | | | |
| 16 | | | |
| 17 | | | |
| 18 | | | |
| 19 | | | |
| 20 | Vert Dev (Final Appr) | Angular | Linear |
| 21 | Lat Dev Scaling in Transition | Yes | No |
| 22 | Lat Dev. (Final Appr) | Angular | Linear |
| 23 | Appr Integrity (Final Appr) | Valid | Invalid |
| 24 | GPS Integrity | Fail | Valid |
| 25<br>26<br>27 | GPS Annunciation<br>27(0) & 26(0) & 25(0) – Enroute<br>27(0) & 26(0) & 25(1) – Terminal<br>27(0) & 26(1) & 25(0) – Approach<br>(27(1) & 26(0) & 25(0) – Oceanic | | |
| 28<br>29 | Spare | | |
| 30<br>31 | SSM<br>31(0) & 30(0) – Normal Operations<br>31(0) & 30(1) – No Computed Data<br>31(1) & 30(0) – Functional Test<br>31(1) & 30(1) – Not used | | |
| 32 | Parity (odd) | | |

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## ATTACHMENT 9B
## GENERAL AVIATION WORD EXAMPLES

| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 1 | Label<br>275G 02<br>LRN Status | x | |
| 2 | | | x |
| 3 | | x | |
| 4 | | x | |
| 5 | | x | |
| 6 | | x | |
| 7 | | | x |
| 8 | | x | |
| 9<br>10 | SDI | | |
| 11 | Waypoint Alert | On | Off |
| 12 | Dead Reckon | DR | Not DR |
| 13 | Direct To | Select | Not Select |
| 14<br>15 | Mode<br>15(0) & 14(0) – Multiple Sensor Based<br>15(0) & 14(1) – VOR/DME Offset (RNAV) Approach<br>15(1) & 14(0) – VOR/TACAN (non-Offset) Approach/Enroute<br>15(1) & 14(1) – ILS Approach | | |
| 16 | Vert & Lat Dev Scaling | Approach | Enroute |
| 17 | FMS Controlled Hdg Sub-mode | FMS/FGS | FGS Only |
| 18 | Remote FGS Army for Nav Capt | Arm | No Change |
| 19 | FMS Plan Mode | Select | Not Select |
| 20 | Display Final Appr Course | Display | No Change |
| 21 | Angular Scaling | Active | Not Active |
| 22 | Integrity Warn | Warn | Not Warn |
| 23 | To | To | Not To |
| 24 | From | From | Not From |
| 25 | Parallel XTK Offset | Selected | Not Selected |
| 26 | Airport Display Selected | Select | Not Selected |
| 27 | Message Alert | On | Off |
| 28 | True/Mag | True | Magnetic |
| 29 | HSI Valid (NAV Warn) | Valid | Warn |
| 30<br>31 | SSM | | |
| 32 | Parity (odd) | | |

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## ATTACHMENT 9B
## GENERAL AVIATION WORD EXAMPLES

| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 1 | Label<br>277G 02<br>LRN Status | x | |
| 2 | | | x |
| 3 | | x | |
| 4 | | x | |
| 5 | | x | |
| 6 | | x | |
| 7 | | x | |
| 8 | | x | |
| 9 | SDI (if required) | | |
| 10 | | | |
| 11 | Play Briefing #1 | | |
| 12 | Play Briefing #2 | | |
| 13 | Play Briefing #3 | | |
| 14 | Play Briefing #4 | | |
| 15 | Play Briefing #5 | | |
| 16 | Play Briefing #6 | | |
| 17 | Cancel Briefing #1 | | |
| 18 | Cancel Briefing #2 | | |
| 19 | Cancel Briefing #3 | | |
| 20 | Cancel Briefing #4 | | |
| 21 | Cancel Briefing #5 | | |
| 22 | Cancel Briefing #6 | | |
| 23 | Annunciate Cabin Message (Note) | | |
| 24 | Spares | | Pad Zero |
| 25 | | | |
| 26 | | | |
| 27 | | | |
| 28 | | | |
| 29 | Alternate Format | ALTERNATE | STD |
| 30 | SSM | | |
| 31 | 31(0) & 30(0) – Normal Operation<br>31(0) & 30(1) – No Computed Data<br>31(1) & 30(0) – Functional Test<br>31(1) & 30(1) – Failure Warning | | |
| 32 | Parity (Odd) | | |

NOTE: The **ALTERNATE FORMAT** bit (#29) causes the briefing play (BITS 11 – 16) and briefing cancel (BITS 17 – 22) controls to be interpreted as the briefing number from 1 to 63 with the briefing #1 bit as the least significant. If BIT 29 is set to 1, this decoding will be used. If the briefing number is non zero, the indicated briefing will be played or canceled.

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# ATTACHMENT 9B
# GENERAL AVIATION WORD EXAMPLES

| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 1 | Label<br>300 02<br>Station Declination | x | |
| 2 | | x | |
| 3 | | | x |
| 4 | | | x |
| 5 | | | x |
| 6 | | | x |
| 7 | | | x |
| 8 | | | x |
| 9 | Spares | | Pad Zero |
| 10 | | | |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | DME | Not Collated | Same Location |
| 16 | Tuned and Received | Being Received | Not Received |
| 17 | Station Declination<br>Binary number with sign bit 24 East is positive. West is 2's complement of the positive value. Range is 127 deg. E/W. Resolution is 1 degree at bit 17. | | |
| 18 | | | |
| 19 | | | |
| 20 | | | |
| 21 | | | |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | VOR at location | Yes | No |
| 26 | DME at location | Yes | No |
| 27 | TACAN at location | Yes | No |
| 28 | Class Bit 29/28/0 low 0/1 high 1/0 terminal | | |
| 29 | | | |
| 30 | SSM | | |
| 31 | | | |
| 32 | Parity | | |

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# ATTACHMENT 9B
# GENERAL AVIATION WORD EXAMPLES

| 32 | 31 30 | 29 28 27 26 25 | 24 23 22 21 20 19 | 18 17 16 15 | 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|---|---|---|
| P |  | Company Private Use | Company I. D. (Binary) | EQ Code MSD (Hex) | EQ Code MSD (Hex) | SDI | GA Equipment Ident LABEL 371 |

| **LABEL 371 Company I. D. Field Binary Bit Assignments** | | | | | | **COMPANY** |
|---|---|---|---|---|---|---|
| 24 | 23 | 22 | 21 | 20 | 19 |  |
| 0 | 0 | 0 | 0 | 0 | 1 | B&D INSTRUMENTS |
| 0 | 0 | 0 | 0 | 1 | 0 | BEECH AIRCRAFT |
| 0 | 0 | 0 | 0 | 1 | 1 | BENDIX AVIONICS |
| 0 | 0 | 0 | 1 | 0 | 0 | CANADIAN MARCONI |
| 0 | 0 | 0 | 1 | 0 | 1 | CESSNA AIRCRAFT |
| 0 | 0 | 0 | 1 | 1 | 0 | COLLINS AVIONICS |
| 0 | 0 | 0 | 1 | 1 | 1 | DELCO ELECTRONICS |
| 0 | 0 | 1 | 0 | 0 | 0 | FOSTER RNAV |
| 0 | 0 | 1 | 0 | 0 | 1 | GABLE CONTROLS |
| 0 | 0 | 1 | 0 | 1 | 0 | GLOBAL SYSTEMS |
| 0 | 0 | 1 | 0 | 1 | 1 | GULFSTREAM AEROSPACE |
| 0 | 0 | 1 | 1 | 0 | 0 | HONEYWELL |
| 0 | 0 | 1 | 1 | 0 | 1 | KING RADIO |
| 0 | 0 | 1 | 1 | 1 | 0 | LEARJET |
| 0 | 0 | 1 | 1 | 1 | 1 | LITTON AERO PRODUCTS |
| 0 | 1 | 0 | 0 | 0 | 0 | OFFSHORE NAVIGATION |
| 0 | 1 | 0 | 0 | 0 | 1 | RACAL AVIONICS |
| 0 | 1 | 0 | 0 | 1 | 0 | SPERRY |
| 0 | 1 | 0 | 0 | 1 | 1 | UNIVERSAL NAVIGATION SYS |
| 0 | 1 | 0 | 1 | 0 | 0 | 3M AVIATION SAFETY SYSTEMS |
| 0 | 1 | 0 | 1 | 0 | 1 | ALLIEDSIGNAL GENERAL AVIATION AVIONICS |
| 0 | 1 | 0 | 1 | 1 | 0 | ALLIEDSIGNAL GLOBAL WULFSBERG |
| 0 | 1 | 0 | 1 | 1 | 1 | BF GOODRICH AVIONICS |
| 0 | 1 | 1 | 0 | 0 | 0 | GARMIN |
| 0 | 1 | 1 | 0 | 0 | 1 | ARNAV |
| 0 | 1 | 1 | 0 | 1 | 0 | COMPUTER INSTRUMENT CORPORATION |
| 0 | 1 | 1 | 0 | 1 | 1 | SPARE |
| 1 | 1 | 1 | 1 | 1 | 1 | SPARE |

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## ATTACHMENT 9C
## GENERAL AVIATION EQUIPMENT IDENTIFIERS

| Equipment HEX ID | EQUIPMENT |
|---|---|
| 01 | Flight Control Computer |
| 02 | Flight Management Computer |
| 04 | Inertial Reference System |
| 05 | Attitude and Heading Ref. System |
| 06 | Air Data System |
| 09 | Airborne DME |
| 0B | Global Positioning System |
| 10 | Airborne ILS Receiver |
| 11 | Airborne VOR Receiver |
| 12 | Airborne ADF System |
| 16 | Airborne VHF Comm Receiver |
| 18 | ATC Transponder |
| 25 | Electronic Flight Instruments |
| 27 | Microwave Landing System |
| 36 | Radio Management System |
| 5A | Loran |
| 5B | Omega |
| A9 | Airborne DME Controller |
| B0 | Airborne ILS Controller |
| B2 | Airborne ADF Controller |
| B6 | VHF Comm Controller |
| B8 | ATC Transponder Controller |
| C7 | Microwave Landing System Controller |
| FA | Loran Controller |
| FB | Omega Controller |

# ATTACHMENT 10
# MANUFACTURER SPECIFIC STATUS WORD

| 32 | 31 30 29 28 27 26 25 24 23 22 21 19 18 17 | 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|
| P | Company Private Use [A] | Company I.D. (Binary) | SDI [B] | Label (171) |

| BIT | 16 15 14 13 12 11 | Company |
|---|---|---|
| | 0 0 0 0 0 1 | B&D INSTRUMENTS |
| | 0 0 0 0 1 0 | BEECH AIRCRAFT |
| | 0 0 0 0 1 1 | BENDIX AVIONICS |
| | 0 0 0 1 0 0 | CANADIAN MARCONI |
| | 0 0 0 1 0 1 | CESSNA AIRCRAFT |
| | 0 0 0 1 1 0 | COLLINS AVIONICS |
| | 0 0 0 1 1 1 | DELCO ELECTRONICS |
| | 0 0 1 0 0 0 | FOSTER RNAV |
| | 0 0 1 0 0 1 | GABLES CONTROLS |
| | 0 0 1 0 1 0 | GLOBAL SYSTEMS |
| | 0 0 1 0 1 1 | GULFSTREAM AEROSPACE |
| | 0 0 1 1 0 0 | HONEYWELL |
| | 0 0 1 1 0 1 | KING RADIO |
| | 0 0 1 1 1 0 | LEAR JET |
| | 0 0 1 1 1 1 | LITTON AERO PRODUCTS |
| | 0 1 0 0 0 0 | OFFSHORE NAVIGATION |
| | 0 1 0 0 0 1 | RACAL AVIONICS |
| | 0 1 0 0 1 0 | SPERRY |
| | 0 1 0 0 1 1 | UNIVERSAL NAVIGATION SYSTEMS |
| | 0 1 0 1 0 0 | 3M AVIATION SAFETY SYSTEMS |
| | 0 1 0 1 0 1 | ALLIED SIGNAL GENERAL AVIATION AVIONICS |
| | 0 1 0 1 1 0 | ALLIED SIGNAL GLOBAL WULFSBAG |
| | 0 1 0 1 1 1 | BF GOODRICH AVIONICS |
| | 0 1 1 0 0 0 | GARMIN |
| | 0 1 1 0 0 1 | ARNAV |
| | 0 1 1 0 1 0 | COMPUTER INSTRUMENT CORPORATION |
| | 0 1 1 0 1 1 | RYAN |
| | 0 1 1 1 0 0 | SPARE |
| | 1 1 1 1 1 1 | SPARE |

c-17

[A] This word is used for manufacturer-specific information exchange (e.g., sub-LRU-Level BITE status). The Company I.D. fields should be used to differentiate each manufacturer’s unique use of the Company Private Use field.

[B] Per Section 2.1.4

## ATTACHMENT 11
## SYSTEM ADDRESS LABELS

| | SYSTEMS | SYSTEM ADDRESS LABEL (OCTAL) |
|---|---|---|
| | 777 CABIN INTERPHONE SYSTEM | 152 |
| c-17 | CVR #2 | 156 |
| c-16 | CVR | 157 |
| | 747 DFHR AND A330/340 SSFDR | 163 |
| c-15 | DFDAU (MANDATORY LOAD FUNCTION) | 170 |
| | SDU #2 | 173 |
| | RFU | 174 |
| c-17 | HGA/IGA HPA | 175 |
| c-17 | LGA HPA | 177 |
| | GPS/GNSS SENSOR | 201 |
| c-16 | FCMC Com A340-500/600 | 210 |
| | FCMC Mon A340-500/600 | 211 |
| | FCMC Int A340-500/600 | 212 |
| | MCDU 1 | 220 |
| | MCDU 2 | 221 |
| | MCDU 3 | 222 |
| | PRINTER 1 | 223 |
| | PRINTER 2 | 224 |
| c-16 | HUD | 225 |
| | HIGH SPEED DL (ARINC 615) | 226 |
| | MCDU 4 | 230 |
| c-14 | EIVMU 1 | 234 |
| | EIVMU 2 | 235 |
| | EIVMU 3 | 236 |
| | EIVMU 4 | 237 |
| c-16 | APM-MMR | 241 |
| | MMR | 242 |
| | ILS | 244 |
| | MLS | 245 |
| | AHRS | 246 |
| c-17 | HIGH-SPEED DATA (HSDU #1) | 247 |
| | HIGH-SPEED DATA (HSDU #2) | 250 |
| | VDR #1 | 251 |
| | VDR #2 | 252 |
| | VDR #3 | 253 |
| c-17 | NETWORK SERVER SYSTEM | 254 |
| | ELECTRONIC FLIGHT BAG LEFT | 255 |
| | ELECTRONIC FLIGHT BAG RIGHT | 256 |
| c-15 | CABIN VIDEO SYSTEM (AIRSHOW) | 266 |
| c-14 | LOW SPEED DL (ARINC 603) | 300 |
| | FMC 1 | 300 |
| | FMC 2 | 301 |
| | DFDAU (AIDS) | 302 |
| | CFDIU | 303 |
| | ACARS MU/CMU (724B, 748) | 304 |
| | WBS | 305 |
| | TCAS | 306 |
| | SDU #1 | 307 |

## ATTACHMENT 11
## SYSTEM ADDRESS LABELS

| SYSTEMS | SYSTEM ADDRESS LABEL (OCTAL) | |
|---|---|---|
| GPWS | 310 | c-16 |
| GNLU 1 | 311 | |
| GNLU 2 | 312 | |
| GNLU 3 | 313 | |
| GNU 1 | 314 | |
| GNU 2 | 315 | |
| GNU 3 | 316 | |
| AUTOTHROTTLE COMPUTER | 321 | |
| FCC 1 | 322 | |
| FCC 2 | 323 | |
| FCC 3 | 324 | |
| APU | 325 | |
| APU CONTROLLER | 326 | |
| MODE CONTROL PANEL (MCP) | 327 | |
| FMC 3 | 330 | |
| ATC TRANSPONDER | 331 | |
| DADC | 332 | |
| CABIN TELECOMMUNICATIONS UNIT (CTU) | 334 | c-15 |
| HF DATA RADIO/DATA UNIT #1 | 340 | |
| HF DATA RADIO/DATA UNIT #2 | 344 | |
| REMOTE DATA CONCENTRATOR | 345 | c-17 |
| ACESS | 360 | c-14 |
| EFIS | 361 | |
| PASSENGER SERVICES SYSTEM (PSS) 767300,400 | 362 | c-16 |
| CABIN SERVICE SYSTEM (CSS) 747-400 | 363 | |
| AUDIO ENTERTAINMENT SYSTEM (AES)BOEING | 364 | |
| ENGINE INDICATION UNIT | 365 | c-14 |
| MULTICAST | 366 | c-16 |
| BRIDGE | 367 | |
| CABIN TERMINAL 3 | 372 | c-14 |
| CABIN TERMINAL 4 | 373 | |
| CABIN TERMINAL 1 | 374 | |
| CABIN TERMINAL 2 | 375 | |
| OMEGA NAV. SYSTEMS | 376 | |

# APPENDIX A
# LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

## A1-1.0 Introduction

Selection of the electrical characteristics of the Mark 33 DITS followed verification of the suitability of proposed values in laboratory tests performed by the Boeing Commercial Airplane Co. Boeing presented two reports to AEEC's Systems Architecture and Interfaces Subcommittee on these activities, one at the meeting held in Arlington, Virginia, in March 1977 and the other at the meeting held in Los Angeles, California, in May 1977. The material in this Appendix is excerpted from these reports.

## A1-2.0 Electromagnetic Emission and Susceptibility Tests

Electromagnetic emission and susceptibility tests were conducted to determine if the proposed 100 kbps waveform was suitable for use in a commercial airplane EMI environment. The EMI conditions used for the tests were derived from RTCA Document DO-160, "Environmental Conditions and Test Procedures for Airborne Electronic/Electrical Equipment and Instruments" dated February 28th, 1975.

## A1-2.1 Cable and Test Configuration

The cable used for the tests was standard aircraft type twisted shielded wire of 22 AWG. The wire configuration consisted of approximately 60 ft. of cable which was subjected to the EMI environment within a screened room. This cable was connected in series with 300 ft. of cable not subjected to the EMI environment. The test was configured to simulate the maximum length wire run with DO-160 conditions applied.

The 60 Ft. length of cable was connected to the transmitter for the emission tests and to the receiver for the susceptibility tests.

## A1-2.2 Transmitter Characteristics

The block schematic of the bipolar line driving transmitter built for the tests is shown in Figure a-(i). The waveform was shaped at the pulse generator such that it exhibited the following characteristics:

Differential Output Voltage:

| | |
|---|---|
| HI | +10V |
| NULL | 0V |
| LO | -10V |

Risetime = Falltime = l.0 μ sec
Bit Rate= 100 kilobits/second
HI time= NULL time= LO time

## A1-2.3 Receiver Input Circuit Description

To perform the susceptibility tests, receivers were constructed utilizing various methods of common mode rejection and various processing schemes.

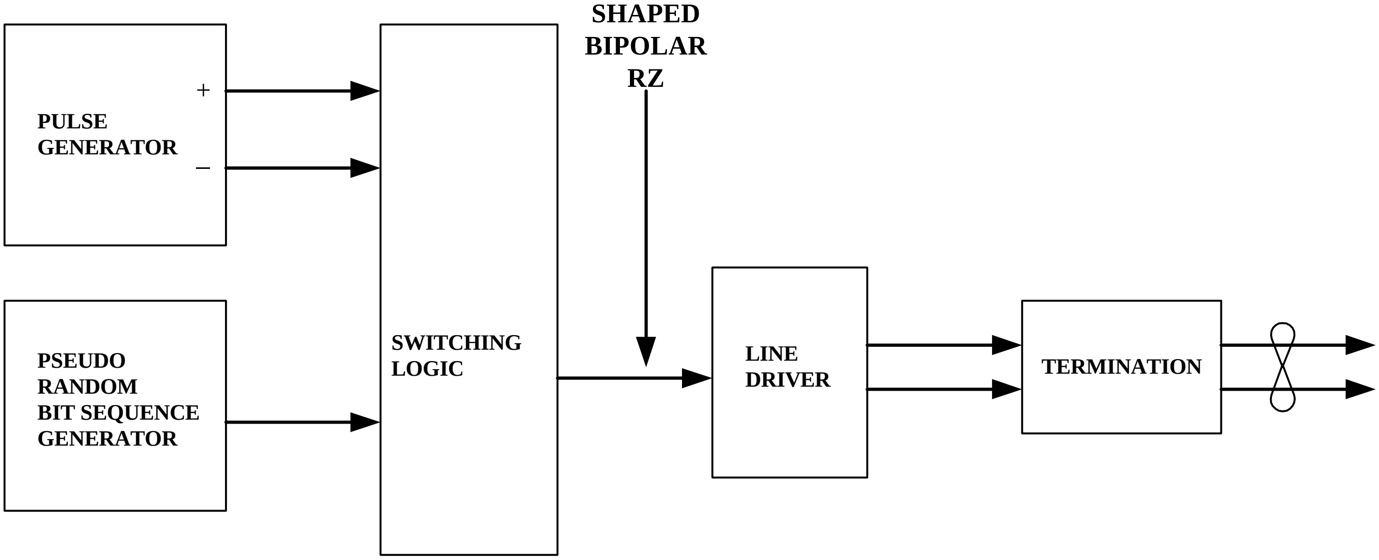
Differential Amplifier Input. Figure a-(ii) shows schematics of the differential input stages used for the receivers. The differential amplifier input stage required resistors to local ground at the input to provide a path for the input current for the voltage followers. Voltage protection was used to prevent damage to the voltage followers in the event of high voltage, common mode spikes. The voltage follower stages provided a controlled impedance for the differential amplifier stage.

Opto-Isolator Input The opto-isolator input stage utilized two H-P 5082-4371 isolators connected in opposite polarity to detect the bipolar data. The HP 5082-4371 input has a forward conduction "knee" at approximately 1.4 volts. A second simple LED (HP 5082-4650) was connected in series with each opto-isolator to provide a combined knee voltage of approximately 3 volts. A series resistor RL of 1000 ohms was placed in series with the LED/opto-isolator network to limit the receiver current to 7mA at 10 volts (differential) applied at the input. At 4.5V differential on the line, one opto-isolator conducts 1.5 mA.

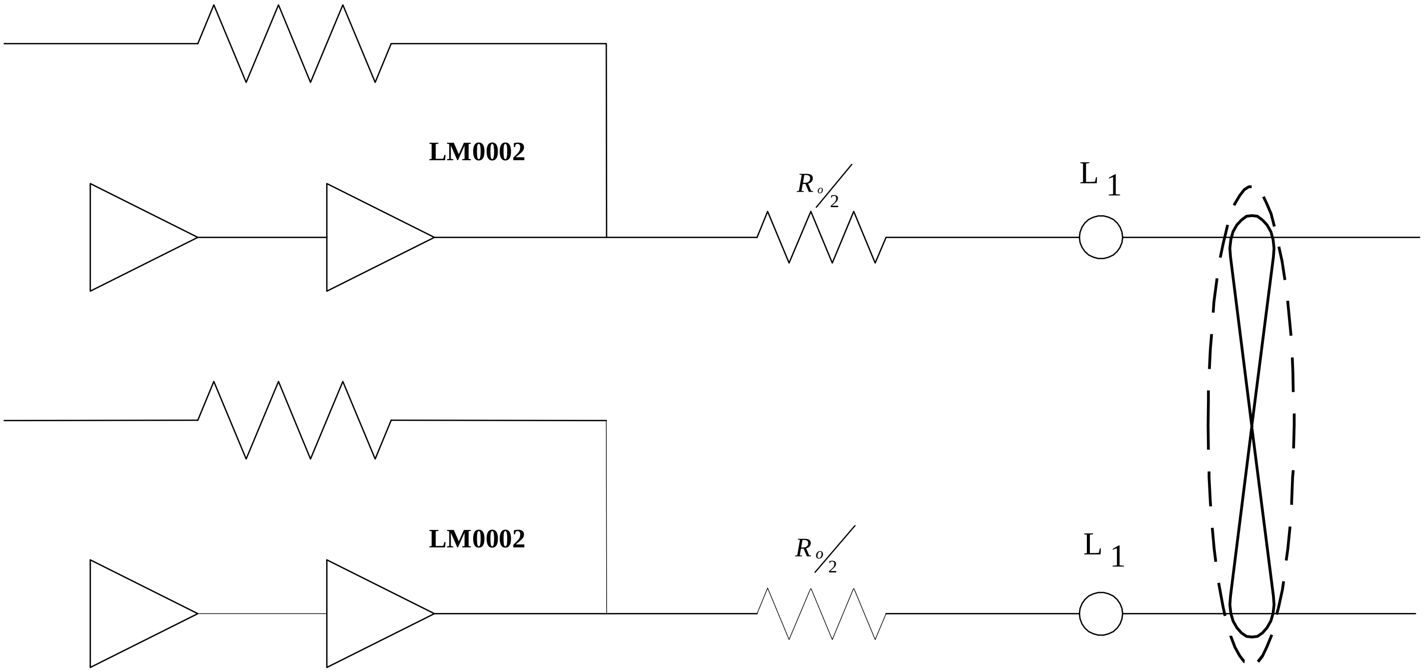
One circuit configuration which enables the opto-isolator to operate at 100 kilobits per second at these low input currents is shown in figure a-(iii). A potential of +15 volts is applied to pin 8 to provide maximum gain in the first transistor. During conduction, a charge on the second transistor is discharged via pin 7 and R2 to a potential of +0.5 volts set by R1 and R3. Discharging to a +0.5 volt potential reduces the possibility of a loss of the first bit following a long null period. This problem has been observed when discharging pin 7 to ground potential.

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(i)
### BIPOLAR TRANSMITTER BLOCK SCHEMATIC

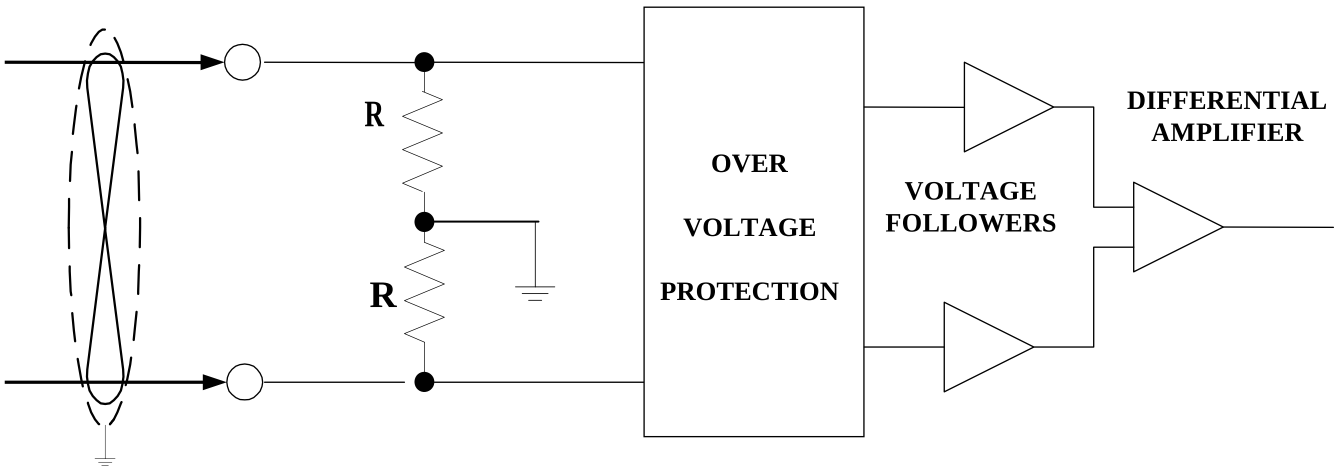


DETAIL OF LINE DRIVER AND TERMINATION



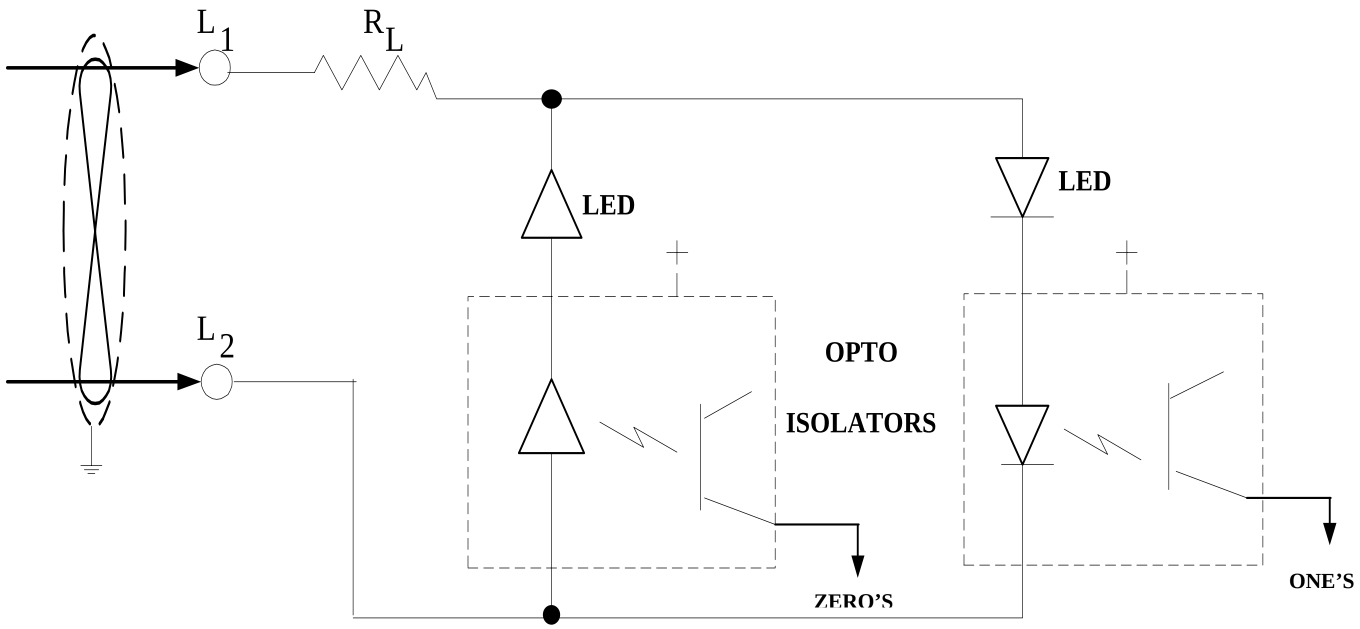
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(ii)
### RZ BIPOLAR RECEIVER INPUT TYPES TESTED



R > 12 K Ohms (Provides Path for V. F. Input Current)

Figure (a) Differential amplifier input schematic.



$R_L$ = CURRENT LIMITING = 1000 OHMS
LED = LED IN SERIES WITH OPTO ISOLATOR TO PROVIDE ON NULL LEVEL
OPTO-ISOL = HP 5082-4371

Figure (b) OPTO-ISOLATED INPUT SCHEMATIC

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### A1-2.4 Receiver Data Detection Technique

Two data detection schemes were used, (i) data sampling (sample and decision) and (ii) integrate and dump (Figure a-(iv).

The data sampling system detects positive-going or negative-going edges which exceed ±3 volts differential voltage. The edges cause a timing circuit to time for approximately 2 µsec. When the timing circuit has timed out, a sample of the input is taken. If the sample is HI, a ONE is declared. If the sample is LO, a ZERO is declared. If the sample is NULL, and error diagnostic can be output, since a NULL state is known to be invalid at the data sampling time. An error diagnostic will be output if, for example, during a period of NULL on the line, a short-duration noise spike causes the input to exceed the ±3V threshold, so initiating the edge detector timing circuit, but dissipates rapidly so that a NULL is estimated at the data sampling time.

The integrate-and-dump processor circuit detects positive or negative-going edges which exceed the ±3V differential threshold. The edge detection causes an integration circuit to integrate the input voltage for a period of 5 µsec. The output of the integrator is sampled (timing is derived from the edge detector) at the end of the integration period. If it is above zero voltage, a ONE is declared; if it is below zero voltage, a ZERO is declared.

A threshold level could be introduced about zero voltage to provide an indication of the total energy contained in the pulse. If the integrator output fell within the threshold, an error diagnostic could be presented indicating the at the detection of the bit was marginal.

### A1-2.5 Test Data Message

The test waveform was a continuous pseudo-random bit pattern. This continuous pattern did not test the initial synchronization or “false-alarm” aspects in a word-by-word transmission environment with NULL on the transmission line between words.

### A1-2.6 Emission of RF Energy Test Results

The following tests were performed under conditions of light (one receiver) and heavy (20 receivers) line loading.

A. Conducted RF Interference (RTCA DO-160 Paragraph 21.2)
The interference measured was within the limits specified in DO 160 Figure 21-2.

B. Radiated RF Interference (RTCA DO-160 Paragraph 21.3)
The interference measured was within the limits specified in DO-160 Figure 21-5.

It should be noted that the 20dB limit exceedance permitted in DO 160 was not taken. The transmitter output spectrum can be further improved by the addition of filtering to attenuate output frequencies above those of interest in the digital data.

### A1-2.7 Susceptibility Test Results

The tests were performed to determine the susceptibility of the Mark 33 DITS to RF, AF and spike interference levels specified in DO-160 under conditions of light (one receiver) and heavy (20 receivers) line loading.

The following receiver configurations were tested:

(i) Differential Amplifier input, time sample processing
(ii) Differential Amplifier input, integrate-and-dump processing
(iii) Opto-isolator input, time sample processing
(iv) Opto-isolator input, integrate-and-dump processing

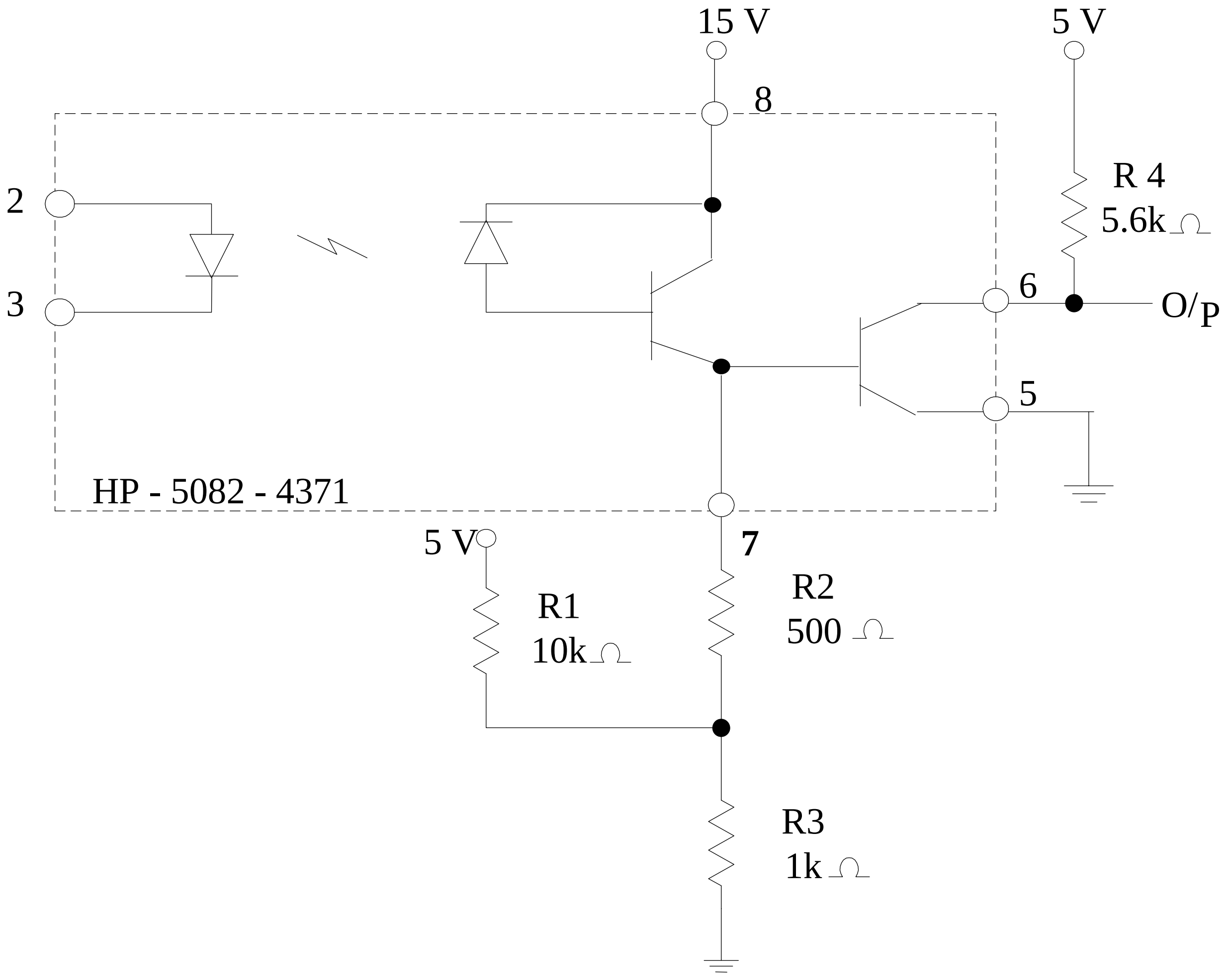
The data transmitted consisted of a continuous pseudo-random bit sequence. Error checking was made on a bit-by-bit basis.

A. Conducted RF Susceptibility (DO-160 Paragraph 20.20B Category Z)
No bit errors were detected with RF applied to any of the line loading and receiver configurations.

B. Magnetic Fields Induced Into Interconnecting Cables (DO-160 Paragraph 19.3)
Test performed at a level above those specified in DO-160 Figure 19-1. No bit errors were detected with the field applied to the cable for any cable loading or receiver configuration.

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

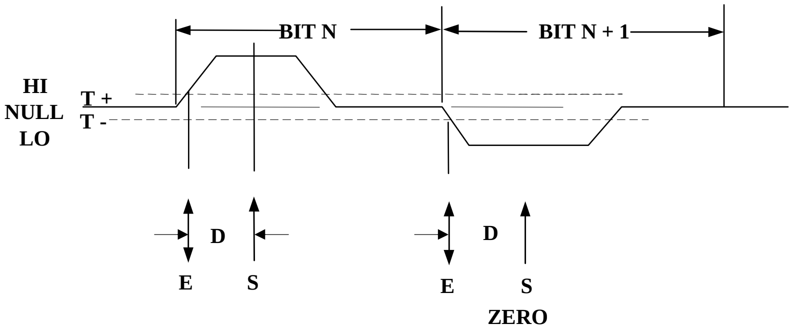
### FIGURE a-(iii)
### OPTO-ISOLATOR FRONT-END CIRCUIT SCHEMATIC



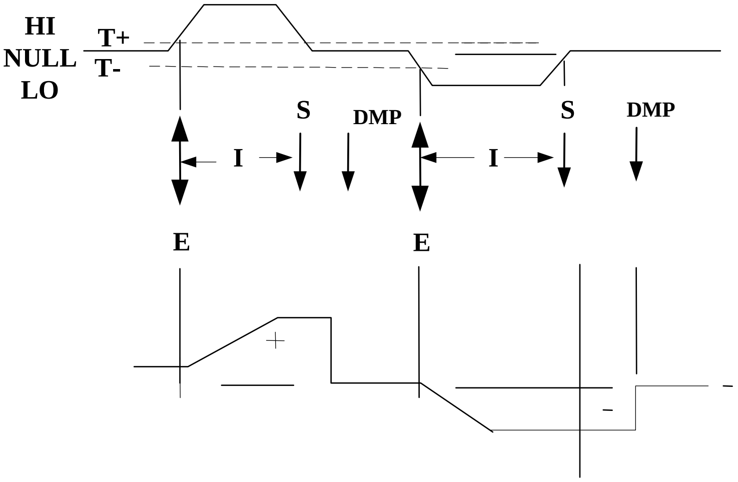
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(iv)
### DATA DETECTION

(a) SAMPLE - AND - DECISION



( b ) INTEGRATE - AND - DUMP



LEGEND:

E = EDGE DETECT (BIT TIMING)

D = DELAY

S = SAMPLE

I = INTEGRATION INTERVAL

DMP = DUMP INTEGRATOR CHARGE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

C. Electric Fields Induced Into Interconnecting Cables (DO-160 Paragraph 19.4)
The tests were perform with voltage levels above those specified in DO 160 Figure 19-1 Category Z. No bit errors were detected with the field applied for any cable loading or receiver configuration.

D. Spikes Induced Into Interconnecting Cables (DO-160 Paragraph 19.5, Category Z)
The spikes were generated and applied to the cable as shown in DO-160, Figure 19-4. Bit errors were counted during the application of 50 transients and also following the transient test. The following results were observed:

| Receiver Configuration | Line | Loading |
|---|---|---|
| | Light | Heavy |
| Diff. Amp., Sample Det | 0 | 0 |
| Diff. Amp., Int. & Dump Det | 0 | 0 |
| Opto-Isolator, Sample Det | 8 | 15 |
| Opto-Isolator, Int & Dump Det | 0 | 1 |

All configurations performed with zero bit errors for approximately $10^7$ bits following the transient test.

### A1-3.0 Pulse Distortion Tests For Typical Aircraft wire Installations

Laboratory testing and computer simulation studies were conducted to investigate the pulse distortion introduced on typical aircraft wire installations.

### A1-3.1 Laboratory Tests

Receivers and a transmitter were constructed to operate using the DITS high speed (100 KBPS) waveform. Lengths of twisted shielded cable were connected to form a representative wiring configuration for digital data. The wire length and stub configuration were selected to represent postulated installations on a B747 airplane. The cable used for lab tests was 20 and 22 AWG twisted shielded cable with wrapped KAPTON insulation, no. BMS B-51, Class 2 type III. The pulse distortion at the receiver nodes of the wiring systems were recorded. The characteristics of the 20 AWG cable were measured and used to develop the cable model used in the computer simulation.

### A1-3.2 Computer Simulation

A computer program was developed to evaluate pulse distortion on lines with stubs. The DITS transmitter impedance and voltage waveform was modeled. The cable model was developed from the measured cable characteristics. The DITS receiver input impedance was modeled.

The computer simulation was run and results were plotted for various line length and stub configurations representing postulated installations on a B747 airplane.

### A1-3.3 Results

The results of the laboratory tests and computer simulation for the same cable configuration showed good agreement, with a maximum difference of 0.4 volts on rising and falling edges. The computer simulation showed slightly higher cable loss effect than the lab test. The lab test results were recorded using an oscilloscope camera; the computer results were plotted. Only the plotted results are presented here.

Figure a-(v) shows the schematic for the first simulation. This configuration represents a transmitter, a receiver and a single length of twisted shielded cable 200 feet long. The cable is modeled as Blocks 1 to 4, for later stub connection.

At the transmitter and receive ends of the cable, the shields are grounded via a 0.05 µH inductor (which models the inductance of the ground lead). At other nodes, the shields and cable inners are carded through, representing a continuous length of cable.

Figure a-(vi) Transmitter open circuit differential output voltage. This waveform was used for all the simulation runs.

Figure a-(vii) The transmitter output voltage and receiver input voltage for the configuration in Figure a-(v).

Figure a-(viii) shows the schematic for the second simulation. This configuration represents a transmitter at an engine location, with receivers at the equipment bay and the flight deck. Four receiver loading configurations are shown with maximum loading of twenty receivers. The waveforms for this simulation run are shown in Figures a-(ix) through a-(xvi).

Figures a-(ix) and a-(x)  Transmitter and receiver waveform for loading configuration 1.

Figures a-(xi) to a-(xvi)  Waveforms for loading configurations 2, 3 and 4.

Figure a-(xvii)  shows the schematic for the third simulation. This configuration represents a transmitter at the flight deck with receivers at the equipment bay, the inner engine and the outer engine.

Figures a-(xviii) to a-(xxi)  Waveforms for the third simulation.

Figure a-(xxii)  shows the schematic for the fourth simulation. This configuration represents a transmitter at the equipment bay with receivers at the equipment bay, the flight engineer’s panel, the first officer’s panel and the captain’s panel.

Figures a-(xxiii) to a-(xxvi)  Waveforms for the fourth simulation.

Figure a-(xxvii)  shows the schematic for the fifth simulation. This is a long line simulation and is included to show the operation of the system with lines longer than would realistically be used in a “B747-sized” airplane. This configuration represents a transmitter with one receiver close (10 feet) and one receiver remote (500 feet).

Figures a-(xxviii) and a-(xxix)  Waveforms for the “long line” configuration.

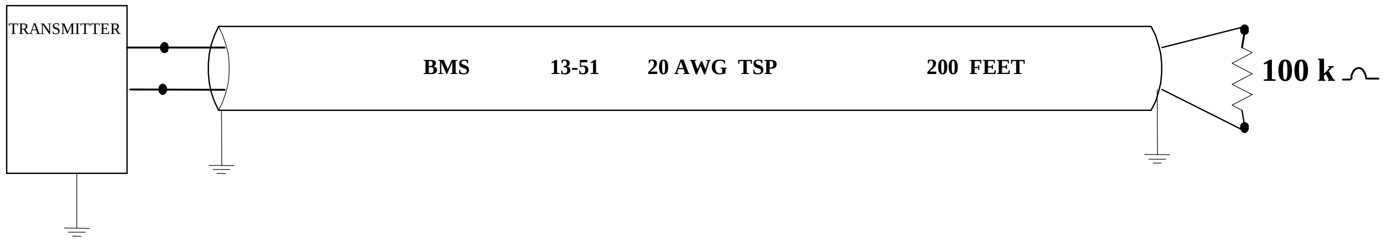
### A1-3.4  Conclusions

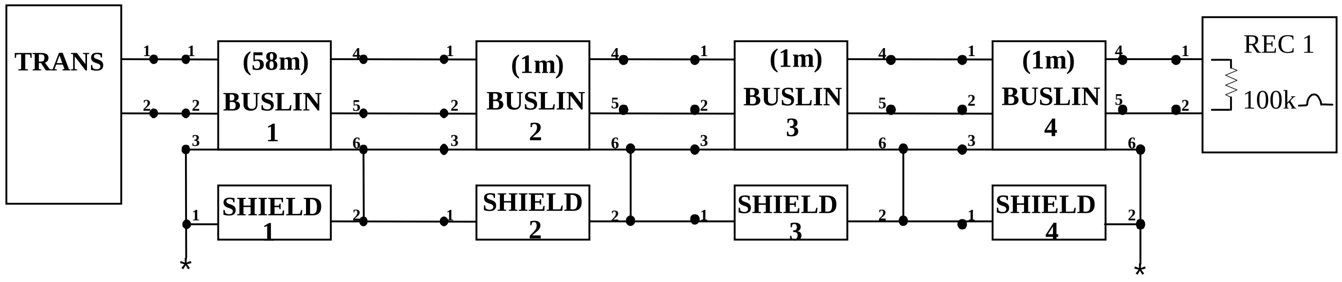
From laboratory tests and simulations, it is concluded that no intolerable bit distortion is introduced into the “high speed DITS” waveform due to cable lengths and stub configurations likely to be encountered on a “B747-size” transport aircraft.

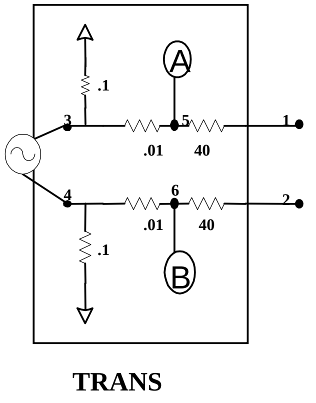
If installations are anticipated involving longer line lengths or cables with radically different electrical characteristics, then further investigation may be required.

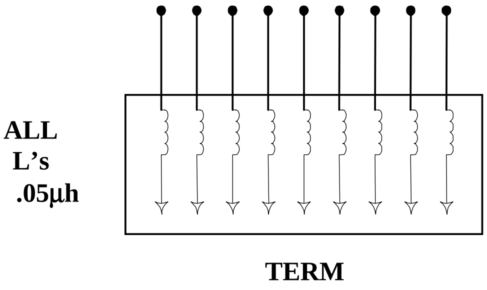
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(v)





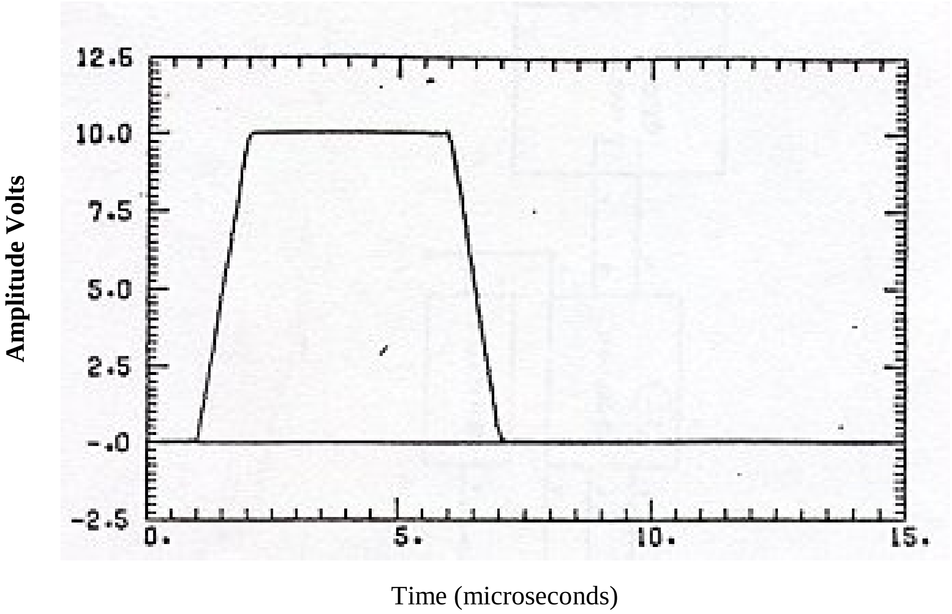




* SHIELD TIED TO INDUCTOR
ON TERM

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

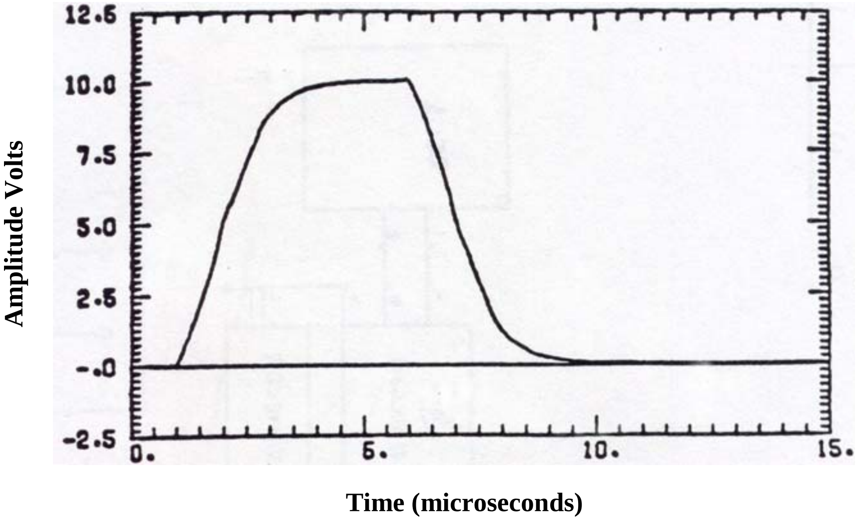
### FIGURE a-(vi)



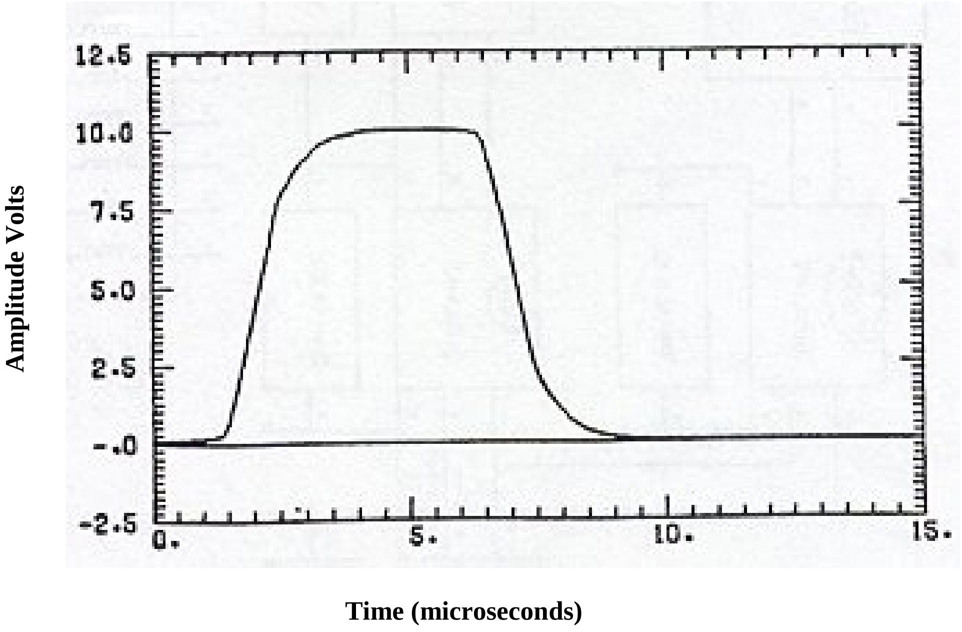
TRANSMITTER LEAD A TO LEAD B VOLTAGE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(vii)



TRANSMITTER OUTPUT VOLTAGE

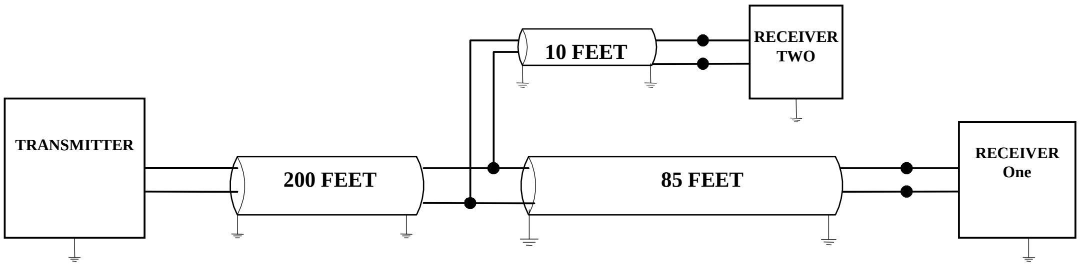


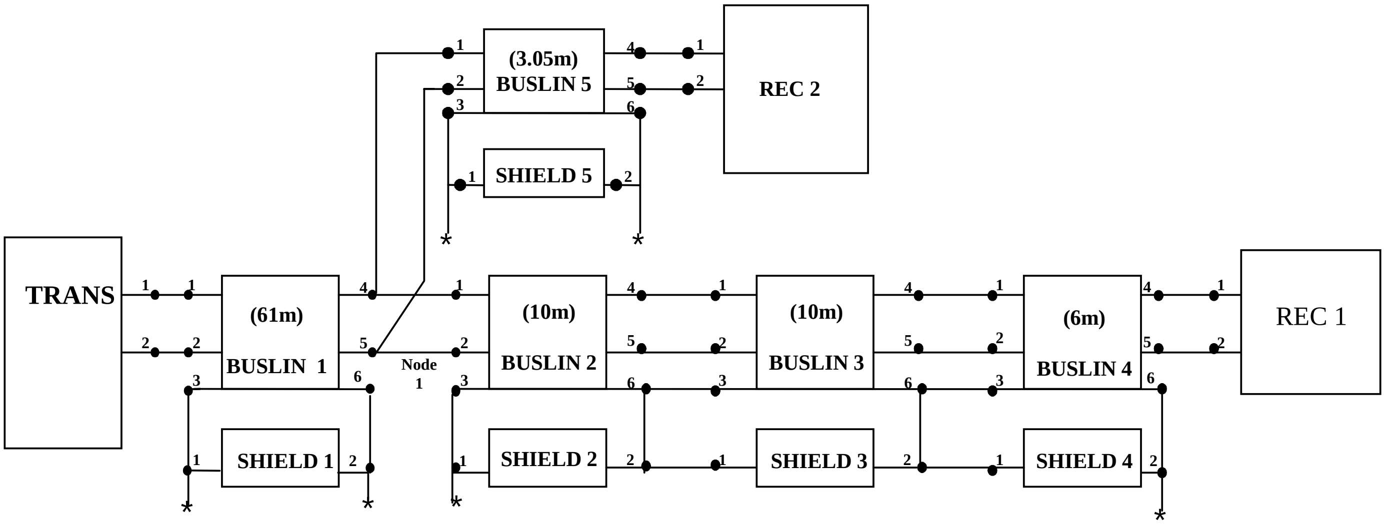
OPEN CIRCUIT VOLTAGE AT RECEIVER ONE

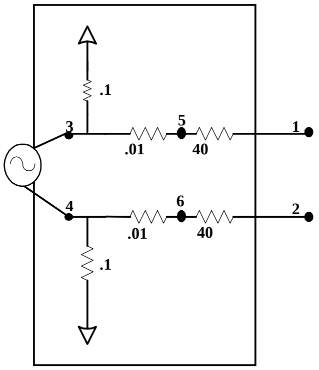
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(viii)

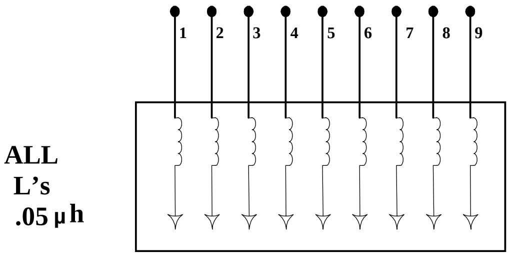
| Configuration | # Load Rec 1 | # Load Rec 2 |
|---|---|---|
| 1 | 1 | 1 |
| 2 | 1 | 10 |
| 3 | 10 | 1 |
| 4 | 10 | 10 |





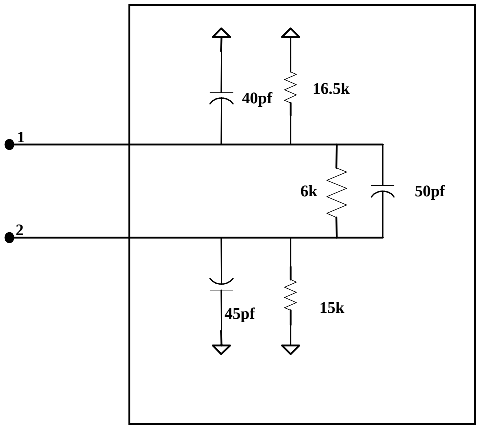


TRANS



TERM

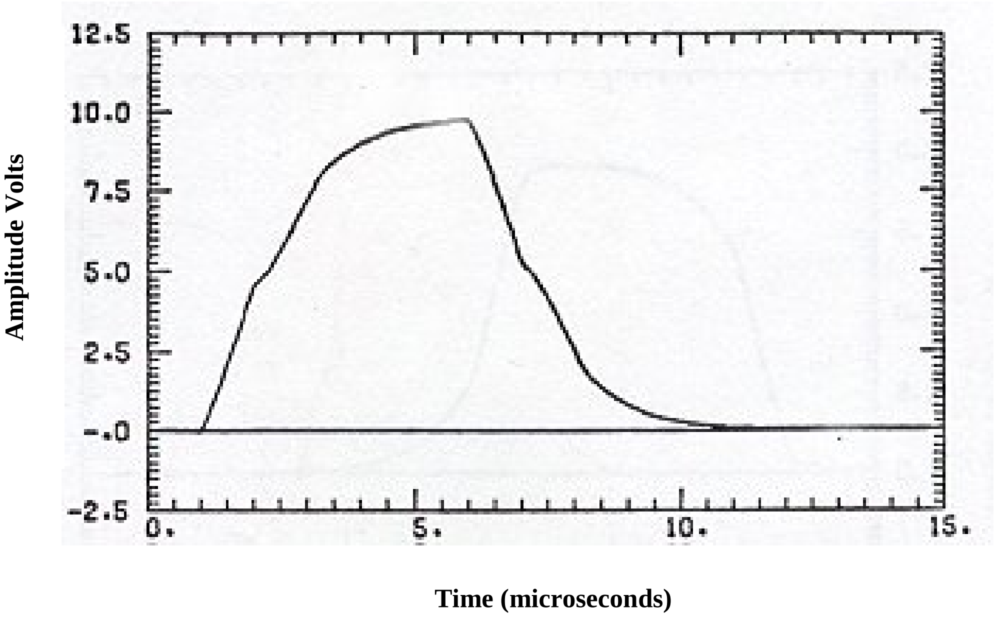
* SHIELD TIED TO INDUCTOR ON TERM BLOCK



REC 1

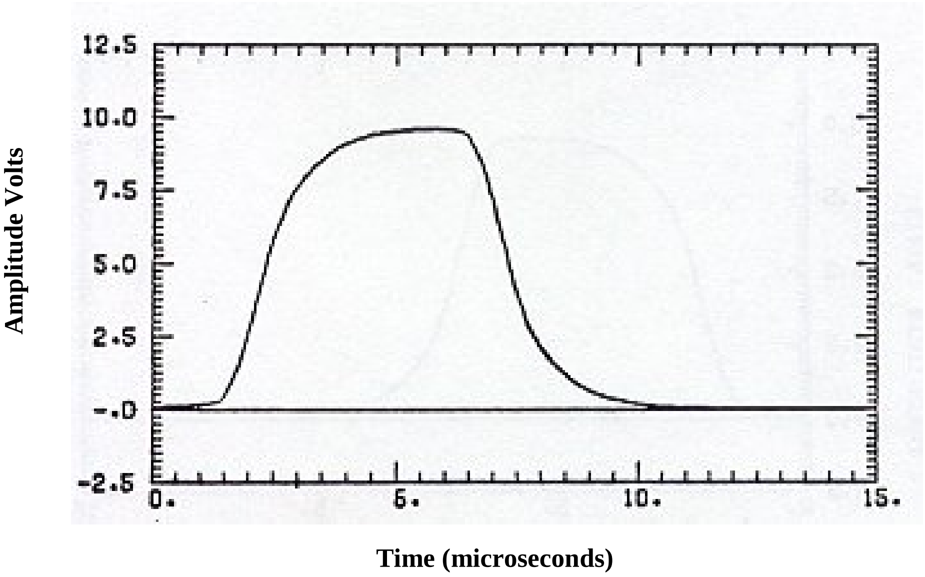
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(ix)



CONFIGURATION 1

TRANSMITTER OUTPUT VOLTAGE



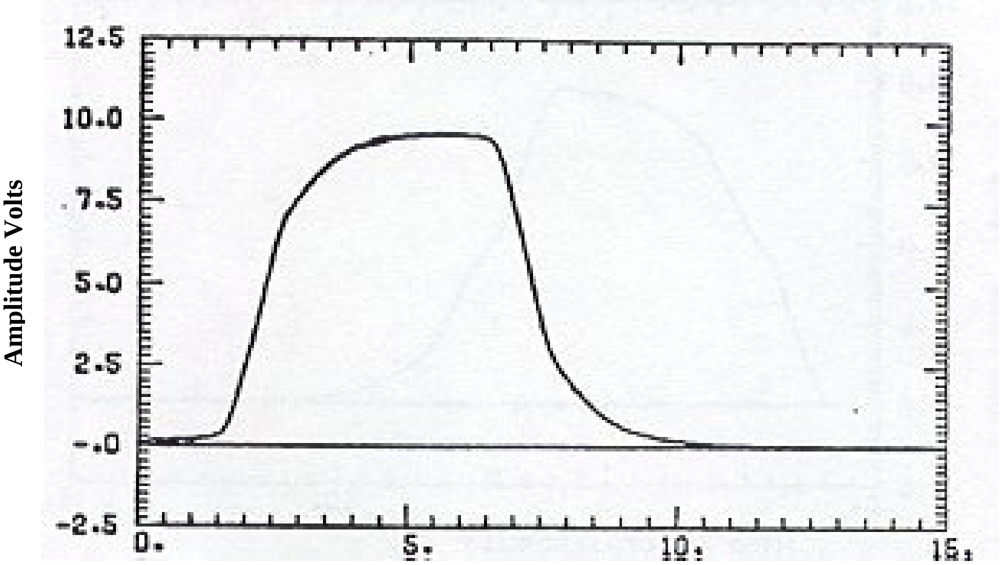
CONFIGURATION 1

VOLTAGE AT FIRST NODE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(x)

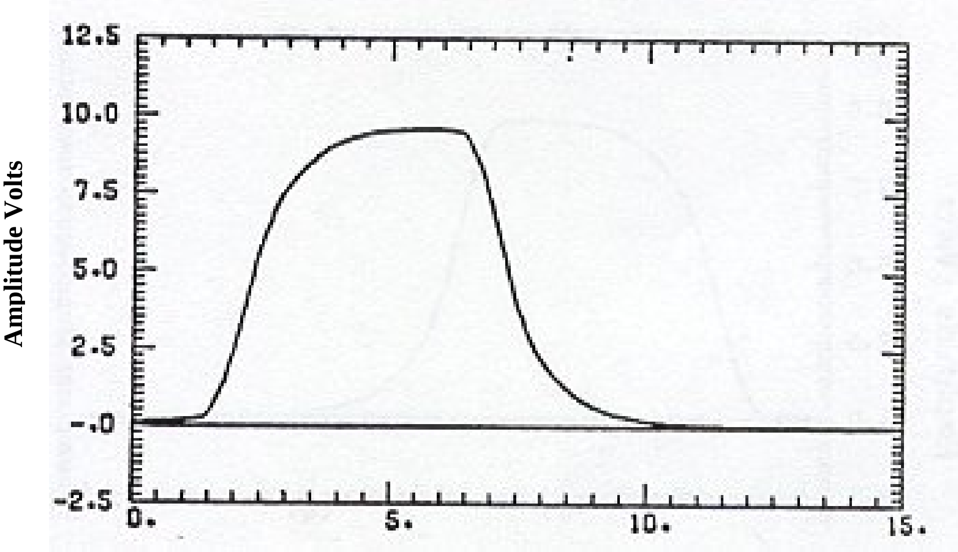
CONFIGURATION 1



Time (microseconds)

VOLTAGE AT RECEIVER ONE

CONFIGURATION 1

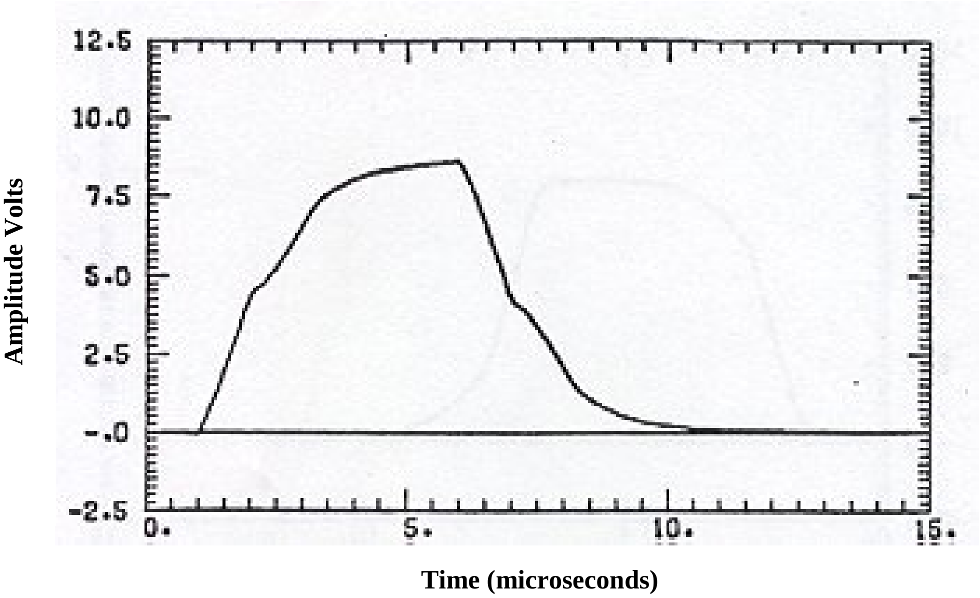


Time (microseconds)

VOLTAGE AT RECEIVER TWO

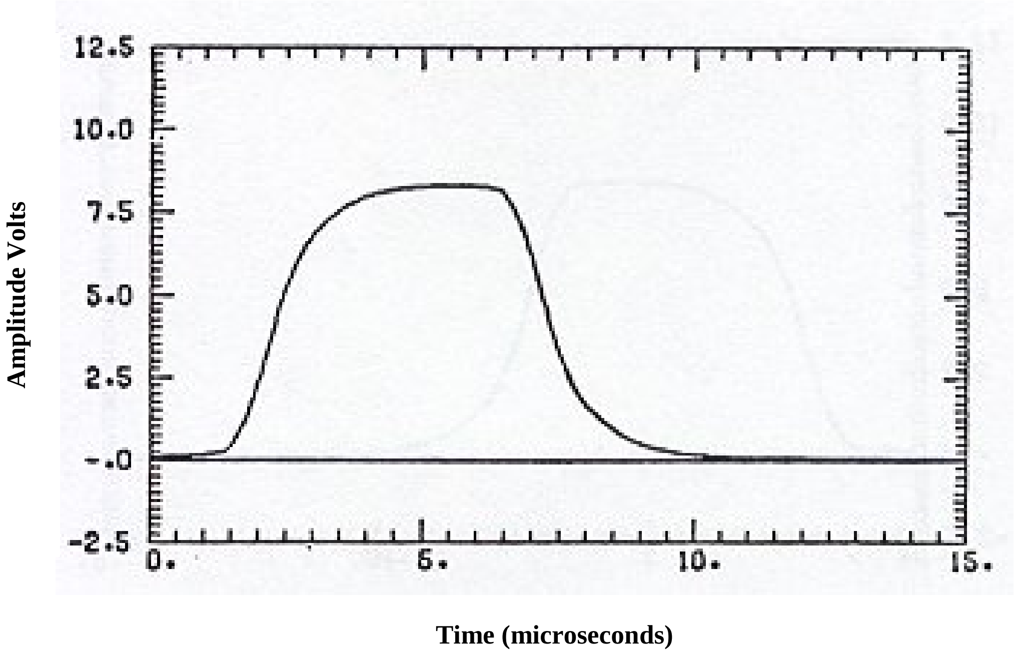
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xi)



CONFIGURATION 2

TRANSMITTER OUTPUT VOLTAGE

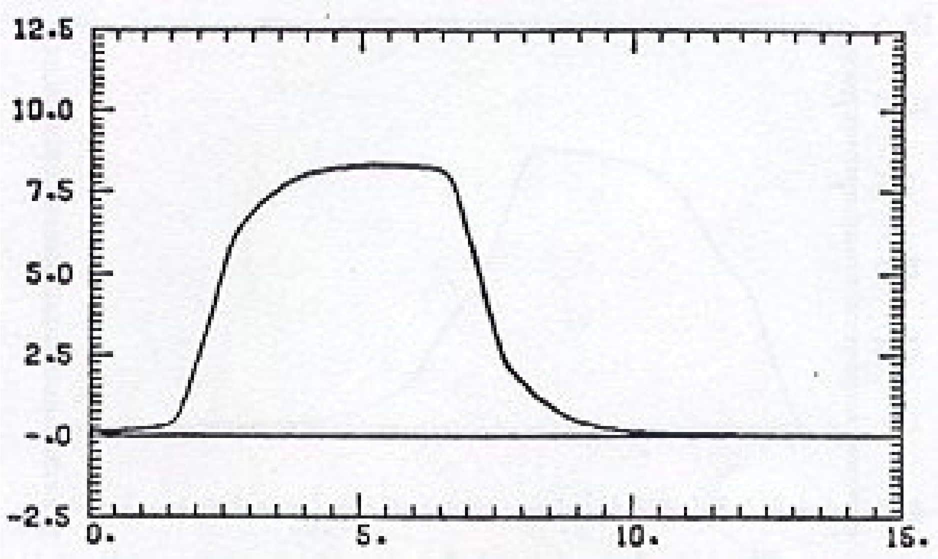


CONFIGURATION 2

VOLTAGE AT FIRST NODE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xii)

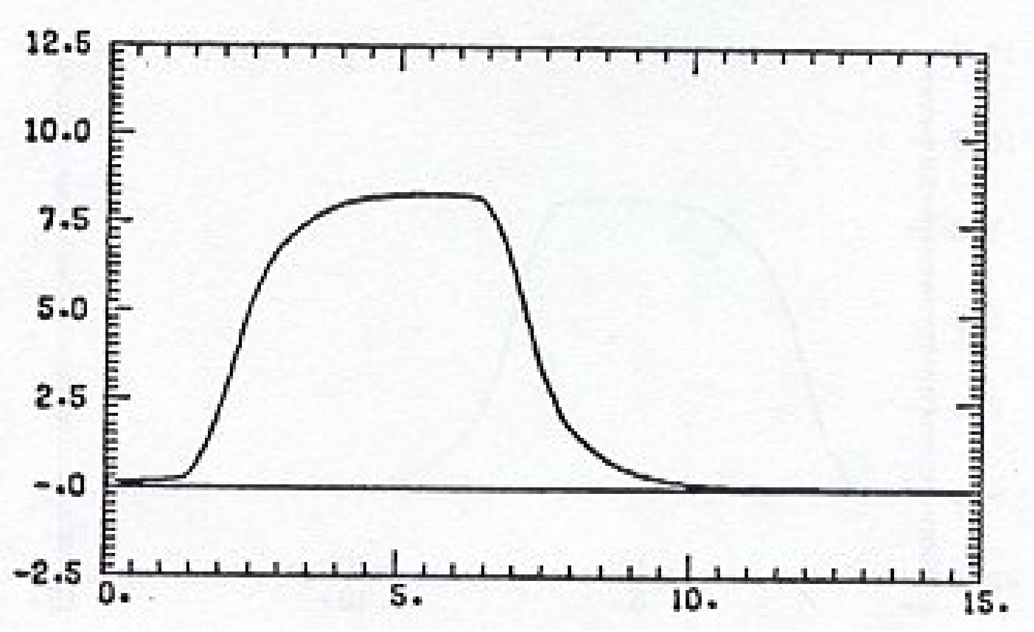


**Amplitude Volts**

**Time (microseconds)**

**CONFIGURATION 2**

VOLTAGE AT RECEIVER ONE



**Amplitude Volts**

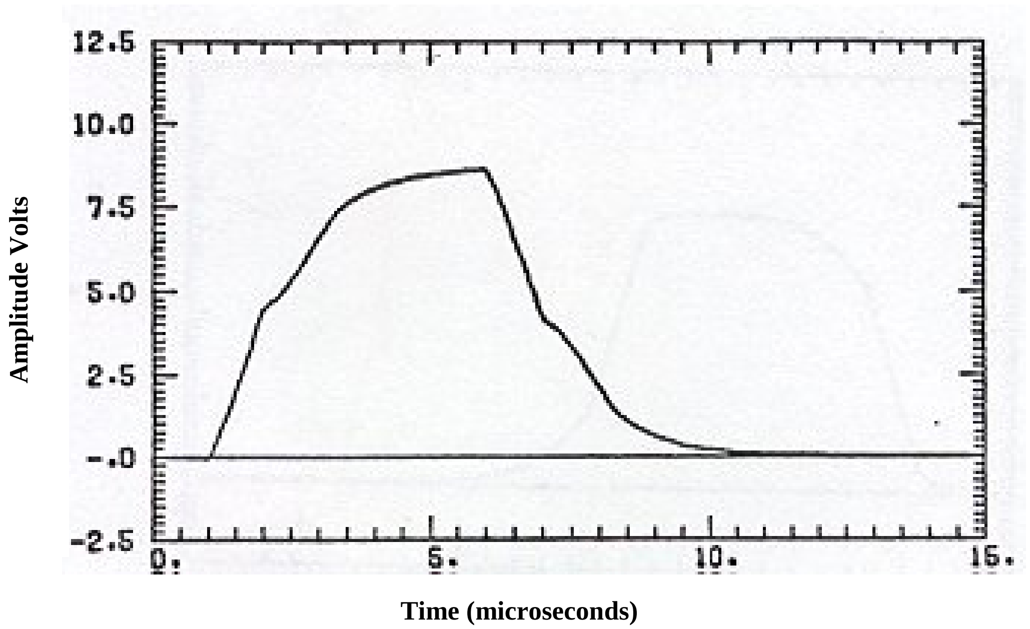
**Time (microseconds)**

**CONFIGURATION 2**

VOLTAGE AT RECEIVER TWO

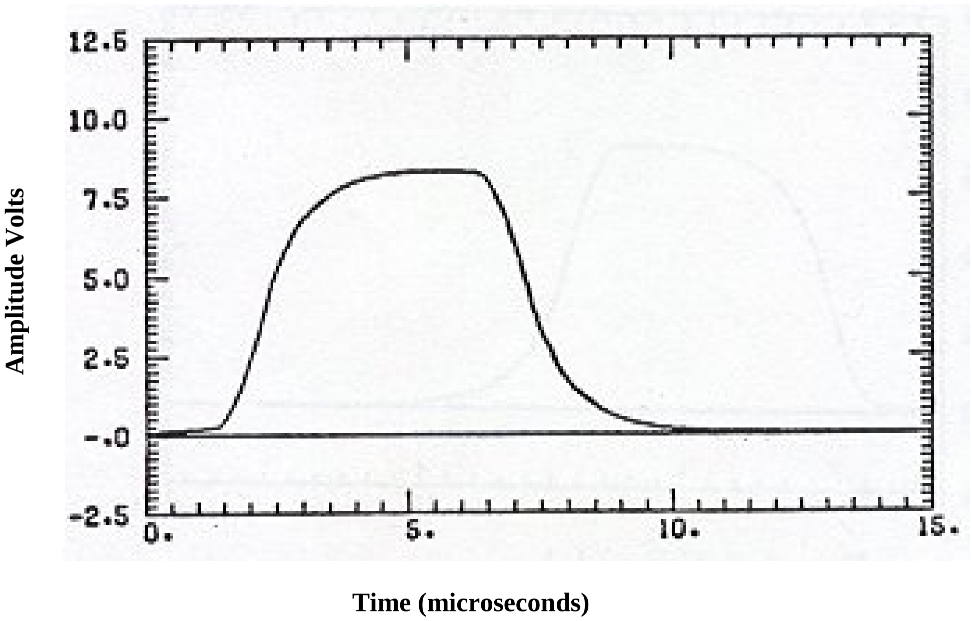
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xiii)



CONFIGURATION 3

TRANSMITTER OUTPUT VOLTAGE

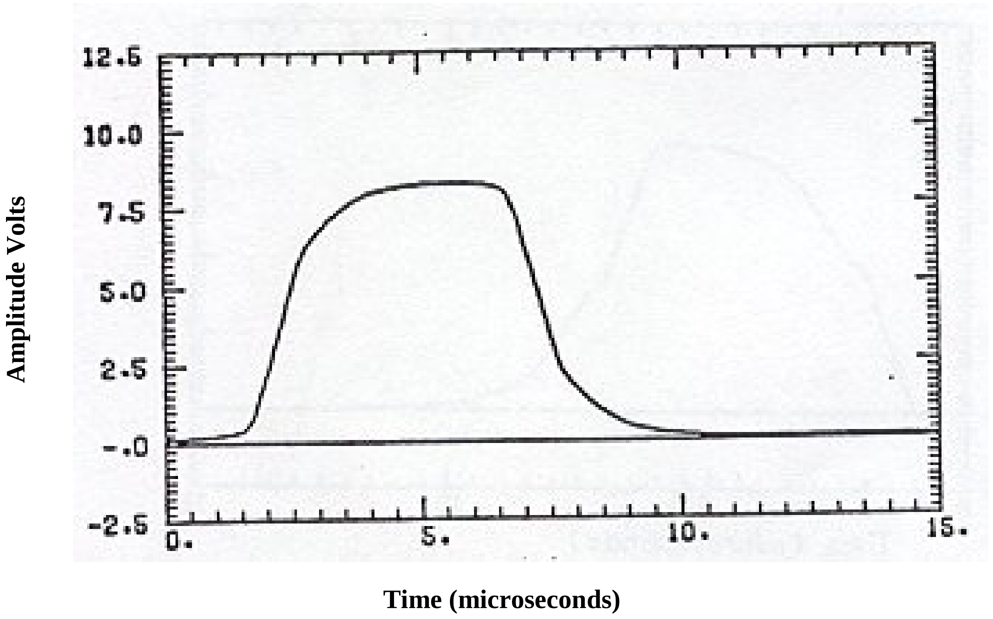


CONFIGURATION 3

VOLTAGE AT FIRST NODE

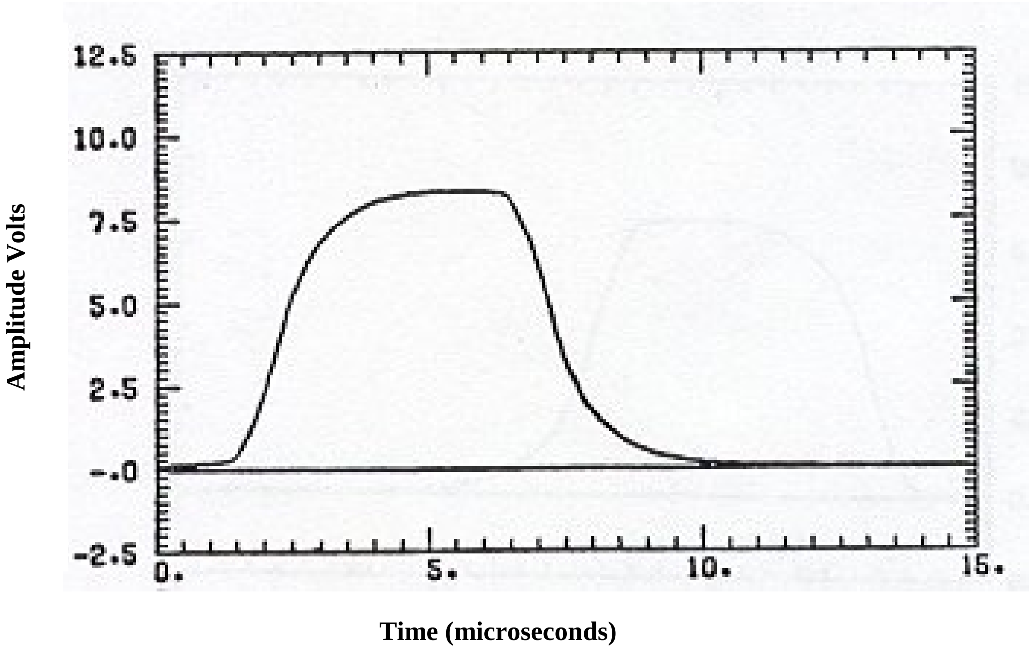
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xiv)



VOLTAGE AT RECEIVER ONE

CONFIGURATION 3

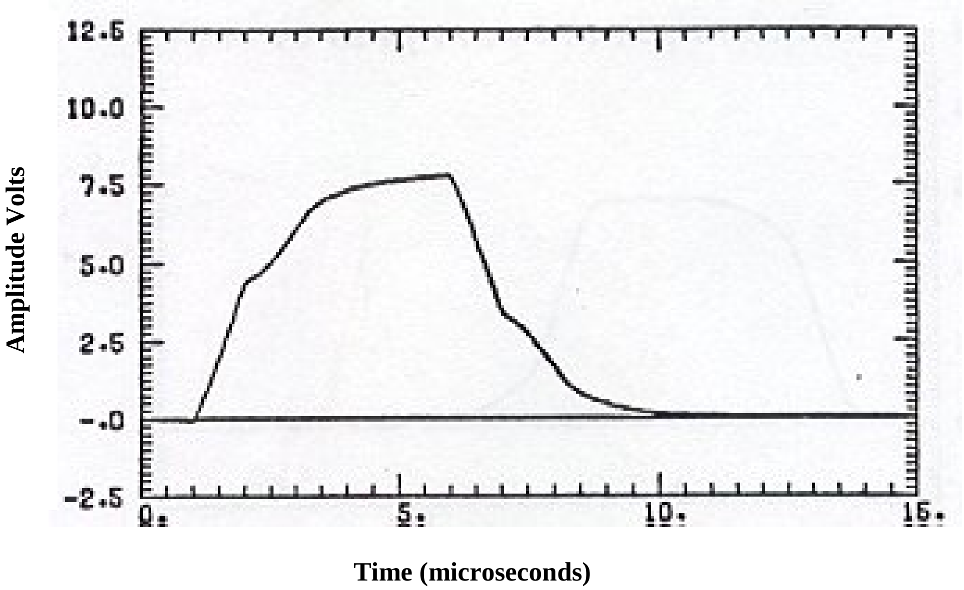


VOLTAGE AT RECEIVER TWO

CONFIGURATION 3

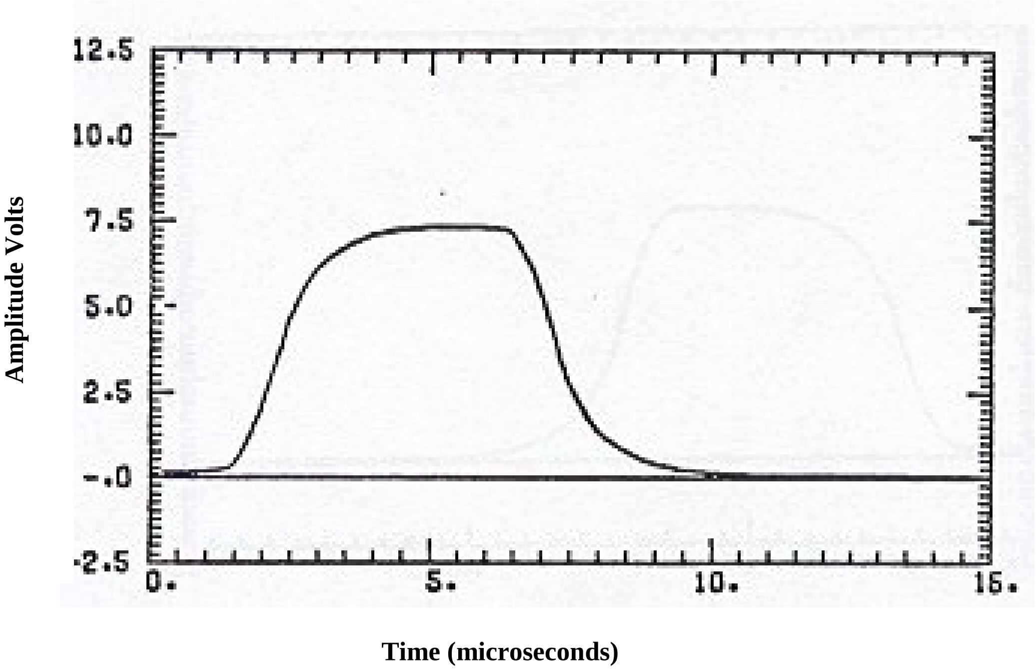
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xv)



CONFIGURATION 4

TRANSMITTER OUTPUT VOLTAGE

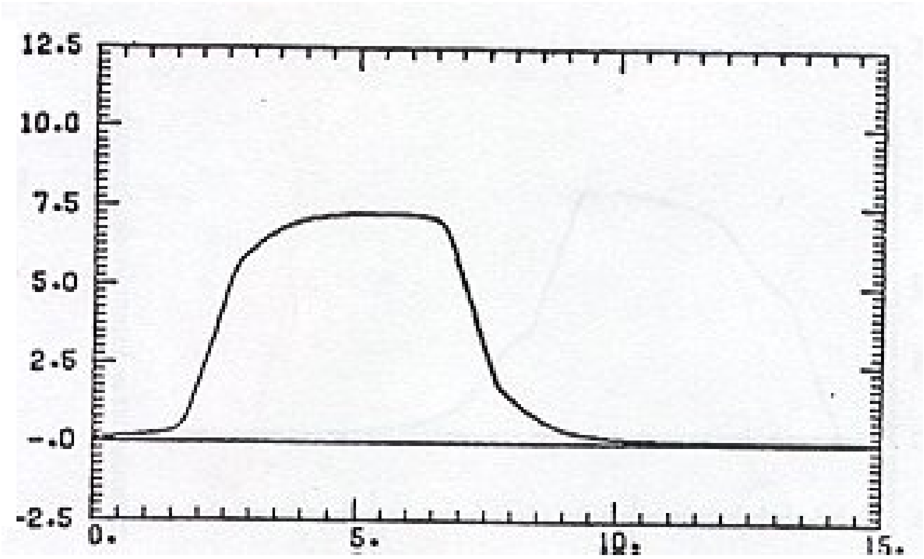


CONFIGURATION 4

VOLTAGE AT FIRST NODE

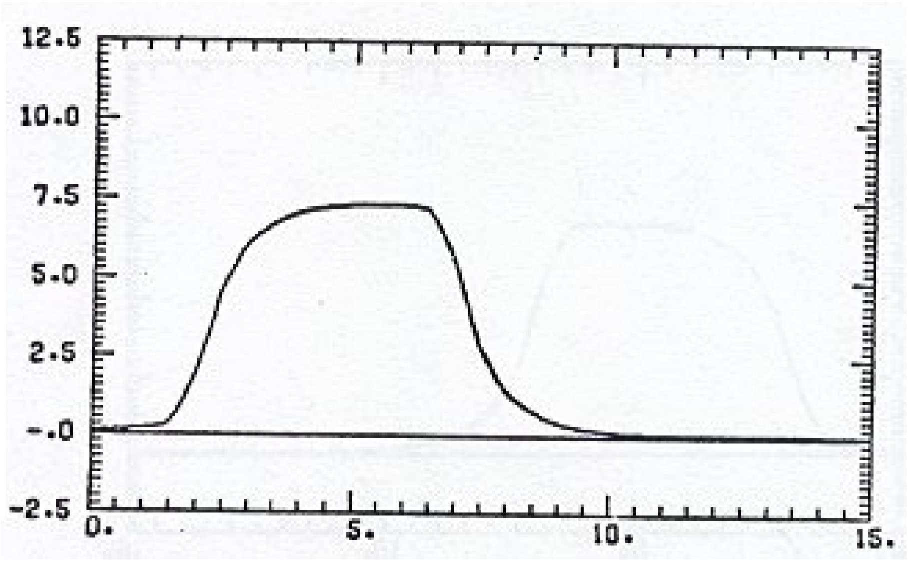
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xvi)



CONFIGURATION 4

VOLTAGE AT RECEIVER ONE

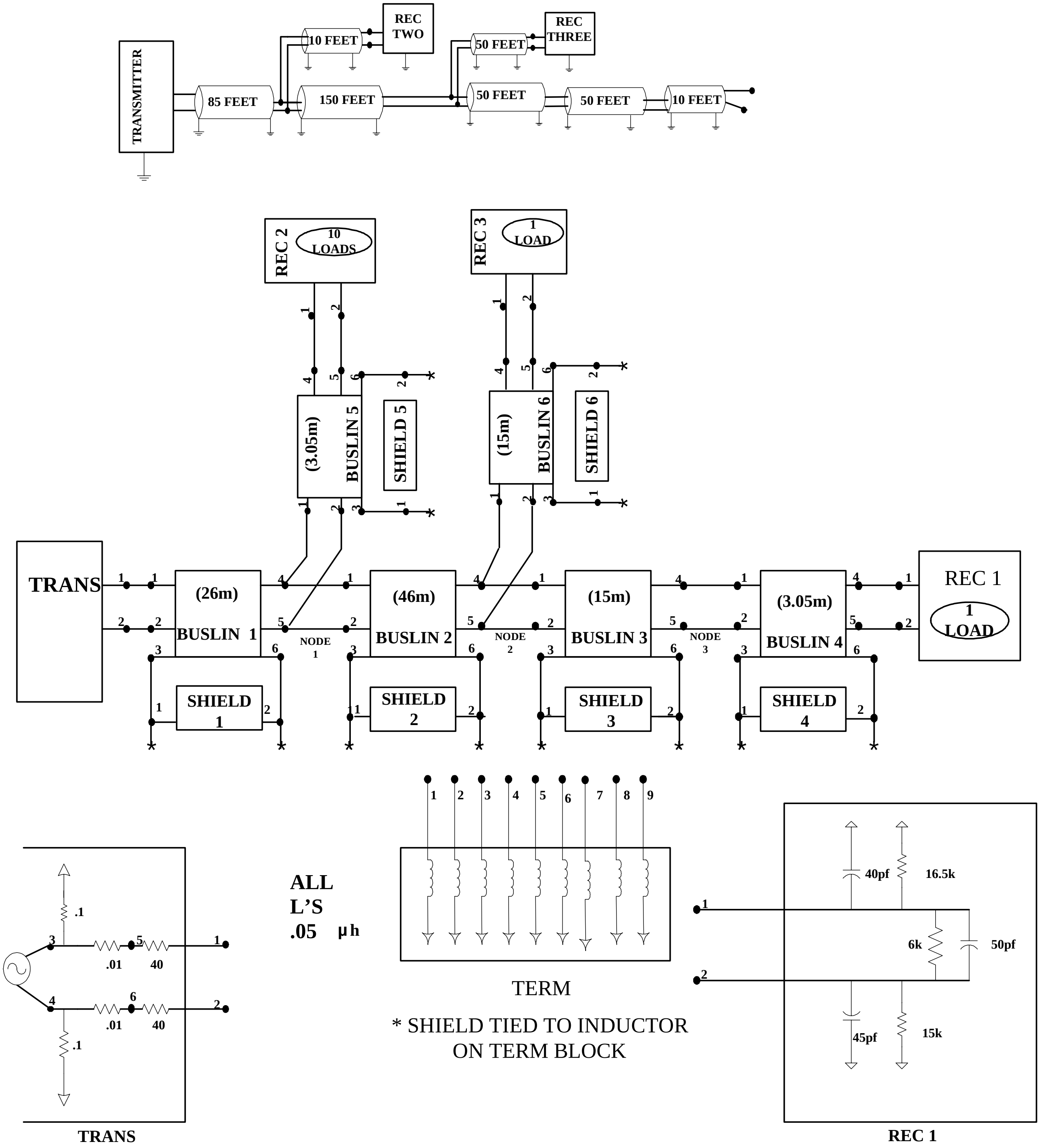


CONFIGURATION 4

VOLTAGE AT RECEIVER TWO

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xvii)

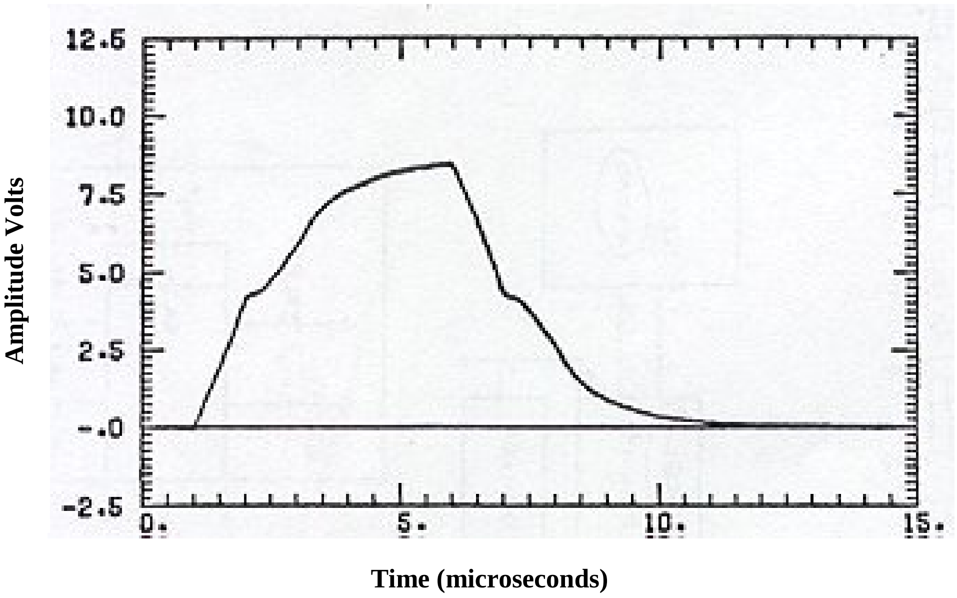


ALL L'S .05 μh

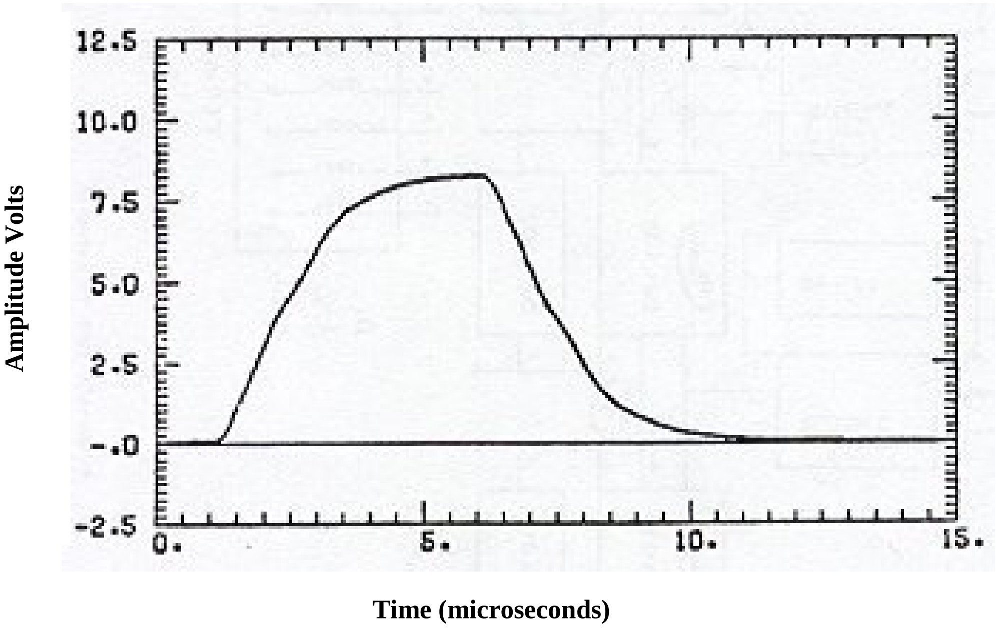
* SHIELD TIED TO INDUCTOR ON TERM BLOCK

# APPENDIX A
# LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

**FIGURE a-(xviii)**



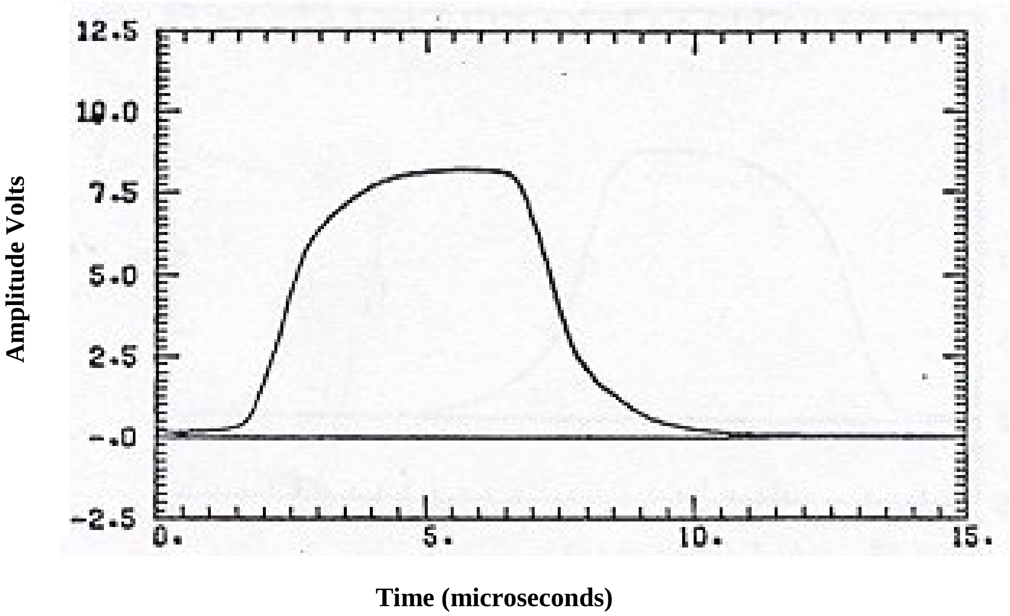
TRANSMITTER OUTPUT VOLTAGE



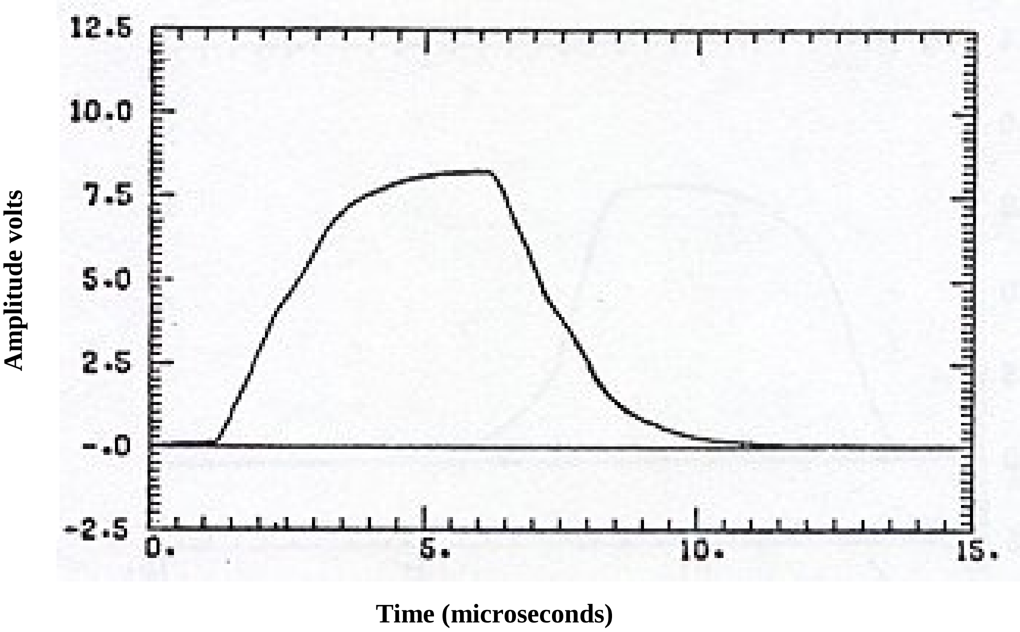
VOLTAGE AT FIRST NODE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xix)



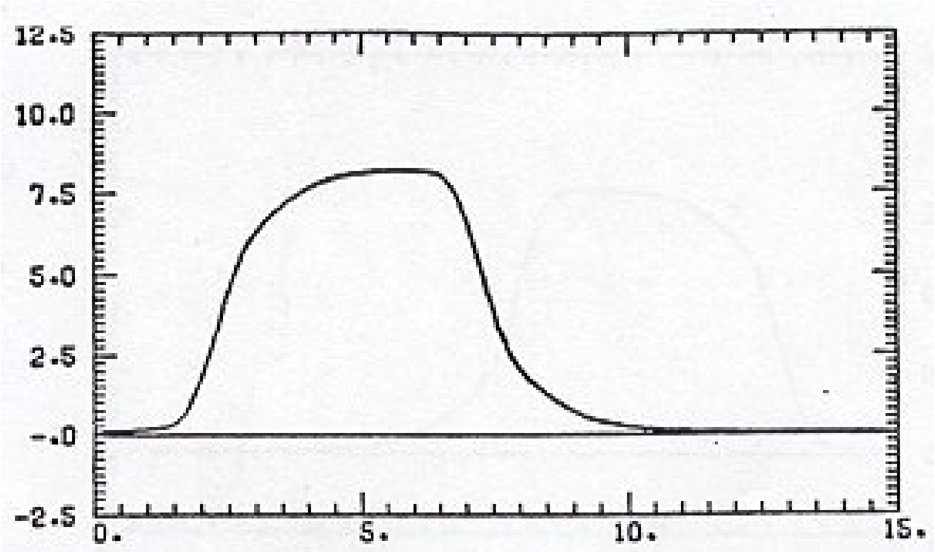
VOLTAGE AT RECEIVER ONE



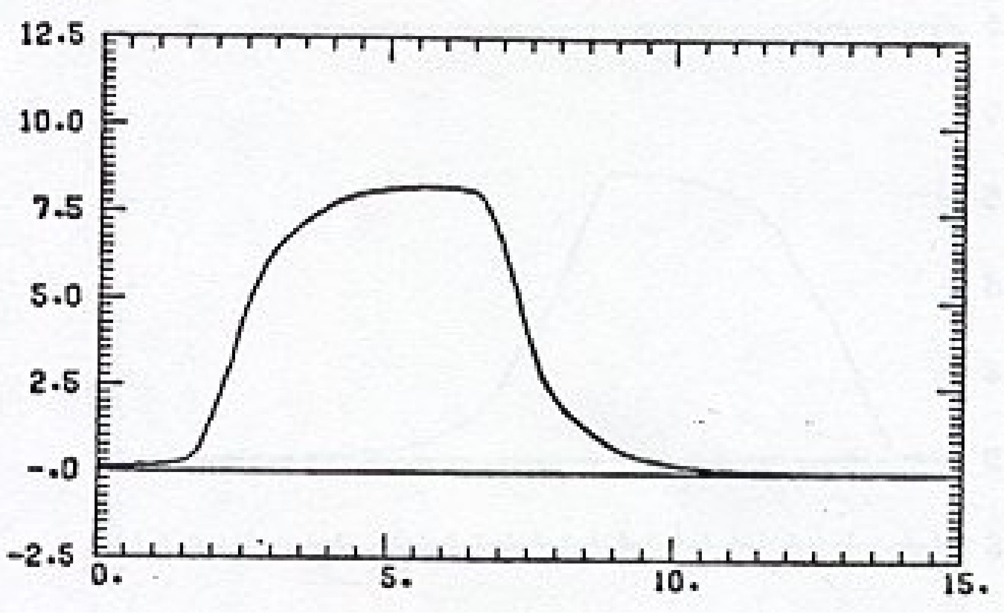
VOLTAGE AT RECEIVER TWO

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xx)



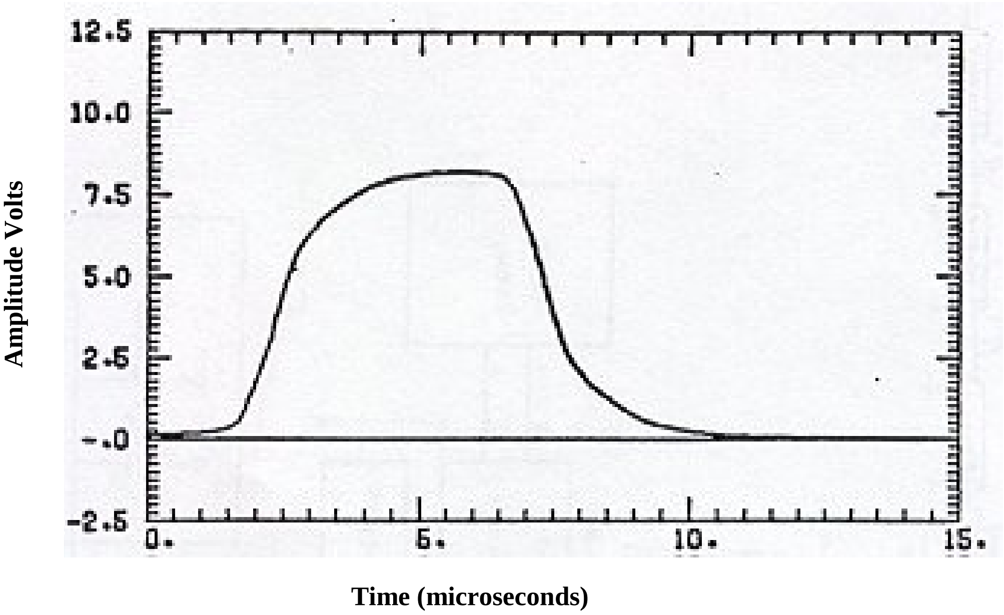
VOLTAGE AT SECOND NODE



VOLTAGE AT RECEIVER THREE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

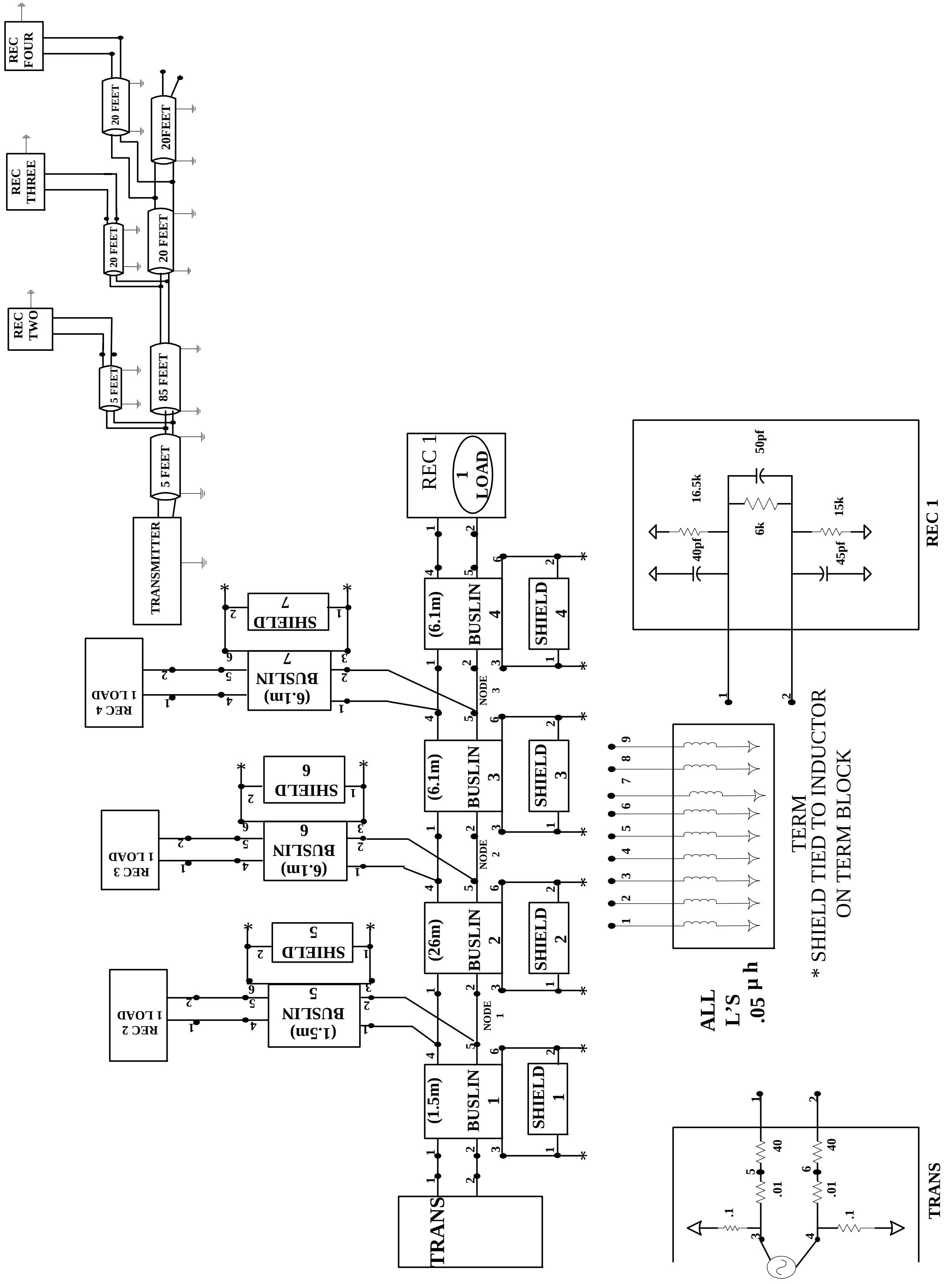
### FIGURE a-(xxi)



VOLTAGE AT THREE NODE

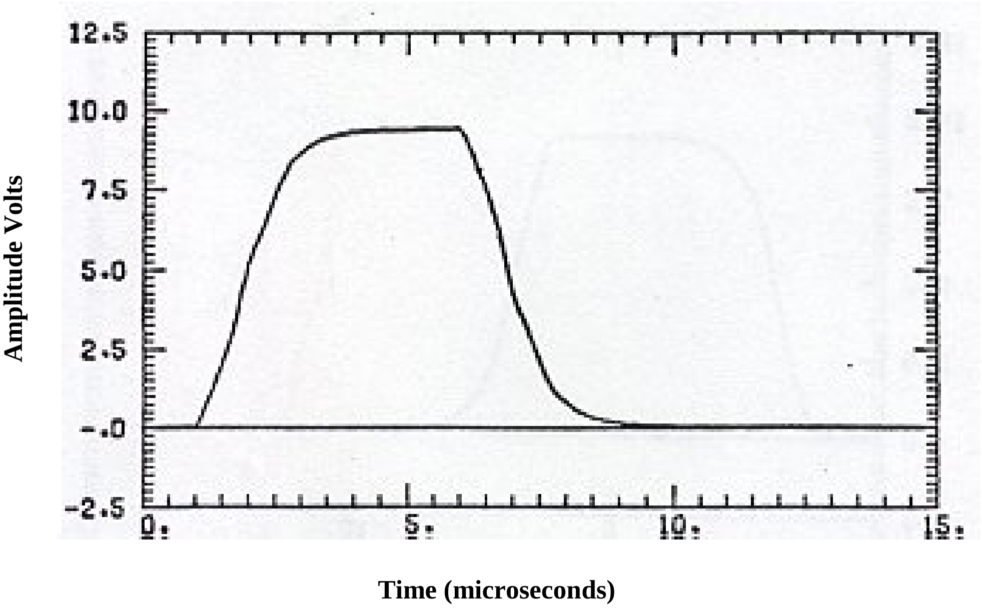
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xxii)

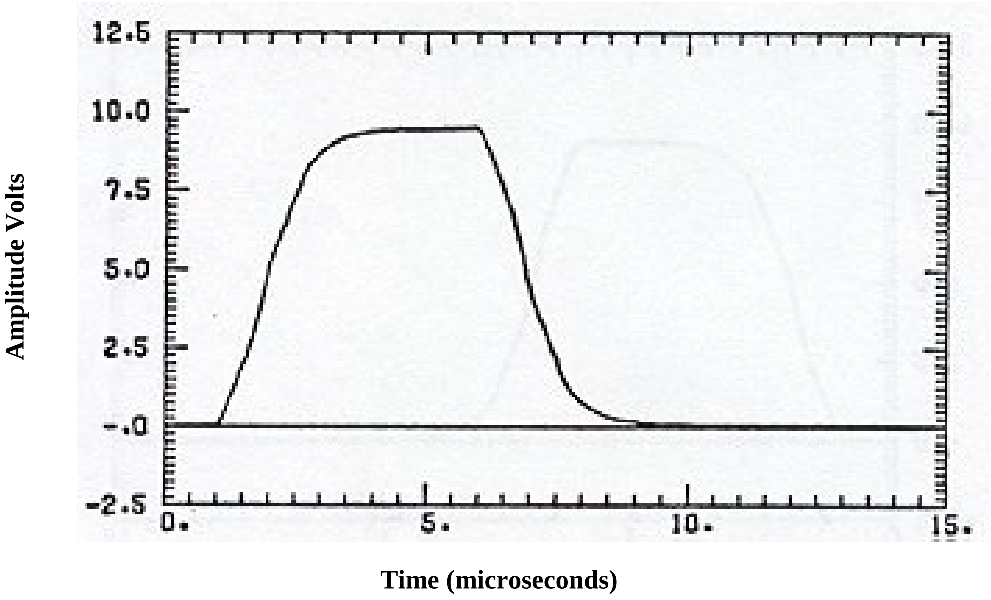


## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xxiii)



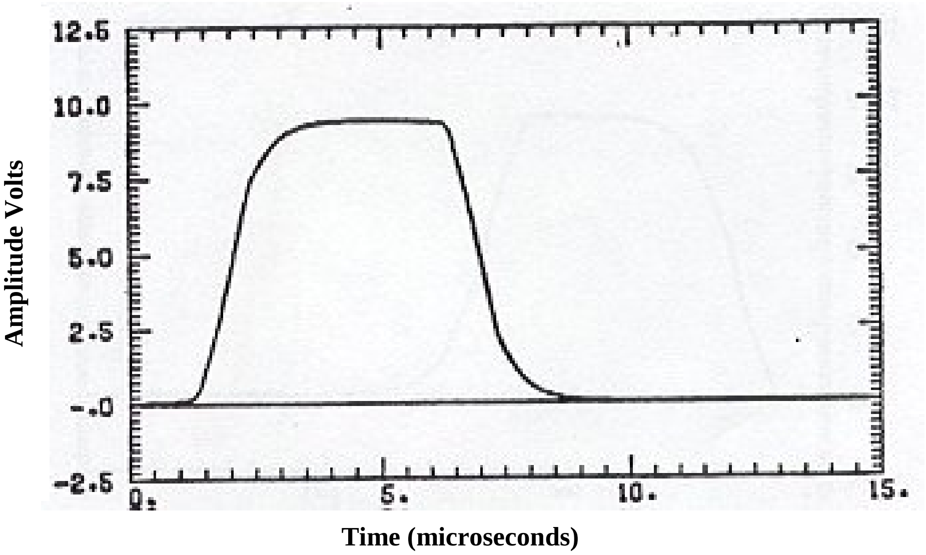
TRANSMITTER OUTPUT VOLTAGE



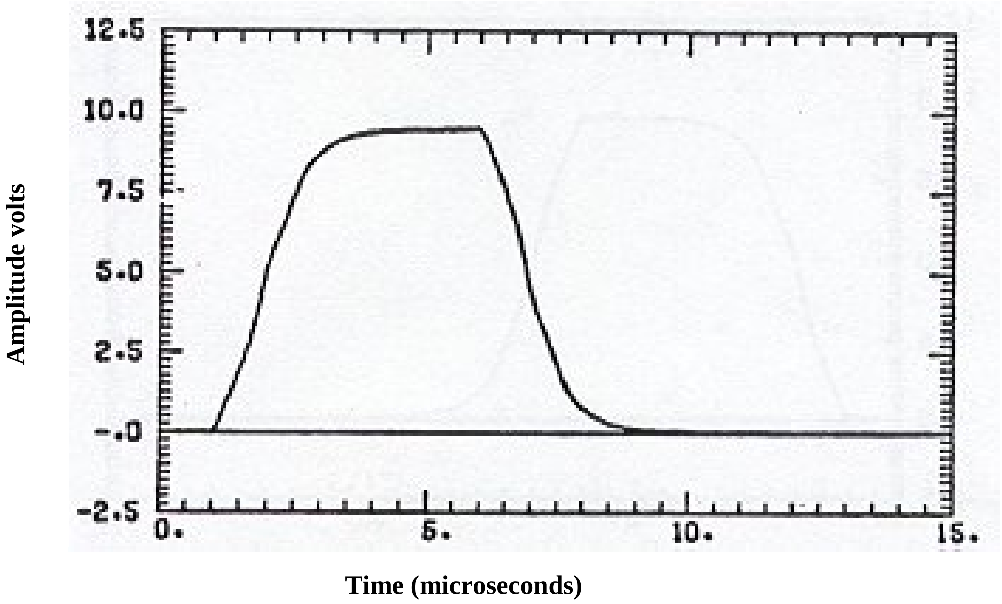
VOLTAGE AT FIRST NODE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xxiv)



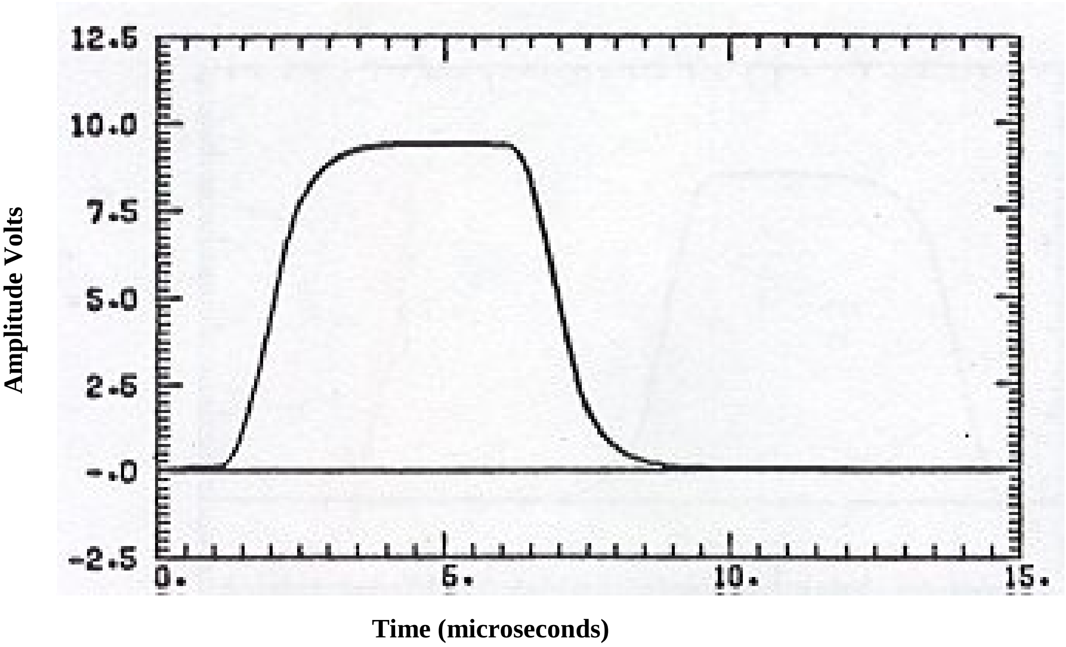
VOLTAGE AT RECEIVER ONE



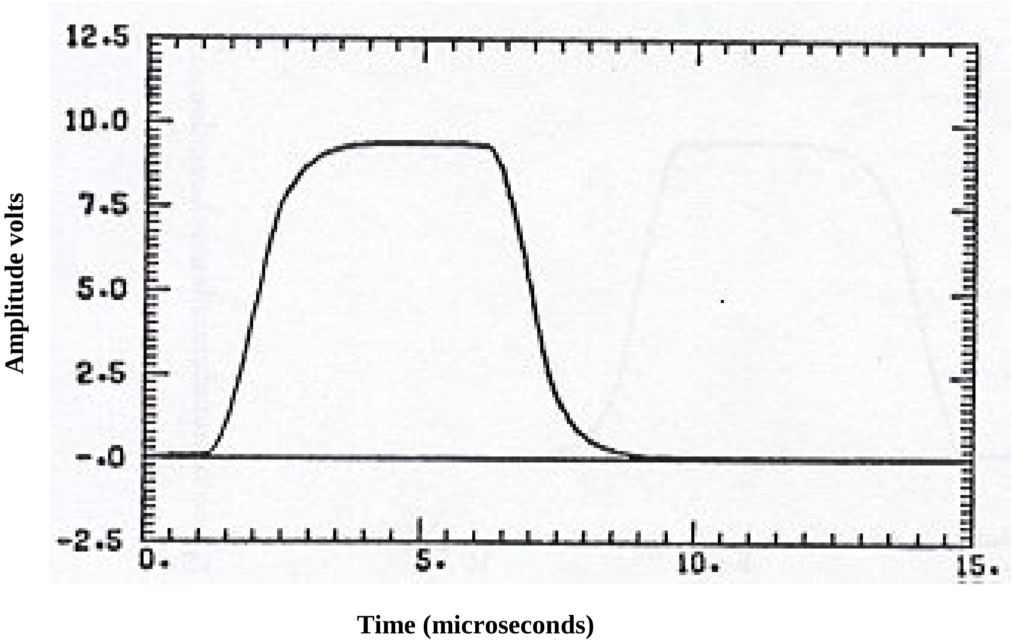
VOLTAGE AT RECEIVER TWO

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xxv)



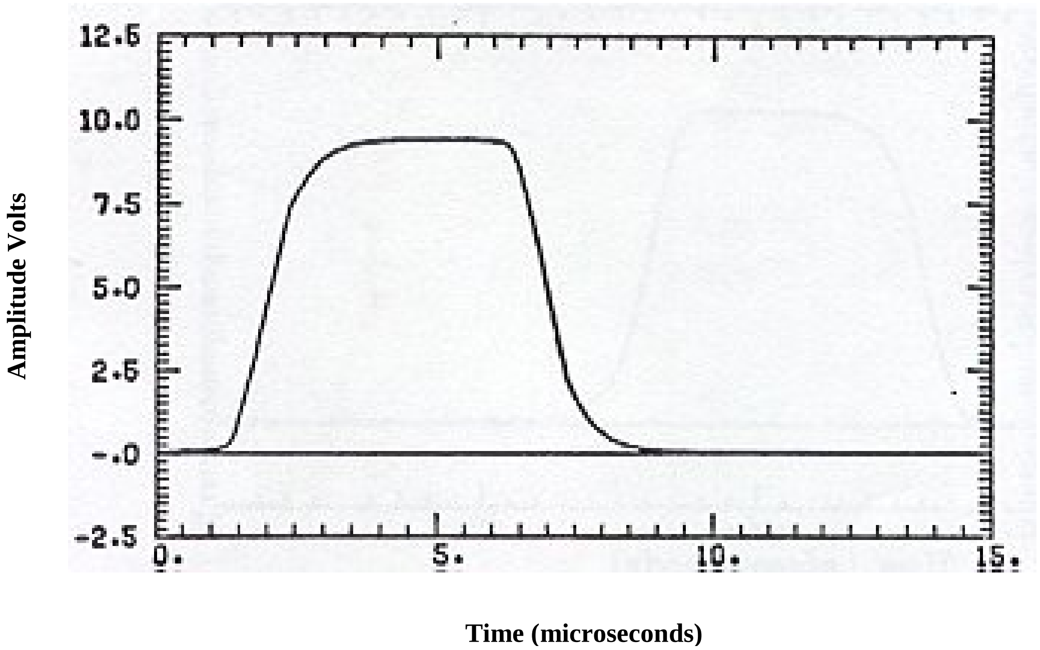
VOLTAGE AT SECOND NODE



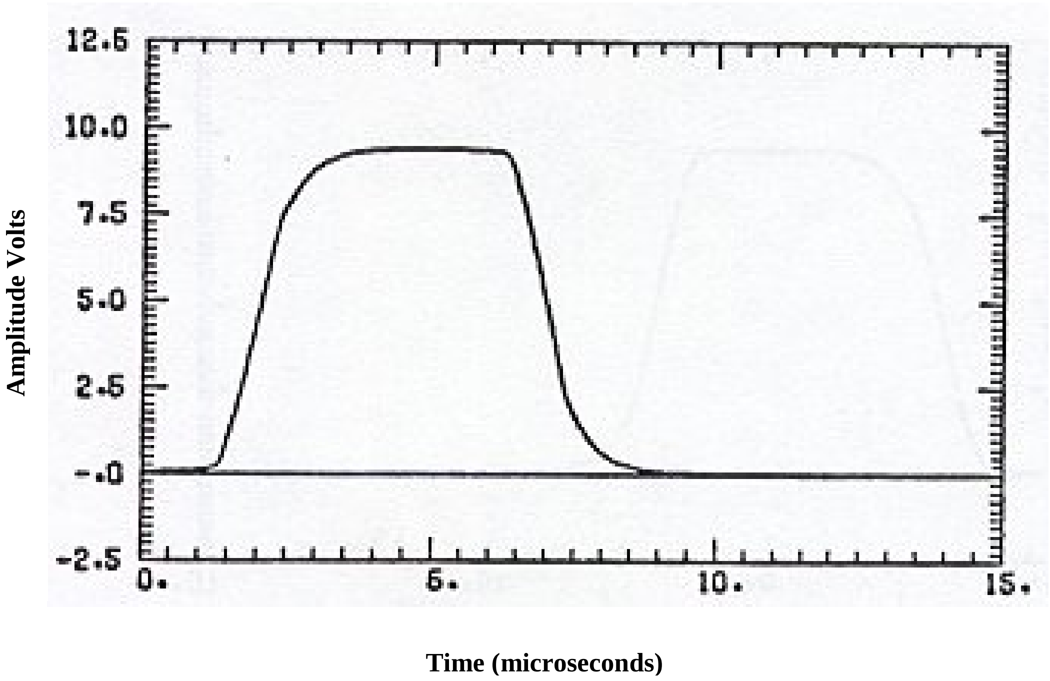
VOLTAGE AT RECEIVER THREE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

FIGURE a(xxvi)



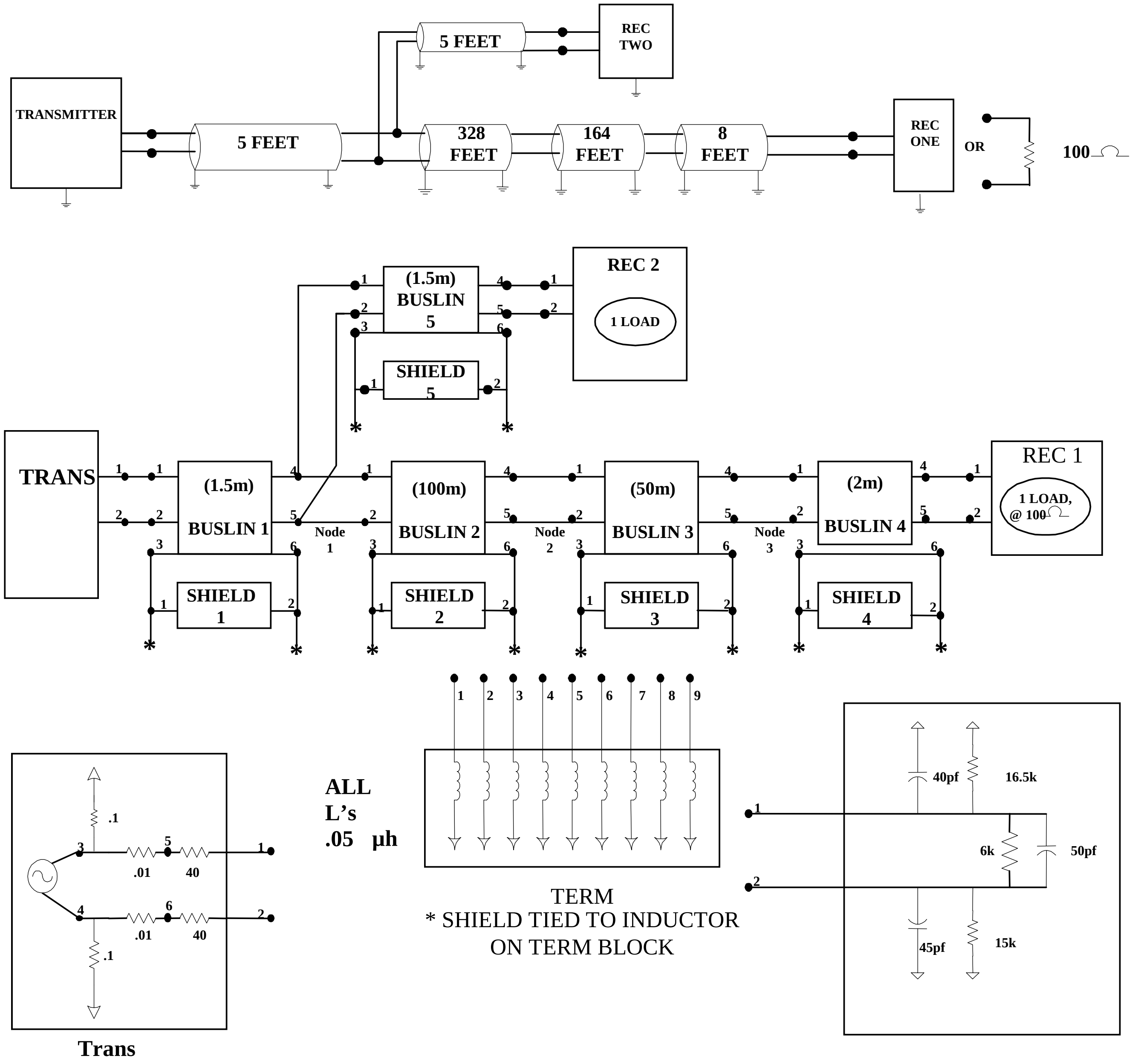
VOLTAGE AT NODE THREE



VOLTAGE AT RECEIVER FOUR

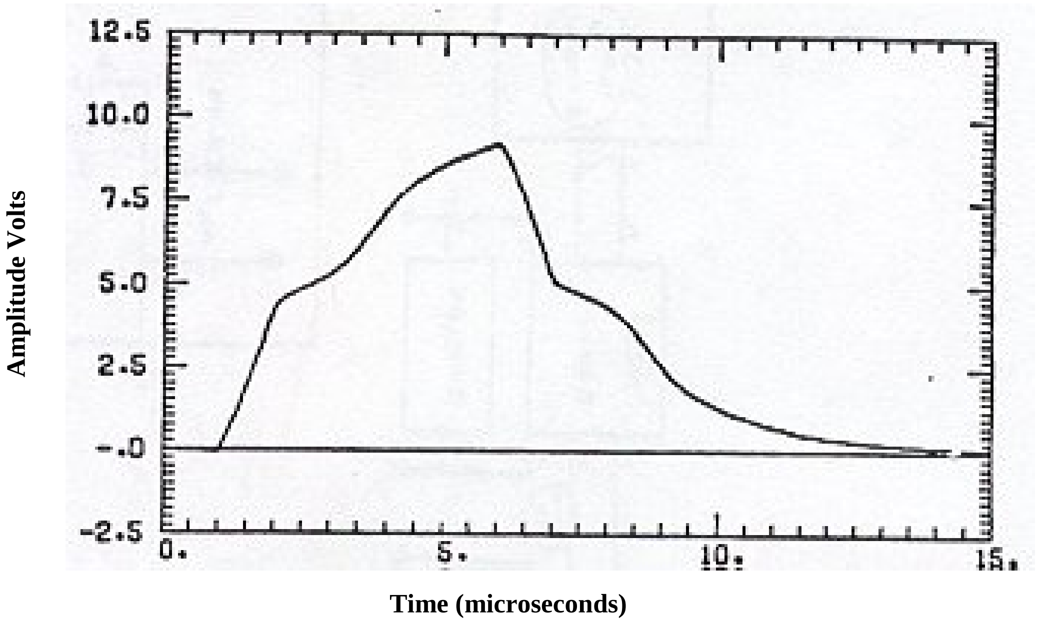
## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xxvii)

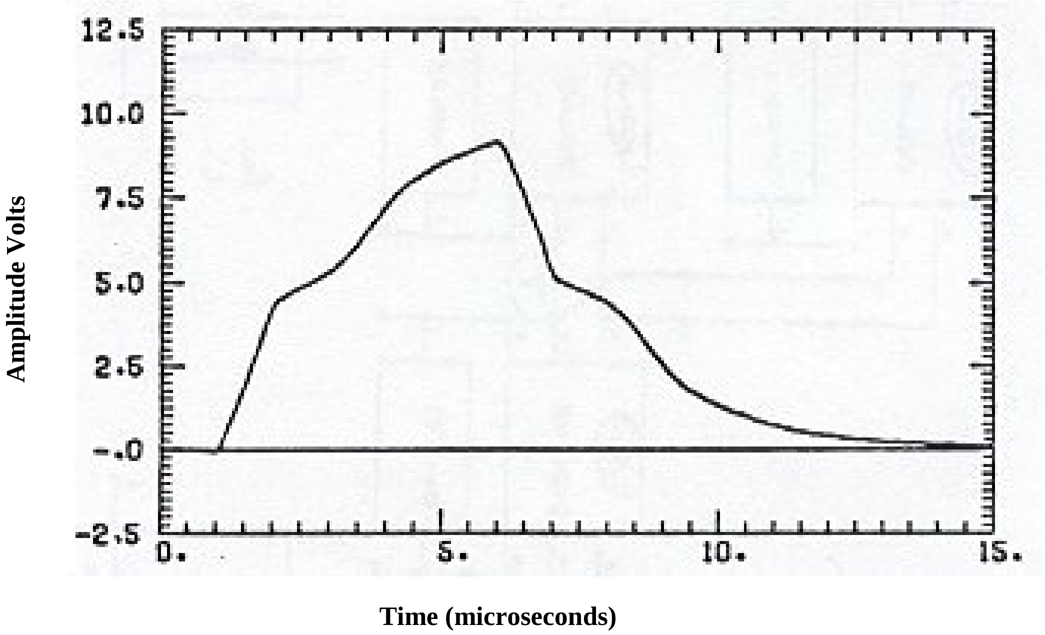


## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

FIGURE a-(xxviii)



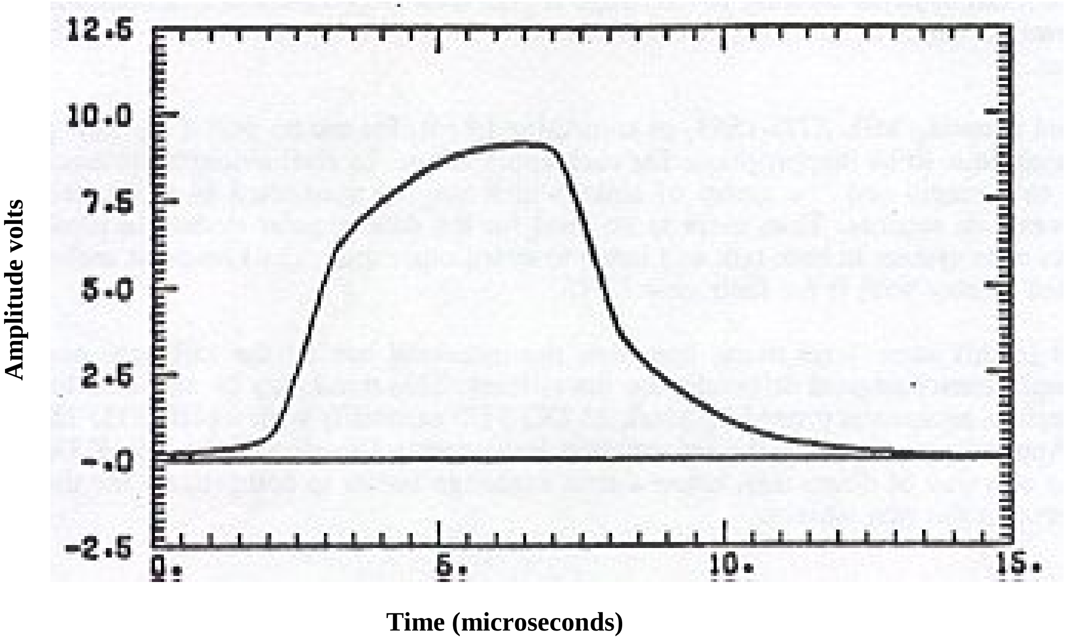
TRANSMITTER OUTPUT VOLTAGE



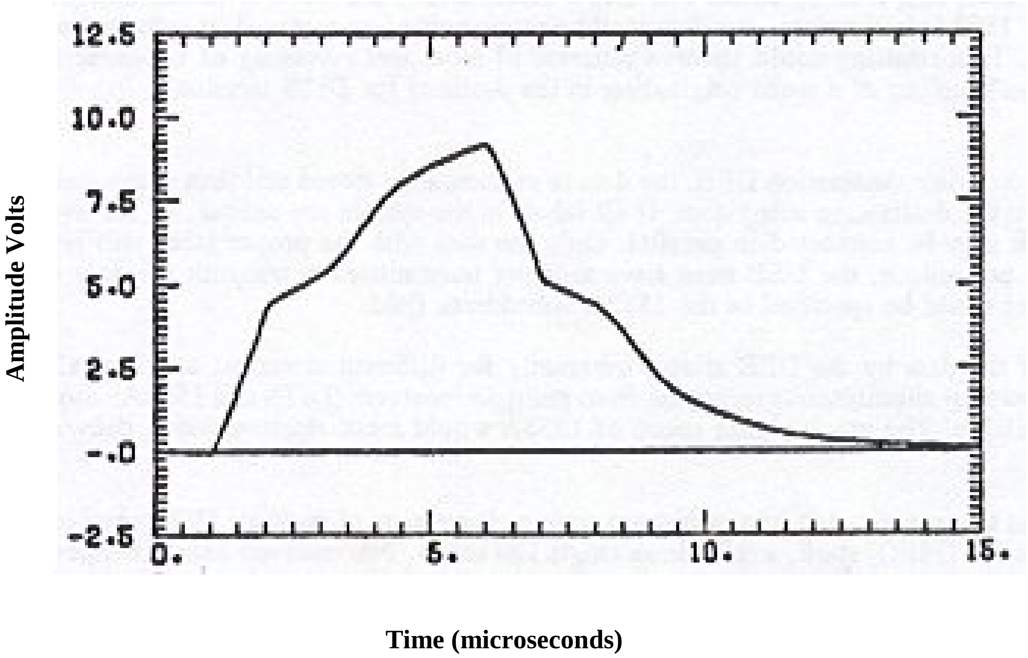
VOLTAGE AT FIRST NODE

## APPENDIX A
## LABORATORY VERIFICATION OF ARINC 429 DITS ELECTRICAL CHARACTERISTICS

### FIGURE a-(xxix)



VOLTAGE AT RECEIVER ONE



VOLTAGE AT RECEIVER TWO

# APPENDIX B
# AN APPROACH TO A HYBRID BROADCAST-COMMAND/RESPONSE DATA BUS ARCHITECTURE

## A2-1.0 Introduction

During the time that the broadcast approach to digital information transfer became established in the air transport industry, the military aviation community adopted a command/response time division multiplex technique as its standard. In this approach, all aircraft systems needing to exchange digital data are connected to a common bus and a dedicated “bus controller” determines which of them may output data on to the bus at any given time. MIL STD 1553 was written to describe this system.

The airlines considered adopting MIL STD 1553, or something like it, for use on post-1980 new civil aircraft types but found the multiplex technique to be inappropriate for such applications. In civil avionics systems, data typically flows from a given source to a single sink, or group of sinks which may be connected in a parallel, and these sinks are typically not themselves data sources. Thus there is no need for the data transfer system to provide the capability for every unit of every avionics system to both talk and listen to every other unit. The broadcast technique is adequate, and thus the airlines elected to stay with it for their new DITS.

Another development in this same time frame has been the increased use by the military, particularly in transport aircraft, of avionics equipment designed originally for the airlines. This trend may be expected to continue and so give rise to the need to interface equipment providing Mark 33 DITS I/0 capability with a MIL STD 1553A data bus system. The material in this Appendix prepared by the Information Engineering Division of the USAF Directorate of Avionics Engineering describes one way of doing this, using a data exchange buffer to compensate for the electrical, logic and timing differences between the two systems.

## A2-2.0 Suggested Mark 33 DITS/MIL STD 1553A Interface

The following is a proposed method for interfacing an avionic system employing sensors designed for any combination of ARINC Mark 33 DITS and MIL-STD-1553A. This method minimizes message related differences and compensates for electrical, logic and timing differences in a Data Exchange Buffer (DEB).

In a hybrid system such as shown in Figure b-(i), a signal may originate in either a DITS type subsystem or a 1553A subsystem and may be destined for either type of terminal. DITS data received by a DEB is momentarily stored and then retransmitted, complete with label, to the 1553A bus controller. The bus controller determines the intended destinations from the label and look-up table. For DITS destinations, the word is retransmitted, as received, to the appropriate DEB. For 1553A destinations, the data may be retransmitted as received or reformatted, as required by the destination subsystem. Reformatting could involve removal of label and reversing of bit order (MSB vs LSB first). Figure b-(ii) shows the handling of a word originating in the destined for DITS terminals.

Upon arrival at the appropriate destination DEB, the data is momentarily stored and then retransmitted in DITS format, complete with label, to the destination subsystem. If all labels in the system are unique, all receivers in all subsystems associated with a DEB may be connected in parallel. Only the data with the proper label will be recognized by each receiver. If labels are not unique, the DEB must have separate transmitters to transmit the data with identical labels. The desired transmitter could be specified in the 1553A subaddress field.

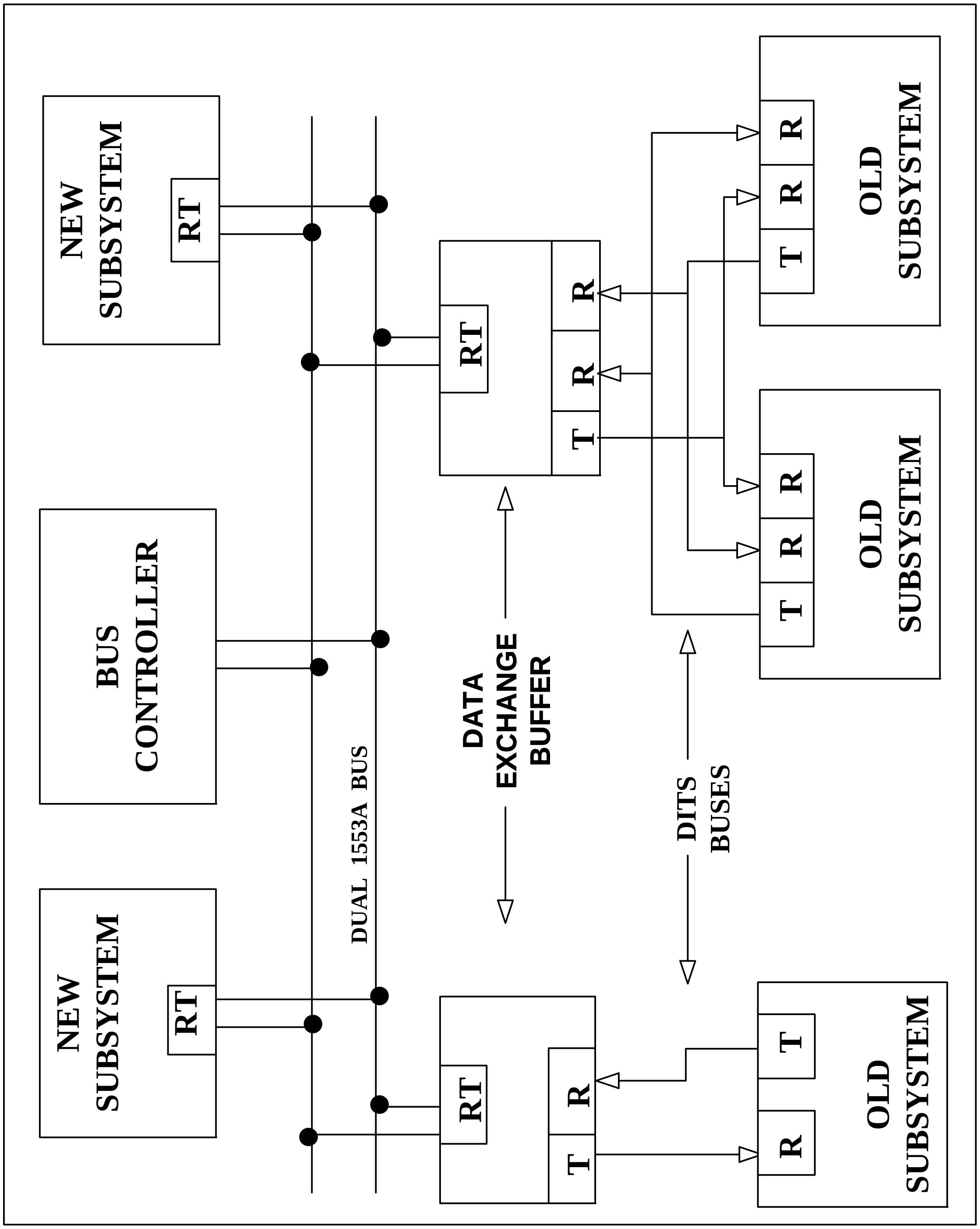
The retransmission of the data by the DEB allows inherently for different electrical and logical characteristics. The storage of the data allows for simultaneous reception from multiple receivers (DITS and 1553A) and retransmission when the desired bus is available. The much higher speed of 1553A would make retransmission delays small.

Figure b-(iii) illustrates the organization of a minimum system. It consists of multiple DITS receivers dumping received data into a first-in first-out (FIFO) stack, available as single LSI chips. The received data is temporarily stored and then retransmitted by the 1553A terminal. Data received via 1553A is dumped into another FIFO for retransmission by a DITS transmitter. The hardware consists only of DITS receivers, the 1553A terminal, the DITS transmitter, and as many FIFO’s as are required. Hand-shaking signals available on the FIFO’s eliminate almost all supporting SSI chips. This entire system would probably fit on one full ATR card or less.

Figure b-(iv) illustrates possible organization for a more sophisticated DEB. It consists of an many DITS transmitters and receivers as necessary, a single (internally redundant) 1553A remote terminal, a buffer memory, a controller (microprocessor), and a program for the controller contained in ROM. Whenever a complete, valid word is available at a receiver, the controller is notified. When the parallel data bus becomes available, the word is transferred to memory. When the desired transmitter (DITS or 1553A) becomes available, the data word is routed from memory to the transmitter. The low rate of DITS terminals (minimum 320 microsec/word) would result in a very low loading of the parallel bus and controller. The speed of the 1553A terminal might necessitate a direct memory access arrangement. The controller, the program memory, the buffer memory and a dual 1553A remote terminal would probably fit on one one-sided 3/4 ATR card. The required ARINC transmitters and receivers would probably fit on another card.

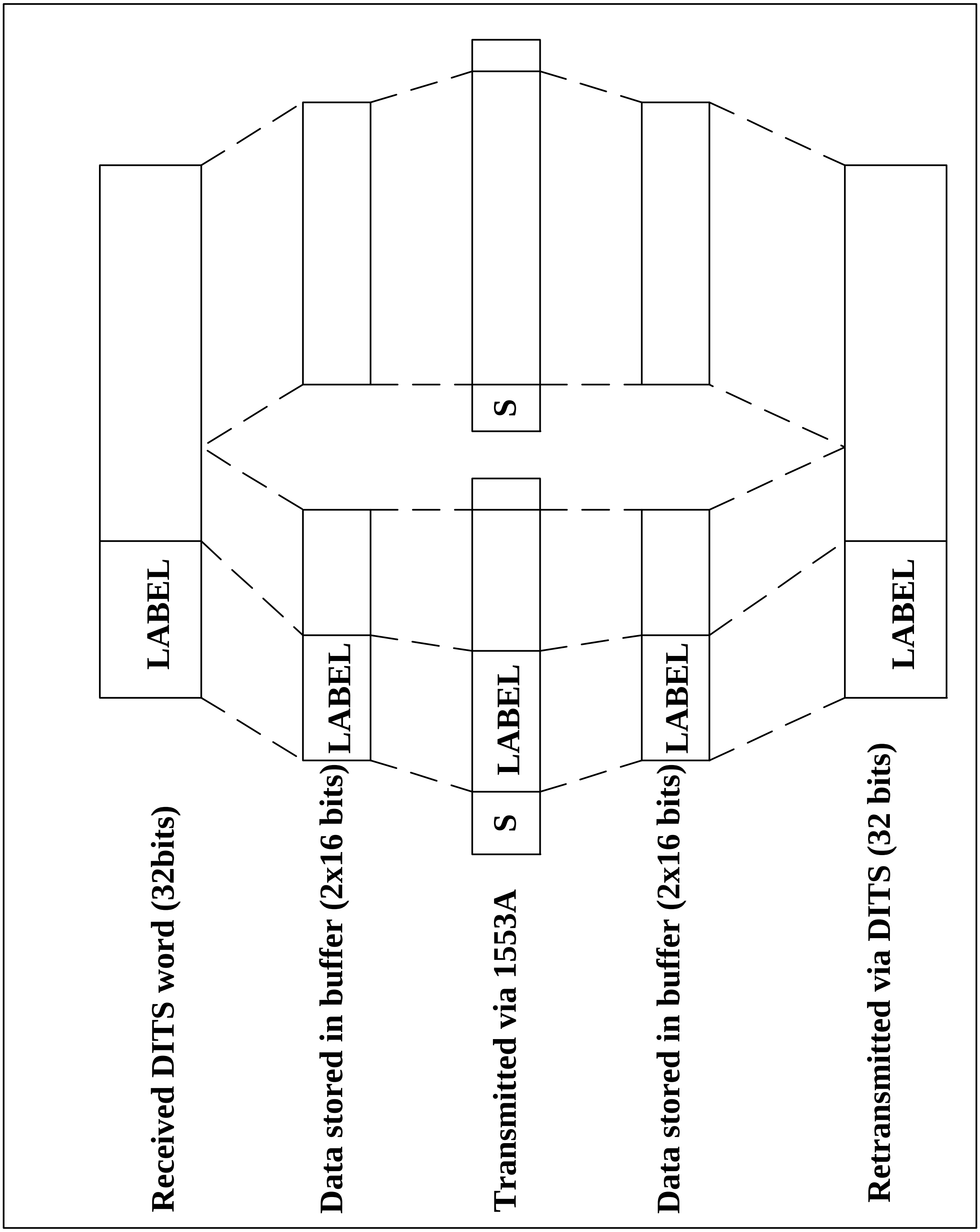
This method represents one way of constructing a hybrid system. The retransmission of the label with the data greatly reduces the intelligence required by the DEB but increases bus loading. A more intelligent DEB, perhaps located in the bus controller, could achieve much higher efficiencies.

FIGURE b-(i)
HYBRID BUS ARCHITECTURE



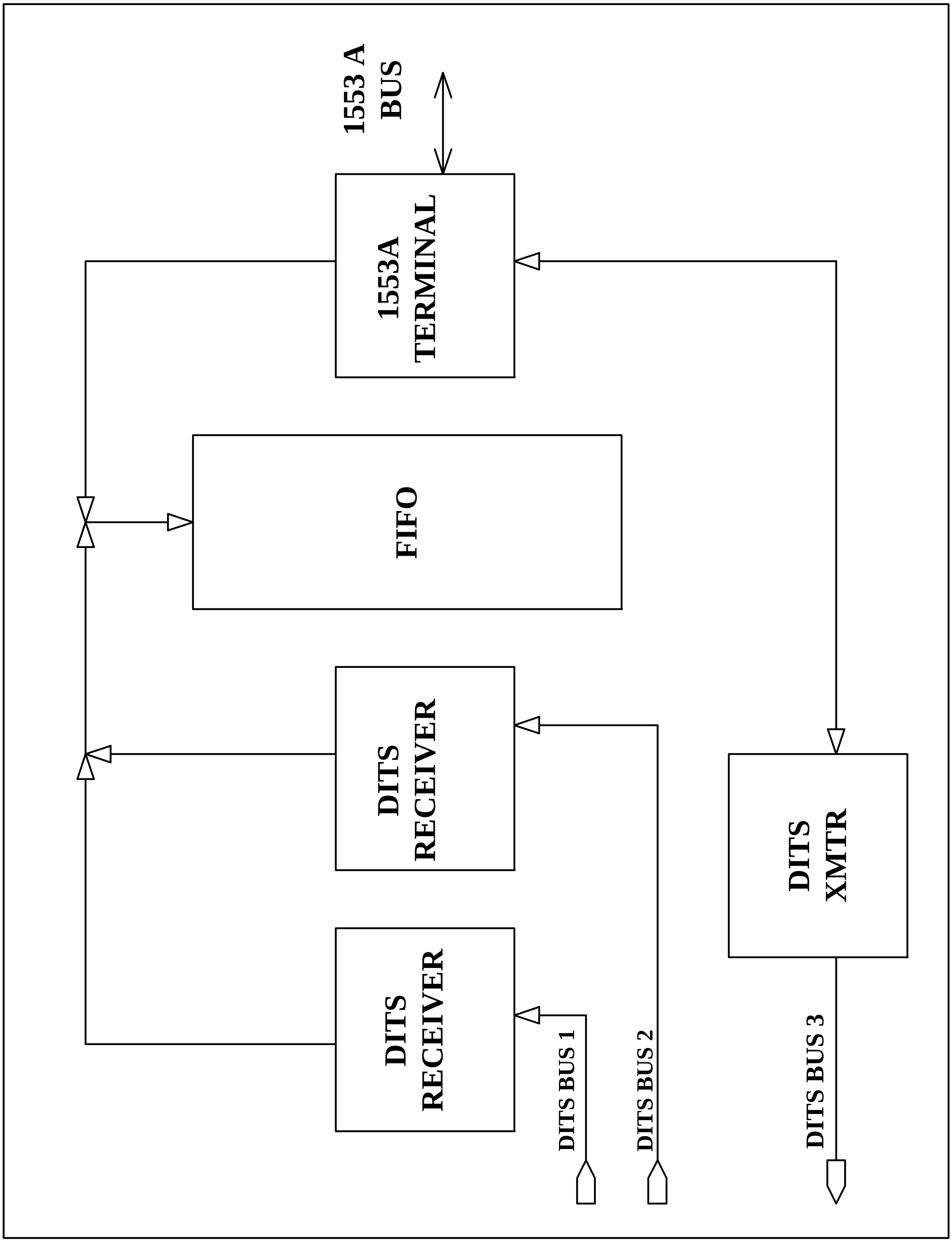
## APPENDIX B
## AN APPROACH TO A HYBRID BROADCAST-COMMAND/RESPONSE DATA BUS ARCHITECTURE

FIGURE b-(ii)
MESSAGE WORD FORMATTING



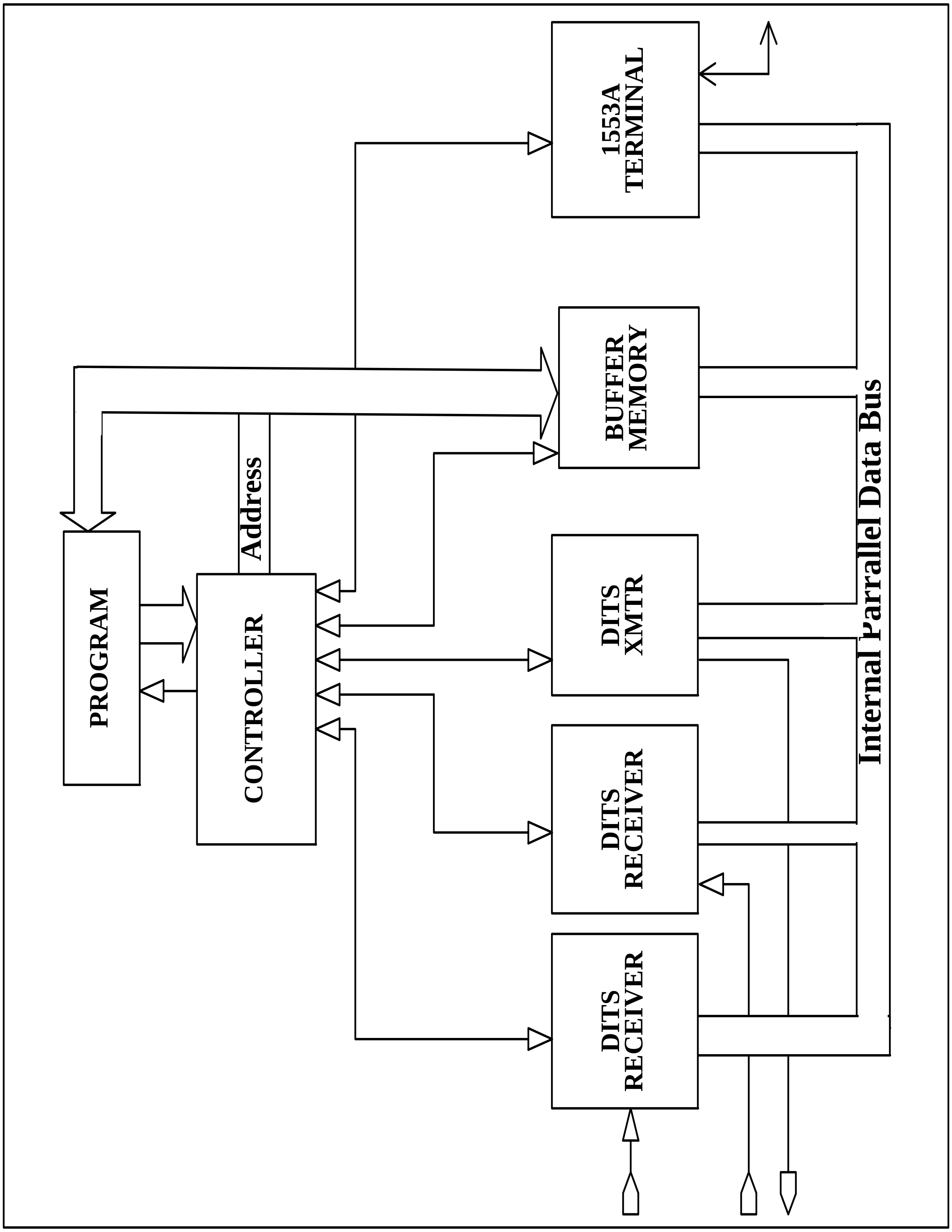
## APPENDIX B
## AN APPROACH TO A HYBRID BROADCAST-COMMAND/RESPONSE DATA BUS ARCHITECTURE

### FIGURE b-(iii)
### MINIMUM DATA EXCHANGE BUFFER



## APPENDIX B
## AN APPROACH TO A HYBRID BROADCAST-COMMAND/RESPONSE DATA BUS ARCHITECTURE

FIGURE b-(iv)
PROGRAMMABLE DATA EXCHANGE BUFFER



## APPENDIX C
## DIGITAL SYSTEMS GUIDANCE (PART 1)

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**Rockwell
International**

4 May 1979

### A Control System View of ARINC 429 Bus Specifications

By
T. G. Sharpe and G. E. Forquer

### I. Introduction and Summary

The discussion below summarizes concepts that have grown out of an in-house effort to determine what parameter characteristics Collins feels should be included in the data standards tables of ARINC Bus Specification 429 (DITS). The DITS specification seems to be evolving as more than merely a digital bus description since in many ways it is taking on the characteristics of a system interface specification. This raises philosophical questions concerning those characteristics, which should appear in the individual equipment specifications versus those which should appear in “429”. The authors cannot resolve such partitioning questions. Hopefully we can contribute, as outlined below, to an understanding of what information is required by control systems designers to achieve an acceptable system performance. The detailed discussion in this paper evolves a set of terms (outlined below) which are usable in a specification. Which of these terms appear in the individual equipment specifications and which appear in “429” remains to be determined.

At the present time, it is suggested that control system designers interfacing with digitally bused data should be concerned with three prime areas: stability considerations, signal degradation, and spectral characteristics. Without these elements of information, thorough analysis of system performance will not be possible.

The following eight parameter characteristics should prove adequate for the minimal control of interfacing considerations.

Stability
- Control Band
- Magnitude Limits
- Phase Limits

Signal Degradation
- Modification Signal to Noise Ratio (MSN)
- Static Accuracy

Spectral Characteristics
- Update Interval
- Transmit Interval
- Pre-sampling Bandwidth Limit

The following discussion of these characteristics should aid the reader in understanding their purpose and assessing their adequacy. It is recognized that some changes may necessarily take place as the industry completes its digital interfacing standardization task.

### II. Stability Consideration

There is nothing uniquely digital in this area. Here our concern is with those characteristics that are most often used in linear system stability analysis – namely gain and phase characteristics. We recognize at the outset that all sensor systems are not 100% linear but this does not prevent us from defining a linear model of sufficient quality to support stability analyses. It is useful to consider here that generally the sensor will be wideband relative to the band of frequencies of interest to the control system. This is necessary from a stability point of view since the converse (that is, signals narrowband relative to the control band) would introduce excessive phase lag in the control band. Thus far we have implicitly considered both bandpass and lowpass centered at zero frequency. For simplicity, however, the discussion below will assume low pass sensor characteristics but the ideas apply generally. Figure 1 illustrates an assumed sensor characteristic.

#### Gain and Phase Constraints

Note that prime concerns are that the gain remain essentially constant through the control band and that the phase be bounded by a linear characteristic through the control band. From a control law stability point of view, we are not concerned with what happens at frequencies above the control band because these are beyond the range where the data is being used by the control system. If we consider open loop Bode plots broken at the sensor output, the control band as used above should be wide enough to include the phase crossover as well as the gain crossover. The phase and gain characteristics provide information about phase and gain margin degradation. For most sensors the gain crossover in typical control laws is known approximately. Phase crossover is not as easily determined. A reasonable first cut would be to define the control band as approximately ten times the open loop crossover frequency with the expectation that beyond this range control law gain is low enough to prevent gain margin

## APPENDIX C
## DIGITAL SYSTEMS GUIDANCE (PART 1)

problems. However, some sensors may have trouble holding a tight gain (and phase) spec over this wide a bandwidth. Possibly in these cases a loosening of the spec between open loop crossover and ten times open loop crossover may be required. With this kind of specification a simple transport delay in combination with a gain change can be used for stability analysis or, for slightly more complex cases, simple transfer functions can be used to approximately fit the spec. The important point here is not to constrain the sensor designer to a first order or second order or any specific implementation, but to rather bound in a simple yet usable sense the stability degradation the sensor can introduce. The important stability characteristics are defined concisely below.

- Control Band – That band of frequencies over which magnitude and phase characteristics of the sensor are important to the control system stability.

- Magnitude Constraint – The bounds (envelope) on the permissible gain variation in a linear frequency response sense that are permissible over the control band.

- Phase Constraint – The bounds (envelope) on the permissible phase variation in a linear frequency response sense that are permissible over the control band.

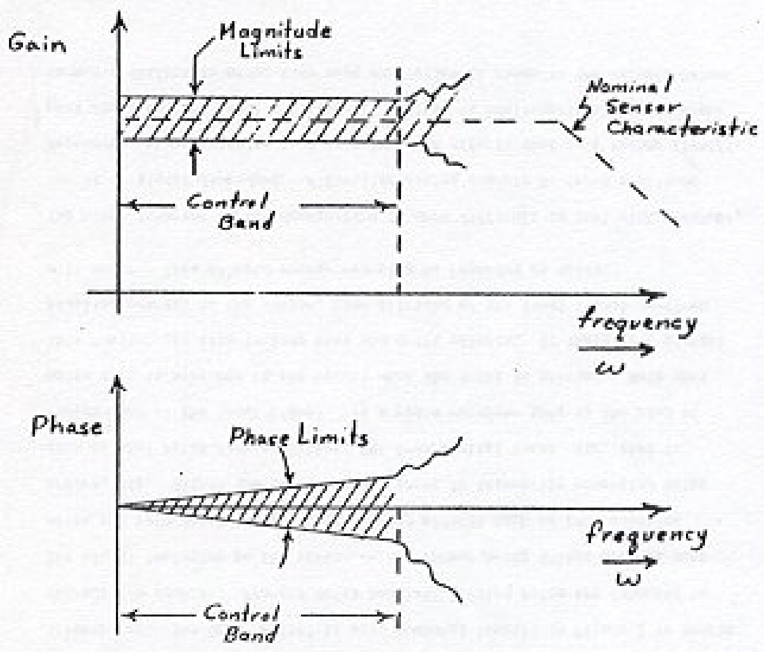

Figure 1. Gain and Phase Limits of Interest to Control System Designer

## APPENDIX C
## DIGITAL SYSTEMS GUIDANCE (PART 1)

### Potential Measurement Technique

These quantities could be measured by providing a sinusoidal input stimuli at selected frequencies in the control band using a mid-range amplitude. At each frequency the output component of interest (assuming some distortion) will be the output component whose frequency corresponds to the input frequency. The phase and amplitude of this component of this component relative to the forcing function will provide the magnitude and phase information. In the terminology of nonlinear system analysis, this procedure yields and empirically derived describing function for the sensor over the control band. If amplitude dependent nonlinearities are severe, more than one amplitude of forcing function may have to be used with the procedure repeated at each amplitude.

### III. Signal Degradation

In this area we are concerned with what the sensor may have done to degrade the signal. The thrust here is not stability but performance. Figure 2 presents a view of sensor and signal characteristics that is useful in this context. In Figure 2 some important sources of signal degradation are illustrated. The term “noise” is used somewhat loosely in Figure 2 to denote degradation sources. Process noise and installation noise are inherent in the signal impinging on the sensor – the former being things such as gust noise and beam noise and the latter being effects such as EMI, mounting errors, etc. Within the sensor itself there is internally generated noise such as shot noise from resistors, EMI from digital buses, etc. that is independent of the input signal. In a radio receiver this is the kind of noise that is measured at the output when the input is shorted. Note that this “noise” can also include bias and drift effects. If there is a digital sampling process in the sensor, some aliasing of the input signal spectrum will occur. This aliased energy may also be regarded as noise.

The other inherent sensor degradation is more difficult to deal with, however, for it is signal dependent. A familiar analog example is input amplitude dependent characteristics such as saturation effects that only become significant above certain input amplitudes. Another is nonlinearities that produce harmonic distortion under sine wave excitation as shown in the example below.

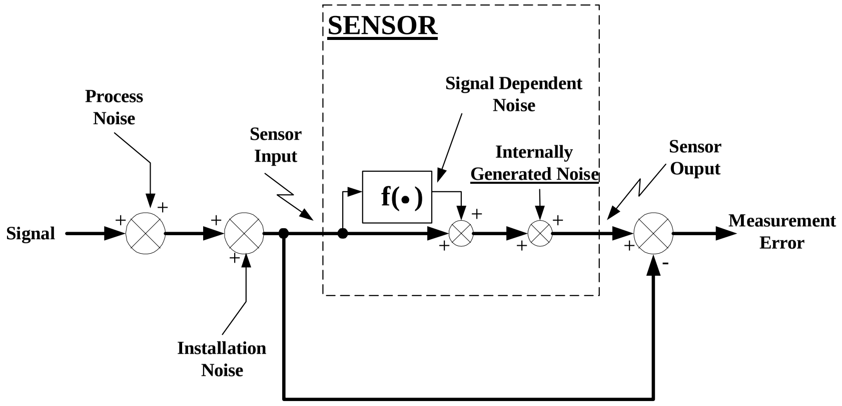

**Figure 2. Sensor and Signal Characteristic and Measurement Noise**

## APPENDIX C
## DIGITAL SYSTEMS GUIDANCE (PART 1)

### Harmonic Distortion

Consider square law distortion in an otherwise linear sensor. Let the sensor output be

$$y(t) = x(t) + kx(t)^2$$

Where x(t) is the sensor input and let x(t) = sinwt. Then

$$y(t) = \sin wt + k\sin^2 wt$$

$$y(t) = \sin wt \pm \frac{k}{2} \mp \frac{k}{2} \cos 2wt$$

Note that d.c. and second harmonic components as well as the forcing frequency appear at the output. In digital systems a similar effect occurs when multiple rates are introduced, such as signals being received at one rate from a digital bus and being used at a different rate by a software program. If the analog signals originally sampled and put on the bus were sinusoidal at one frequency then, in general, frequency components less than and greater than the input frequency (as well as the input frequency) appear after the second sampler. The amplitude and number of these spurious outputs is a function of the two sampling rates as well as the input frequency. The net effect of all such internal sensor effects is observable by subtracting sensor input from sensor output to yield measurement error as shown in Figure 2.

### Measurement Error

The involved nature of what can happen to the signal within the sensor as shown in Figure 2 is the source of ambiguity in conventional "accuracy" specs. Since measurement noise can be dependent on input amplitude as well as spectral characteristics, it is not possible to specify it with a single and simple metric. It should also be apparent that measurement error must be addressed statistically since a significant portion of the input, process noise, is only describable as a random process.[1] Technically the input signal is also in general a random processes influenced by such things as the gust striking the aircraft. Gusts also can only be described as random processes.

To evaluate the spectral characteristics of measurement error will require tests which force the system with noise type inputs. Exponentially correlated noise of specified variance and correlation time (or bandwidth) should be sufficient in most cases. If a sensor is known to be susceptible to a specific type of noise, however, that noise should be included in the test. Often it will be useful to separate out the low frequency or d-c components of measurement error since these may be more tolerable in some applications than dynamic errors. A set of tests that will measure these characteristics is described below.

### Modified Signal to Noise Ratio (MSN)

Force the sensor with random noise of specified rms value (σ) and correlation time (τ). Determine the power spectral density (PSD) of the input signal to the sensor. Determine the PSD of the measurement error. Plot the two PSD's on a common plot as shown in Figure 3. Define a modified signal to noise ratio (which will be a function of frequency) as the square root of noise ratio at each frequency of signal PSD amplitude to measurement error PSD. Note in the example shown in Figure 3 there is a bulge in the measurement error around zero frequency. This effect would indicate d-c bias and possibly low frequency bias drift from the sensor. This effect may or may not be important depending on whether the application permits washing out low frequency components, e.g. in a complementary filter. In the range of frequencies where accurate sensor response is required, it is suggested that appropriate values for the modified signal to noise (MSN) will be 100 to 1000. Roughly, these numbers correspond to noise power being 1% to .1% of signal power at each frequency or noise being 40 to 60 db down from signal. The relationship between MSD and ordinary signal to noise can be understood by assuming both signal and noise PSD's are flat over a band of frequencies Δw as shown in Figure 3. Let the value of the signal PSD in this band be $S_o$, then rms signal power in the band Δw is given by $\sqrt{S_o * w}$. Similarly, rms error power is given by $\sqrt{P_o * w}$. Therefore conventional signal to noise over the band w is given by $\sqrt{\frac{S_o}{P_o}}$ . Requiring that this signal to noise be 100 is equivalent to requiring that noise power be 1% of signal power over this band. Carrying this back to the MSN implies that MSN (w) = $\sqrt{\frac{S_o}{P_o}}$ = 100 over the band Δw. The above also represents the motivation for considering square root of the ratio than the ratio directly.

### Amplitude Dependent Nonlinearities

The approach described above tests for input frequency dependent degradations by providing a realistic input spectrum. It should be realized that if there are amplitude dependent degradations, the MSN analysis will yield different answers depending on the rms value of the input noise. It is suggested that the MSN measurement be done with worst case input noise, i.e., largest rms and bandwidth

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[1] Recognizing that a complete description of a random process includes not only probability distributions but also spectral characteristics.

## APPENDIX C
## DIGITAL SYSTEMS GUIDANCE (PART 1)

that will be encountered. In some cases alternate MSN specs for different flight regimes may be appropriate.

In many cases a more explicit presentation of the amplitude dependent non-linearities may be desirable. A good example here is localizer receiver linearity, specified as being linear within a given percentage up to .155 DDM, a larger percentage from .155 to .310 DDM and not decreasing between .310 and .400 DDM. Such a specification is important in defining localizer capture laws, where one can begin “using” the signal crudely before it is linear or precisely accurate. It should be noted that this is a slightly different use of sensor data than for precise state control, i.e. the control is carrying the system to a prescribed state rather than maintaining it at a prescribed state in the presence of noise. Normally the latter operation will require more accurate information from the sensor. The amplitude dependent degradations should be measured statically -- that is, one should provide a test input at specified amplitude, allow transients to settle, and measure the output value.

The important signal degradation terms are defined concisely below. Only the last two are proposed as parameter characteristics--the first three being definitions to clarify the last two.

- Measurement Error – The difference between the signal impinging on the sensor and the output representation of that signal by the sensor expressed in consistent units.

- Signal PSD (SPSD) – The power spectral density of the signal impinging on the sensor.

- Measurement Error PSD (MEPSD) – The power spectral density of measurement error introduced by the sensor.

- Modified Signal to Noise Ratio – A measure primarily of the spectral characteristics of sensor errors defined as the square root of the ratio of SPSD and MEPSD at each frequency in the control band.

$$\text{i.e., MSN(w)} = \sqrt{\frac{\text{SPSD (w)}}{\text{MEPSD (w)}}}$$

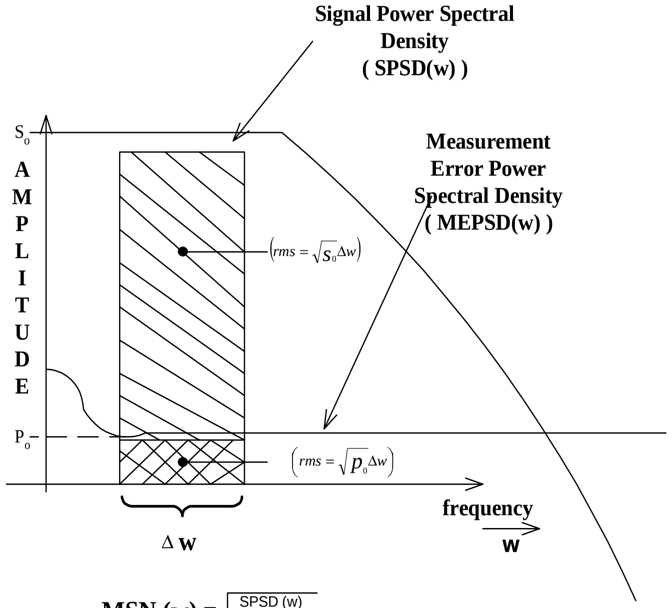
- Static Accuracy – A measure of the amplitude dependent characteristics of sensor errors defined as the difference between input and output signals after all transients have settled.

<u>Potential Measurement Technique</u>

Modified Signal to Noise (MSN) determination requires assuming a random process model for the signal impinging on the sensor. Normally an exponentially correlated signal with specified variance will be sufficient. Empirically determined power spectral densities (using discrete Fourier Transform techniques) will need to be measured for input signal as well as measurement error. Static accuracy measurement was described above.

### IV. Spectral Characteristics

In this area the digital nature of the system interface must be faced squarely. The control system designer cannot alter the signal degradation introduced by



$$\text{MSN (w)} = \sqrt{\frac{\text{SPSD (w)}}{\text{MEPSD (w)}}}$$

$\text{MSN} \triangleq$ **Modified Signal to Noise Ratio**

**Figure 3. Modified Signal to Noise Ratio**

the sensor whether it be due to nonlinearities, aliasing, noise, etc. He has great potential, however, for making matters worse if he is not alert to potential aliasing problems that he may introduce. To analyze aliasing precisely he would need a precise definition of the spectrum of each signal being received on the digital bus including the update interval for each signal. A more practical approach is to place an upper bound on the received signal spectrum and then ensure downstream performance is adequate using this bound as the signal spectrum. These ideas are made more precise below.

### Multirate Sampling

A simple model for signals received from a bus and used in a digital processor is shown in Figure 4. We note that the spectrum of the signal on the bus, $F_1$ (s), is an infinitely replicated version of the analog input spectrum with replicas spaced by the input sampling frequency F1. We cannot, therefore, speak of the bandwidth of $F_1$ (s) strictly. What we mean here is that a bound is required on each copy in $F_1$ (s). Deriving the spectrum of the signal $F_2$ (s) is beyond the scope of this discussion but a technique has been developed that will yield this spectrum, $F_2$ (s), given the quantities $F_1$, $F_2$, and the shape of the repeated spectrum of F (s) in $F_1$ (s). There is considerable spreading of signal energy in this process with considerable "aliasing" potential even if the quantity $f_c$ in Figure 4 is much less than the Nyquist frequency $(\frac{f1}{2}, \frac{f2}{2})$ for both $F_1$ and $F_2$. The "aliasing" in the spectrum $F_2$ (s) occurs because the second sampler is not operating on a properly band limited function (see Figure 4) due to the "infinite replica" nature of the spectrum $F_2$ (s).

### Deterministic Versus Random Signals

The discussion above did not specify whether the original analog quantity was a deterministic signal or a random process. For deterministic cases we deal with the Fourier transforms of the signals involved. However, as pointed out in Section III the signals of interest are really describable only in terms of random processes. For this case the development must proceed in terms of power spectral density of the signals involved. Figure 5 then illustrates the bound on bused signal PSD that is envisioned. Recall that white noise through a lowpass filter yields a PSD that rolls off at 40 db/decade as shown below.

White Noise Input PSD: $U(S) = A \quad - \infty < w < + \infty$

Filter Transfer Function: $T (jw) = \frac{1}{J\tau w+1}$

Output PSD: $Y (S) = T(S)T^*(S)U(S)$

$$Y(w) = \frac{A}{\tau^2 w^2+1}$$

Adequate roll off chracteristic of the digitally bused data reduces the aliasing problem of the second sampler if the second sampling is properly performed. However, not only this spectrum but also the frequency $F_1$ enters into the aliasing in $F_2$ (s), therefore, it is desirable also to carefully specify $F_1$. This will be accomplished through the update interval. Assuming $F_2$ is somewhat fixed by computer speed and loading considerations, aliasing can be minimized for a given input spectrum by making $F_1$ as high relative to $F_2$ as possible.

The important spectral characteristic terms are defined concisely below.

- Update Interval – The cyclic time interval, as measured at the DITS bus interface, between transmissions of new freshly sensed and converted/derived values of the parameter.

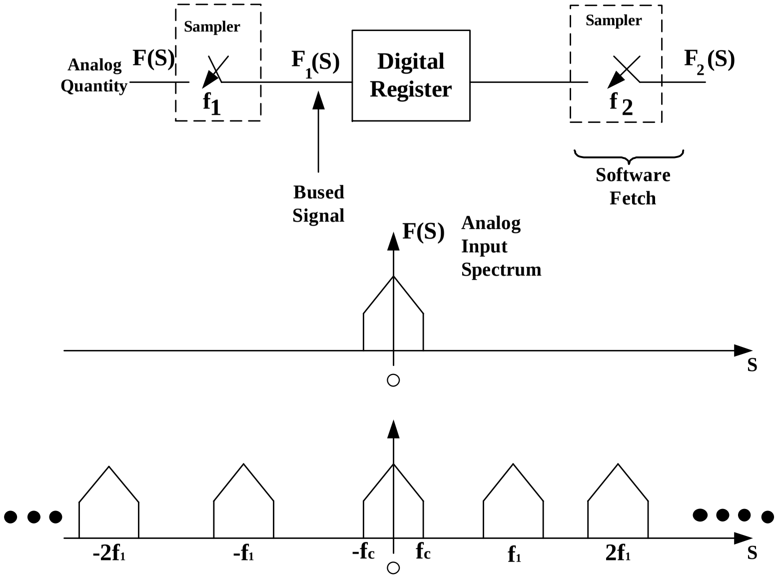
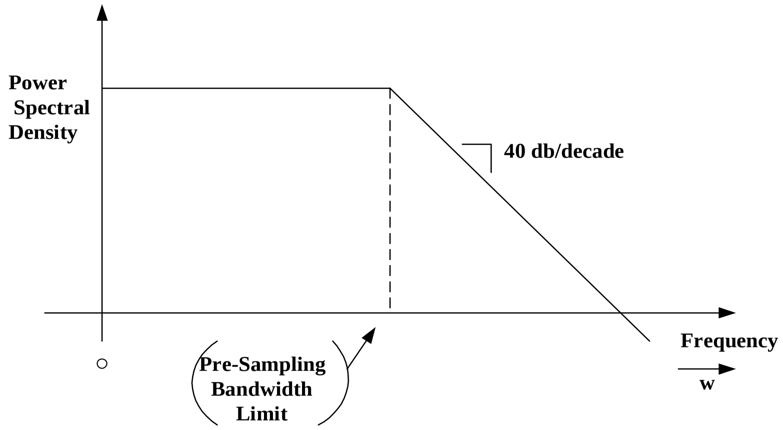


Figure 4 Analysis of Multirate Sampling

## APPENDIX C
## DIGITAL SYSTEMS GUIDANCE (PART 1)

- Transmit Interval – The cyclic time interval, as measured at the DITS bus interface, between transmissions of the parameter. Transmit Interval ≤ Update Interval.

- Pre-sampling Bandwidth Limit – That bandwidth for a first order lag that will upper bound the spectral characteristics of the signal of the signal on the bus.



**Note: Periodic Function - Only Positive Half of Zero Centered Component Shown (see Figure 4)**

Figure 5 PSD Bound on Bused Signal

## APPENDIX D
## DIGITAL SYSTEMS GUIDANCE (PART 2)

**BOEING COMMERCIAL AIRPLANE COMPANY**
P.O. Box 3707
Seattle, Washington 98124
M/S 47-09
A Division of The Boeing Company

May 11, 1979
SYST-B8713-79-209

Mr. B. R. Climie, Chairman
Airlines Electronic Engineering Committee
Aeronautical Radio, Inc.
2551 Riva Road
Annapolis, Maryland 21401

Dear Rick:

The enclosed paper is a revised version of "Design Parameters for Digital Avionic Systems," which was originally circulated with AEEC letter 79-022/SAI-99. The revision addresses the topic of aliasing which could occur when reducing the sampling rate of a digitally encoded signal. This topic was discussed at the DITS working group meeting held on April 18 and 19.

Sincerely

AIR TRAFFIC CONTROL
AND ELECTRONIC SYSTEMS

A. F. Norwood, Chief

AFN:
Enclosure

**BOEING**

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Attachment to
SYST-B-8764-20-075

# DESIGN PARAMETERS FOR DIGITAL AVIONIC SYSTEMS
Prepared by
Boeing Commercial Airplane Company
REVISION A

### Summary

This paper explains the necessity for defining presampling filter characteristics, transport delays and minimum update rates for digital and noise characteristics are discussed. A design procedure for selecting the required filter characteristic and update rate is presented.

### Introduction

The new generation of commercial aircraft will use digital technology to implement many functions, which were traditionally performed with analog hardware. These functions include inner and outer servo loops for aircraft control and guidance, processing and filtering signals from navigation and other sensors, and filtering of data prior to its display on cockpit instruments. Digital technology will also replace the majority of the formerly analog communication paths between systems, sensors, instruments and actuators.

A basic property of these and other digital systems is that they only process or transfer values of data from discrete points in time. The contrast between the discrete time nature of a digital system and the continuous time nature of an analog system is shown in Figure 1. Analog systems are said to operate in the continuous time domain while digital systems are said to operate in the discrete time domain.

In order for discrete time digital systems to be used to process or transfer the inherently continuous time data from real world physical systems, samples of the continuous data must be taken at periodic intervals. These samples from discrete points in time can then be used as the input to the discrete time digital system. It is intuitively obvious that the interval between samples affects the accuracy with which the continuous time data is represented by the discrete samples. It is also obvious that rapidly varying signals should be sampled more often than slowly varying signals in order to maintain an adequate representation of the continuous analog data. Selection of a proper sampling rate for each signal is a design task unique to digital systems. An understanding of the Sampling Theorem is necessary in order to make the proper trade offs between sampling rate, signal-to-noise ratio, signal delay, and system complexity.

## APPENDIX D
## DIGITAL SYSTEMS GUIDANCE (PART 2)

### The Sampling Theorem

The Sampling Theorem states that a signal which contains no frequency components higher than $f_o$ Hertz can be exactly recovered from a set of its samples if the samples are spaced no further apart than ½ $f_o$ seconds. This is equivalent to requiring that the sampling frequency be greater than twice the highest frequency component of the signal.

The reason for this requirement can be shown by examing the frequency spectrum of the sampler output. Modeling the sampling operation as the multiplication of the input signal by an impulse train as shown in Figure 2 allows the sampler output spectrum to be computed from a Fourier Transform identity. The required identity states that time domain multiplication is equivalent to frequency domain convolution. Therefore, the output spectrum is found by convolving the input spectrum with the spectrum of the impulse train. This relationship is shown in Figure 3. The convolution operation has the effect of reproducing the spectrum of the input signal about zero frequency and at all harmonics of the sampling frequency. If the sampling frequency, $1/T_s$, is greater than twice $f_o$ the spectral components centered about the sampling frequency and its harmonics will not overlap the spectral component centered about zero frequency. Therefore, the spectral component centered about zero, which is identical to the input spectrum, can be obtained by passing the sampled output through a low pass filter with a bandwidth of $f_o$ Hz.

### Application of the Sampling Theorem to Digital Avionics Systems

The discussion of the Sampling Theorem in the preceding section has shown that a signal which contains no frequency components higher than $f_o$ Hz. can be exactly represented by a series of samples spaced no further apart than ½ $f_o$ seconds. However, signals, which represent physical quantities, such as those processed by avionic systems never satisfy the strict bandwidth limitation requirement stated above. Therefore exact reproduction of the original signal from its samples is not possible. The effect of the non-bandlimited nature of signals is to distort the replica reconstructed from the samples. The shaded area shown in Figure 4 represents typical high frequency signal energy which distorts the low frequency portion of the signal spectrum. The high frequency portion of the signal takes on the identity of the lower frequencies, hence the name “aliasing” for this phenomenon.

Aliasing becomes a greater problem when the signal is corrupted by noise, which has a wider bandwidth than the signal. When this occurs both signal energy and noise energy which is beyond one half of the sampling frequency is aliased into the low frequency portion of the recovered signal. This effect is shown in Figure 5. The signal-to-noise ratio is degraded by both noise and signal components which are aliased into the low frequency portion of the signal spectrum. The effect of aliasing can be decreased by sampling the incoming signal at a higher rate and/or using a presampling filter to reduce the bandwidth of the signal prior to sampling. Neither of these approaches can ever completely eliminate the effect of aliasing and they each result in some negative impact on the overall system.

An increase in the sampling rate requires more computations to be done in a given period of time. This requires more computational resources, which increases the weight, complexity, and power requirements of the computer subsystems. The use of a presampling filter to limit the bandwidth prior to sampling distorts the signal. It also increases the delay experienced by signals as they propagate through the system. The increase in delay reduces phase margin if the signal is used in a closed loop control system. Therefore, more stringent delay requirements must be placed on other components in the loop if the system phase margin is to remain constant.

### Design Tradeoffs for Digital Avionics Systems

The final choices of sample rate and presampling filter depend upon the input signal and noise spectra, maximum allowable signal-to-noise ratio degradation due to aliasing, maximum allowable transport delay, available computational resources, and the bandwidth of the system which uses the data. A practical way to make these choices is to analyze the system for various sample rates and filters. This can best be done with the aid of a computer program which computers the effect of each combination of sample rate and filter characteristic on the output signal-to-noise ratio for the defined input signal and noise spectra.

The initial computation is to determine the effect of the prefilter on the in-band signal-to-noise ratio without regard to aliasing effects. A typical plot of signal-to-noise ratio versus presampling filter bandwidth is shown in the top curve of Figure 6. This curve forms a baseline against which signal-to-noise ratio degradation caused by aliasing can be compared. The signal-to-noise ratio is determined by computing the input signal power and input noise power, which is passed by the selected prefilter. This parameter will generally exhibit a peak value at a specific bandwidth. The signal-to-noise ratio will decrease with increasing bandwidth as more noise is admitted and decrease with decreasing bandwidth as signal energy is eliminated.

The filter order is an important design parameter because higher order filters roll off more rapidly near the cutoff frequency. Therefore higher order filters admit less noise and signal from beyond the cutoff frequency than low order filters. Because of this characteristic, high order filters alias no more noise into the signal than slightly narrower bandwidth low order filters. However, high order filters delay the signal more than low order filters.

The ultimate objective of the design task discussed in this paper is to achieve acceptable system performance with the minimum possible

## APPENDIX D
## DIGITAL SYSTEMS GUIDANCE (PART 2)

sampling rate. System performance is adversely affected by large propagation delays and high in-band noise levels.

If the maximum allowable propagation delay is given, the minimum usable filter bandwidth can be found standard plots of group delay versus frequency for the type and order of filter considered. (See for example Reference 1, page 112.) This minimum bandwidth is plotted on Figure 6 as a vertical line. The maximum achievable signal-to-noise ratio is constrained by the requirement for a presampling filter wide enough to limit delay to the given value. The intersection of the minimum bandwidth line with the top curve of Figure 6 gives the maximum achievable signal-to-noise ratio i.e., the signal-to-noise ratio which would be achieved by an unsampled system.

Sampling rate is chosen by comparing the maximum acceptable degradation in signal-to-noise ratio to the actual aliasing degradation due to sampling at the candidate rates. For the example shown in Figure 6, a sampling rate of 50Hz would be chosen.

A system interface which meets prescribed limits on signal delay and maximum noise due to aliasing can be designed using the procedures outlined above. Some systems which use sampled data, such as closed loop control systems, have a bandwidth which is much smaller than that of the sampling filter. For this reason it is important to verify that the signal and noise power which is aliased into the frequency band of interest is well below the inherent noise in that band.

This can be accomplished by constructing a signal and noise power spectral density plot for the filter and sampling rate chosen. The power spectral density plot is most easily obtained with the aid of a computer program. A typical plot of this type is shown in Figure 7. The example power spectral densities in Figure 7 show that the aliased signal and noise is much lower than the inherent noise level in the frequency range of interest. If this constraint is not met a different combination of filter and sampling frequency must be chosen.

In some situations it may be desired to reduce the sampling rate of a digitally encoded signal. This may be done where wideband digital data is used to drive an instrument or subsystem which responds only to narrower bandwidth data. Simple deletion of unwanted samples to reduce the sampling rate can cause aliasing problems similar to those encountered when sampling an analog signal at an insufficient rate. The aliasing can be elimination of the unwanted samples. Design of the digital filter is subject to the same set of delay versus aliasing noise tradeoffs as the design of an analog presampling filter.

Conclusion

The procedures outlined in this paper can be used to choose the presampling filter and sampling rate required for interfaces to a digital signal processing or control system. The values are chosen to meet the constraints of maximum allowable delay and maximum allowable noise due to aliasing. Signal and noise spectra of the signal to be sampled must be supplied as an input to the design procedure.

Reference: Herman J. Blinchikoff and Anatol I. Zverev, Filtering in the Time and Frequency Domains, John Wiley and Sons, New York.

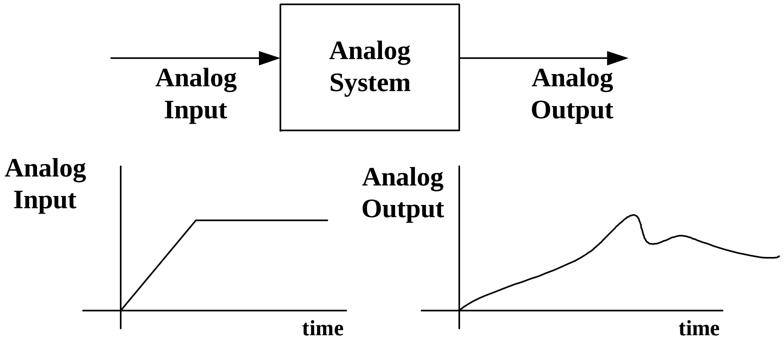


**Figure 1(a) Typical Input and Output of Analog System**

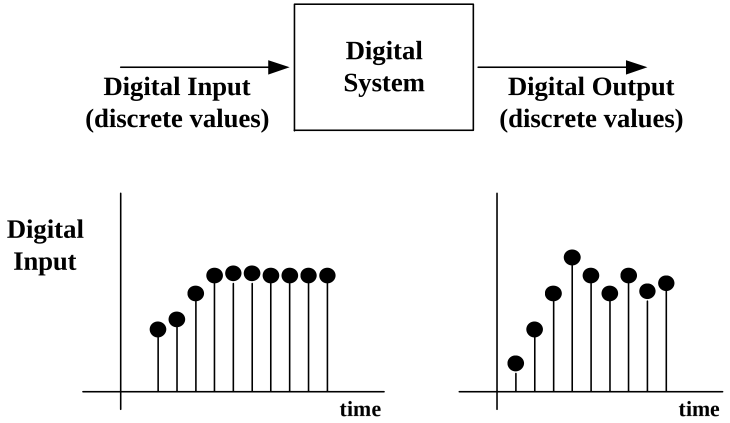


**Figure 1(b) Typical Input and Output of Digital System**

## APPENDIX D
## DIGITAL SYSTEMS GUIDANCE (PART 2)

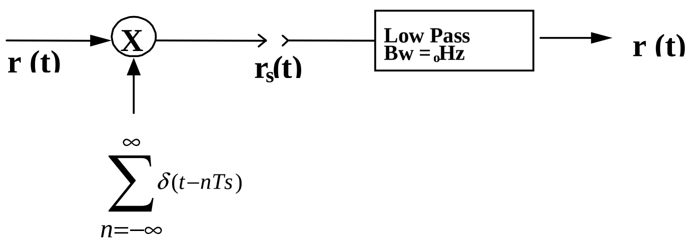


Figure 2 Mathmatical Model of Sampling Process

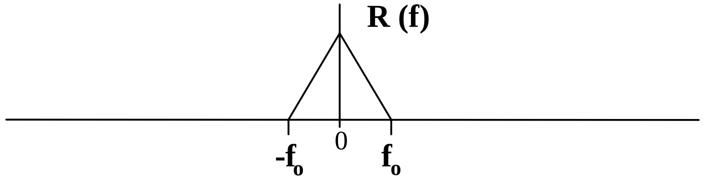


Figure 3(b) Spectrum of f(t) Bandlimited to $f_o$ Hz

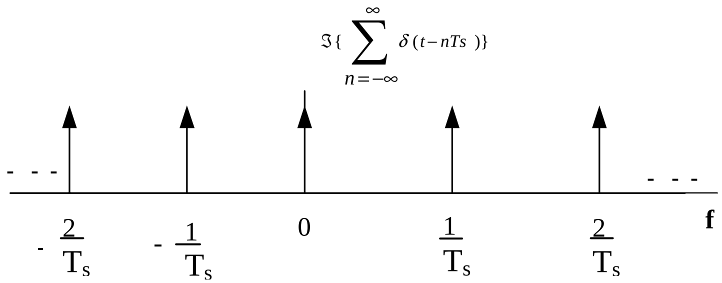


Figure 3(b) Spectrum of Input Train, $\sum_{n=-\infty}^{\infty} \delta(t-nTs)$

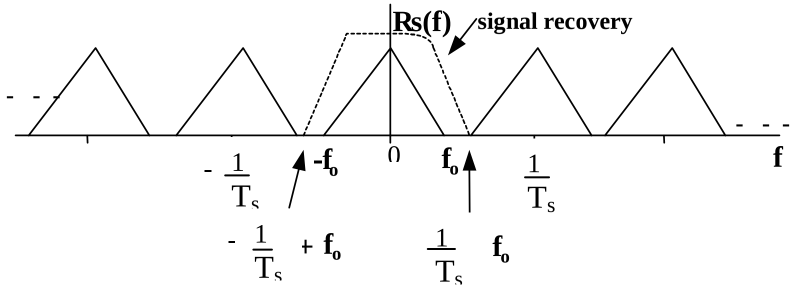


Figure 3(c) Spectrum of Sampling Output

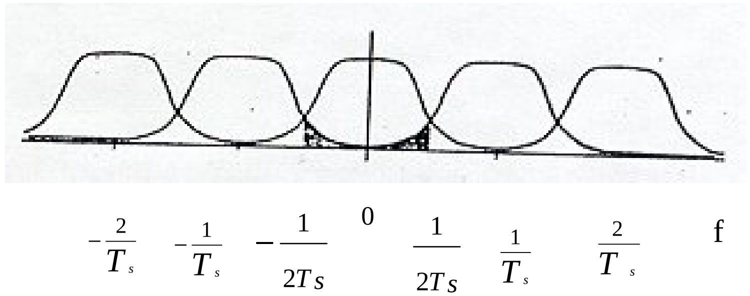


Figure 4 Sampler Output Spectrum When Input Signal Bandwidthis not Limited to One-Half of the Sampling Frequency

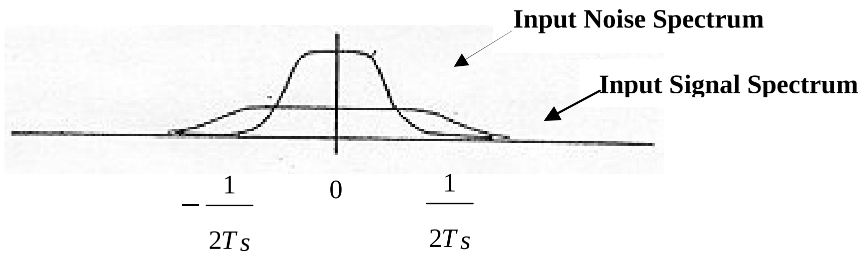


Figure 5(a) Input Signal and Noise Spectra

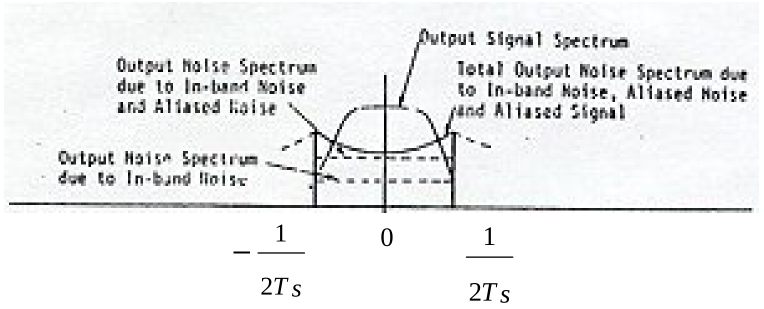


Figure 5(b) Output Signal and Noise Spectra Showing Signal-to-Noise Ratio Degradation Due to Aliasing of Signal and Noise

## APPENDIX D
## DIGITAL SYSTEMS GUIDANCE (PART 2)

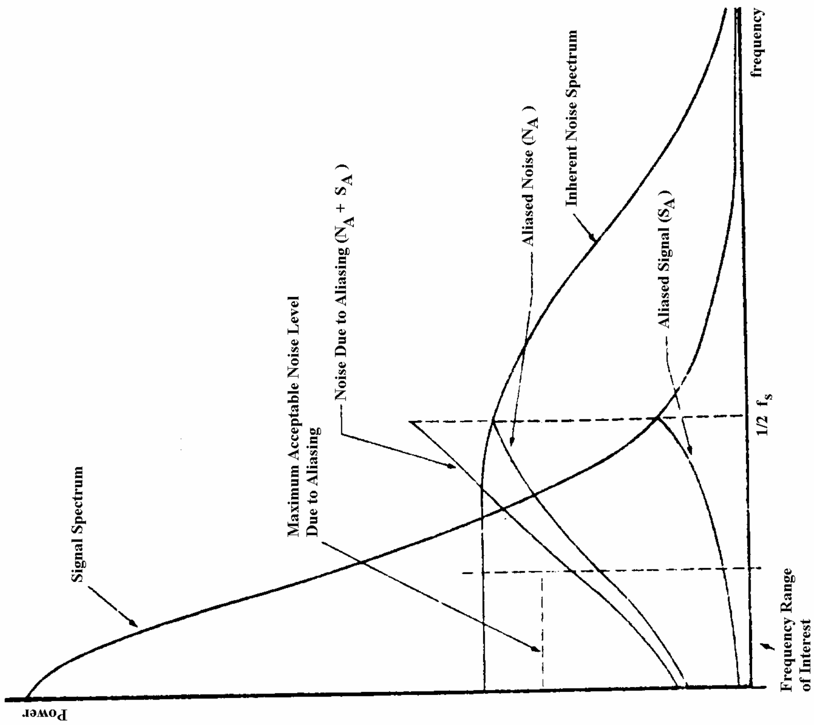


FIGURE 7 Sample Plot of Signal and Noise Power Spectral Densities

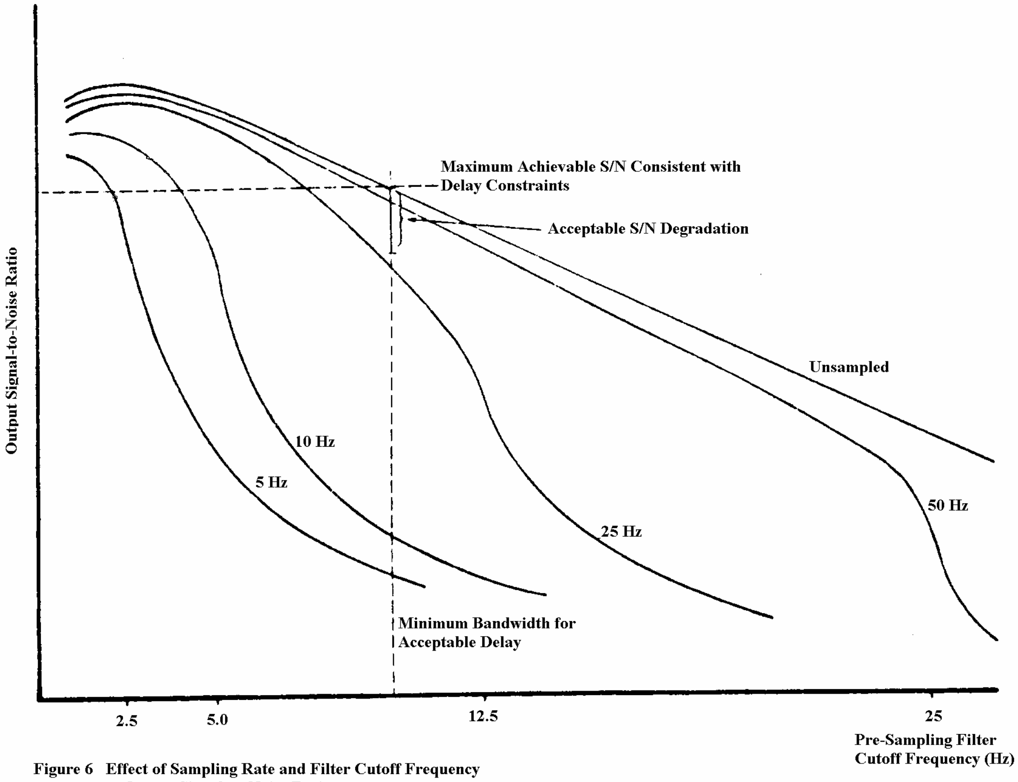


Figure 6 Effect of Sampling Rate and Filter Cutoff Frequency on Output Signal-to-Noise Ratio

# APPENDIX E
## GUIDELINES FOR LABEL ASSIGNMENTS

The ARINC 429 data bus was developed to provide a standardized means of digital information transfer between the “ARINC 700” series of avionics units. ARINC 429 has proven to be a very flexible standard and its usage has extended to provide data transfer between Line Replaceable Units (LRU) which are not otherwise covered by ARINC Characteristics. It is important that each new usage of ARINC 429 be coordinated and indexed by ARINC such that the information on usage (label allocation, data format, etc.) is available industry-wide. The use of the same label for two different functions on a particular LRU type built by different manufacturers can create serious problems.

To facilitate the coordination of ARINC 429 label usage between the industry and the ARINC staff, a set of guidelines is provided.

1. New labels should be selected from the five character field as defined in Section 2.3 (three octal and three hexadecimal).

2. The following labels have special significance and should not be used: label 000 (not used) and label 377 (equipment identification). The preferred SSM encoding for method for the Equipment Identification Word (label 377) is according to the Discrete word guidelines. When this label was originally assigned, it was recognized as a non-BNR word. The SSM encoding was according to the BCD and DISC guidelines that were identical at that time. During development of Supplement 4, the SSM for DISC was revised to it current form to provide enhanced failure warning. When the SSM encoding was changed, some systems retained the BCD encoding for the Equipment Identification word and others changed to DISC encoding. c-17

3. The following labels are presently “spare” and should only be used for new parameters which may have very widespread usage throughout the airplane architecture. c-16

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 005 | 040 | 050 | 054 | 107 | 163 | 227 | 371 |
| 006 | 046 | 051 | 055 | 113 | 167 | 240 | |
| 007 | 047 | 052 | 057 | 124 | 226 | 243 | |

4. Where possible, similar word usage should be “grouped”; for example, if Engine N 1 is to be provided from a new unit (PMUX) it should utilize label 246 which is presently N 1 (engine direct).

5. Where possible, grouped usage should have identical data specification (units, range, significant digits/bits, positive sense, resolution, min--max transmit interval). To facilitate this commonality it is permissible for a particular LRU to output a lower resolution signal (fewer significant digits/bits) if the least significant remainder of the data field is set to zeros.

6. Where word grouping is not possible, the labels should be selected from the following subgroups:

   Binary coded decimal (BCD) sub-group 001 to 067, 125, 165, 170, 200, 201,230 to 237.

   Binary (BNR) subgroup 070 to 124, 126 to 144, 150 to 154, 162 to 164, 166, 167, 171 to 177, 202 to 227, 240 to 257, 262 to 265, 267, 310 to 347, 360 to 376.

   Mixed BCD and BNR subgroup 260, 261

   Discretes subgroup 145 to 147, 270 to 276

   Maintenance and discrete data subgroup 155, 156

   Maintenance data subgroup 157 to 161, 350 to 354

   Test word subgroup 266, 277

   Application dependent subgroups 300 to 307

   Acknowledgement subgroup 355

   Maintenance ISO #5 subgroup 356

   ISO #5 message subgroup 357

   A schematic of these subgroups is attached.

## APPENDIX E
## GUIDELINES FOR LABEL ASSIGNMENTS

7. Allocation of bits within words, as defined in the appropriate sections.

   BCD
   BNR
   Discretes
   Maintenance data
   Test
   Application dependent
   Acknowledgement
   Maintenance ISO #5
   ISO #5 message

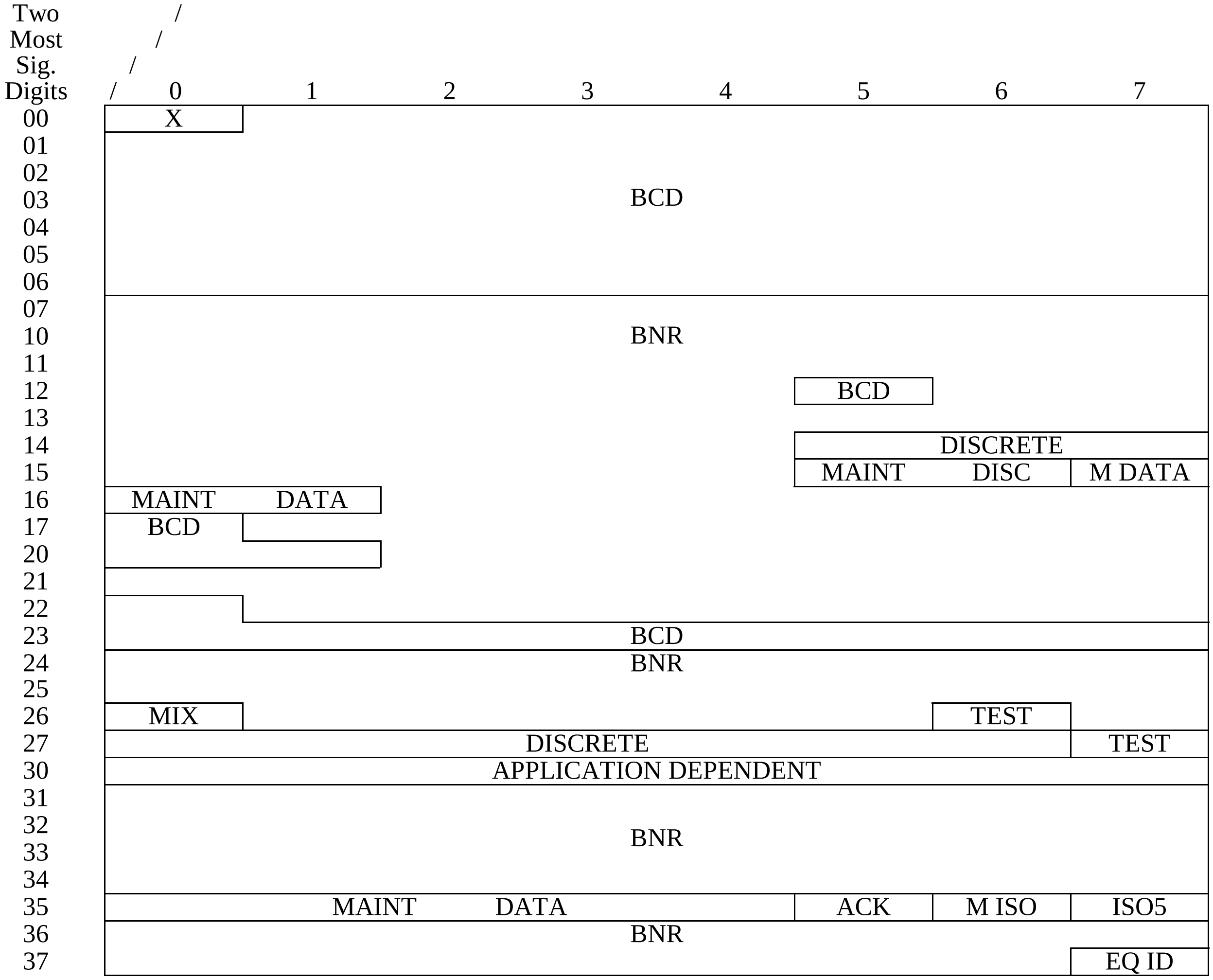
8. The data should be fully defined by Equipment ID and the label and the Source Destination Indicator (SDI). It should not be necessary to decode additional bits in the word to correctly interpret the data field.

9. The equipment ID should be allocated as the two least significant digits of the 7XX ARINC equipment specification, if one exists. For equipment not otherwise covered by an ARINC Specification, an equipment ID should be allocated with a non-numeric value of the hexadecimal character set as the least significant digit.

10. Equipment ID of 000 (HEX) should not be used.

11. The SDI code should indicate the aircraft installation number of the source equipment, in a multi-system installation, as described in 2.1.4.

**Least Significant Digit**



# APPENDIX X
# CHRONOLOGY & BIBLIOGRAPHY

## X-l.0 Chronology

AEEC established the Systems Architecture and Interfaces (SAI) Subcommittee in 1975 to develop the air transport industry’s approach to digital avionics systems architecture, to define digital system interface standards. With respect to this last-named, the Subcommittee soon determined that the industry’s previous approaches to digital information transfer, described in ARINC Specification 419, “Digital Data System Compendium”, needed rationalization and modernization to be applicable in the future digital systems world. However, this work was not started immediately because of the need to concentrate on the more basic tasks related to digital systems architecture.

About a year later, AEEC deemed it timely to start the spec-writing for a digital automatic flight control system based on the system architecture concepts developed by the SAI Subcommittee. The Subcommittee AEEC established to do this began its work in January 1977. Part of this activity was the definition of black box interface standards, and this brought into sharp focus the need for the new digital information transfer system to be properly specified.

The SAI Subcommittee immediately began to devote time to the discussion of the issues involved to give direction to the Digital Information Transfer System (DITS) working group it set up to develop a spec draft. This group met early in April 1977, and produced a draft which the full Subcommittee reviewed at its meeting in May. A second working group meeting during the period of that Subcommittee meeting, followed by a third in mid-June, produced the second draft of the spec. This draft was submitted to AEEC for adoption, which was achieved at the Summer 1977 General Session in July.

The spec adopted by AEEC contained details of numeric data (BNR and BCD) transfer only. The SAI Subcommittee notified AEEC of its intent to broaden the scope of the document to cover alpha/numeric (ISO Alphabet No. 5) and graphic data handling also. These subjects would be addressed in a Supplement to the spec which AEEC would be asked to approve at a later date.

## X-2.0 Bibliography

The following is a list of AEEC letters associated with the preparation of ARINC Specification 429. A list of AEEC letters related the SAI Subcommittee's overall activities may be found in ARINC Report 299, “AEEC Letter Index”.

| AEEC Letter No. | Date | Subject |
|---|---|---|
| 76-130/SAI-20 | Dec. 9, 1976 | Report of the Systems Architecture and Interfaces Subcommittee Meeting held November 16th, 17th and 18th, 1976 in Seattle, Washington |
| 77-009/SAI-22 | Jan. 27, 1977 | Whither On-Board Digital Data Transmission Standards? |
| 77-020/SAI-25 | Feb. 11, 1977 | More On Digital Data Transmission Standards |
| N77-035/SAI-26 | Mar. 21, 1977 | Boeing Report On Alternative Digital Information System Signalling Standards |
| 77-037/SAI-28 | Mar. 25, 1977 | Report of the Systems Architecture and Interfaces Subcommittee Meeting Held March 7th, 8th and 9th, 1977 in Arlington, Virginia |
| 77-047/SAI-33 | Apr. 13, 1977 | Circulation of Draft No. I of Project Paper 429, “Mark 33 Digital Information Transfer System (DITS)” |
| 77-056/SAI-37 | Apr. 18, 1977 | Report of the SAI Subcommittee BITS Working Group Meeting Held April 5-6, 1977, in Annapolis, Maryland |
| 77-066/SAI-41 | Jun. 8, 1977 | Report of the Systems Architecture and Interfaces Subcommittee Meeting Held May 9th, 10th and 11th, 1977 in Los Angeles, California |
| 77-079/SAI-46 | Jun. 23, 1977 | Circulation of Draft No. 2 of Project paper 429, “Mark 33 Digital Information Transfer System (DITS)” |

## X-3.0 Meeting Attendees

The following people comprised the SAI Subcommittee’s Digital Information Transfer System Working Group.

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The following people attended one or more of the SAI Subcommittee meetings held November 16th-18th, 1976, March 7th-9th, 1977 and May 9th-11th, 1977, during which the 429 DITS spec drafts and other proposals produced by the DITS working group were reviewed, refined and finalized.

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## APPENDIX X
## CHRONOLOGY & BIBLIOGRAPHY

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| Joseph Koprowski | SINGER KEARFOTT | Little Falls, New Jersey |
| John Desmond | SMITHS INDUSTRIES INC. | Clearwater, Florida |
| Dave Richardson | SMITHS INDUSTRIES INC. | Clearwater, Florida |

## APPENDIX X
## CHRONOLOGY & BIBLIOGRAPHY

| | | |
|---|---|---|
| Brian Williams | SMITHS INDUSTRIES INC. | Cheltenham, Glos, UK |
| Mike C. Pietromonaco | S. P. INC | Bellevue, Washington |
| Donald Baker | SPERRY FLIGHT SYSTEMS | Phoenix, Arizona |
| Don Burkholder | SPERRY FLIGHT SYSTEMS | Phoenix, Arizona |
| Jack E. Emfinger | SPERRY FLIGHT SYSTEMS | Phoenix, Arizona |
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| Harry O. Smith | SPERRY FLIGHT SYSTEMS | Phoenix, Arizona |
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| Robert Schaeperkoetter | SUNSTRAND DATA CONTROL | Redmond, Washington |
| C. A. Bennet | TELEDYNE CONTROLS El | Segundo, California |
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| J. Lane Ware | THOMSON-CSF | New York, New York |
| William Donnell | TRACOR APPLIED TECHNOLOGY | Austin, Texas |
| R. R. Fay | TRACOR APPLIED TECHNOLOGY | Austin, Texas |
| Jean-Pierre Tomasi | TRT | Le Plessis-Robinson, France |
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# SUPPLEMENT 1

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: June 1, 1978

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: April 11, 1978

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement adds to Specification 429 material related to the transfer of graphic and ISO alphabet No. 5 encoded alpha/numeric data by the Mark 33 DITS. Also, it clarifies the purpose of the SDI function, adds BCD and BNR numeric data encoding examples to Attachment 6 and introduces two Appendices into the Specification.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-1" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages where necessary and destroying the pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-1 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is identified by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 1.3.2 ISO Alphabet No. 5 Data Transfer

Existing text supplemented – no other changes.

### 1.3.3 Graphic Data Transfer

New section added by this Supplement.

### 2.1.2 Information Element

COMMENTARY

revised to improved clarity of opening sentence, and to modify the statement concerning the BCD-encoding of latitude and longitude as a consequence of the clarification of the use priorities for bit nos. 9 and 10 introduced into Section 2.1.4 by this Supplement.

ORIGINAL TEXT FOLLOWS

To permit the use of common hardware elements for the transmission of BNR and BCD numeric data, the format for the Mark 33 DITS BCD word differs from that used formerly for this type of data. Bit no. 32 is assigned to parity, bit nos. 31 and 30 to the sign/status matrix, bit no. 29 is the most significant bit of the data field, and the maximum decimal value of the most significant character is 7. Previously, the BCD word contained no parity bit, the sign/status matrix occupied bit nos. 32 and 31, bit no. 30 was the most significant data bit and the maximum decimal value of the most significant character was 3. This format made the word 8-bit byte oriented with respect to the data. This characteristic is not retained in the Mark 33 system.

Also, the Mark 33 BCD word will not accommodate latitude and longitude to the formerly specified resolution of 0.1 minute of arc. If BCD transmission of these quantities in required, either the resolution must be decreased or the word must be restructured. Restructuring involves limiting the maximum decimal value of the most significant character to 1, moving the remaining BCD characters towards the MSB by two bit positions and using bit nos. 9 and 10 for data instead of reserving them for source/destination identification encoding per Section 2.1.4 of this document. It is probable, however, that future latitude and longitude displays will not be the simple, dedicated read-out type for which BCD data is intended. More likely is the use of some form of multiple-message display, such as a CRT, which will be backed by its own data processor and prefer inputs of BNR data. If this proves to be the case, there will be no problem!

### 2.1.3 Information Identifier

Text expanded to explain differing roles of label codes in numeric (BCD/BNR) and alpha/numeric (ISO Alphabet No. 5) data transfer. "Special Note" added.

ORIGINAL TEXT FOLLOWS

The first eight bits of each word are assigned to a label function so that the data contained in the word may be identified. Label code assignments are set forth in the table of Attachment 1 to this document.

### 2.1.4 Source/Destination Identifier

Section modified to indicate that bit nos. 9 & 10 are not available for the SDI function in DITS words employed for graphic and ISO Alphabet No. 5 data transfer, or in BNR/BCD words in which bit nos. 9 and 10 are needed for valid data in order to achieve the desired resolution. Code table revised and function application more fully described. Consequential revisions to Commentary.

ORIGINAL TEXT FOLLOWS

Bit nos. 9 & 10 of the word should be reserved for a data source/destination identification function. This function may find application when specific words need to be directed to a specific system of a multi-system installation or when the source system of a multi-system installation needs to be recognizable from the word content. When the source/destination identifier function is used, bit nos. 9 & 10 should be encoded as follows. When it is not used, binary zeros or valid data should be transmitted in these positions

| Bit No. | | System |
|---|---|---|
| 10 | 9 | |
| 0 | 0 | 1 |
| 0 | 1 | 2 |
| 1 | 0 | 3 |
| 1 | 1 | 4 |

### COMMENTARY

In many applications of the Mark 33 DITS, data source/destination identification will not be needed. In these cases, bits 9 & 10 will be used as pad bits for valid data. In certain other applications of the system, for example, BCD latitude and longitude encoding (if needed – see Commentary following Section 2.1.2 of this document), the need to use bit nos. 9 and 10 to obtain adequate data resolution will preclude source/destination identification in this way.

Note that this document does not address the practical question of how these bits will be set in those multi-system installations in which the source/destination identification function is desired. One way would be to use program pins on individual system black boxes which would be wired to set up the appropriate code. The ARINC Characteristics devoted to the individual systems will define the method actually to be used.

### 2.1.5 Sign/Status Matrix

Section divided into two sub-sections, one to describe the BCD numeric and ISO Alphabet #5 alpha/numeric data sign status matrix, and the other to describe the BNR numeric data sign/status matrix.

ORIGINAL TEXT FOLLOWS

The "sign" (plus, minus, north, south, etc.) of the transmitted data and the status of the transmitter hardware should be encoded in bit nos. 30 and 31 as shown in the table below.

| Bit No. | | Designation | |
|---|---|---|---|
| 31 | 30 | BNR/BCD Data | ISO # 5 Data |
| 0 | 0 | Plus, North, East<br>Right, To | TBD |
| 0 | 1 | No Computed Data | |
| 1 | 0 | Functional Test | |
| 1 | 1 | Minus, South, West,<br>Left, From | |

Notes:

1. A source system should indicate failure by ceasing to supply data to a bus.

2. Both bits should be "zero" in BNR and BCD words when no sign is needed.

3. The "no computed data" code should be generated when computed data is not available for reasons other than equipment failure.

4. When is appears in a word identified by its label as a system output, the "functional test" code should be interpreted as advice that the data in the word results from the execution of a functional test. When it appears in a word identified by its label as an instruction, e.g., a radio channel change command, this code should be interpreted as a command to perform a functional test.

### 2.1.6 Data Standards

Typographical errors corrected in second paragraph of Commentary.

### 2.2.1 Transmission System Interconnect

Existing material supplemented with information concerning shield grounding.

### 2.2.3.2 Receiver Voltage Levels

DC levels between terminal A and ground and terminal B and ground at which receivers should not be damaged raised from +20VDC to +28VDC (min) and for –20VDC to –28VDC (min) respectively to align numerical values with aircraft DC power supply value.

### 2.3.1.3 ISO Alphabet No. 5 Data

New section added by this Supplement.

### 2.4.1 Bit Rate

Existing commentary supplemented with warning against selection of 13.6 KBPS and 100 KBPS because of possible interference with operation of OMEGA and LORAN C system on the aircraft.

### Attachment 2: Data Standards Tables 1 and 2

Column heading "MIN TRANSMIT INTERVAL msec" changed to "MAX TRANSMIT INTERVAL msec" in each case.

### Attachment 2: Data Standards Table 3

Table 3 (Alpha/Numeric (ISO Alphabet No. 5) Data Standards) deleted. Table 4 (Discrete Data) renumbered Table 3.

Note: Table 3 was reserved for alpha/numeric (ISO Alphabet No. 5) data standards prior to the preparation of this Supplement. The need for it disappeared as a result of the particular approach selected for handling this data introduced into Specification 429 by this Supplement.

Attachment 6: General Word Formats and Encoding Examples

BNR word format example amended as consequence of change to sign/status matrix (see Section 2.1.5) General Word Formats for ISO Alphabet No. 5 data added. Encoding examples added.

Appendix 1: Laboratory Verification of ARINC 429 DITS Electrical Characteristics

New material added by this Supplement.

Appendix 2: An Approach to a Hybrid Broadcast Command/Response Data Bus Architecture.

New material added by this Supplement.

NOTE: Due to the large number of changes
Created by this Supplement, it is NOT
available separately to update 429-1.

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# SUPPLEMENT 2

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: March 1, 1979

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: December 6, 1978

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement amends the material added to Specification 429 on ISO Alphabet No. 5 data transfer, and expands the multiple-word DITS message concept first used in this application to cover Discrete, Acknowledgement and Maintenance (ISO Alphabet No. 5 and discrete data formats) information transfer as well. The Application Notes of Chapter 3 of the Specification are amended to bring them into line with adopted practice in the control of DME's and ATC transponders, and supplemented with material related to the multiple-word message applications of the system just mentioned. Also, additions and modifications have been made to the label codes and data standards in Attachments 1 and 2 of the Specification to bring them into line with adopted practice.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original test for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-2" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages where necessary and destroying the pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-2 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 2.1.2 INFORMATION ELEMENT

Text revised to describe word application groups.

ORIGINAL TEXT FOLLOWS:

### 2.1.2 Information Element

The basic information element is a digital word containing 32 bits. Word formats for the different types of data handled by the Mark 33 DITS (see Section 2.3.1 of this document) are depicted in Attachment 6. When less than the full data field is needed to accommodate the information conveyed in a word in the desired manner, the unused bit positions should be filled with binary zeros or valid data pad bits. If valid data bits are used, the resolution possible for the information will exceed that called for in this specification. The Commentary following Section 2.1.6 of this document refers.

### 2.1.3 INFORMATION IDENTIFIER

Text revised to describe label use for AIM/Discrete/Maintenance data word type identification.

ORIGINAL TEXT FOLLOWS:

### 2.1.3 Information Identifier

The first eight bits of each word are assigned to a label function. Labels will a) identify the information contained within numeric (BCD/BNR) data words (e.g., DME distance, static air temperature), and b) act as receiving device addresses for alpha/numeric (ISO Alphabet No. 5) data words (e.g., navigation system CDU or map display). Label code assignments are set forth in Attachment 1 to this document.

### 2.1.5.1 BCD NUMERIC AND AIM DATA WORDS

Title and text revised to include other AIM applications in material originally prepared to describe sign/status matrix use in ISO Alphabet No. 5 words, and to provide definition of Self-Test.

ORIGINAL TEXT FOLLOWS:

### 2.1.5.1 BCD Numeric and ISO Alphabet No. 5 Data Words

The sign (plus, minus, north, south, etc.) of BCD numeric data, the word type of alpha/numeric (ISO alphabet No. 5) data and the status of the transmitter hardware should be encoded in bit nos. 30 and 31 of the word as shown in the table below.

| Bit No. | | Designation | |
|---|---|---|---|
| 31 | 30 | BNR/BCD Data | ISO #5 Data |
| 0 | 0 | Plus, North, East Right, to | Initial Word |
| 0 | 1 | No Computed Data | No Computed Data |
| 1 | 0 | Functional Test | Intermediate Word |
| 1 | 1 | Minus, South, West Left, From | Final Word |

Notes:

1. A source system should annunciate any detected failure that causes one or more of the words normally output by that system to be unreliable by ceasing to supply the affected word or words to the data bus.

2. Both bits should be "zero" when no sign is needed.

3. The "no computed data" code should be generated when computed data is not available for reasons other than equipment failure.

4. When it appears in a word identified by its label as a system output, the "functional test" code should be interpreted as advice that the data in the word results from the execution of a functional test. When it appears in a word identified by its label as an instruction, e.g., a radio channel change command, this code should be interpreted as a command to perform a functional test.

5. See Section 2.3.1.3 of this document for definitions of the terms "Initial Word", "Intermediate Word" and "Final Word".

2.1.5.2 BNR NUMERIC DATA WORDS

Text revised to provide definition of Self-Test.

ORIGINAL TEXT FOLLOWS:

2.1.5.2 BNR Numeric Data Words

The sign (plus, minus, north, south, etc.) of BNR numeric data words and the status of the transmitter hardware should be encoded in bit nos. 29, 30 and 31 of the word as shown in the table below.

| Bit No. | | | Designation |
|---|---|---|---|
| 31 | 30 | 29 | BNR Data |
| 0 | 0 | 0 | Failure Warning/Plus, North, East Right, To |
| 0 | 0 | 1 | Failure Warning/Minus, South, West, Left, From |
| 0 | 1 | 0 | No Computed Data |
| 1 | 0 | 0 | Functional Test/Plus, North, East, Right, To |
| 1 | 0 | 1 | Functional Test/Minus, South, West Left, From |
| 1 | 1 | 0 | Normal Operation/Plus, North, East, Right, To |
| 1 | 1 | 1 | Normal Operation/Minus, South West, Left, From |
| 0 | 1 | 1 | Not Used (Growth) |

Notes:

1. A source system should annunciate any detected failure that causes one or more of the words normally output by that system to be unreliable by setting bit nos. 30 and 31 in the affected word(s) to the "failure warning" code defined above. Words containing this code should continue to be supplied to the data bus during the failure condition.

2. Bit no. 29 should be "zero" when no sign is needed.

3. The "no computed data" code should be generated when computed data is not available for reasons other than equipment failure.

4. When it appears in a word identified by its label as a system output, the "functional test" code should be interpreted as advice that the data in the word results from the execution of a functional test. A self-test should produce indications of 1/8 of positive full-scale values unless indicated otherwise in an ARINC Equipment Characteristic.

5. If, during the execution of a functional test, a source system detects a failure which causes one or more of the words normally output by that system to be unreliable, it should immediately change the states of bit nos. 30 and 31 in the annunciation is replaced with the "failure warning" annunciation

2.2.3.1 TRANSMITTER VOLTAGE LEVELS

Tolerances on "HI" and "LO" voltage states changed from ± 0.5 volt to ± 1.0 volt to correct previously undetected error.

2.3.1.2 DISCRETES

Minor changes to existing wording to improve clarity. New paragraphs added to describe two types of dedicated –to-discrete words and their applications.

ORIGINAL TEXT FOLLOWS:

2.3.1.2 Discretes

In addition to handling numeric data as specified above, the Mark 33 DITS should also be capable of accommodating discrete items of information, either in the "spare" bits of data words or, when necessary, in dedicated words. Any discrete information contained in a word assigned a label in Attachment 1 is specified in the definition for that word in Attachment 2.

The rule to be followed in the assignment of bits to discrete functions is to start with the least significant bit available in the word and to continue towards the most significant bit. Attachment 6 shows this against the background of the generalized word structure.

2.3.1.3 Maintenance Data (General Purpose)

This section inserted to describe use and application of general purpose Maintenance words.

ORIGINAL TEXT FOLLOWS:

2.3.1.3 Alpha/Numeric (ISO Alphabet No. 5) Data

ISO Alphabet No. 5 alpha/numeric data will consist of seven-bit characters encoded per the table of Attachment 5 to this document. Three such characters should occupy bit nos. 9 through 29 of a DITS 32-bit word, as shown in the general word format diagram in Attachment 6. As for numeric (BCD) data words, bit nos. 1 through 8 should be the word label (receiving device address-see Section 2.1.3), bit nos. 30 and 31 the sign/status matrix and bit no. 32 the word parity bit.

The typical alpha/numeric message contains more than three ISO Alphabet No. 5 characters, necessitating the transmission of multi-DITS-word messages. The following procedure should be used to permit receivers to determine that such messages are received in their entirety, with no words having been "lost along the way". Only when this determination has been made, and the parity check for each word shows the data to be error-free, should the message be displayed to the aircrew or otherwise utilized.

### 2.3.1.3 Alpha/Numeric (ISO Alphabet No. 5) Data (cont'd)

The first DITS word of the message should contain the label in bit nos. 1 through 8, two numeric characters encoded per ISO Alphabet No. 5 in bit nos. 9 through 15 and 16 through 22 and the ISO Alphabet No. 5 control character "STX"in bit nos. 23 through 29. The two numeric characters should indicate the decimal number of DITS words in the message (maximum number is 99), with the most significant character occupying bit nos. 16 through 22. This count, which should include this initial word, will be one plus the next whole number greater than one third of the number of ISO Alphabet No. 5 characters to be transmitted. The sign/status matrix should contain the "initial word" code defined in Section 2.1.5 of this document.

The subsequent DITS words of the message should each contain the label in bit nos. 1 through 8 and three ISO Alphabet No. 5 characters. The sign/status matrix of all these words except the last word should contain the "intermediate word" code defined in Section 2.1.5.1 of this document. The last word of the message should contain the "final word" code in its sign/status matrix. Any unused bit positions in the final word resulting from the number of ISO characters in the message being one or two less than a number wholly divisible by three should be filled with binary "zeros".

### 2.3.1.4 AIM Data

Section number, text and title revised to include other AIM word applications in material originally prepared to describe ISO Alphabet No. 5 data handling (originally in Section 2.3.1.3). Detailed amendments in this area also.

### 3.1.4.2 DME

The "Override" switching function has been replaced by the "DME Mode Select" function.

### 3.1.4.7 ATC TRANSPONDER

"Mode A/B Select" and "Standby" deleted from list of switching functions. Control word format re-structured to release bits unneeded in numeric data part of word for assignment to discrete switching functions.

### Fig. 3-1 Radio Systems Management Word Formats

Bit nos. 11 and 12 in the DME data word have been assigned to "DME Mode Select".

The description of bit 14 in the VOR/ILS data word has been revised to improve clarity.

ORIGINAL TEXT FOLLOWS:

[1] When bit no. 4 is "zero", the ILS mode should be "off. When bit no 14 is "one", the ILS mode should be "one".

ORIGINAL ATC TRANSPONDER WORD FORMAT ILLUSTRATION FOLLOWS:

| ATC TRANSPONDER | PARITY (odd) | SIGN/STATUS MATRIX | 0.7 (3) | 0.7 (6) | 0.7 (2) | 0.7 (0) | A/B Mode Select | IDENT | STANDBY | ALT. REP. OFF | RESERVED (SDI) | LABEL Beacon Transponder Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 27 | 26 25 24 23 | 22 21 20 19 | 18 17 16 15 | 14 | 13 | 12 | 11 | 10 9 | 8 7 6 5 4 3 2 1 |
| Example | 0 | 0 0 | 0 1 1 | 0 1 1 0 | 0 0 1 1 | 0 0 0 0 | 0 | 0 | 0 | 0 | 0 0 | 1 1 0 1 1 0 0 0 |

[1]

[1]

| Bit | Zero | One |
|---|---|---|
| 11 | Alt. Rep. ON | Alt. Rep. OFF |
| 12 | Standby OFF | Standby ON |
| 13 | Ident OFF | Ident ON |
| 14 | Select Mode A | Select Mode B |

The revised format of the ATC transponder word is as shown on page 10.

3.2 AIM Information Transfer

New section added by this Supplement.

Attachment 1: Label codes

Some parameter names have been changed and others have been added to the list. Instead of showing the entire list, only the original assignment of those that have been changed are shown below.

| **Label (Octal)** | **Original Assignment** | **Proposed Assignment** |
|---|---|---|
| 007 | Align Status/Inertial Discretes | No assignment |
| 014 | None assigned | Magnetic Heading |
| 015 | None assigned | Wind Speed |
| 016 | None assigned | Wind Direction-True |
| 017 | None assigned | Selected Runway Heading |
| 024 | Selected Course | Selected Course #1 |
| 027 | None assigned | Selected Course #2 |
| 041 | None assigned | Set Latitude |
| 042 | None assigned | Set Longitude |
| 043 | None assigned | Set Magnetic Heading |
| 044 | None assigned | True heading |
| 045 | None assigned | Minimum Airspeed |
| 100 | Selected Course | Selected Course #1 |
| 107 | AFS Discretes | No assignment |
| 110 | None assigned | Selected Course #2 |
| 112 | None assigned | Selected EPR or $N_1$ |
| 124 | FMC Discretes | Caution & Warning DFDR Discretes #1 |
| 130 | None assigned | Tt2 |
| 131 | None assigned | Pt2 |
| 132 | None assigned | Pt7 |
| 133 | None assigned | Thrust Lever Angle |
| 145 | None assigned | AFS DFDR Discretes #1 |
| 146 | None assigned | AFS DFDR Discretes #2 |
| 147 | None assigned | AFS DFDR Discretes #3 |
| 166 | None assigned | RALT Check Point Dev. |
| 203 | Altitude (29.92) | Altitude (1013.25mb) |
| 204 | Altitude (Baro) | Baro Corrected Altitude #1 |
| 214 | Air Data Computer Discretes | No assignment |
| 216 | Baroset | No assignment |
| 220 | None assigned | Baro Corrected Altitude #2 |
| 221 | None assigned | Indicated Angle of Attack |
| 223 | Altitude (29.92) | No assignment |
| 224 | Altitude Baro | Caution/Warning DFDR Discretes #2 |
| 225 | Mach | No assignment |
| 226 | Computed Airspeed | No assignment |
| 227 | Max Allowable Airspeed | No assignment |
| 234 | Baroset (millibars) | Baro Correction (mb #1) |
| 235 | Baroset (ins. of Hg) | Baro Correction (mb #1) |
| 236 | None assigned | Baro Correction (mb #2) |
| 237 | None assigned | Baro Corrected (in of Hg #2) |
| 241 | None assigned | Corrected Angle of Attack |
| 242 | None assigned | Total Pressure |
| 245 | None assigned | Minimum Airspeed |
| 247 | None assigned | Total Fuel |
| 270 | None assigned | Discrete Data #1 |
| 271 | None assigned | Discrete Data #2 |
| 272 | None assigned | Discrete Data #3 |
| 273 | None assigned | Discrete Data #4 |
| 274 | None assigned | Discrete Data #5 |
| 334 | Free Heading | Platform Heading |
| 340 | $N_1$ or EPR Actual | EPR Actual |
| 346 | None assigned | $N_1$ Actual |
| 350 | Engine Discretes | Maintenance Data #1 |
| 351 | Control Panel Discretes | Maintenance Data #2 |
| 352 | Control Panel Discretes | Maintenance Data #3 |
| 353 | Control Panel Discretes | Maintenance Data #4 |
| 354 | Instrument Discretes | Maintenance Data #5 |
| 355 | None assigned | Acknowledgement |
| 356 | None assigned | Maintenance ISO #5 Message |
| 357 | None assigned | ISO #5 Message |
| 360 | None assigned | Potential Vertical Speed |
| 372 | None assigned | Wind Direction-Magnetic |
| 373 | None assigned | N-S Velocity-Magnetic |
| 374 | None assigned | E-W Velocity-Magnetic |
| 375 | None assigned | Along Heading Acceleration |
| 376 | None assigned | Cross Heading Acceleration |

## Attachment 2: Data Standards

A number of additions and changes have been made to the tables. The octal labels and parameter names are shown for each data item that has been changed. The original data is shown only for the data that has been changed by this supplement. Also a second “Note” has been added to Table 2.

Table 1 BCD DATA

| Label (Octal) | Parameter Name | Max Transmit Interval | Range (Scale) | Sig. Fig. | Pad Fig. | Units | Resol |
|---|---|---|---|---|---|---|---|
| 170 | Decision Hgt Sel.(EFI) | 200 | 0 - 500 | 3 | 2 | Feet | 1.0 |
| 201 | DME Distance | 200* | -1 - 399.99* | 5 | 0 | N.M. | 0.01 |
| 230 | True Airspeed | 500* | 130 - 599* | 3 | 2 | Knots | 1.0 |
| 231 | Total Air Temp. | 500 | +500 — 99* | 2 | 3 | $o_c$ | 1.0 |
| 233 | Static Air Temp. | 500 | -99 - +60* | 2 | 3 | $o_c$ | 1.0 |
| 234 | Baroset (mb)* | 200* | 0 - 3999* | 4* | 1* | mb | 1.0* |
| 235 | Baroset (ins. of Hg*) | 200* | 0 - 39.99* | 4* | 1* | ins.Hg | 0.01* |

*This data has been changed.

Note: Labels 017, 027, 041, 042, 043, 044, 045, 236 and 237 previously had no values assigned. Values for labels 223, 224, 225, 226 and 227 have been changed.

Table 2 BNR DATA

| Label (Octal) | Parameter Name | Max Transmit Interval | Sig. Bits (Not Inc. Sign) | Units | Range | Approx. Resol. |
|---|---|---|---|---|---|---|
| 100 | Selected Course | 62.5* | 9 | Deg/180 | ± 180 $^{o}$ | 0.35$^{o}$ |
| 103 | Selected Airspeed | 62.5* | 11* | Deg/180 | ± 180 $^{o}$ | 0.25* |
| 121 | Horiz. Strg. Signal | 100 | 9* | Deg/180 | +45$^{o}$ * | 0.1 $^{o}$ * |
| 122 | Vert.Strg.Signal | 100 | 9 | Deg/180 | +22.50 $^{o}$ * | 0.05 $^{o}$ * |
| 140 | Flight Director-Roll | 62.5* | 9 | Deg/180 | ±45 $^{o}$ | 0.1 $^{o}$ |
| 141 | Flight Director-Pitch | 62.5* | 9 | Deg/180 | ± 22.5 | 0.05 $^{o}$ |
| 164 | Radio Height | 50 | 18* | Feet | 32768* | 0.125 |
| 202 | DME Distance | 200* | 16 | N.M. | 512 | 0.0008 |
| 203 | Altitude (29.92) | 62.5 | 17* | Feet | 131,071 | 1.0* |
| 206 | Computed Airspeed | 125 | 12* | Knots | 1024 | 0.25* |
| 207 | Max.Allowable Airspeed | 500* | 12 | Knots | 1024 | 0.25 |
| 210 | True Airspeed | 500* | 11 | Knots | 2048 | 1.0 |
| 215 | Impact Pressure | 125 | 12* | ins/Hg* | 32* | 0.008* |
| 313 | Track Angle True | 50* | 12 | Deg/180 | ± 180 $^{o}$ | 0.05 $^{o}$ |
| 314 | True Heading | 50* | 12 | Deg/180 | ± 180 $^{o}$ | 0.05 $^{o}$ |
| 317 | Track Angle-Magnetic | 50* | 12 | Deg/180 | ± 180 $^{o}$ | 0.05 $^{o}$ |
| 320 | Magnetic Heading | 50* | 12 | Deg/180 | ± 180 $^{o}$ | 0.05 $^{o}$ |
| 321 | Drift Angle | 50* | 11 | Deg/180 | +90 $^{o}$ | 0.05 $^{o}$ |
| 322 | Flight Path Angle | 50* | 10 | Deg/180 | ± 45 $^{o}$ | 0.05 $^{o}$ |
| 323 | Flight Path Acceleration | 20 | 12* | g | 4* | 0.001* |
| 324 | Pitch Angle | 50* | 13 | Deg/180 | +90 $^{o}$ | 0.01 $^{o}$ |
| 325 | Roll Angle | 50* | 14 | Deg/180 | ± 180 $^{o}$ | 0.01 $^{o}$ |
| 331 | Body Long-accel. | 6.25* | 12 | g | 4 | 0.001 |
| 334 | Free Heading | 20* | 12* | Deg/180 | ± 180 $^{o}$ | 0.05 $^{o}$ |
| 335 | Track Angle Rate | * | * | * | * | * |
| 336 | Inertial Pitch Rate | 20 | 12* | Deg/sec | 128 | 0.03 $^{o}$ * |
| 337 | Inertial Roll Rate | 20 | 12* | Deg/sec | 128 | 0.03 $^{o}$ * |
| 340 | $N_1$ Actual * | 200 | 12 | RPM | 4096 | 1 |
| 341 | $N_1$ Command | 200 | 12* | RPM* | 4096* | 1* |
| 342 | $N_1$ Limit | 200 | 12* | RPM* | 4096* | 1* |
| 343 | $N_1$ Derate | 200 | 12* | RPM* | 4096* | 1* |
| 344 | $N_2$ | 100 | 14 | RPM* | 16384* | 1* |

Table 2 BNR Data (cont'd)

| Label (Octal) | Parameter Name | Max Transmit Interval | Sig. Bits (Not Inc. Sign) | Units | Range | Approx. Resol. |
|---|---|---|---|---|---|---|
| 345 | Exhaust Gas Temp. | 200 | 11* | $^{O}$C * | 2048 | 1* |
| 346 | $N_1$ Actual | 200 | 12* | RPM* | 4096* | 1* |
| 347 | Fuel Flow | 200 | 11* | Lbs/hr | 32768 | 16* |
| 362 | Along Track Horiz. Accel. | 50* | 12 | g | 4 | 0.001 |
| 365 | Integrated Vertical Accel. | 50* | 15* | Knots | 4096* | 0.125* |
| 366 | N-S Velocity | 200* | 15 | Knots | 4096 | 0.125 |
| 367 | E-W Velocity | 200* | 15 | Knots | 4096 | 0.125 |

Note: Labels 110, 112, 130, 131, 132, 133, 241, 245, 247, 346, 360, 372, 373, 374 and 376 previously had no values assigned. Values for label 216 have been deleted.

*This data has been changed.

Attachment 6: General Word Formats and Encoding Examples

AIM word format examples have been added. Detailed descriptions of these words have been included in the text of Section 2.3.1.3.

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# SUPPLEMENT 3

# TO

# ARINC  SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published:  November 1, 1979

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: August 31, 1979

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces material on the transfer of file data and the related protocol. The file transfer capability is being added primarily for the Flight management Computer (FMC) program/data load and update and FMC intersystem crosstalk. A number of labels and corresponding data standards have been added.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement; and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-3" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages where necessary and destroying the pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-3 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 2.1.5.1 BCD NUMERIC, DISCRETE AND AIM DATA WORDS

Table amended to provide consistency between AIM and file transfer data words.

ORIGINAL TEXT FOLLOWS:

| Bit No. | | Designation | |
|---|---|---|---|
| 31 | 30 | BCD Numeric Data | AIM Data |
| 0 | 0 | Plus, North East Right, To | Final Word |
| 0 | 1 | No Computed Data | Intermed. Word |
| 1 | 0 | Functional Test | Control Word |
| 1 | 1 | Minus, South West, Left, From | Initial Word |

### 2.1.6 DATA STANDARDS

Text added to clarify data encoding.

ORIGINAL TEXT FOLLOWS:

### 2.1.6 Data Standards

The units, ranges, resolutions, refresh rates, number of significant bits, pad bits etc. for the items of information to be transferred by the Mark 33 DITS are tabulated in Attachment 2 to this document.

COMMENTARY

Note that Section 2.3.1.1 of this document calls for numeric data to be encoded in BCD and binary, the latter using two's complement fractional notation. In this notation, the most significant bit of the data filed represents one half of the maximum value chosen for the parameter being defined. Successive bits represents the increments of a binary fraction series. Negative number are encoded as the complements of positive values and the negative sign is annunciated in the sign/status matrix.

In establishing a given parameter's binary data standards for inclusion in Attachment 2, the units, maximum value and resolution of the parameter are first determined in that order. The least significant bit of the word is then given a value equal to the resolution increment, and the number of significant bits is chosen such that the maximum value of the fractional binary series just exceeds the maximum value of the parameter, i.e., equals the next whole binary number greater than the maximum parameter value less one least significant bit value. For example, if the Mark 33 DITS is required to transfer altitude in units of feet over a range of zero to 100,000 feet with a resolution of one foot, the number of significant bits is 17 and the maximum value of the fractional binary series is 131,071 (i.e., 131,071 – 1). Note that because accuracy is a quality of the measurement process and not the data transfer process, it plays no part in the selection of word characteristics. Obviously, the resolution provided in the DITS word should equal or exceed the accuracy in order not to degrade it.

For the binary representation of angular data, the Mark 33 DITS employs "degrees divided by 180°" as the unit of data transfer and ± 1 (semicircle) as the range for two's complement fractional notation encoding ignoring, for the moment, the subtraction of the least significant bit value. Thus the angular range 0 through 359.XXX degrees is encoded as 0 through ± 179.XXX degrees, the value of the most significant bit is none half semicircle and there are no discontinuities in the code.

For convenience, all binary word ranges in Attachment 2 are shown as whole binary numbers rather than such numbers less one least significant bit value. Also the resolutions shown are approximate only. Accurate resolutions can be determined, if required, by reference to the range values and numbers of significant bits for the words of interest.

### 2.1.6 Data Standards (cont'd)

COMMENTARY (cont'd)

It should be noted that in all applications of the two's complement fractional notation, the maximum value of the word, once chosen, cannot be changed by the use of more bits in the data field. The number of bits in the word affects only the resolution of the data, not its range.

Binary coded decimal (BCD) data is encoded per the numeric subset of the ISO Alphabet No. 5 code (see Attachment 5 to this document) using bit nos. 1 through 4 of the seven-bit-per-character code. Alpha/numeric data is encoded using all seven bits per character of the ISO Alphabet #5 code and is transmitted using the special word format described in Section 2.3.1.3 of this document.

### 2.3.1.5 FILE DATA TRANSFER

Section added to provide description of file data transfer protocol.

### 3.1.4.3 HF COMMUNICATIONS

Text amended to describe switching functions and finer frequency selection increments.

ORIGINAL TEXT FOLLOWS:

3.1.4.3 HF Communications

| | |
|---|---|
| Frequency Range: | 2.8MHz to 24MHz |
| Frequency Selection Increments | 1kHz |
| Characters encoded in DITS word: | 10MHz, 1MHz, 0.1MHz, 0.01MHz, 0.001MHz |
| Switching Functions: | USB/AM mode selection |

### Fig. 3-1 RADIO SYSTEMS MANAGEMENT WORD FORMATS

Error corrected in bits 24 and 25 of ILS word.

HF COMM frequency word format changed and second word added to enable the use of 100 Hz channel spacing.

ORIGINAL TEXT FOLLOWS:

| HF COM<br>Function | PARITY (Odd) | SIGN/STATUS MATRIX | 10MHz (2) | 1MHz (3) | 0.1MHz (5) | 0.01MHz (7) | 0.001MHz (9) | USB/AM MODE | RESERVED (SDI) | LABEL HF COM Frequency |
|---|---|---|---|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 27 | 26 25 24 23 | 22 21 20 19 | 18 17 16 15 | 14 13 12 11 | 10 | 9 | 8 7 6 5 4 3 2 1 |
| Example | 0 | 0 0 | 0 1 0 | 0 0 1 1 | 0 1 0 1 | 0 1 1 1 | 1 0 0 1 | 0 | 0 | 1 1 1 1 1 0 0 0 |
| Notes | | | | | | | | [1] | [2] | |

[1] When bit no. 10 is "zero" the equipment should operate in the AM mode. When bit no. 10 is "one" the equipment should operate in the SSB (USB) mode.

[2] Only bit no. 9 is available for the SDI function in this word.

### ATTACHMENT 1: LABEL CODES

The following labels have been given new assignments:

053, 056, 060, 061, 062, 063, 065, 066, 067, 070, 071, 075, 076, 077, 120, 126, 134, 137, 143, 175, 176, 177, 200, 217, 226, 251, 252-256, 257, 260, 261, 277, 300-307, 361.

### ATTACHMENT 2: DATA STANDARDS

Tables 1 and 2 have both additions and modifications made to the data standards. Notes 2 thru 5 deleted. The original information provided in ARINC 429-2 is included in these tables. An asterisk beside a value designated that a change has been recommended. The formats of table 1 and 2 have also been changed to provide the addition of data standard descriptors.

Table 3.7 added for GPWS discretes.

ATTACHMENT 2: DATA STANDARDS (cont'd)

TABLE 1 BCD DATA

| LABEL (OCTAL) | PARAMETER NAME | MAX. TRANSMIT INTERVAL msec | RANGE (SCALE | SIG. FIG. | PAD FIG. | UNITS | RESOL |
|---|---|---|---|---|---|---|---|
| 0 1 0 | Present Position-Lat. | 200* | 90S-90N | 5 | 0 | Deg/Min* | 0.1 |
| 0 1 1 | Present Position-Long. | 200* | 180E-180W | 6 | 0 | Deg/Min* | 0.1 |
| 0 1 2 | Ground Speed | 200* | 0-2000 | 4 | 1 | Knots | 1.0 |
| 0 1 3 | Track Angle (true) | 200* | 0-359.9 | 4 | 1 | Deg | 0.1 |
| 0 1 4 | Magnetic Heading | 200* | 0-359 | 3 | 2 | Deg | 1.0 |
| 0 1 5 | Wind Speed | 200* | 0-299 | 3 | 2 | Knots | 1.0 |
| 0 1 6 | Wind Direction (true) | 200* | 0-359 | 3 | 2 | Deg | 1.0 |
| 0 4 1 | Set Latitude | 200* | 90S-90N | 5 | 0 | Deg/Min | 0.1 |
| 0 4 2 | Set Longitude | 200* | 180E-180W | 6 | 0 | Deg/Min | 0.1 |
| 0 4 3 | Set Magnetic Heading | 200* | 0-359.9* | 4* | 1* | Deg | 0.1* |
| 1 2 5 | Greenwich Mean Time | 200 | 0-23.59.9 | 5 | 0 | Hr/Min* | 0.1 |
| # 2 3 0 | True Airspeed | 62.5* | 100-599 | 3 | 0 | Knots | 1.0 |

TABLE 2 BNR DATA

| LABEL (OCTAL) | PARAMETER NAME | MAX. TRANSMIT INTERVAL msec | SIG. BITS (NOT INC. SIGN) | UNITS | RANGE See Note 1 | APPROX RESOL |
|---|---|---|---|---|---|---|
| 1 0 0 | Selected Course #1 | 50 | 9* | Deg/180 | ±180° | 0.35* |
| 1 0 1 | Selected Heading | 62.5 | 9* | Deg/180 | ±180° | 0.35* |
| 1 0 5 | Selected Runway Heading | 62.5 | 9* | Deg/180 | ±180° | 0.35* |
| 1 1 0 | Selected Course #2 | 50 | 9* | Deg/180 | ±180° | 0.35* |
| 1 1 6 | Cross Track Distance | 62.5 | 8* | N.M. | 128 | 0.5* |
| 1 2 1 | Horiz. Steering Signal | 100 | 10* | Deg/180 | ±60 ° | 0.06* |
| 1 2 2 | Vertical Steering Signal | 100 | 9* | Deg/180 | ±30 ° | 0.06* |
| 1 2 3 | Throttle Command | * | * | * | * | * |
| 1 3 0 | Tt2* | 200 | 11 | °C | 128 | 0.06 |
| 1 3 1 | Pt2* | 200 | 13 | PSIA | 32 | 0.004 |
| 1 3 2 | Pt7* | 200 | 13 | PSIA | 32 | 0.004 |
| 1 4 0 | Flight Director-Roll | 100 | 9* | Deg/180 | ±45 ° * | 0.1* |
| 1 4 1 | Flight Director-Pitch | 100 | 9* | Deg/180 | ±22.5 ° | 0.05 |
| 1 4 2 | Fast/Slow | 62.5 | 8* | Knots | 32 | 0.125* |
| 1 4 3 | Flight Director-Yaw* | 100* | 12* | Deg/180* | ±180 ° | 0.05* |
| 1 6 4 | Radio Height | 50 | 17* | Feet | 16384* | 0.125 |
| 2 0 3 | Altitude (1013.25mb) | 62.5 | 18* | Feet | 131,072 | 0.05* |
| 2 1 0 | True Airspeed | 62.5* | 11* | Knots | 2048 | 1.0* |
| 2 1 1 | Total Air Temp. | 500 | 10* | °C | 512 | 0.5* |
| 2 1 3 | Static Air Temp. | 500 | 10* | °C | 512 | 0.5* |
| 2 2 1 | Indicated Angle of Attack | 62.5 | 11* | Deg/90* | ±90 ° * | 0.05 |
| 2 4 1 | Corrected Angle of Attack | 62.5 | 11* | Deg/90* | ±90 ° * | 0.05 |
| 2 4 7 | Total Fuel | 200* | 15* | Lb. | 655,360 | 20* |
| 3 1 0 | Present Position-Lat. | 200 | 18* | Deg/180 | 0-90N-0-90S | 0.00035* |
| 3 1 1 | Present Position-Long. | 200 | 18* | Deg/180 | 0-180E-0-180W | 0.00070* |
| 3 1 2 | Ground speed | 100* | 15 | Knots | 4096 | 0.125 |
| 3 1 3 | Track Angle True | 40* | 12 | Deg/180 | ±180 ° | 0.05 |
| 3 1 4 | True Heading | 40* | 12 | Deg/180 | ±180 ° | 0.05 |
| 3 1 7 | Track Angle-Mag | 40* | 12 | Deg/180 | ±180 ° | 0.05 |
| 3 2 0 | Magnetic Heading | 40* | 12 | Deg/180 | ±180 ° | 0.05 |
| 3 2 1 | Drift Angle | 40* | 11* | Deg/180 | ±90 ° * | 0.05 |
| 3 2 2 | Flight Path Angle | 40* | 10* | Deg/180 | ±45 ° * | 0.05 |
| 3 2 4 | Pitch Angle | 20* | 13* | Deg/180 | ±90 ° * | 0.01 |
| 3 2 5 | Roll Angle | 20* | 14 | Deg/180 | ±180 ° | 0.01 |
| 3 6 0 | Potential Vertical Speed | 50 | 10* | Ft/min* | 16384* | 16* |

\# The change to MTI was erroneously omitted from Draft 1 of Supplement 3, but was included prior to publication of Supplement 3.

ATTACHMENT 2: DATA STANDARDS (cont'd)

NOTES

1. The number entered in the Range Column for each parameter that is not angular in nature is the nearest whole binary number greater than the parameter range required. As explained in the Commentary following Section 2.1.6 of this document, the weight of the most significant bit of the two's complement fractional notation binary word will be one half this value, and the actual maximum value of the parameter capable of being encoded will be the number in the range column less one least significant bit value. The numbers entered in the RANGE column for angular parameters are the actual degree ranges required. The way in which these parameters are encoded is also explained in the Commentary following Section 2.1.6.

2. Bit nos. 9 and 10 of the word may be used to achieve a 20 bit capability for high resolution of the Lat./Long. Position (codes 310 and 311). The resulting resolution is .000086$^{o}$ for latitude and .00017$^{o}$ for longitude.

3. A change in ARINC 707 not shown in Supplement 2 is a planned change for Supplement 3. A self-test inhibit bit will be added and the range of the data word will be halved to a value of 8192 ft.

4. A change in ARINC 710 not shown in Supplement 2 is a planned change for Supplement 3. The resolution of Selected Runway Heading (BCD and BNR) will be changed to .1$^{o}$.

5. A change being considered for Supplement 3 is to change the range to –6g - +4g to facilitate direct recording by the flight recorder.

ATTACHMENT 6: GENERAL WORD FORMATS & ENCODING EXAMPLES

SSM codes in AIM words changed to reflect table amendment of section 2.1.5.1.

Radio Height code example changed to reflect shift in field.

Note 4 of Table 6.2 deleted to revert data coding to the original two's complement notation.

Word formats added for date/flight leg and flight number information.

Word format added for VOR Omnibearing.

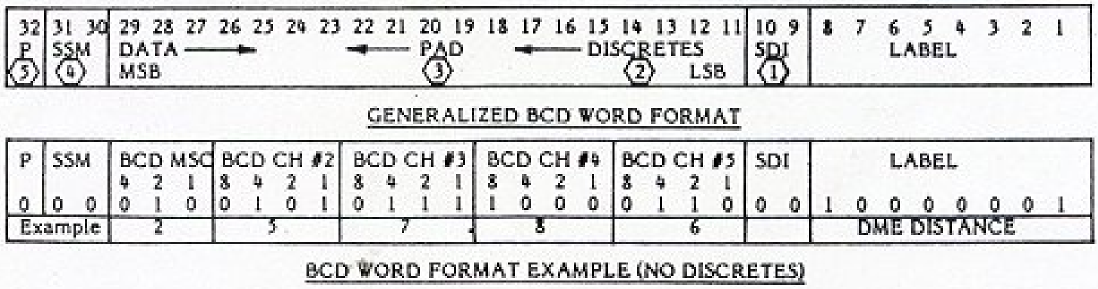
Codes 203, 204, 206 and 207 deleted in Table 6.1a.

ORIGINAL TEXT FOLLOWS:

ATTACHMENT 6

## GENERAL WORD FORMATS AND ENCODING EXAMPLES

### 1. GENERAL WORD FORMATS



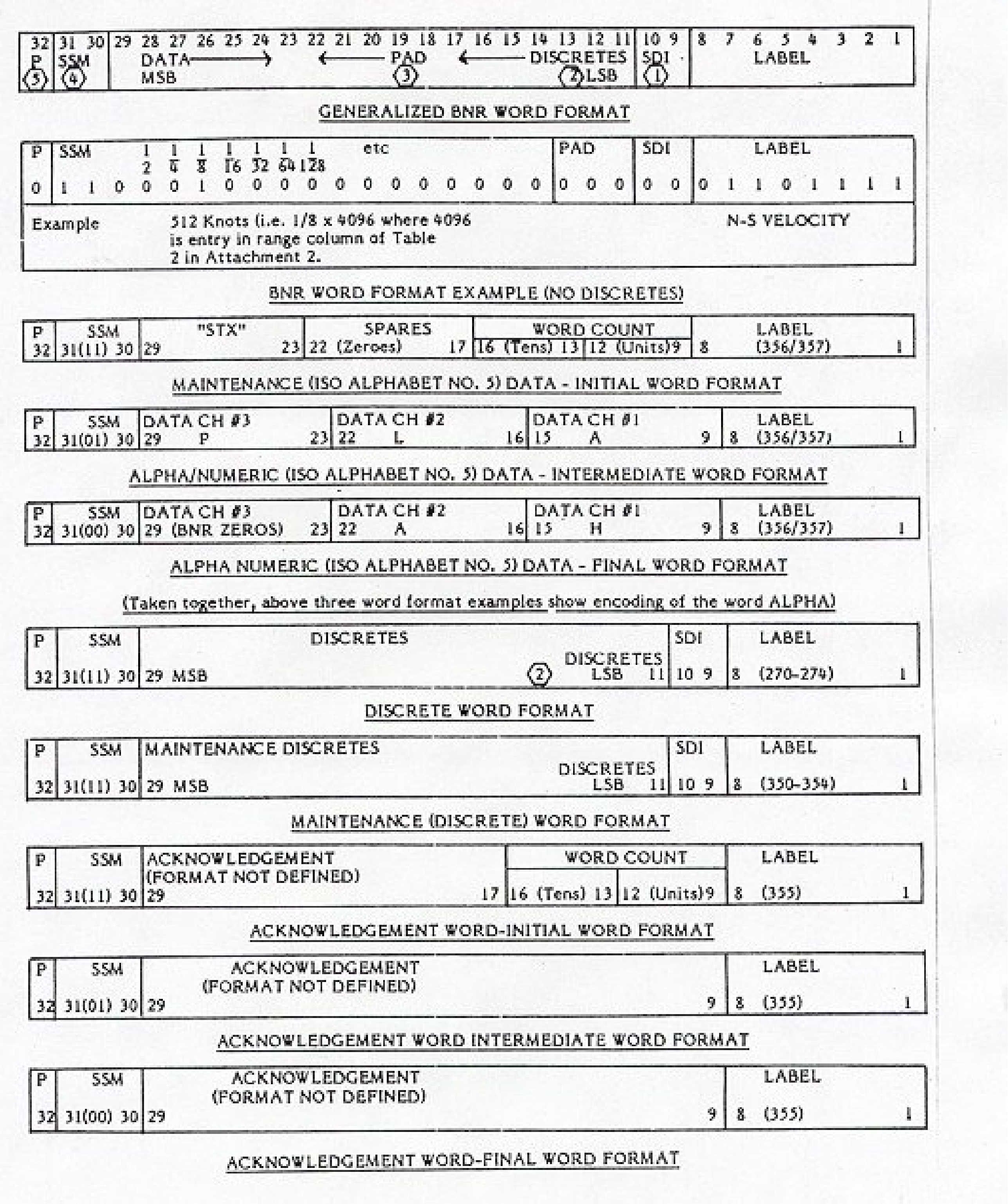
| | | | | |
|---|---|---|---|---|
| 32 | 31 30 | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
| P<br>⑤ | SSM<br>④ | DATA ——→ ←—— PAD ←—— DISCRETES<br>MSB ③ ② LSB | SDI<br>① | LABEL |

GENERALIZED BCD WORD FORMAT

| P | SSM | BCD MSC | BCD CH #2 | BCD CH #3 | BCD CH #4 | BCD CH #5 | SDI | LABEL |
|---|---|---|---|---|---|---|---|---|
| | | 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | 8 4 2 1 | | |
| 0 | 0 0 | 0 1 0 | 0 1 0 1 | 0 1 1 1 | 1 0 0 0 | 0 1 1 0 | 0 0 | 1 0 0 0 0 0 0 1 |
| Example | | 2 | 5 | 7 | 8 | 6 | | DME DISTANCE |

BCD WORD FORMAT EXAMPLE (NO DISCRETES)

ATTACHMENT 6: GENERAL WORD FORMATS & ENCODING EXAMPLES (cont'd)



| | | | | |
|---|---|---|---|---|
| 32<br>P<br>⑤ | 31 30<br>SSM<br>④ | 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11<br>DATA ⟶ ⟵ PAD ⟵ DISCRETES<br>MSB ③ ② LSB | 10 9<br>SDI<br>① | 8 7 6 5 4 3 2 1<br>LABEL |

GENERALIZED BNR WORD FORMAT

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | SSM | | | $\frac{1}{2}$ | $\frac{1}{4}$ | $\frac{1}{8}$ | $\frac{1}{16}$ | $\frac{1}{32}$ | $\frac{1}{64}$ | $\frac{1}{128}$ | | etc | | | | | | | PAD | | | SDI | | | | | LABEL | | | | |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |

| | | |
|---|---|---|
| Example | 512 Knots (i.e. 1/8 x 4096 where 4096 is entry in range column of Table 2 in Attachment 2. | N-S VELOCITY |

BNR WORD FORMAT EXAMPLE (NO DISCRETES)

| | | | | | | |
|---|---|---|---|---|---|---|
| P | SSM | "STX" | SPARES | WORD COUNT | | LABEL |
| 32 | 31(11) 30 | 29 23 | 22 (Zeroes) 17 | 16 (Tens) 13 | 12 (Units)9 | 8 (356/357) 1 |

MAINTENANCE (ISO ALPHABET NO. 5) DATA - INITIAL WORD FORMAT

| | | | | | |
|---|---|---|---|---|---|
| P | SSM | DATA CH #3 | DATA CH #2 | DATA CH #1 | LABEL |
| 32 | 31(01) 30 | 29 P 23 | 22 L 16 | 15 A 9 | 8 (356/357) 1 |

ALPHA/NUMERIC (ISO ALPHABET NO. 5) DATA - INTERMEDIATE WORD FORMAT

| | | | | | |
|---|---|---|---|---|---|
| P | SSM | DATA CH #3 | DATA CH #2 | DATA CH #1 | LABEL |
| 32 | 31(00) 30 | 29 (BNR ZEROS) 23 | 22 A 16 | 15 H 9 | 8 (356/357) 1 |

ALPHA NUMERIC (ISO ALPHABET NO. 5) DATA - FINAL WORD FORMAT

(Taken together, above three word format examples show encoding of the word ALPHA)

| | | | | |
|---|---|---|---|---|
| P | SSM | DISCRETES | SDI | LABEL |
| 32 | 31(11) 30 | 29 MSB ② DISCRETES LSB 11 | 10 9 | 8 (270-274) 1 |

DISCRETE WORD FORMAT

| | | | | |
|---|---|---|---|---|
| P | SSM | MAINTENANCE DISCRETES | SDI | LABEL |
| 32 | 31(11) 30 | 29 MSB DISCRETES LSB 11 | 10 9 | 8 (350-354) 1 |

MAINTENANCE (DISCRETE) WORD FORMAT

| | | | | | |
|---|---|---|---|---|---|
| P | SSM | ACKNOWLEDGEMENT (FORMAT NOT DEFINED) | WORD COUNT | | LABEL |
| 32 | 31(11) 30 | 29 17 | 16 (Tens) 13 | 12 (Units)9 | 8 (355) 1 |

ACKNOWLEDGEMENT WORD-INITIAL WORD FORMAT

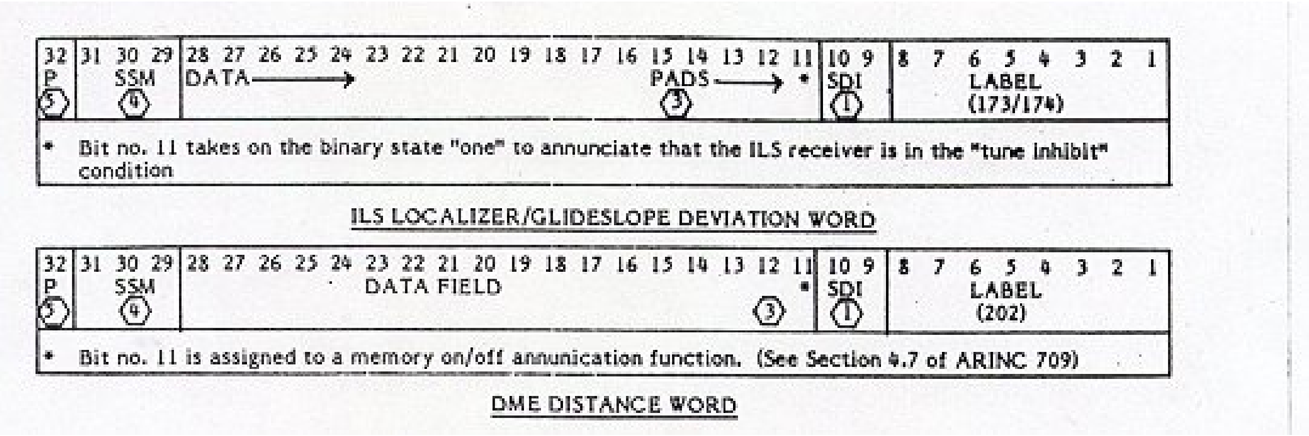
| | | | |
|---|---|---|---|
| P | SSM | ACKNOWLEDGEMENT (FORMAT NOT DEFINED) | LABEL |
| 32 | 31(01) 30 | 29 9 | 8 (355) 1 |

ACKNOWLEDGEMENT WORD INTERMEDIATE WORD FORMAT

| | | | |
|---|---|---|---|
| P | SSM | ACKNOWLEDGEMENT (FORMAT NOT DEFINED) | LABEL |
| 32 | 31(00) 30 | 29 9 | 8 (355) 1 |

ACKNOWLEDGEMENT WORD-FINAL WORD FORMAT

ATTACHMENT 6: GENERAL WORD FORMATS & ENCODING EXAMPLES (cont'd)



| 32 | 31 30 29 | 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|
| P ⑤ | SSM ④ | DATA⟶ PADS⟶ * ③ | SDI ① | LABEL (173/174) |

* Bit no. 11 takes on the binary state "one" to annunciate that the ILS receiver is in the "tune inhibit" condition

ILS LOCALIZER/GLIDESLOPE DEVIATION WORD

| 32 | 31 30 29 | 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
|---|---|---|---|---|
| P ⑤ | SSM ④ | DATA FIELD ③ * | SDI ① | LABEL (202) |

* Bit no. 11 is assigned to a memory on/off annunication function. (See Section 4.7 of ARINC 709)

DME DISTANCE WORD

DME DISTANCE WORD

Attachment 6 (cont'd)
GENERAL WORD FORMATS AND ENCODING EXAMPLES

NOTES

[1] Source/Destination Identifier (SDI) Field

The purpose of the SDI field is explained in Section 2.1.4 of this document, as are also the limitations on its use. When the SDI function is not required, this field may be occupied by binary zero or valid data pad bits.

[2] Discretes

As discussed in Section 2.3.1.2 of this document, unused bits in a word may be assigned to discrete functions, one bit per variable. Bit #11 of the word should be the first to be so assigned; followed by bit #12 and so on in ascending numerical order until the data field is reached. In the absence of discretes, unused bit positions should be occupied by binary zero or valid data pad bits.

[3] Pad

All bit positions not used for data or discretes should be filled with binary zero or valid pad bits. Section 2.1.2 of this document refers.

[4] Sign/Status Matrix (SSM)

Section 2.1.5 of this document describes the functions of the sign/status matrix and the ways in which the bits constituting it are encoded.

[5] Parity Bit

This bit is encoded to render word parity odd. Section 2.3.4 of this document refers.

OBSOLETE

| Bit No. | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER (Label) | | SSM | | DATA FIELD | | | | | | | | | | | | | | | | | | | SDI | | LABEL | | | | | | | |
| | | | | MSC | | | | | | | | | | | | | | | | | | LSC | | | | | | | | | | |
| | | | | (4 | 2 | 1) | (8 | 4 | 2 | 1) | (8 | 4 | 2 | 1) | (8 | 4 | 2 | 1) | (8 | 4 | 2 | 1) | | | (1 | 2 | 4) | (1 | 2 | 4) | (1 | 2) |
| Distance To Go (001)<br>+2750.4 NM | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Time To Go (002)<br>145.3 min | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cross Track Distance (003)<br>225.6 NM | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | ①<br>P | P | P | P | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ground Speed (012)<br>650 Knots | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Track Angle (True) (013)<br>165.5 deg | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Selected Vertical Speed (020)<br>-2200 ft/min | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected EPR (021)<br>2.05 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected $N_1$ (021)<br>2750 RPM | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected Mach (022)<br>0.850 Mach | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected Heading (023)<br>177 deg | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Selected Course (024)<br>254 deg | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Selected Altitude (025)<br>41,000 ft. | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Selected Airspeed (026)<br>423 Knots | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| Greenwich Mean Time (125)<br>1545.5 hr | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 |
| Radio Height (165)<br>2450.5 ft | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 |
| Decision Ht. Selected (170)<br>200 ft. | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| DME Distance (201)<br>257.86 NM | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Altitude (29.92) (203)<br>39500 ft. | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Altitude (Baro) (204)<br>41350 ft | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Computed Airspeed (206)<br>425 Knots | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| Max Allowable Airspeed (207)<br>450 Knots | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| True Airspeed (230)<br>565 Knots | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| Total Air Temp (231)<br>-025°C 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| Altitude Rate (232)<br>-15250 ft/min | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| Static Air Temp. (233)<br>+013°C 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 |
| Baroset (ins Hg) (235)<br>29.92 ins Hg | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | P | P | P | P | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |

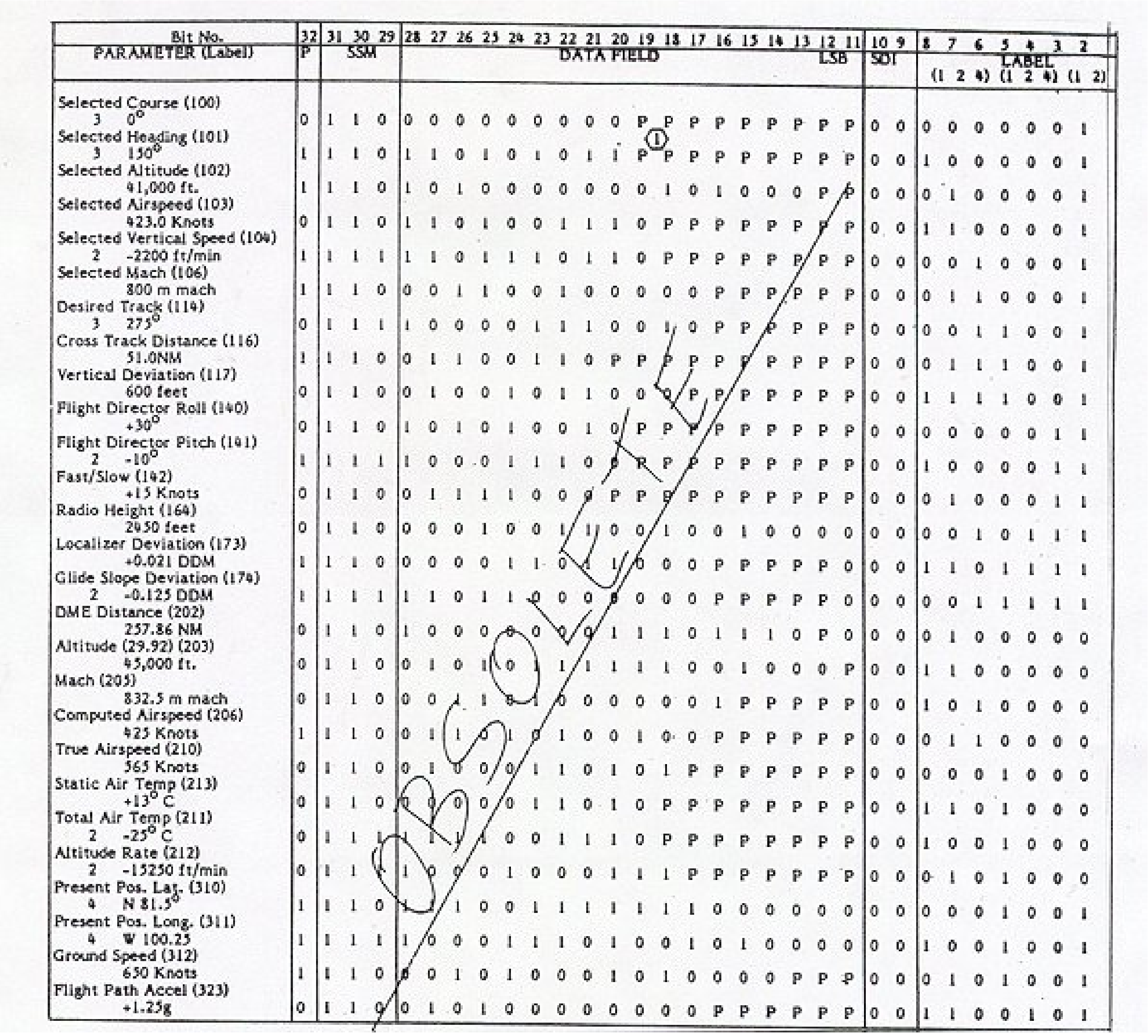
TABLE 6-1a

BCD DATA ENCODING EXAMPLES

NOTES:

[1] "P" denotes pad "zero" or valid data. Section 2.1.2 if this document refers. Note possible use of pad bits for discrete functions per Section 2.3.1.2.

[2] Because the actual maximum value of the most significant character of each of these quantities exceeds 7, it cannot be encoded in the most significant character position of the BCD word. For this reason each quantity has been given and "artificial" MSC of zero and its actual MSC encoded in the next most significant character position of the word.



| Bit No. | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETER (Label) | P | SSM | | | DATA FIELD | | | | | | | | | | | | | | | | LSB | | SDI | | LABEL | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | (1 | 2 | 4) | (1 | 2 | 4) | (1 2) |
| Selected Course (100)<br>3 0° | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P ① | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Selected Heading (101)<br>3 150° | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | P | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Selected Altitude (102)<br>41,000 ft. | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | P | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Selected Airspeed (103)<br>423.0 Knots | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| Selected Vertical Speed (104)<br>2 -2200 ft/min | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| Selected Mach (106)<br>800 m mach | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| Desired Track (114)<br>3 275° | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| Cross Track Distance (116)<br>51.0NM | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | P | P | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| Vertical Deviation (117)<br>600 feet | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |
| Flight Director Roll (140)<br>+30° | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | P | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Flight Director Pitch (141)<br>2 -10° | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | P | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 |
| Fast/Slow (142)<br>+15 Knots | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | P | P | P | P | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| Radio Height (164)<br>2950 feet | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| Localizer Deviation (173)<br>+0.021 DDM | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | P | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| Glide Slope Deviation (174)<br>2 -0.125 DDM | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| DME Distance (202)<br>257.86 NM | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | P | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Altitude (29.92) (203)<br>45,000 ft. | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | P | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Mach (205)<br>832.5 m mach | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | P | P | P | P | P | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Computed Airspeed (206)<br>425 Knots | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| True Airspeed (210)<br>565 Knots | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | P | P | P | P | P | P | P | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Static Air Temp (213)<br>+13° C | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 |
| Total Air Temp (211)<br>2 -25° C | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | P | P | P | P | P | P | P | P | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| Altitude Rate (212)<br>2 -15250 ft/min | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | P | P | P | P | P | P | P | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Present Pos. Lat. (310)<br>4 N 81.5° | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Present Pos. Long. (311)<br>4 W 100.25 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| Ground Speed (312)<br>650 Knots | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | P | P | P | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 |
| Flight Path Accel (323)<br>+1.25g | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | P | P | P | P | P | P | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 |

OBSOLETE

TABLE 6-2

BNR DATA ENCODING EXAMPLES

NOTES: [1] "P" denotes pad "zero" or valid data. Section 2.1.2 of this document refers. Note possible use of pad bits for discrete functions per Section 2.3.1.2.

[2] Negative values are encoded as the two's complements of positive values and the negative sign is annunciated in the sign/status matrix.

[3] Angles in the range 0 to 180° are encoded as positive numbers. Angles in the range 180° to 360° are subtracted from 360° and the resulting number encoded as a negative value per note 2. Arc minutes and seconds are encoded as decimal degrees.

[4] Latitude values are encoded as positive angles in the range 0 to 90° with the sign/status matrix indicating North or South. Longitude values are encoded as positive angles in the range 0 to 180° with the sign/status matrix indicating East or West. Arc minutes and seconds are encoded as decimal degrees.

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# SUPPLEMENT 4

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published:  August 1, 1980

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: June 17, 1980

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces material on defining "No Computed Data" and "Failure Warning", priority assignment of SSM codes, description of fault tolerance and isolation, address capability of A/N messages, command/response protocol, modification of data standards, addition of new labels, change of some word formats, addition of material on signal characteristics, change of receiver impedance limits, expansion of the current label, change of the receiver voltage thresholds and modification of the HF and DME word formats.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains description of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-4" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages where necessary and destroying the pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-4 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 2.1.3 INFORMATION IDENTIFIER

Text changed to describe use of five-character label.

Commentary text partially deleted.

ORIGINAL TEXT FOLLOWS:

2.1.3 Information Identifier

The first eight bits of each word are assigned to a label function. Label will:

a. identify the information contained within BNR and BCD numeric data words (e.g., DME distance, static air temperature, etc.) and

b. identify the word application for Discrete, Maintenance and AIM data.

Label code assignments are set forth in Attachment 1 to this document.

Special Note:

In some ARINC 429 DITS applications, a bus will be dedicated to delivering a single information element from a source to one or more identical sink devices. In such circumstances, the sink device designer might be tempted to assume that decoding the word label is not necessary. Experience has shown, however, that system developments frequently occur that result in the need for additional information elements to appear on the bus. If a sink device designed for service prior to such a development cannot decode the original word label, it cannot differentiate between this word and the new data in the new situation. The message for sink designers should therefore be quite clear – provide label decoding from the outset, no matter how strong the temptation to omit it might be.

COMMENTARY

> Attachment 1 defines 256 discrete label codes. This quantity is expected to meet label assignment needs for the foreseeable future. Should additional labeling capability be required in the longer term, it is envisaged that, rather than extend the length of the label field, a scheme will be devised in which existing label assignments are duplicated. For example, the system could readily accommodate the assignment of the same label to two dissimilar parameters for which the probability of transmission on the same bus is very low.
>
> Adherence to the label code assignments of Attachment 1 is essential in inter-system communications and in intra-system communications where the system elements are defined as "unit interchangeable" per ARINC Report No. 403. The assignment of label codes for all such communications must be coordinated with the air transport industry if chaos is to be avoided. A manufacturer who finds that Attachment 1 does not specify the label he needs for such system application must not simply choose one from those unassigned and "drive on". He should contact ARINC for assistance.

### 2.1.5.1 BCD NUMERIC, DISCRETE, AIM DATA AND FILE TRANSFER WORDS

Text describing "no computed data" modified.

Commentary providing definitions added.

ORIGINAL TEXT FOLLOWS:

2.1.5.1 BCD Numeric, Discrete, AIM Data and File Transfer Words

The sign (Plus, minus, North, South, etc.) of BCD numeric data, the word type (first, intermediate, control, last) for AIM data, and the status of the transmitter hardware should be encoded in bit nos. 30 and 31 of the word as shown in the table below. The sign/status matrices of Discrete words should be encoded per the rules set forth for BCD numeric data.

| Bit No. | | Designation | | |
|---|---|---|---|---|
| 31 | 30 | BCD Numeric Word | AIM | File Transfer |
| 0 | 0 | Plus, North East, Right To, Above | Intermediate Word | Intermediate Word, Plus, North, etc. |
| 0 | 1 | No Computed Data | Initial Word | Initial Word |
| 1 | 0 | Functional Test | Final Word | Final Word |
| 1 | 1 | Minus, South West, Left, From, Below | ControlWord | Intermediate Word, Minus South, etc. |

Notes:

1. A source system should annunciate any detected failure that causes one or more of the words normally output by that system to be unreliable by ceasing to supply the affected word or words to the data bus.

2. Bit nos. 30 and 31 of BCD numeric data words should be “zero” when no sign is needed.

3. The “no computed data” code should be generated for BCD numeric data words when computed data is not available for reasons other than equipment failure.

4. When it appears in a BCD numeric data word identified by its (label) as a system output, the “functional test” code should be interpreted as advice that the data in the word results from the execution of a functional test. When it appears in a BCD numeric data word identified by its label as an instruction, e.g., a radio channel change command, this code should be interpreted as a command to perform a functional test. A self-test should produce indications of 1/8 of positive full-scale values unless indicated otherwise in an ARINC Equipment Characteristic.

5. See Section 2.3.1.3 of this document for definitions of the terms “Initial Word”, “Control Word”, “Intermediate Word” and “Final Word.”

### 2.1.5.2 BNR NUMERIC DATA WORDS

Table modified to permit sign coding for “no computed data”.

Definition of “failure warning” and “no computed data” added.

ORIGINAL TEXT FOLLOWS:

### 2.1.5.2 BNR Numeric Data Words

The sign (plus, minus, north, south, etc.) of BNR numeric data words and the status of the transmitter hardware should be encoded in bit nos. 29, 30 and 31 of the word as shown in the table below.

| Bit No. | | | Designation BNR Data |
|---|---|---|---|
| 31 | 30 | 29 | |
| 0 | 0 | 0 | Failure Warning/Plus, North, East Right, To |
| 0 | 0 | 1 | Failure Warning/Minus, South, West Left, From |
| 0 | 1 | 0 | No Computed Data |
| 1 | 0 | 0 | Functional Test/Plus, North, East, Right, To |
| 1 | 0 | 1 | Functional Test/Minus, South, West Left, From |
| 1 | 1 | 0 | Normal Operation/Plus, North, East, Right, To |
| 1 | 1 | 1 | Normal Operation/Minus, South West, Left, From |
| 0 | 1 | 1 | Not Used (Growth) |

Notes:

1. A source system should annunciate any detected failure that causes one or more of the words normally output by that system to be unreliable by setting bit nos. 30 and 31 in the affected word(s) to the “failure warning” code defined above. Words containing this code should continue to be supplied to the data bus during the failure condition.

2. Bit no. 29 should be “zero” when no sign is needed.

3. The “no computed data” code should be generated when computed data is not available for reasons other than equipment failure.

4. When it appears in a word identified by its label as a system output, the “functional test” code should be interpreted as advice that the data in the word results from the execution of a functional test. A self-test should produce indications of 1/8 of positive full-scale values unless indicated otherwise in an ARINC Equipment Characteristic.

5. If, during the execution of a functional test, a source system detects a failure which causes one or more of the words normally output by that system to be unreliable, it should immediately change the states of bits nos. 30 and 31 in the annunciation to the “failure warning” annunciation.

### 2.1.5.3 STATUS PRIORITIES

New section inserted.

### 2.2.1 TRANSMISSION SYSTEM INTERCONNECT

Commentary expanded to provide description of possible solutions to single-wire fault conditions.

ORIGINAL TEXT FOLLOWS:

### 2.2.1 Transmission System Interconnect

A data source should be connected to the data sink(s) by means of a single twisted and shielded pair of wires. The shields should be grounded at both ends and at all production breaks in the cable. The interwiring diagram to be found in each ARINC Equipment Characteristic shows connector pins assigned to carry shields into black boxes for grounding. Equipment manufacturers should ensure, however, that their equipment will operate correctly if, instead of being terminated on these pins, shields are grounded in the aircraft close to the rack connector.

COMMENTARY

> In practical wire line digital information transmission systems, cable characteristics and electrical mismatches can produce distortion of the digital data pulses. Also, noise due to electrical interference perturbs digital signals.
>
> The performance of a digital receiver depends upon the receiver input signal characteristics (data with distortion and noise) and the receiver design.
>
> Prior to the selection of the voltage and impedance parameters set forth in this Section of this document, the pulse distortion likely to be encountered in systems built around them in existing size commercial aircraft was evaluated and judged to be acceptable for a well-designed receiver. No restriction is placed by this specification, therefore, on the number or length of sturbs for installations on aircraft no larger than those existing, e.g., B 747. See Appendix 1 to this document for a report of this investigation.

### 2.2.3.1 TRANSMITTER VOLTAGE LEVELS

Text changed to improve clarity.

ORIGINAL TEXT FOLLOWS:

### 2.2.3.1 Transmitter Voltage Levels

The differential output signal across the specified output terminals (balanced to ground at the transmitter) should be + 10 ± 1.0 volts, 0 ± 0.5 volts and –10 ± 1.0 volts respectively for the "HI", "NULL" and "LO" states when the transmitter is open circuit. The output impedance of the transmitter should be as specified in Section 2.2.4.1 of this document. This output impedance should be present for the "HI", "NULL" and "LO" transmitter output conditions and also during transitions between these levels.

### 2.2.3.2 RECEIVER VOLTAGE LEVELS

Receiver voltage thresholds changed.

Fault voltage text deleted.

Commentary revised to include description of receiver reaction to undefined voltages.

ORIGINAL TEXT FOLLOWS:

### 2.2.3.2 Receiver Voltage Levels

The differential voltage presented at the receiver input terminals will be dependent upon line length, stub configuration and the number of receivers connected. In the absence of noise, the normal ranges of voltages presented to the receiver terminals (A and B) would be:

| | |
|---|---|
| "HI" | +6V to 10V |
| "NULL" | +0.5 to –0.5V |
| "LO" | -6V to –10V |

In practice, these nominal voltages will be perturbed by noise and pulse distortion. Thus, receivers should associate the following voltage ranges with the three states indicated:

| | |
|---|---|
| "HI" | +5V to 13V |
| "NULL" | +2.5V to –2.5V |
| "LO" | -5V to –13V |

Receivers should not be damaged by the application of up to 20VAC (RMS) across terminals A and B by the application of up to +28Vdc (min) bias between terminal A and ground and –28Vdc (min) bias between terminal B and ground. See Attachment 3 to this document for a pictorial representation of transmitter and receiver voltage levels.

COMMENTARY

> Receiver input common mode voltages (terminal A to ground and terminal B to ground) are not specified because of the difficulties of defining ground with any satisfactory degree of precision. Receiver manufacturers are encouraged to work with the differential input voltage (line A to line B) and not line-to-ground voltages.
>
> The opinion is held by some people that conditions on transmission lines will be encountered which will require receivers to operate with less than the above-defined minimum difference of 2.5V between the NULL and HI and NULL and LO states. Receiver designers are encouraged to investigate the possibilities and problems of working with a minimum difference of 1 volt between these states and to report their findings.

### 2.2.4.1 TRANSMITTER OUTPUT IMPEDANCE

Text added to improve clarity.

ORIGINAL TEXT FOLLOWS:

2.2.4.1 Transmitter Output Impedance

The transmitter output impedance should be 75 ± 5 ohms, divided equally between line A and line B to provide an impedance balanced output.

COMMENTARY

The output impedance of the transmitter is specified as 75 ± 5 ohms to provide an approximate match to the characteristic impedance of the cable. The match can only be approximate due to the wide range of characteristic impedance which may be encountered due to the variety of conductor wire gages and insulation properties. Measurements on a few samples of wire showed a spread of characteristic impedance of 63 and 71 ohms. An extrapolation over the wire gages 20 to 26 for wrapped and extruded insulation indicate an expected characteristic impedance spread of 80 to 60 ohms approx. Twisted shielded wire specifications do not control the characteristic impedance of the cable, thus future developments in insulation techniques may result in cables having characteristic impedances outside the range estimated.

2.2.4.2 RECEIVER INPUT IMPEDANCE

Value of RI changed.

ORIGINAL TEXT FOLLOWS:

2.2.4.2 Receiver Input Impedance

The receiver should exhibit the following characteristics, measured at the receiver input terminals:

Differential Input Resistance RI = 6,000 ohms minimum

Differential Input Capacitance CI = 50pF maximum
Resistance to Ground $R_H$ and $R_G \geq$ 12,000 ohms
Capacitance to Ground $C_H$ and $C_G \leq$ 50pF.

No more than twenty receivers should be connected on to one digital data bus and each receiver should incorporate isolation provisions to ensure that the occurrence of any reasonably probable failure does not cause loss of data to the others.

See Attachment 4 to this document for a pictorial representation of the input and output circuits standards.

COMMENTARY

The above characteristics apply to differential amplifier receivers. Opto-isolator technology is progressing and may soon find application in digital data receivers. Opto-isolator receivers impose slightly greater loads on data buses than differential amplifier receivers and the way in which they are characterized is different. It is probable, however, that a future revision of this Specification will include material specifically related to their use.

2.2.5 Fault Tolerance

New section inserted.

2.2.5.1 Receiver External Fault voltage Tolerance

New section inserted.

2.2.5.2 Transmitter External Fault Voltage Tolerance

New section inserted.

2.2.5.3 Transmitter External Fault Load Tolerance

New section inserted.

2.2.6 Fault Isolation

New section inserted.

2.2.6.1 Receiver Fault Isolation

New section inserted.

2.2.6.2 Transmitter Fault Isolation

New section inserted.

2.3.1.2 Discretes

Text modified to expand label examples.

Reference to AIDS limitations deleted.

ORIGINAL TEXT FOLLOWS:

2.3.1.2 Discretes

In addition to handling numeric data as specified above, the Mark 33 DITS should also be capable of accommodating discrete items of information either in the unused (pad) bits of data words or, when necessary, in dedicated words. Any discrete information contained in a numeric data word assigned a label in Attachment 1 is specified in the definition for that word in Attachment 2.

The rule to be followed in the assignments of bits to discretes in numeric data words is to start with the least significant bit of the word and to continue towards the most significant bit available in the word. Attachment 6 shows that this against the background of the generalized word structure.

There are two types of discrete words. These are general purpose discrete words, and dedicated discrete words. Five labels (octal 270-274) are assigned to the general purpose words in Attachment 1. These words should be used in ascending label order (starting with octal 270) when the system receiving the data can identify its source by reference to the port at which it arrives. The dedicated words should be used when the

### 2.3.1.2 Discretes (cont'd)

data is intended for the AIDS DFDAU which cannot identify sources in this way.

COMMENTARY

> The foregoing special provisions for the delivery of discrete data to an AIDS were made to compensate for the number of digital ports required when many ports are used is extremely difficult to achieve, which necessitated the development of the special AIDS words. These words should be limited to AIDS utilization. The few aircraft systems which deliver discretes to an AIDS by means of the Mark 33 DITS will be burdened very little by this. Similarly, the impact of label use will be small.

### 2.3.1.4 AIM DATA

Text added to describe unit addressing.

ORIGINAL TEXT FOLLOWS:

### 2.3.1.4 AIMS Data

AIM data (Acknowledgement, ISO Alphabet No. 5 and Maintenance information encoded in dedicated words) should be handled in the manner described in this Section.

All three of these applications may involve the transfer of more than 21 bits per "data package". Source equipment should format such long messages into groups of 32-bit DITS words, each word containing the relevant application label (see Attachment 1) in bit nos. 1 through 8, and a sign/status matrix code in bit nos. 30 and 31.

Bit no. 32 should be encoded to render word parity odd. The first word of each group should contain the sign/status matrix code defined for "initial word" in Section 2.1.5.1 of this document. It should also contain, in bit nos. 9 through 16, the binary representation of the number of words in the group, except that when this word is the only word to be transmitted, i.e., the total number of information bits to be transmitted is 13 or less, bit nos. 9 through 16 should all be binary "zeros".

When the word application label is assigned in Attachment 1 for Acknowledgement Data, bit nos. 17 through 29 of this initial word may be used for information transfer. When the word application label is either of those assigned in Attachment 1 for ISO Alphabet No. 5 data transfer or Maintenance Data (ISO Alphabet Not. 5), bit nos. 17 through 22 should be binary "zeros" (spares) and bit nos. 23 through 29 should take on the pattern of the ISO Alphabet No. 5 control character "STX".

The second word of the ISO Alphabet No. 5 and Maintenance Data (ISO Alphabet No. 5) application groups is an optional control word containing the sign/status matrix code for "control" information for the display. When it is used, bit nos. 9 through 13 should contain the binary representation of the line count, bit nos. 14 through 16 should encode the required color, bit nos. 17 and 18 the required intensity, bit nos. 19 and 20 the required character size and bit no. 21 should indicate whether or not the display is required to flash. See Attachment 6 to this document for the encoding standards. Bit nos. 22 through 29 of the word should be binary "zero" (spares).

Intermediate words, containing the sign/status matrix code for "intermediate word", follow the initial word of the group or the control word, when used. Intermediate words are optional in the sense that they are only transmitted if more words than the initial word and the final word (see below) are needed to accommodate the quantity of information to be transferred. When the word application group label that is assigned in Attachment 1 for Acknowledgement, Data bit nos. 9 through 29 of that word are available for information transfer. When the word application label is either of those assigned in Attachment 1 for ISO Alphabet No. 5 data transfer or Maintenance Data (ISO Alphabet No. 5), bit nos. 9 through 29 of each word should be divided into three seven-bit bytes (bit nos. 9 through 15, 16 through 22 and 23 through 29), each of which contains one ISO Alphabet No. 5 character.

Each AIM application group transmission other than single-word transmissions (see below) should be terminated with a word containing the sign/status matrix code for "final word" defined in Section 2.1.5.1 of this document. The data field of this word should be structured similarly to that of the intermediate word. Any unused bit positions in ISO Alphabet No. 5) final transfer or Maintenance Data (ISO Alphabet No. 5) final words resulting from the number of ISO Alphabet No. 5 characters in the message being one or two less than a number wholly divisible by three should be filled with binary "zeros".

### 2.3.1.5.1 COMMAND/RESPONSE PROTOCOL

Text modified to describe transmitter reaction to lack of "Clear to send".

ORIGINAL TEXT FOLLOWS:

### 2.3.1.5.1 Command/Response Protocol

File data will consist of both ARINC 429 BNR numeric words and ISO alphabet No. 5 characters. A file may contain from 1 to 127 records. Each record may contain from 1 to 126 data words.

A record will contain, at the minimum, one of the eight versions of the "initial word" described in Section 2.3.1.5.2. Records in which this initial word contains the "Data Follows" code will also contain from 1 to 126 "intermediate words" (data) and a "final word" (error control). The file data transfer protocol is as follows. A transmitter having the data to send to a receiver transmits, on the bus connecting it to that receiver, the "Request to Send" initial word. The receiver responds, on the separate bus provided for return data flow, with the "Clear to Send" reply. The transmitter then sends the "Data Follows" initial word, the "intermediate words" and the "final word". The receiver processes the error control information in the "final word" and, if no errors are revealed, closes out the transaction by sending the “Data Received OK” word to the transmitter.

If the receiver is not ready to accept data when the transmitter sends its “Request to Send” word, it will so indicate in its response (see Section 2.3.1.5.2). The transmitter should then wait 200 milliseconds and retransmit the “Request to Send”. The transmitter should also repeat a “Request to Send” transmission 50 milliseconds after the initial transmission if no response is obtained from the receiver. An alert should be raised in the system containing the transmitter if 4 attempts to obtain a “Clear to Send” response from a receiver are unsuccessful.

If the receiver detects a parity error during the transmission, it may request an error-correcting retransmission by sending a “Data Received Not OK” word to the transmitter in which is identified the record in which the error occurred. The transmitter will interrupt the data flow and back up to the start of the record so identified. It will then send a “Data Follows” initial word identifying this record as the starting point of the retransmission and recommence its output of data, continuing through the “final word”. The receiver will then close out the transaction as before.

An error detected by processing the error control information in the “final word” will also result in the receiver sending a “Data Received Not OK” word to the transmitter. In the absence of identification of the record in which the error occurred, this word should contain the sequence number of the first record of the file. The transmitter’s response will be to retransmit the whole file.

The receiver can signal loss of synchronization to the transmitter at any time by sending the “Synchronization Lost” initial word. On receiving this word the transmitter should curtail the data flow and back up to the beginning of the file. It should then re-establish that the receiver can accept data by going through the request-to-send/clear-to-send routine. Having done this it should send the “Data Follows” initial word, followed by the data and the “final word”.

The protocol also allows a transmitter to send file size information to a receiver without any commitment to send, or request to the receiver to accept, the file itself. The “Header Information” initial word is used for this purpose. Additionally, a “Poll” initial word is defined for use in system in which continuous “handshaking” between two terminals is desired. The response to a “Poll” word will be either a “Request to Send” initial word when the polled terminal does have data to transmit, or another “Poll” word when it does not. An exchange of “Poll” words may be interpreted as the message, “ I have nothing for you, do you have anything for me?”

### 2.4.2 INFORMATION RATES

Commentary added to describe refresh rate.

ORIGINAL TEXT FOLLOWS:

### 2.4.2 Information Rates

The minimum update interval for each item of information transferred by the Mark 33 DITS is specified in the tables of Attachment 2.

Discretes contained within data words will be transferred at the bit rate and repeated at the update rate of the primary data. Words dedicated to discretes should be repeated continuously at the rates defined in Attachment 2.

#### COMMENTARY

The time intervals between successive transmissions of a given BCD word specified in table 1 of Attachment 2 to this document are, in general, too short for the signal to be of use in driving a display device directly. If the signal was so used, the least significant character of the display would change too rapidly for human perception. Considerations other than human factors demand the time intervals specified. Thus, display designers should incorporate into their devices means for selecting those words to be used for updating the display from the greater quantity delivered.

### 3.1.4.2 DME

Encoding and switch functions modified.

ORIGINAL TEXT FOLLOWS:

### 3.1.4.2 DME

| | |
|---|---|
| Frequency Range: | 108.00MHz to 135.95MHz |
| Frequency Selection: Increment: | 50kHz |
| Characters encoded In DITS word: | 10MHz, 1MHz, 0.1MHz, 0.01MHz, (100MHz Character is always Decimal 1) |
| Switching Functions: | Standby, DME Mode Select ILS Mode |

FIGURE 3-1 Radio Systems Management Word Formats

HF and DME words modified.

ORIGINAL TEXT FOLLOWS:

| DME<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 10MHz (1) | 1MHz (1) | 0.1MHz (5) | 0.01MHz (0) | ILS Mode | Standby | DME Mode Select | RESERVED (SDI) | LABEL DME Frequency |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 27 | 26 25 24 23 | 22 21 20 19 | 1 8 17 16 15 | 14 | 13 | 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
| Example | 1 | 0 0 | 0 0 1 | 0 0 0 1 | 0 1 0 1 | 0 0 0 0 | 0 | 0 | 0 0 | 0 0 | 1 0 1 1 1 0 0 0 |
| Notes | | | | | | | [1] | [2] | [3] | | |

[1] Bit no. 14 should be set to “zero” for VOR frequencies and “one” for ILS frequencies by the tuning information source.

[2] [3]

| Bit | Zero | One |
|---|---|---|
| 11 | DME Mode select coding per Section 4.1.6 of ARINC Char. 709 | |
| 12 | | |
| 13 | Standby off | Standby on |

| HF COM<br>Word #1<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 10MHz (2) | 1MHz (3) | 0.1MHz (5) | 0.01MHz (7) | 0.001MHz (9) | USB/LSB Mode | SSB/AM Mode Word Identifier | LABEL HF COM Frequency |
|---|---|---|---|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 | 27 26 25 24 | 23 22 21 20 | 09 18 17 16 | 15 14 13 12 | 11 | 10 9 | 8 7 6 5 4 3 2 1 |
| Example | 0 | 0 0 | 1 1 | 0 0 1 1 | 0 1 0 | 0 1 1 1 | 1 0 0 1 | 0 | 0 0 | 1 1 1 1 1 0 0 0 |
| Notes | | | | | | | | [1] | [2] [3] | |

[1] Bit no. 11 should be set to “zero” for LSB operation and “one” for USB operation.

[2] Bit no. 10 should be set to “zero” for AM operation and “one” for SSB operation.

[3] Bit no. 9 should be set to “zero” when the 100 Hz option is not used and “one” when it is.

| HF COM<br>Word #2<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | .1Khz (5) | NOT USED | | LABEL HF COM Frequency |
|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 27 26 | 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 | 10 9 | 8 7 6 5 4 3 2 1 |
| Example | 0 | 0 0 | 0 1 0 1 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 0 0 | 1 1 1 1 1 0 0 0 |

Note: The HF COMM #2 word is used only when bit no. 9 of word #1 is “one”.

ATTACHMENT 1: LABEL CODES

Column "EQPT. ID (HEX)" has been added for five-character label implementation.

Table containing "Equipment ID Codes" added.

The following labels have been given new assignments:

004, 034, 056, 060-064, 070-106, 111, 114-122, 126, 127, 135, 136, 140-141, 144-162, 173-177, 202-212, 215, 217, 222-226, 242, 244-252, 256-265, 276, 310-322, 340-342, 344, 345, 347, 350, 370, 377.

Label 226 (FWC #2) deleted.

Labels 124 and 224 (C&W DFDR Discretes) deleted.

ATTACHMENT 2: DATA STANDARDS

The columns for "bandwidth", "noise level" and "update interval" have been deleted. A column for "minimum transmit interval" has been added. The column for "transport delay" has been changed to "maximum transport delay". A column for "EQPT.ID (HEX)" has been added.

Data standards added for new labels.

Note [2]: A nominal interval description has been added.

Note [3]: A definition for "maximum transport delay" has been added.

Note [4]: SDI assignments defined for labels 060-064.

The following tables list the parameters for which the data standards have changed. An asterisk beside a particular value designates that a new value is suggested.

TABLE 1 BCD DATA

| LABEL (OCTAL) | PARAMETER NAMES | UNITS | RANGE (SCALE) | SIG. DIG. | POSITIVE SENSE | RESOL. | MAXIMUM TRANSMIT INTERVAL |
|---|---|---|---|---|---|---|---|
| 010 | Present Position – Lat. | Deg:Min | 90S-90N* | 5* | | 0.1 | 500 |
| 017 | Selected Runway Heading | Deg | 0-359.9 | 4 | | 0.1 | 200* |
| 024 | Selected Course #1 | Deg | 0-359 | 3 | | 1.0 | 200* |
| 027 | Selected Course #2 | Deg | 0-359 | 3 | | | 200* |
| 033 | ILS Frequency | | | | | | 200* |
| 034 | VOR/ILS Frequency | | | | | | 200* |
| 041 | Set Latitude | Deg:Min | 90S-90N* | 5* | N | 0.1 | 500 |
| 065 | Gross Weight | 100lb. | 0-10000* | 5 | | 1.0 | 200 |
| 067 | Lateral CG | Mlb-in.* | ± 100.00* | 4* | | 0.1* | 200 |
| 200 | Drift Angle | Deg | ± 90* | 3* | | 0.1 | 200 |
| 231 | Total Air Temperature | °C | -60-+90* | 2* | | 1.0 | 500 |
| 232 | Altitude Rate | Ft/Min | ± 20,000 | 4 | Up | 20.0* | 62.5 |
| 233 | Static Air Temperature | °C | -99-+60* | 2* | | 1.0 | 500 |

TABLE 2 BNR DATA

| LABEL (OCTAL) | PARAMETER NAME | UNITS | RANGE | SIG. BITS | POSITIVE SENSE | APPROX. RESOL. | MAXIMUM TRNASMIT INTERVAL |
|---|---|---|---|---|---|---|---|
| 077 | Lateral CG | MLB/in | ± 128* | 14* | | 0.001 | 200 |
| 100 | Selected Course #1 | Deg/180 | ± 180° | 12 | | 0.05 ° | 50* |
| 105 | Selected Runway Heading | Deg/180 | ± 180° | 11 | | 0.05 ° | 62.5* |
| 110 | Selected course #2 | Deg/180 | ± 180° | 12 | | 0.05 ° | 50* |
| 173 | Localizer Deviation | DDM | ± 0.4 | 12 | | 0.0001 | 62.5* |
| 174 | Glideslope Deviation | DDM | ± 0.8 | 12 | | 0.0002 | 62.5* |
| 222 | VOR Omnibearing | Deg/180 | ± 180° | 12 | | 0.044 ° | 62.5* |
| 256 | Fuel Quantity #1 | Lbs. | 131,072 | 15 | | 4 | 200* |
| 257 | Fuel Quantity #2 | Lbs. | 131,072 | 15 | | 4 | 200* |
| 310 | Present Position – Lat. | Deg/180 | 0-90N-0-90S* | 20 | | .000086 °* | 200 |

ATTACHMENT 2: DATA STANDARDS (cont'd)

ORIGINAL TEX FOLLOWS:

[2] Transmit intervals and the number of parameters to be transmitted are prime factors in bus loading. It was suggested that a Minimum Transmit Interval be specified (perhaps a value of ½ the Transmit Interval) to control bus loading. The ability of receivers to reject unwanted words would also be effective in improving bus efficiency.

Table 3.2 FCC DISCRETES – LABELS 270, 271

Existing tables replaced by new set of tables.

ORIGINAL TEXT FOLLOWS:

Table 3.2: FCC Discretes – Labels 270, 271

Discrete Word #1

| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 1 | Label | X | |
| 2 | | | X |
| 3 | | X | |
| 4 | | X | |
| 5 | | X | |
| 6 | | | X |
| 7 | | | X |
| 8 | | | X |
| 9* | Capt. Flight Director | On | Off |
| 10* | F. O. Flight Director | On | Off |
| 11 | Turbulence Mode | Requested | Not Requested |
| 12 | Autopilot #1 | Engaged | Not Engaged |
| 13 | Autopilot #2 | Engaged | Not Engaged |
| 14 | RESERVED (A/P #3) | Engaged | Not engaged |
| 15 | Autothrottle #1 | Armed | Not Armed |
| 16 | RESERVED (A/T #2) | Armed | Not Armed |
| 17 | Airspeed Hold Mode | Requested | Not Requested |
| 18 | Airspeed Select Mode | Requested | Not Requested |
| 19 | Mach Select Mode | Requested | Not Requested |
| 20 | Mach Hold Mode | Requested | Not Requested |
| 21 | Bank Angle Limit | See Below | |
| 22 | | | |
| 23 | | | |
| 24 | Heading Select Mode | Requested | Not Requested |
| 25 | N1/EPR Select Mode | Requested | Not Requested |
| 26 | IAS on Throttle | Requested | Not Requested |
| 27 | Mach on Throttle | Requested | Not Requested |
| 28 | Spare | | |
| 29 | Spare | | |
| 30 | Sign/Status | | |
| 31 | Matrix | | |
| 32 | Parity (Odd) | | |

ATTACHMENT 2: DATA STANDARDS (cont'd)

Bank Angle Limit Encoding

Bit nos. 21, 22 and 23 of Discrete Word #1 should be encoded to indicate selected bank angle limit as follows:

*Bits 9 and 10, which are normally used for the SDI, have purposely been used for Discrete information.

| Limit | Bit No. | | |
|---|---|---|---|
| | 21 | 22 | 23 |
| Not used | 0 | 0 | 0 |
| 5° | 0 | 0 | 1 |
| 10 ° | 0 | 1 | 0 |
| 15 ° | 0 | 1 | 1 |
| 20 ° | 1 | 0 | 0 |
| 25 ° | 1 | 0 | 1 |
| 30 ° | 1 | 1 | 0 |
| Spare | 1 | 1 | 1 |

Discrete Word #2

| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 1 | Label | X | |
| 2 | | | X |
| 3 | | X | |
| 4 | | X | |
| 5 | | X | |
| 6 | | | X |
| 7 | | | X |
| 8 | | X | |
| 9* | Altitude Hold Mode | Requested | Not Requested |
| 10* | Altitude Select Mode | Requested | Not Requested |
| 11 | Vertical Speed Select Mode | Requested | Not Requested |
| 12 | Vertical Speed Hold Mode | Requested | Not Requested |
| 13 | Horizontal Navigation | Requested | Not Requested |
| 14 | Vertical Navigation | Requested | Not Requested |
| 15 | Land Command | Requested | Not Requested |
| 16 | LOC Approach Command | Requested | Not Requested |
| 17 | Back Course Approach Command | Requested | Not Requested |
| 18 | CWS #1 | Requested | Not Requested |
| 19 | CWS #2 | Requested | Not Requested |
| 20 | CWS #3 | Requested | Not Requested |
| 21 | Pitch Upper Mode Cancel | Requested | Not Requested |
| 22 | Roll Upper Mode Cancel | Requested | Not Requested |
| 23 | Heading Hold | Requested | Not Requested |
| 24 | Spare | | |
| 25 | | | |
| 26 | | | |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | Sign/Status Matrix | | |
| 31 | | | |
| 32 | Parity (odd) | | |

* Bits 9 and 10, which are normally used for the SDI, have purposely been used for Discrete information.

### TABLE 3.7 GPWS DISCRETE LABEL 270 23

Visual message bit assignments inserted.

### TABLE 3.8 TCC DISCRETES LABELS 272 03, 273 03, 274 03, 275 03

New tables inserted.

### ATTACHMENT 3: VOLTAGE LEVELS

Hi and Lo thresholds changed from 5-13 volts to 6.5-13 volts.

### ATTACHMENT 4: INPUT/OUTPUT CIRCUIT STANDARDS

$R_I$ increased from 6,000 to 12,000 ohms.

Total system resistance range of 300-6000 ohms changed to 400-8000 ohms.

### ATTACHMENT 6: GENERAL WORD FORMATS AND ENCODING EXAMPLES

Format for alphanumeric message initial word modified.

Slat/Flap angle word added.

GMT binary word added.

Label Fields changed in discrete word and maintenance (discrete) word.

In table 6-1b note [1] deleted and bits 21 and 22 of latitude word interchanged.

In Table 6-2 examples corrected for Present Position (Latitude and Longitude).

Radio Height word added.

ORIGINAL TEXT FOLLOW:

| P | SSM | “STX” | SPARES | WORD COUNT | LABEL |
|---|---|---|---|---|---|
| 32 | 31 (01) 30 | 29 23 | 22 (Zeros) 17 | 16 BNR EQUIV. 9 | 8 (356/357) 1 |

ALPHA NUMERIC (ISO ALPHABET NO. 5) DATA – INITIAL WORD FORMAT

| P | SSM | | SDI | LABEL |
|---|---|---|---|---|
| | | DISCRETES | | |
| 32 | 31 (00) 30 | 29 MSB 2 LSB 11 | 10 9 | 8 (270-274) 1 |

DISCRETE WORD FORMAT

| P | SSM | MAINTENANCE DISCRETES | SDI | LABEL |
|---|---|---|---|---|
| | | DISCRETES | | |
| 32 | 31 (00) 30 | 29 MSB LSB 11 | 10 9 | 8 (350-354) 1 |

MAINTENANCE (DISCRETE) WORD FORMAT

### APPENDIX 3: DIGITAL SYSTEMS GUIDANCE (PART 1)

Appendix added.

### APPENDIX 4: DIGITAL SYSTEM GUIDANCE (PART 2)

Appendix added.

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2551 Riva Road
Annapolis, Maryland  21401 – 7645 USA

# SUPPLEMENT 5

# TO

# ARINC  SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: April 4 1981

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: March 12, 1981

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces material on fault detection, transmit intervals for words using multiple SDI codes, modification of IRS/AHRS discrete formats, expansion of error control definition, revision of ILS word, addition of new labels and change of existing data standards.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-5" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages where necessary and destroying the pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-5 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 2.2.1 TRANSMISSION SYSTEM INTERCONNECT

Text revised for break connections.

Text added to Commentary describing increase of voltage threshold.

ORIGINAL TEXT FOLLOWS:

### 2.2.1 Transmission System Interconnect

A data source should be connected to the data sink(s) by means of a single twisted and shielded pair of wires. The shields should be grounded at both ends and at all production breaks in the cable to an aircraft ground close to the rack connector.

COMMENTARY

> In practical wire line digital information transmission systems, cable characteristics and electrical mismatches can produce distortion of the digital data pulses. Also, noise due to electrical interference perturbs digital signals. The performance of a digital receiver depends upon the receiver input signal characteristics (data with distortion and noise) and the receiver design.
>
> Prior to the selection of the voltage and impedance parameters set forth in this Section of this document, the pulse distortion likely to be encountered in systems built around them in existing size commercial aircraft was evaluated and judged to be acceptable for a well-designed receiver. No restriction is placed by this specification, therefore, on the number or length of stubs for installations on aircraft no larger than those existing, e.g., B 747. See Appendix 1 to this document for a report of this investigation.
>
> Tests have shown that some receivers continue decoding data properly when one side of the transmission line is open or shorted to ground. When this condition exists noise immunity decreases and intermittent operation may occur. Users desire protection against non-annunciated system operation in this mode. This protection may consist of additional circuitry to detect and annunciate the fault.

### 2.2.3.2 RECEIVER VOLTAGE LEVELS

Normal voltage ranges changed due to impedance changes.

ORIGINAL TEXT FOLLOWS:

### 2.2.3.2 Receiver Voltage Levels

The differential voltage presented at the receiver input terminals will be dependent upon line length, stub configuration and the number of receivers connected. In the absence of noise, the normal ranges of voltages presented to the receiver terminals (A and B) would be:

| | |
|---|---|
| "HI" | +6.5V to 10V |
| "NULL" | +2.5V to –2.5V |
| "LO" | -6.5V to –13V |

In practice, these nominal voltages will be perturbed by noise and pulse distortion. Thus, receivers should associate the following voltage ranges with the three states indicated:

| | |
|---|---|
| "HI" | +6.5V to 13V |
| "NULL" | +2.5V to –2.5V |
| "LO" | -6.5V to –13V |

COMMENTARY

> Receiver reaction is currently undefined in Specification 429 for voltages that fall in the range just above and below the "NULL" range. Respective equipment Characteristics should be referenced for desired receiver response in this range. However, it is desirable that all DITS receivers will discontinue operation when the voltage levels fall into the undefined regions. Manufacturers are urged, as new equipment is developed, to "design in" the rejection capability.
>
> The opinion is held by some people that conditions on transmission lines will be encountered which will require receivers to operate with less than the

above-defined minimum difference of 4.0V between the NULL and HI and NULL and LO states. Receiver designers are encouraged to investigate the possibilities and problems of working with a minimum difference of 1 volt between these states and to report their findings.

Receiver input common mode voltages (terminal A to ground and terminal B to ground) are not specified because of the difficulties of defining ground with any satisfactory degree of precision. Receiver manufacturers are encouraged to work with the differential input voltage (line A to line B) and not line-to-ground voltages.

### 2.3.1.5.4 FINAL WORDS

Text added to define checksum.

ORIGINAL TEXT FOLLOWS:

### 2.3.1.5.4 Final Words

The final word of each record contains error control information. Bit nos. 1 through 8 contain the file label. Bit nos. 9 through 29 contain an error control checksum computed from the states of bit nos. 9 through 31 of each intermediate word of the record. Bit nos. 30 and 31 of this word contain the code identifying it as a final word. Bit no. 32 is encoded to render word parity odd.

### 2.3.4 ERROR DETECTION/CORRECTION

Obsolete text deleted.

ORIGIANL TEXT FOLLOWS:

### 2.3.4 Error Detection/Correction

The last bit of each word should be encoded such that word parity is rendered odd to allow error detection in receivers. Note that the parity calculation encompasses all 31 label and information bits of the word. The Mark 33 DITS contains no provisions for message retransmission, the inclusion of redundant bits in words or other means of error correction.

### Fig. 3-1: RADIO SYSTEMS MANAGEMENT WORD FORMATS

Bits 3 and 7 of transponder word changed to “0”. (editorial)

Bit 11 and 12 assigned to ILS category designation.

Control Panel Function Matrix added to transponder word.

ORIGINAL MATERIAL ON NEXT PAGE:

### 2.4.2 INFORMATION RATES

Text added to describe transmission of labels with multiple SDI codes.

ORIGINAL TEXT FOLLOWS:

### 2.4.2 Information Rates

The minimum and maximum transmit intervals for each item of information transferred by the Mark 33 DITS are specified in the tables of Attachment 2.

COMMENTARY

> There are no values given for refresh rates in this Specification. However, it is desirable that data be refreshed at least once per transmission. Those data actually requiring long processing times or a large number of samples are the only types not expected to be refreshed with every transmission.

Discretes contained within data words should be transferred at the bit rate and repeated at the update rate of the primary data. Words dedicated to discretes should be repeated continuously at the rates defined in Attachment 2.

COMMENTARY

> The time intervals between successive transmissions of a given BCD word specified in table 1 of Attachment 2 to this document are, in general, too short for the signal to be of use in driving a display device directly. If the signal was so used, the least significant character of the display would change too rapidly for human perception. Considerations other than human factors demand the time intervals specified. Thus, display designers should incorporate into their devices means for selecting those words to be used for updating the display from the greater quantity delivered.

Fig. 3-1: RADIO SYSTEMS MANAGEMENT WORD FORMATS (cont'd)

| ILS<br>Function | PARITY (odd) | SIGN/STATUS MATRIX | 10MHz (0) | 1MHz (9) | 0.1MHz (3) | 0.01MHz (0) | SPARE | SPARE | SPARE | SPARE | RESERVED (SDI) | LABEL ILS Frequency |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bit No. | 32 | 31 30 | 29 28 27 | 26 25 24 23 | 22 21 20 19 | 18 17 16 15 | 14 | 13 | 12 | 11 | 10 9 | 8 7 6 5 4 3 2 1 |
| Example | 1 | 0 0 | 0 0 0 | 1 0 0 1 | 0 0 1 1 | 0 0 0 0 | 0 | 0 | 0 | 0 | 0 0 | 1 1 0 1 1 0 0 0 |

## ATTACHMENT 1: LABEL CODES

The following labels have been given new assignments:

073 02, 073 A2, 112 02, 130 1A, 131 2D, 132 1A, 133 1A, 151 02, 154 02, 164 02, 164 03, 174 03, 205 1A, 207 0A, 211 1A, 215 1A, 242 1A, 245 0A, 256 0A, 260 31, 262 0A, 263 0A, 264 0A, 265 0A, 270 1A, 270 1E, 270 30, 271 06, 271 1A, 271 1E, 272 1A, 274 0A, 275 2B, 300 1A, 301 1A, 303 1A, 304 1A, 305 1A, 306 1A, 307 1A, 325 1A, 340 1A, 340 2D, 341 1A, 342 1A, 344 1A, 345 1A, 346 1A, 350 1A, 351 1A, 352 1A, 353 1A, 354 1A.

Label 242** was deleted.

Label 316 04 changed form "Wind Angle" to "Wind Direction (True)".

## ATTACHMENT 1: EQUIPMENT CODES

New assignments were made for 0A and 2D.

Note added to 1A.

## ATTACHEMENT 2: DATA STANDARDS

Data standards were added for new labels.

The following table lists the parameters for which the existing data standards have changed. An asterisk beside a particular value designates that a new value is suggested.

| LABEL | EQPT ID (HEX) | PARAMETER NAME | UNITS | RANGE | SIG. DIG/ BITS | POS. SENSE | RESOL | MIN. TR. INT. | MAX. TR. INT. |
|---|---|---|---|---|---|---|---|---|---|
| 004 | 01 | Runway Distance to Go | Feet | 0-79900 | 3 | | 100.0 | 200* | 400* |
| 165 | 07 | Radio Height | Feet | ± 0-7999.9 | 5 | | 0.1 | 100* | 200* |
| 205 | 06 | Mach | mMach* | 4096* | 13* | | 0.5* | 62.5 | 125 |
| 210 | 06 | True Airspeed | Knots | 2048* | 13* | | 0.25* | 62.5 | 125 |
| 215 | 06 | Impact Pressure | mb | 512* | 9* | | 1.0* | 62.5 | 125 |
| 242 | 06 | Total Pressure | mb | 2045* | 11* | | 1.0* | 62.5 | 125 |
| 313 | 04 | Track Angle True | Deg/180 | ± 180° | 12* | | 0.05° | 25 | 50 |
| 314 | 04 | True Heading | Deg/180 | ± 180° | 12* | | 0.05° | 25 | 50 |
| 317 | 04 | Track Angle Magnetic | Deg/180 | ± 180° | 12* | | 0.05° | 25 | 50 |
| 317 | 05 | Track Angle Magnetic | Deg/180 | ± 180° | 12* | | 0.05° | 25 | 50 |
| 320 | 04 | Magnetic Heading | Deg/180 | ± 180° | 12* | | 0.05° | 25 | 50 |
| 320 | 05 | Magnetic Heading | Deg/180 | ± 180° | 12* | | 0.05° | 25 | 50 |
| 323 | 04 | Flight Path Acceleration | g | 2* | 14* | | 0.0001* | 10 | 20 |
| 323 | 05 | Flight Path Acceleration | g | 2* | 14* | | 0.0001* | 10 | 20 |
| 324 | 04 | Pitch Angle | Deg/180 | ± 180° | 14 | | 0.01° | 25* | 50* |
| 324 | 05 | Pitch Angle | Deg/180 | ± 180° | 14 | | 0.01° | 25* | 50* |
| 325 | 04 | Roll Angle | Deg/180 | ± 180° | 14 | | 0.01° | 25* | 50* |
| 325 | 05 | Roll Angle | Deg/180 | ± 180° | 14 | | 0.01° | 25* | 50* |
| 360 | 04 | Potential Vertical Speed | Ft/min | 16384* | 10* | | 16* | 25 | 50 |
| 360 | 05 | Potential Vertical Speed | Ft/min | 16384* | 10* | | 16* | 25 | 50 |
| 361 | 04 | Altitude (Inertial) | Feet | 131,072 | 18* | | 0.5* | 32.25* | 62.5* |
| 361 | 05 | Altitude (Inertial) | Feet | 131,072 | 18 | | 0.5 | 31.25* | 62.5* |
| 365 | 04 | Inertial Vert. Vel. (EFI) | Ft/min | 16384* | 10* | | 16* | 20 | 40 |
| 365 | 05 | Inertial Vert. Vel. (EFI) | Ft/min | 16384* | 10* | | 16* | 20 | 40 |
| 375 | 05 | Along Heading Accel. | g | 4 | 12 | | 0.001 | 25* | 50* |
| 376 | 05 | Cross Heading Accel. | g | 4 | 12 | | 0.001 | 25* | 50* |

Note [2]: Guidance added for transmission intervals of labels with multiple SDI codes.

ORIGINAL TEXT FOLLOWS:

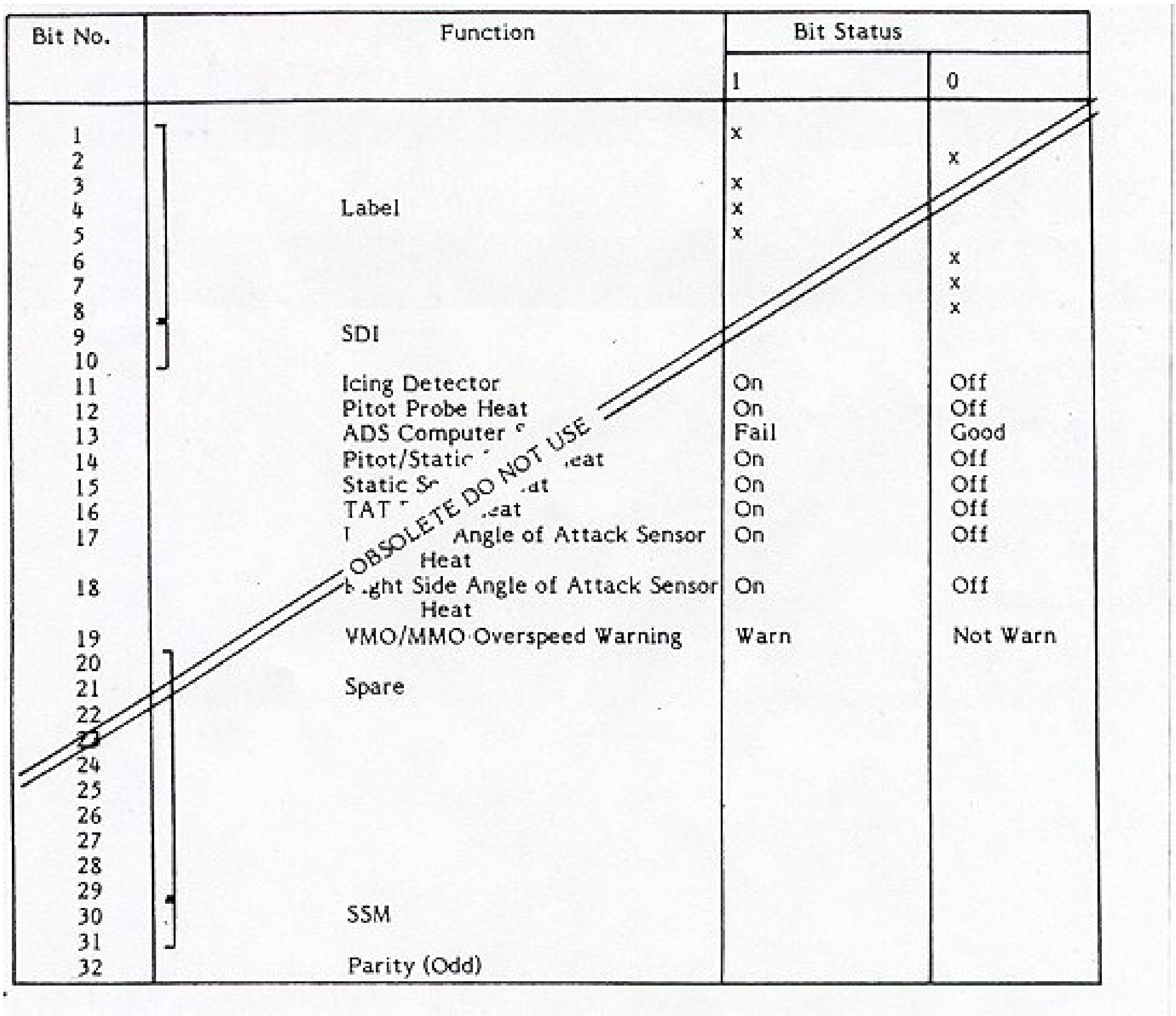
[2] Transmit intervals and the number of parameters to be transmitted are prime factors in bus loading. The interval for transmission of parameters should fall between the minimum and maximum specified intervals and nominally should be near the center of the range at equal intervals between transmissions. When heavy bus loading dictates a shift from the center of the range, the shift should be toward the maximum transmit interval.

## TABLE 3.1: INTERVAL DISCRETES – LABEL 270

Discrete word formats revised.

ORIGINAL TEXT FOLLOWS:

Table 3.1: Inertial Discretes – Label 270



| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 1 | Label | x | |
| 2 | | | x |
| 3 | | x | |
| 4 | | x | |
| 5 | | x | |
| 6 | | | x |
| 7 | | | x |
| 8 | | | x |
| 9 | SDI | | |
| 10 | | | |
| 11 | Icing Detector | On | Off |
| 12 | Pitot Probe Heat | On | Off |
| 13 | ADS Computer [illegible] | Fail | Good |
| 14 | Pitot/Static [illegible] Heat | On | Off |
| 15 | Static S[illegible] Heat | On | Off |
| 16 | TAT [illegible] Heat | On | Off |
| 17 | [illegible] Angle of Attack Sensor Heat | On | Off |
| 18 | Right Side Angle of Attack Sensor Heat | On | Off |
| 19 | VMO/MMO Overspeed Warning | Warn | Not Warn |
| 20 | Spare | | |
| 21 | | | |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | | | |
| 26 | | | |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | SSM | | |
| 31 | | | |
| 32 | Parity (Odd) | | |

OBSOLETE DO NOT USE

Notes: [1] Attitude invalid is equivalent to IRS failure.

[2] Bit 14 "1" condition indicates that the "Magnetic Heading" outputs are no longer being computer and have the characteristics of a "free DG" which is subject to control by a "Set Heading" input to the IRU. (See Section 3.2.4 for further explanation).

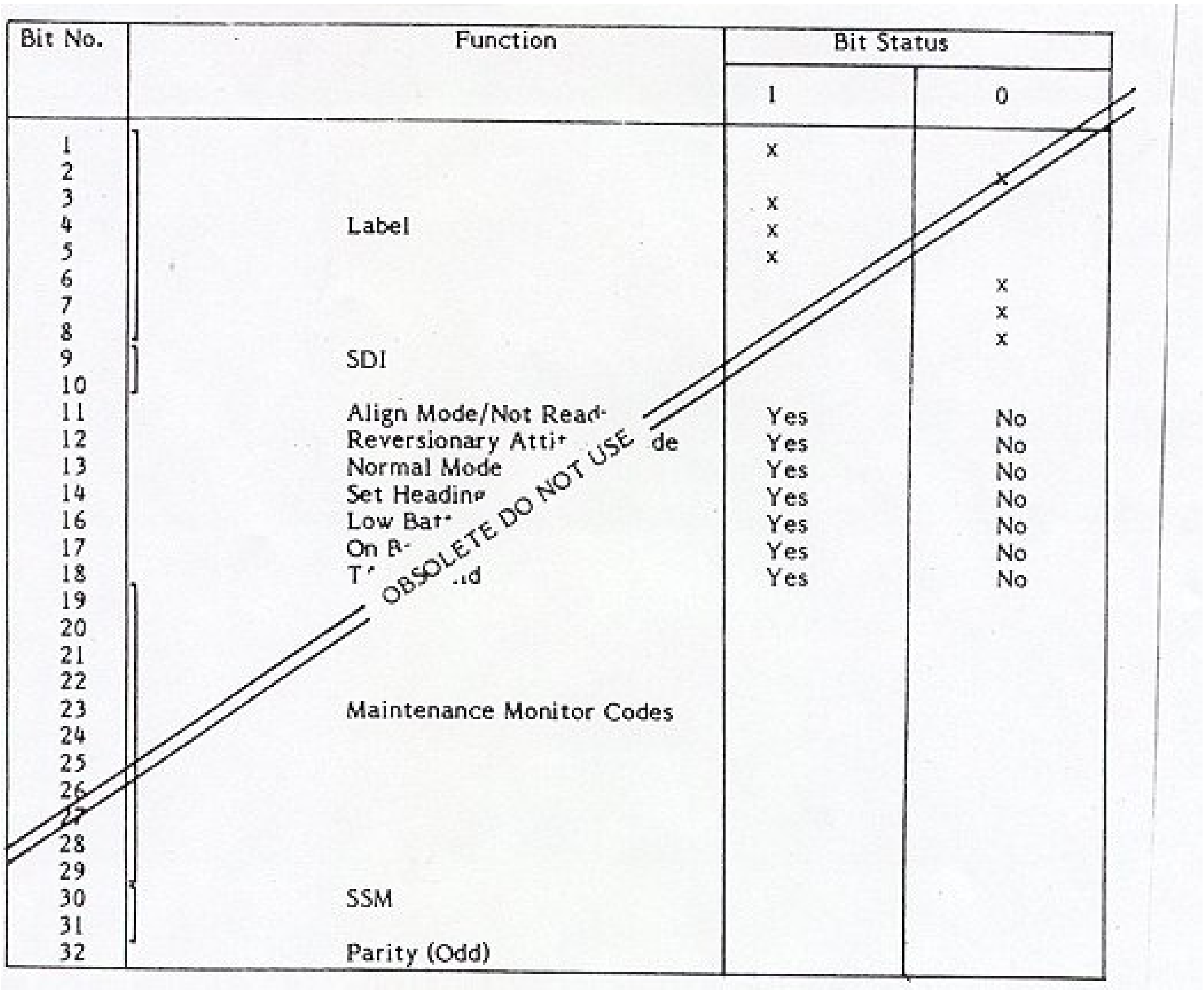
TABLE 3.4: AIR DATA DISCRETES

Discrete word #1 format changed.

Discrete word #2 added.

ORIGINAL TEXT FOLLOWS:

Table 3.4: Air Data Discretes – Label 270



| Bit No. | Function | Bit Status | |
|---|---|---|---|
| | | 1 | 0 |
| 1 | Label | x | |
| 2 | | | x |
| 3 | | x | |
| 4 | | x | |
| 5 | | x | |
| 6 | | | x |
| 7 | | | x |
| 8 | | | x |
| 9 | SDI | | |
| 10 | | | |
| 11 | Align Mode/Not Read[illegible] | Yes | No |
| 12 | Reversionary Atti[illegible]de | Yes | No |
| 13 | Normal Mode | Yes | No |
| 14 | Set Headin[illegible] | Yes | No |
| 16 | Low Bat[illegible] | Yes | No |
| 17 | On B[illegible] | Yes | No |
| 18 | T[illegible]d | Yes | No |
| 19 | Maintenance Monitor Codes | | |
| 20 | | | |
| 21 | | | |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | | | |
| 26 | | | |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | SSM | | |
| 31 | | | |
| 32 | Parity (Odd) | | |

ATTACHMENT 6 – GENERAL WORD FORMATS AND ENCODING EXAMPLES

Examples revised to agree with adopted data standards changes.  (editorial)

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# SUPPLEMENT 6

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: January 22, 1982

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: December 9, 1981

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces the assignment of octal labels and hexadecimal equipment identifiers, the addition of guidance for label selection, a revision of failure warning annunciation in discrete words, deletion of the weight & balance words, editorial revisions to the label tables and addition of EEC discrete word formats.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-6" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-6 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 2.1.5.1 BCD, NUMERIC, DISCRETE, AIM DATA AND FILE TRANSFER WORDS

Commentary revised to reflect use of failure warning flags in discrete words.

ORIGINAL TEXT FOLLOWS:

COMMENTARY

Definitions

Invalid Data – is defined as any data generated by a source system whose fundamental characteristic is the inability to convey reliable information for the proper performance of a user system. There are two categories of invalid data namely, "No Computed Data" and "Failure Warning".

No Computes Data – is a particular case of data invalidity where the source system is unable to compute reliable data for reasons other than system failure. This inability to compute reliable data is caused exclusively be a definite set of events or conditions whose boundaries are uniquely defined in the system characteristic. When such a condition exists, the source system should annunciate its outputs to be invalid by setting the sign/status matrix of the affected words to the "NCD" code, as defined in sections2.1.5.1 and 2.1.5.2. The system indicators may or may not be flagged depending on system requirements.

Failure Warning – is a particular case of data invalidity where the system monitors have detected one or more failures. These failures are uniquely characterized by boundaries defined in the system characteristic. When such a condition exists, the source system should annunciate its outputs to be invalid by either ceasing to supply the affected words to the data bus (the case of BCD data and ILS-LRRA installations with provisions for the interruption of AFS BNR data – see ARINC characteristics 707 and 710) or by setting the sign/status matrix of the affected words to the "Failure Warning" code (BNR case), as defined in sections 2.1.5.1 and 2.1.5.2. The system indicators should always be flagged during a "Failure Warning" condition.

### 2.1.5.2 BNR NUMERIC DATA WORDS

Commentary for failure warning revised.

ORIGINAL TEXT FOLLOWS:

COMMENTARY

Definitions

Invalid Data – is defined as any data generated by a source system whose fundamental characteristic is the inability to convey reliable information for the proper performance of a user system. There are two categories of invalid data, namely, "No Computed Data" and "Failure Warning".

No Computed Data – is a particular case of data invalidity where the source system is unable to compute reliable data for reasons other than system failure. This inability to compute reliable data is caused exclusively by a definite set of events or conditions whose boundaries are uniquely defined in the system characteristic. When such a condition exists the source system should annunciate its outputs to be invalid by setting the sign/status matrix of the affected words to the "NCD" code, as defined in sections 2.1.5.1 and 2.1.5.2. The system indicators may or may not be flagged depending on system requirements.

Failure Warning – is a particular case of data invalidity where the system monitors have detected one or more failures. These failures are uniquely characterized by boundaries defined in the system characteristic. When such a condition exists, the source system should annunciate its outputs to be invalid by either ceasing to supply the affected words to the data bus (the case of BCD data and ILS-LRRA Installations with provisions for the interruption of AFS BNR data – see ARINC Characteristics 707 and 710) or by setting the sign/status matrix of the affected words to the "Failure Warning" code (BNR case), as defined in sections 2.1.5.1 and 2.1.5.2. The system indicators should always be flagged during a"Failure Warning" conditions.

Fig. 3.1 RADIO SYSTEMS MANAGEMENT WORD FORMATS

Assignments for bits 12, 15 and 17 removed from table for note 1 of ATC transponder word (editorial).

ATTACHMENT 1: LABEL CODES

The following labels have been given new assignments:

021 02, 041 02, 042 02, 043 02, 066 02, 071 33, 072 2F, 072 33, 074 33, 075 02, 077 02, 114 2F, 115 2F, 130 2F, 131 2F, 132 33, 133 2F, 155 33, 156 33, 157 33, 160 33, 161 33, 241 2C, 244 33, 250 2B, 252 2F, 260 33, 261 33, 262 02, 262 33, 263 33, 264 2F, 264 33, 265 33, 267 0A, 267 33, 270 2F, 270 3A, 271 2F, 271 3A, 273 2F, 272 2F, 273 33, 274 2F, 274 33, 275 2F, 315 02, 340 2F, 341 2F, 342 2F, 344 2F, 344 33, 345 2F, 346 2F, 350 2F, 351 2E, 351 2F, 352 2E, 352 2F, 353 2F, 354 2F, 375 33, 376 33.

The following labels have been deleted:

060 32, 061 32, 062 32, 063 32, 064 32.

Editorial changes were made to provide for consistency between Attachment 1 and Attachment 2.

"Predictive" deleted from 207 0A.

ATTACHMENT 1: EQUIPMENT CODES

New assignments were made for 0D, 2E, 2F, 3A, 3B, 33, and 34.

Nomenclature modified for 2C and 32.

ATTACHMENT 2: DATA STANDARDS

Data standards were added for new labels.

Editorial changes made.

Resolutions revised for 315 04, 315 05, 316 04, 321 04, 321 05, 322 04, 334 04, and 334 05 to match ARINC 704 and 705.

EEC discrete words added.

ATTACHMENT 6: GENERAL WORD FORMATS AND CODING EXAMPLES

Format added for label 262 02.

Bit 12 corrected in DME distance word (editorial).

Example added for GMT binary word.

APPENDIX 5: LABEL SELECTION GUIDANCE

Appendix added.

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# SUPPLEMENT 7

# TO

# ARINC  SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published:  January 3, 1983

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: November 4, 1982

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces new label assignments, data standards and equipment identification codes, and means for transmitting data with reduced accuracy.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-7" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-7 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 2.1.5.1 BCD, NUMERIC, DISCRETE, AIM DATA AND FILE TRANSFER WORDS

Note [6] added.

### 2.1.5.2 BNR NUMERIC DATA WORDS

Note [6] added.

### ATTACHMENT 1 – LABEL CODES

The following labels have been given new assignments:

046 33, 047 33, 114 3F, 115 3F, 127 33, 130 30, 130 3F, 131 30, 131 33, 132 30, 133 3F, 164 3B, 173 3B, 174 3B, 175 33, 212 3B, 242 3B, 244 3B, 245 3B, 246 3B, 247 3B, 252 3F, 264 3F, 270 30, 270 33, 270 3B, 270 3F, 271 30, 271 33, 271 3B, 271 3F, 272 3B, 272 3F, 273 3B, 273 3F, 274 3B, 274 3F, 275 3B, 275 3F, 311 3B, 214 3B, 325 2F, 325 3F, 340 33, 340 3F, 341 3F, 342 3B, 342 3F, 344 3F, 345 3F, 346 33, 346 3F, 347 30, 350 3F, 351 3F, 352 3F, 353 3F, 354 3F, 377 30.

The terminology has been modified for the following labels:

072 33, 074 33, 132 33, 244 33, 262 33, 263 33, 264 33, 265 33.

Station identifiers deleted on engine related parameters.

### ATTACHMENT 1 – EQUIPMENT CODES

Code 2F changed from "EEC (Full Authority)" to "Full Authority EEC-A".

Code 30 assigned as "Airborne Separation Assurance System".

Description of Code OD changed to "AIDS Data Management Unit (DMU)"

Code 3F assigned as "Full Authority EEC_B".

### ATTACHMENT 2 – DATA STANDARDS

Data standards were added for new labels.

Data standards added for the following existing labels:

270 3A, 271 3A, 270 2F-275 2F, 350 2F,-354 2F.

Note added to label 072 33.

Digits of label 014 changed from 3 to 4 (previously adopted).

Range of label 014 changed from 359 to 359.9 (previously adopted). Significant bits of label 321 changed from 12 to 11 (typo).

Note [4] added.

Note [5] added.

Note flag [5] added to following labels:

074 2C, 075 2C, 247 2C 250 2C, 256 2C, 257 2C, 260 2C, 262 2C.

### ATTACHMENT 6 – GENERAL WORD FORMATS AND ENCODING EXAMPLES

Formats for engine serial number words added.

Formats for ASAS words added.

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# SUPPLEMENT 8

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: December 3, 1984

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: November 4, 1983

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces new label assignments, revised data standards, expanded text describing SDI codes and makes note of a change in the resolution of the Magnetic Heading label incorporated in Supplement 7.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-8" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-8 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 2.1.4 SOURCE DESTINATION IDENTIFIER

Text added to clarify use of SDI on combined source/sink equipment.

ORIGINAL TEXT FOLLOWS:

### 2.1.4 Source/Destination Identifier

Bit nos. 9 and 10 of numeric data words should be reserved for a data source/destination identification function. They are not available for this function in alpha/numeric (ISO Alphabet No. 5) data words (See Section 2.3.1.3 of this document) or when the resolution needed for numeric (BNR/BCD) data necessitates their use for valid data. The source/destination identifier function may find application when specific words need to be directed to a specific system of a multi-system installation or when the source system of a multi-system installation needs to be recognizable from the word content. When it is used, a source equipment should encode its aircraft installation number in bit nos. 9 and 10 as shown in the table below. A sink equipment should recognize words containing its own installation number code and words containing code "00", the "all-call" code.

| Bit No. | | Installation No. |
|---|---|---|
| 10 | 9 | |
| 0 | 0 | See Note Below |
| 0 | 1 | 1 |
| 1 | 0 | 2 |
| 1 | 1 | 3 |

Note: In certain specialized application of the SDI function the all-call capability may be forfeited so that code "00" is available as an "installation no. 4" identifier.

When the SDI function is not used, binary zeros or valid data should be transmitted in bit nos. 9 and 10.

COMMENTARY

> This document does not address the practical question of how the SDI bits will be set in those multi-installation systems in which the source/destination function is desired. One way would be to use program pins on the individual installation black boxes which would be wired to set up the appropriate code. The ARINC Characteristics devoted to the individual systems will define the method actually to be used.

### ATTACHMENT 1 – LABEL CODES

The following labels have been given new assignments:

012 25, 060 3C, 061 3C, 062 3C, 063 3C, 064 3C, 137 2F, 137 3F, 140 25, 141 25, 142 25, 151 27, 152 27, 153 27, 154 27, 155 27, 156 27, 157 27, 160 27, 161 27, 162 27, 163 27, 164 25, 164 27, 165 27, 170 C5, 173 25, 270 25, 271 C5, 272 C5, 273 C5, 274 25, 275 25, 313 25, 314 25, 317 25, 320 25, 324 25, 325 25, 330 2F, 330 3F, 331 2F, 332 2F, 332 3F, 333 3F, 334 2F, 334 3F, 350 25, 351 25, 352 25, 353 25, 370 C5.

### ATTACHMENT 1 - EQUIPMENT CODES

Code 3C assigned to Tire Pressure System.

### ATTACHMENT 2 – DATA STANDARDS

Table 1 had been modified in Supplement 7 to reflect the resolution of label 014 as 0.1, rather than 1.0, which had been incorrectly introduced in a previous Supplement. This change is hereby noted.

Data standards added for new labels.

Data standards revised for labels 115 2F, 115 3F, 325 2F, 325 3F.

### ATTACHMENT 6 – GENERAL WORD FORMATS

Tire pressure SDI bit coding added.

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# SUPPLEMENT 9

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: April 30, 1985

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: October 11, 1984

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces new label assignments and equipment identification codes. This Supplement also corrects a word format bit error introduced in a previous Supplement.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-9" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-9 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### ATTACHMENT 1 – LABEL CODES

The following labels have been given new assignments:

075 3E, 076 3E, 103 1B, 104 1B, 105 1B, 106 1B, 107 1B, 130 35, 131 35, 132 35, 203 18, 270 1B, 270 35, 270 3E, 270 4A, 271 18, 271 35, 272 18, 272 35, 273 18, 273 35, 274 18, 274 35, 275 18, 275 4A, 276 18, 300 3D, 336 1A, 337 1A, 347 18, 347 35, 350 18, 350 35, 350 3E, 370 04, and 370 05.

### ATTACHMENT 1 – EQUIPMENT CODES

Codes 3D, 3E, 4A, 4B, 4C and 90-9F given new assignments.

### ATTACHMENT 2 – DATA STANDARDS

Data standards entered for new labels. Range for labels 012 and 170 changed to 7999.

### ATTACHMENT 6 – GENERAL WORD FORMATS AND ENCODING EXAMPLES

Label 150 and 323 examples corrected.

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# SUPPLEMENT 10

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: November 17, 1986

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: November 7, 1985

## A PURPOSE OF THIS SUPPLEMENT

This Supplement introduces new label assignments, equipment identification codes and revised data standards.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with “c-10” symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-10 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced for reference.

### 3.1.4 FREQUENCY RANGES AND SWITCHING FUNCTIONS

Note 6 deleted on DME Frequency Word.

### Attachment 1 – Label Codes

The following labels have been given new assignments:

072 02, 075 0B, 076 0B, 077 0B, 176 5A, 177 5A, 200 5A, 201 5A, 202 5A, 203 5A, 204 5A, 205 5A, 206 18, 213 8D, 227 7E, 241 4D, 242 09, 242 10, 242 11, 242 12, 244 8D, 247 4D, 251 1A, 255 2F, 255 3F, 256 4D, 270 0B, 272 3A, 272 5A, 273 5A, 274 5A, 275 5A, 276 2F, 276 3F, 335 2F, 336 2F, 336 3F, 356 XX, 371 00.

Labels for ARINC Characteristic 737 WBT and ARINC Characteristic 738 ADIRS added.

### Attachment 1 – Equipment Codes

The following codes have been given new assignments:

0B, 35, 36, 37, 38, 4D, 4E, 5A, 5B, 5C, 5D, 5E, 5F, 6A, 6B, 6C, 6D, 6E, 6F, 7A, 7B, 7C, 7D, 7E, 7F, 8A, 8B, 8C, 8D, AD, C3.

### Attachment 2 – Data Standards

Data standards entered for new labels.

Data standards revised for the following labels:

060 36, 061 3C, 062 3C, 063 3C, 064 3C, 150 31, 176 03, 176 29, 270 3A, 270 2F, 270 3F, 271 2F, 271 3F, 272 2F, 272 3F, 273 2F, 273 3F, 274 2F, 274 3F, 275 2F, 275 3F, 350 2F, 350 3F, 351 2F, 351 3F, 352 2F, 352 3F, 353 2F, 353 3F, 354 2F, 354 3F.

Labels 060 37-064 3C significant bits changed from 9 to 10 and range changed from 512 to 1024.

Following note added to words (labels 270 3B-275 3B):

> Typical discrete functions are shown in the above tables. Slight variations of bit usage may arise according to the specific application.

Label 203 35 changed to 203 18 (typographical error).

Transmit interval range added to label 150 31.

Labels 176 03 and 176 29 resolutions changed from 0.05 to 0.5 (typographical error).

Original bit assignments for remaining labels listed in following pages.

### Attachment 6 – General Word Formats and Encoding Examples

Example added for label 251 1A, 077 0B and 206 18.

For TPIS word formats:

Wheel #519 label corrected to read “060”. SDI labels clarified.

For BTMS word formats:

Wheel #10, #11, #12 labels corrected to read “116”. Bit 27 assigned to a value of “1024”. SDI labels clarified.

Special expanded format word example added for label 260 31.

### Attachment 9A – General Aviation Labels and Data Standards

New attachment added.

### Attachment 9B – General Aviation Word Examples

New attachment added.

### Attachment 9C – General Aviation Equipment Identifiers

New attachment added.

Table 3.11 Propulsion Discrete Interface Unit – Labels 270 3A and 271 3A

<u>Label 270 3A</u>

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI 1 0<br>Left Engine Right Engine | | | |
| 10 | SDI 0 1 | | | |
| 11 | PDIU Status Flag | Failed | OK | |
| 12 | $T_2$ / $P_2$ Probe Heat | HEAT OFF | HEAT ON | |
| 13 | TLA Interlock Fault | FAULT | OK | 1 |
| 14 | Idle Select | MINIMUM | APPROACH | |
| 15 | Air/Ground Switch | GROUND | AIR | |
| 16 | Opposite Engine Status | SHUT DOWN | RUNNING | |
| 17 | Spare | | X | 2 |
| 18 | Spare | | X | |
| 19 | N2 Mode Trim Release (PROV) | RELEASED | FIXED | 1 |
| 20 | Spare | | X | |
| 21 | Spare | | X | |
| 22 | Spare | | X | |
| 23 | Maintenance Test (Provisional) | ON | OFF | 1 |
| 24 | Ground Test Power | ON | OFF | |
| 25 | Spare | | X | |
| 26 | T/R Indication Power Failed (PROV) | FAILED | OK | 1 |
| 27 | T/R Not Stowed | NOT STOWED | STOWED | 1 |
| 28 | T/R Deployed Indication | DEPLOYED | NOT DEPLOYED | 1 |
| 29 | Engine Fire Warning | ON | OFF | 1 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

1 = RETURN TO SPARE

2 = CHANGE SPARE TO DEFINITION ON NEXT PAGE

Table 3.12 EEC Status – Labels 270 2F, 270 3F, 271 2F, 271 3F, 272 2F, 272 3F, 273 2F, 273 3F, 274 2F, 274 3F, 275 2F, 275 3F

Label 270 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Spare | | X | 2 |
| 15 | Data Entry Plug | Failed | Normal | 1 |
| 16 | Auto Mode | Selected | Not Selected | 3 |
| 17 | Channel Manually Selected | Selected | Not Selected | 3 |
| 18 | $N_2$ Droop Control Mode | Engaged | Not Engaged | |
| 19 | Reverser System Failed | Failed | OK | |
| 20 | Channel Controlling Status | Controlling | Not Controlling | |
| 21 | Bleed Fall-Safe Open | Fall-Safe | Operational | 3 |
| 22 | TCA Valve Failed Closed | Failed | OK | |
| 23 | Spare | | X | 2 |
| 24 | Overspeed Self-Test Failed | Failed | OK | 3 |
| 25 | Channel Incapable (Failed) | Incapable | Capable | |
| 26 | Abnormal Start | Abnormal | OK (Provision) | 3 |
| 27 | SVA Fall-Safe | Fall-Safe | | 3 |
| 28 | Starter Cutout Command | Cutout | Not Cutout | |
| 29 | Oil Overtemperature | Overtemp | OK | 1 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

1 = RETURN TO SPARE

2 = CHANGE SPARE TO DEFINITION ON NEXT PAGE

3 = CHANGE DEFINITION TO DEFINITION ON NEXT PAGE

Label 270 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | Label | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Spare | | X | 2 |
| 15 | Data Entry Plug | Failed | Normal | 1 |
| 16 | Auto Mode | Selected | Not Selected | 3 |
| 17 | Channel Manually Selected | Selected | Not Selected | 3 |
| 18 | $N_2$ Droop Control Mode | Engaged | Not Engaged | |
| 19 | Reverser System Failed | Failed | OK | |
| 20 | Channel Controlling Status | Controlling | Not Controlling | |
| 21 | Bleed Fall-Safe Open | Fall-Safe | Operational | 3 |
| 22 | TCA Valve Failed Closed | Failed | OK | |
| 23 | Spare | | X | 2 |
| 24 | Overspeed Self-Test Failed | Failed | OK | 3 |
| 25 | Channel Incapable (Failed) | Incapable | Capable | |
| 26 | Abnormal Start | Abnormal | OK (Provision) | 3 |
| 27 | SVA Fall-Safe | Fall-Safe | | 3 |
| 28 | Starter Cutout Command | Cutout | Not Cutout | |
| 29 | Oil Overtemperature | Overtemp | OK | 1 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 271 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Reverser Deploy Command | ON | OFF | |
| 15 | Turbine Cooling Air Valve Solenoid | ON | OFF | |
| 16 | Oil Cooler Bypass Valve Solenoid | ON | OFF | 3 |
| 17 | Cowl Vent Solenoid | ON | OFF | 1 |
| 18 | Breather Compartment Ejector Sol. | ON | OFF | 1 |
| 19 | Spare | | X | 2 |
| 20 | Spare | | X | |
| 21 | Spare | | X | |
| 22 | Spare | | X | |
| 23 | Autostar Relay | ON | OFF (Provision) | 1 |
| 24 | TLA Interlock Actuator Command | Block Fwd | Block Rev | |
| 25 | Spare Reverser Group Relay | ON | OFF (Provision) | 1 |
| 26 | Spare | | X | 2 |
| 27 | Spare | | X | 2 |
| 28 | Spare | | X | 2 |
| 29 | Spare | | X | 2 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 271 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Reverser Deploy Command | ON | OFF | |
| 15 | Turbine Cooling Air Valve Solenoid | ON | OFF | |
| 16 | Oil Cooler Bypass Valve Solenoid | ON | OFF | 3 |
| 17 | Cowl Vent Solenoid | ON | OFF | 1 |
| 18 | Breather Compartment Ejector Sol. | ON | OFF | 1 |
| 19 | Spare | | X | 2 |
| 20 | Spare | | X | |
| 21 | Spare | | X | |
| 22 | Spare | | X | |
| 23 | Autostar Relay | ON | OFF (Provision) | 1 |
| 24 | TLA Interlock Actuator Command | Block Fwd | Block Rev | |
| 25 | Spare Reverser Group Relay | ON | OFF (Provision) | 1 |
| 26 | Spare | | X | 2 |
| 27 | Spare | | X | 2 |
| 28 | Spare | | X | 2 |
| 29 | Spare | | X | 2 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 272 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | X | | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | N1 Loop | Engaged | Not Engaged | |
| 15 | N2 Loop | Engaged | Not Engaged | |
| 16 | N2 Topping Loop | Engaged | Not Engaged | |
| 17 | PB Topping Loop | Engaged | Not Engaged | |
| 18 | PB Topping Loop Minimum | Engaged | Not Engaged | |
| 19 | EPR Loop | Engaged | Not Engaged | |
| 20 | Acceleration Schedule Loop | Engaged | Not Engaged | |
| 21 | Deceleration Schedule Loop | Engaged | Not Engaged | |
| 22 | T4.9 Topping Loop | Engaged | Not Engaged | 1 |
| 23 | Back Up Mode | Engaged | Not Engaged | |
| 24 | Spare | | X | 2 |
| 25 | Spare | | X | |
| 26 | Spare | | X | |
| 27 | Spare | | X | |
| 28 | Spare | | X | |
| 29 | Spare | | X | |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 272 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | X | | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | N1 Loop | Engaged | Not Engaged | |
| 15 | N2 Loop | Engaged | Not Engaged | |
| 16 | N2 Topping Loop | Engaged | Not Engaged | |
| 17 | PB Topping Loop | Engaged | Not Engaged | |
| 18 | PB Topping Loop Minimum | Engaged | Not Engaged | |
| 19 | EPR Loop | Engaged | Not Engaged | |
| 20 | Acceleration Schedule Loop | Engaged | Not Engaged | |
| 21 | Deceleration Schedule Loop | Engaged | Not Engaged | |
| 22 | T4.9 Topping Loop | Engaged | Not Engaged | 1 |
| 23 | Back Up Mode | Engaged | Not Engaged | |
| 24 | Spare | | X | 2 |
| 25 | Spare | | X | |
| 26 | Spare | | X | |
| 27 | Spare | | X | |
| 28 | Spare | | X | |
| 29 | Spare | | X | |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 273 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | X | | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | P4.9 Interface Failed | Failed | OK | 3 |
| 15 | PB Interface Failed | Failed | OK | 3 |
| 16 | P2 (Pamb) Interface Failed* | Failed | OK | 3 |
| 17 | C3C Interface Failed | Failed | OK | 3 |
| 18 | T2 Interface Failed | Failed | OK | 3 |
| 19 | T4.9 Interface Failed | Failed | OK | 3 |
| 20 | Tfuel Interface Failed | Failed | OK | 3 |
| 21 | A/D Interface Failed | Failed | OK | 3 |
| 22 | RES/LVDT Interface Failed | Failed | OK | 3 |
| 23 | SVA Interface Failed | Failed | OK | 3 |
| 24 | N1 Interface Failed | Failed | OK | 3 |
| 25 | N2 Interface Failed | Failed | OK | 3 |
| 26 | P4.9 Sensor Prom Failed | Failed | OK | 3 |
| 27 | P2 (Pamb) Sensor Prom Failed* | Failed | OK | 3 |
| 28 | PB Sensor Prom Failed | Failed | OK | 3 |
| 29 | Background is not Executing | Not Executing | Executing | 3 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

* Primary channel uses P2, Secondary channel uses Pamb.

Label 273 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | X | | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | P4.9 Interface Failed | Failed | OK | 3 |
| 15 | PB Interface Failed | Failed | OK | 3 |
| 16 | P2 (Pamb) Interface Failed* | Failed | OK | 3 |
| 17 | C3C Interface Failed | Failed | OK | 3 |
| 18 | T2 Interface Failed | Failed | OK | 3 |
| 19 | T4.9 Interface Failed | Failed | OK | 3 |
| 20 | Tfuel Interface Failed | Failed | OK | 3 |
| 21 | A/D Interface Failed | Failed | OK | 3 |
| 22 | RES/LVDT Interface Failed | Failed | OK | 3 |
| 23 | SVA Interface Failed | Failed | OK | 3 |
| 24 | N1 Interface Failed | Failed | OK | 3 |
| 25 | N2 Interface Failed | Failed | OK | 3 |
| 26 | P4.9 Sensor Prom Failed | Failed | OK | 3 |
| 27 | P2 (Pamb) Sensor Prom Failed* | Failed | OK | 3 |
| 28 | PB Sensor Prom Failed | Failed | OK | 3 |
| 29 | Background is not Executing | Not Executing | Executing | 3 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

* Primary channel uses P2, Secondary channel uses Pamb.

Label 274 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | X | | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Parity Test Hardware Fault | Error | OK | 3 |
| 15 | ROM Checksum Failure | Failed | OK | 3 |
| 16 | Ram Test Failure | Failed | OK | 3 |
| 17 | Instruction Test Failure | Failed | OK | 3 |
| 18 | High Speed Cross Link Failure | Failed | OK | 3 |
| 19 | Foreground Software Execution | Incorrectly | Correctly | |
| 20 | Watch Dog Timer Fault | Error | OK | 3 |
| 21 | Watch Dog/Parity Counter Latch | Latched | Not Latched | 1 |
| 22 | EAROM Failure | Failed | OK | 3 |
| 23 | ROM Parity Error Caused Reset | Yes | No | |
| 24 | RAM Parity Error Caused Reset | Yes | No | |
| 25 | Watchdog Timer Error Caused Reset | Yes | No | |
| 26 | Status Buffer or Watchdog/Parity | Failed | OK | 3 |
| 27 | Loss of Clock Caused Reset | Yes | No | |
| 28 | SDD Output #1 W/A | Failed | OK | |
| 29 | SDD Output #2 W/A | Failed | OK | |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

<u>Label 274 3F</u>

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | X | | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Parity Test Hardware Fault | Error | OK | 3 |
| 15 | ROM Checksum Failure | Failed | OK | 3 |
| 16 | Ram Test Failure | Failed | OK | 3 |
| 17 | Instruction Test Failure | Failed | OK | 3 |
| 18 | High Speed Cross Link Failure | Failed | OK | 3 |
| 19 | Foreground Software Execution | Incorrectly | Correctly | |
| 20 | Watch Dog Timer Fault | Error | OK | 3 |
| 21 | Watch Dog/Parity Counter Latch | Latched | Not Latched | 1 |
| 22 | EAROM Failure | Failed | OK | 3 |
| 23 | ROM Parity Error Caused Reset | Yes | No | |
| 24 | RAM Parity Error Caused Reset | Yes | No | |
| 25 | Watchdog Timer Error Caused Reset | Yes | No | |
| 26 | Status Buffer or Watchdog/Parity | Failed | OK | 3 |
| 27 | Loss of Clock Caused Reset | Yes | No | |
| 28 | SDD Output #1 W/A | Failed | OK | |
| 29 | SDD Output #2 W/A | Failed | OK | |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 275 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | X | | |
| 7 | | | X | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Lamp (1,2 &/or 3) W/A Failed | Failed | OK | 3 |
| 15 | Other Channels Depower Discrete | Disagree | Agree | |
| 16 | PB Sensor Failed | Failed | OK | 3 |
| 17 | PT4.9 Sensor Failed | Failed | OK | 3 |
| 18 | PT2 (Pamb)* Sensor Failed | Failed | OK | 3 |
| 19 | EEC Temperature Status | High | OK | 3 |
| 20 | Spare (all “o” states) | | | 2 |
| 21 | | | | 2 |
| 22 | | | | 2 |
| 23 | | | | 2 |
| 24 | | | | 2 |
| 25 | | | | 2 |
| 26 | | | | 2 |
| 27 | | | | 2 |
| 28 | | | | 2 |
| 29 | | | | |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

[3] Primary channel uses PT2, Secondary channel uses Pamb.

Label 275 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | | X | |
| 3 | | X | | |
| 4 | | X | | |
| 5 | | X | | |
| 6 | | X | | |
| 7 | | | X | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Lamp (1,2 &/or 3) W/A Failed | Failed | OK | 3 |
| 15 | Other Channels Depower Discrete | Disagree | Agree | |
| 16 | PB Sensor Failed | Failed | OK | 3 |
| 17 | PT4.9 Sensor Failed | Failed | OK | 3 |
| 18 | PT2 (Pamb)* Sensor Failed | Failed | OK | 3 |
| 19 | EEC Temperature Status | High | OK | 3 |
| 20 | Spare (all “o” states) | | | 2 |
| 21 | | | | 2 |
| 22 | | | | 2 |
| 23 | | | | 2 |
| 24 | | | | 2 |
| 25 | | | | 2 |
| 26 | | | | 2 |
| 27 | | | | 2 |
| 28 | | | | 2 |
| 29 | | | | |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

CHANGE * Primary channel uses PT2: Secondary channel uses Pamb.

Table 3.13 EEC Maintenance – Labels 350 2F, 350 3F, 351 2F, 351 3F, 352 2F, 352 3F, 353 2F, 353 3F, 354 2F, 354 3F

Label 350 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | Label | | X | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | N1 Failed | Failed | OK | 3 |
| 15 | N2 Failed | Failed | OK | 3 |
| 16 | TT2 Failed | Failed | OK | 3 |
| 17 | TT4.9 Failed | Failed | OK | 3 |
| 18 | Tfuel Failed | Failed | OK | 3 |
| 19 | Toll Failed | Failed | OK | 3 |
| 20 | Wf Resolver Failed | Failed | OK | 3 |
| 21 | SVA LVDT Failed | Failed | OK | 3 |
| 22 | Bleed Prox Input Failed | Failed | OK | 3 |
| 23 | ACC #1 LVDT Failed | Failed | OK | 3 |
| 24 | ACC #2 LVDT Failed | Failed | OK | 3 |
| 25 | Reverser LVDT Failed | Failed | OK | 3 |
| 26 | AOC LVDT Failed | Failed | OK | 3 |
| 27 | Spare LVDT Failed | Failed | OK | 3 |
| 28 | TLA Resolver Failed | Failed | OK | 3 |
| 29 | Oil Overtemperature | Overtemp | OK | 1 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 350 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | N1 Failed | Failed | OK | 3 |
| 15 | N2 Failed | Failed | OK | 3 |
| 16 | TT2 Failed | Failed | OK | 3 |
| 17 | TT4.9 Failed | Failed | OK | 3 |
| 18 | Tfuel Failed | Failed | OK | 3 |
| 19 | Toll Failed | Failed | OK | 3 |
| 20 | Wf Resolver Failed | Failed | OK | 3 |
| 21 | SVA LVDT Failed | Failed | OK | 3 |
| 22 | Bleed Prox Input Failed | Failed | OK | 3 |
| 23 | ACC #1 LVDT Failed | Failed | OK | 3 |
| 24 | ACC #2 LVDT Failed | Failed | OK | 3 |
| 25 | Reverser LVDT Failed | Failed | OK | 3 |
| 26 | AOC LVDT Failed | Failed | OK | 3 |
| 27 | Spare LVDT Failed | Failed | OK | 3 |
| 28 | TLA Resolver Failed | Failed | OK | 3 |
| 29 | Oil Overtemperature | Overtemp | OK | 1 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 351 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Left ADC Inputs Failed | Failed | OK | 3 |
| 15 | Right ADC Inputs Failed | Failed | OK | 3 |
| 16 | Wf T/M W/A Failed | Failed | OK | 3 |
| 17 | SVA T/M W/A Failed | Failed | OK | 3 |
| 18 | BLD T/M W/A Failed | Failed | OK | 3 |
| 19 | ACC #1 T/M W/A Failed | Failed | OK | 3 |
| 20 | ACC #2 T/M W/A Failed | Failed | OK | 3 |
| 21 | AOC T/M W/A Failed | Failed | OK | 3 |
| 22 | Spare T/M W/A Failed | Failed | OK | 1 |
| 23 | Wf Track Check Failed | Failed | OK | 3 |
| 24 | SVA Track Check Failed | Failed | OK | 3 |
| 25 | Bld Track Check Failed | Failed | OK | 3 |
| 26 | ACC #1 Track Check Failed | Failed | OK | 3 |
| 27 | ACC #2 Track Check Failed | Failed | OK | 3 |
| 28 | AOC Track Check Failed | Failed | OK | 3 |
| 29 | Spare Track Check Failed | Failed | OK | 1 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 351 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | | X | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Left ADC Inputs Failed | Failed | OK | 3 |
| 15 | Right ADC Inputs Failed | Failed | OK | 3 |
| 16 | Wf T/M W/A Failed | Failed | OK | 3 |
| 17 | SVA T/M W/A Failed | Failed | OK | 3 |
| 18 | BLD T/M W/A Failed | Failed | OK | 3 |
| 19 | ACC #1 T/M W/A Failed | Failed | OK | 3 |
| 20 | ACC #2 T/M W/A Failed | Failed | OK | 3 |
| 21 | AOC T/M W/A Failed | Failed | OK | 3 |
| 22 | Spare T/M W/A Failed | Failed | OK | 1 |
| 23 | Wf Track Check Failed | Failed | OK | 3 |
| 24 | SVA Track Check Failed | Failed | OK | 3 |
| 25 | Bld Track Check Failed | Failed | OK | 3 |
| 26 | ACC #1 Track Check Failed | Failed | OK | 3 |
| 27 | ACC #2 Track Check Failed | Failed | OK | 3 |
| 28 | AOC Track Check Failed | Failed | OK | 3 |
| 29 | Spare Track Check Failed | Failed | OK | 1 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

<u>Label 352 2F</u>

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | X | | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Spare | | X | 1 |
| 15 | Spare | | X | 1 |
| 16 | Spare | | X | |
| 17 | Spare | | X | 2 |
| 18 | Spare | | X | 2 |
| 19 | Spare | | X | 2 |
| 20 | TCA Valve No. 1 | Failed | OK | 3 |
| 21 | TCA Valve No. 2 | Failed | OK | 3 |
| 22 | Channel Select Discrete | Failed | OK | 3 |
| 23 | PDIU SDD Input Failed | Failed | OK | 3 |
| 24 | N1 Sensor Failed* | Failed | OK (Provision) | 3 |
| 25 | Pb Pneumatic Line* | Failed | OK (Provision) | |
| 26 | P4.9 Pneumatic Line* | Failed | OK (Provision) | |
| 27 | TT4.9 Thermocouple Harness* | Failed | OK (Provision) | 3 |
| 28 | PDIU Status | Failed | OK | 3 |
| 29 | T/L Forward Interlock | Failed | OK | 3 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

*Primary channel only.

Label 352 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | X | | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | Spare | | X | 2 |
| 15 | Spare | | X | 2 |
| 16 | Spare | | X | |
| 17 | Spare | | X | 2 |
| 18 | Spare | | X | 2 |
| 19 | Spare | | X | 2 |
| 20 | TCA Valve No. 1 | Failed | OK | 3 |
| 21 | TCA Valve No. 2 | Failed | OK | 3 |
| 22 | Channel Select Discrete | Failed | OK | 3 |
| 23 | PDIU SDD Input Failed | Failed | OK | 3 |
| 24 | N1 Sensor Failed* | Failed | OK (Provision) | 3 |
| 25 | Pb Pneumatic Line* | Failed | OK (Provision) | |
| 26 | P4.9 Pneumatic Line* | Failed | OK (Provision) | |
| 27 | TT4.9 Thermocouple Harness* | Failed | OK (Provision) | 3 |
| 28 | PDIU Status | Failed | OK | 3 |
| 29 | T/L Forward Interlock | Failed | OK | 3 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

* Primary channel only.

Label 353 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | X | | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | N1 Crosscheck Failed | Failed | OK | 3 |
| 15 | N2 Crosscheck Failed | Failed | OK | 3 |
| 16 | PB Crosscheck Failed | Failed | OK | 1 |
| 17 | PT4.9 Crosscheck Failed | Failed | OK | 1 |
| 18 | TT2 Crosscheck Failed | Failed | OK | 3 |
| 19 | TT4.9 Crosscheck Failed | Failed | OK | 3 |
| 20 | Tfuel Crosscheck Failed | Failed | OK | 3 |
| 21 | Toil Crosscheck Failed | Failed | OK | 3 |
| 22 | Wf Resolver Crosscheck Failed | Failed | OK | 3 |
| 23 | SVA Resolver Crosscheck Failed | Failed | OK | 3 |
| 24 | Bld Prox Input Crosscheck Failed | Failed | OK | 3 |
| 25 | ACC #1 LVDT Crosscheck Failed | Failed | OK | 3 |
| 26 | ACC #2 LVDT Crosscheck Failed | Failed | OK | 3 |
| 27 | Reverser LVDT Crosscheck Failed | Failed | OK | 3 |
| 28 | AOC LVDT Crosscheck Failed | Failed | OK | 3 |
| 29 | TLA Resolver Crosscheck Failed | Failed | OK | 3 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 353 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | | X | |
| 7 | | X | | |
| 8 | | X | | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | N1 Crosscheck Failed | Failed | OK | 3 |
| 15 | N2 Crosscheck Failed | Failed | OK | 3 |
| 16 | PB Crosscheck Failed | Failed | OK | 1 |
| 17 | PT4.9 Crosscheck Failed | Failed | OK | 1 |
| 18 | TT2 Crosscheck Failed | Failed | OK | 3 |
| 19 | TT4.9 Crosscheck Failed | Failed | OK | 3 |
| 20 | Tfuel Crosscheck Failed | Failed | OK | 3 |
| 21 | Toil Crosscheck Failed | Failed | OK | 3 |
| 22 | Wf Resolver Crosscheck Failed | Failed | OK | 3 |
| 23 | SVA Resolver Crosscheck Failed | Failed | OK | 3 |
| 24 | Bld Prox Input Crosscheck Failed | Failed | OK | 3 |
| 25 | ACC #1 LVDT Crosscheck Failed | Failed | OK | 3 |
| 26 | ACC #2 LVDT Crosscheck Failed | Failed | OK | 3 |
| 27 | Reverser LVDT Crosscheck Failed | Failed | OK | 3 |
| 28 | AOC LVDT Crosscheck Failed | Failed | OK | 3 |
| 29 | TLA Resolver Crosscheck Failed | Failed | OK | 3 |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 354 2F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | X | | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | REV Command Solenoid W/A Failure | Failure | OK | 3 |
| 15 | TCA Solenoid W/A Failure | Failure | OK | 3 |
| 16 | Spare Solenoid W/A Failure | Failure | OK | 1 |
| 17 | Spare Solenoid W/A Failure | Failure | OK | 1 |
| 18 | Spare Relay W/A Failure | Failure | OK | 1 |
| 19 | Spare Solenoid W/A Failure | Failure | OK | 3 |
| 20 | BCE Solenoid W/A Failure | Failure | OK | 1 |
| 21 | Spare Solenoid W/A Failure | Failure | OK | 1 |
| 22 | Oil Bypass Solenoid W/A Failure | Failure | OK | 3 |
| 23 | Hot Start Relay W/A Failure | Failure | OK | 1 |
| 24 | TLA Lockout Relay W/A Failure | Failure | OK | 3 |
| 25 | Spare Relay W/A Failure | Failure | OK | 1 |
| 26 | Spare | | X | 1 |
| 27 | Essen. Sol. Current Sense Failure | Failure | OK | 3 |
| 28 | Critical & Noncritical Current Sense Failure | Failure | OK | 3 |
| 29 | Spare | | | |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

Label 354 3F

| Bit No. | Function | Bit Status | | Notes |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | Label | X | | |
| 2 | | X | | |
| 3 | | X | | |
| 4 | | | X | |
| 5 | | X | | |
| 6 | | X | | |
| 7 | | | X | |
| 8 | | | X | |
| 9 | SDI | | | |
| 10 | SDI | | | |
| 11 | PAD | | X | |
| 12 | PAD | | X | |
| 13 | PAD | | X | |
| 14 | REV Command Solenoid W/A Failure | Failure | OK | 3 |
| 15 | TCA Solenoid W/A Failure | Failure | OK | 3 |
| 16 | Spare Solenoid W/A Failure | Failure | OK | 1 |
| 17 | Spare Solenoid W/A Failure | Failure | OK | 1 |
| 18 | Spare Relay W/A Failure | Failure | OK | 1 |
| 19 | Spare Solenoid W/A Failure | Failure | OK | 3 |
| 20 | BCE Solenoid W/A Failure | Failure | OK | 1 |
| 21 | Spare Solenoid W/A Failure | Failure | OK | 1 |
| 22 | Oil Bypass Solenoid W/A Failure | Failure | OK | 3 |
| 23 | Hot Start Relay W/A Failure | Failure | OK | 1 |
| 24 | TLA Lockout Relay W/A Failure | Failure | OK | 3 |
| 25 | Spare Relay W/A Failure | Failure | OK | 1 |
| 26 | Spare | | X | 1 |
| 27 | Essen. Sol. Current Sense Failure | Failure | OK | 3 |
| 28 | Critical & Noncritical Current Sense Failure | Failure | OK | 3 |
| 29 | Spare | | | |
| 30 | SSM | | | |
| 31 | SSM | | | |
| 32 | Parity (Odd) | | | |

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# SUPPLEMENT 11

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: July 22, 1988

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: June 15, 1988

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces new label assignments and equipment identification codes.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with “c-11” symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages they replace. The goldenrod pages should be inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-11 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revisions, any text originally contained in the Specification is reproduced or reference.

### 2.1.5.1 BCD Numeric, Discrete, Aim Data, and File Transfer Words

SSM bit patterns separated from main figure.

### FIGURE 3-1 RADION SYSTEMS MANAGEMENT WORD FORMATS

HF COM frequency control words added.

### ATTACHMENT 1 – LABEL CODES

070 002, 070 0CC, 071 002, 071 0CC, 072 002, 072 0CC, 073 0CC, 074 002, 100 0BB, 101 0BB, 103 0BB, 104 0BB, 105 0BB, 106 0BB, 107 002, 114 0CC, 115 0BC, 115 0CC, 116 0CC, 117 0CC, 126 002, 127 002,143 041, 143 241, 144 041, 144 341, 150 002, 152 041, 153 002, 153 041, 162 0DE, 173 0BD, 200 002, 202 002,203 002, 204 002, 205 002, 205 0B9, 206 0CC, 207 002, 207 0B9, 211 002, 213 002, 213 08D, 220 002, 220 017, 220 024, 220 07E, 221 002, 221 017, 221 024, 221 07E, 222 002, 222 017, 222 024, 222 07E, 223 002, 223 017, 223 024, 223 07E, 224 002, 224 017, 224 024, 224 07E, 225 002, 226 0XX, 230 002, 230 017, 230 024, 230 07E, 241 002, 242 011, 243 0XX, 244 011, 244 08D, 245 002, 246 002, 246 006, 246 009, 247 002, 247 009, 247 0EB, 250 002, 250 12B, 252 0EB, 253 002, 254 002, 254 012, 255 002, 255 012, 255 08E, 256 002, 256 027, 257 002, 257 027, 263 002, 263 010, 264 002, 264 010, 265 002, 267 002, 271 002, 274 0C5, 275 002, 276 001, 276 002, 276 003, 300 039, 300 040, 301 002, 301 039, 301 040, 302 002, 302 039, 302 040, 303 002, 304 039, 304 040, 305 039, 305 040, 306 039, 306 040, 307 039, 307 040, 314 002, 316 002, 322 002, 341 002, 342 002, 343 01A, 350 00B, 350 027, 350 040, 350 241, 350 341, 351 00B, 351 029, 354 002, 355 027, 360 002.

Label 076 008 changed from “Ellipsoidal Altitude” to “GPS Height Above Referenced Ellipsoid”.

### ATTACHMENT 1 – EQUIPMENT CODES

The following codes have been given new assignments:

039, 040, 041, 08E, 08F, 0AA, 0AB, 0AC, 0AE, 0AF, 0BA, 0BB, 0BC, 0BD, 0BE, 0BF, 0C2, 0CA, 0CB, 0CC, 0CD, 0CE, 0CF, 0DA, 0DB, 0DC, 0DD, 0DE, 0DF, 0EA, 0FF, 10A, 10B, 10C, 10C, 10D, 10E, 10F, 110, 12A, 12B, 136, 141, 241, 341.

### ATTACHMENT 2 – DATA STANDARDS

Data Standards entered for new labels:

Label 076 008 changed from “Ellipsoidal Altitude” to “GPS Height Above Referenced Ellipsoid”.

Data Standards revised for following labels:

076 00B, 077 00B, 270 00B

### ATTACHMENT 6

Example revised for label 077 00B.

Example for label 260 removed.

Example for label 260 031 expanded to include 260 002.

Format for label 270 00B added.

Format for label 274 0C5 added.

Format for label 350 027 added.

Code for 747 NR corrected in diagram of TPIS word.

Equipment ID word expanded to accommodate three-character identifier.

### ATTACHMENT 9 – GENREAL AVIATION EQUIPMENT IDENTIFIERS

Code 08C added to list.

Codes for Loran and Omega changed from 08A/08B to 05A/05B, respectively.

NOTE: Due to the large number of changes
Created by this Supplement, it is NOT
available separately to update 429-11.

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# SUPPLEMENT 12

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: July 1, 1990

Prepared by the Airlines Electronic Engineering Committee
Adopted by the Airlines Electronic Engineering Committee: October 25, 1989

## A. PURPOSE OF THIS SUPPLEMENT

The Supplement introduces the Williamsburg bit-oriented file data transfer protocol which supports the transfer of binary and character data. The previous AIM and character-oriented file transfer protocol sections are moved to Appendix 6. The Sign Status Matrix (SSM) information is revised and reorganized. In addition, this Supplement introduces new label assignments and equipment identification codes.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper contains descriptions of the changes introduced into the Specification by this Supplement, and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Specification, modified to reflect these changes. The modified and added material on each replacement page is identified with "c-12" symbols in the margins. Existing copies of Specification 429 may be updated by simply inserting the replacement white pages they replace. The goldenrod pages should e inserted inside the rear cover of the Specification.

Copies of the Specification bearing the number 429-12 already contain this Supplement and thus do not require revisions by the reader.

## C. CHANGES TO SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is entitled by the section number and title currently employed in the Specification, or by the section number and title that will be employed when the Supplement is eventually incorporated. In each case there is included a brief description of the addition or change and, for other than very minor revision, any text originally contained into the Specification reproduced for reference.

### 2.1.3 Information Identifier

This section contains editorial corrections to comply with changes introduced in Supplement 11.

### 2.1.5 Sign/Status Matrix

This section was revised and reorganized. The changes include moving the AIM and file transfer SSM definitions to Appendix 6, adding failure reporting to the discrete word truth table (Section 2.1.5.3) and moving the description of status priorities to Section 2.1.5.

### 2.3.1 Digital Language

The contents of Sections 2.3.1.4 through 2.3.1.5.7 were moved to Appendix 6. The AIM Data and File Data Transfer section headings were retained for reference purposes. Section 2.3.1.5. File Data Transfer, provides the reason for moving the original file transfer protocol and introduces the Williamsburg protocol.

### 2.5 Bit-Oriented Communications Protocol

This new section was added to describe a bit-oriented data transfer protocol. The new protocol was developed to accommodate the interface of the ACARS Management Unit (MU) and the Satellite Data Unit (SDU).

### 3.2 AIM Information Transfer

The information previously contained in this section is no longer applicable to ARINC Specification 429. For reference purposes, the section header is retained and the original contents of this section are located in Appendix 6.

## ATTACHMENT 1 – LABEL CODES

The following labels have been given new assignments:

002 115, 013 0B8, 016 0B8, 046 10A, 046 10B, 047 10A, 047 10B, 107 0BB, 110 0BB, 112 0BB, 114 0BB, 114 10A, 114 10B, 127 10A, 127 10B, 130 035, 130 10A130 10B, 131 035, 132 035, 133 10A, 133 10B, 134 10A, 134 10B, 137 10A, 137 10B, 155 10A, 155 10B, 156 10A, 156 10B, 157 10A, 157 10B, 160 10A, 160 10B, 161 10A, 161 10B, 201 115, 203 035, 203 10A, 203 10B, 205 10A, 205 10B, 211 10A, 211 10B, 220 116, 221 116, 222 115, 222 116,223 116, 224 116, 226 035, 230 116, 234 039, 234 040, 235 039, 235 040, 236 039, 236 040, 237 039, 237 040, 244 10A, 244 10B, 256 114, 257 114, 260 10A, 260 10B, 260 114, 261 10A, 261 10B, 261 114, 262 10A, 262 10B, 262 114, 263 10A, 263 10B, 263 114, 264 10A, 264 10B, 264 114, 265 004, 265 038, 265 10A, 265 10B, 265 114, 267 10A, 267 10B, 270 10A, 270 10B, 270 114, 270 115, 271 10A, 271 10B, 271 114, 272 002, 272 10A, 272 10B, 272 114, 273 10A, 273 10B, 273 114, 274 10A, 274 10B, 274 114, 275 10A, 275 10B, 275 114, 276 114, 277 018, 300 10A, 300 10B, 300 TBD, 301 10A, 301 10B, 302 10A, 302 10B, 303 10A, 303 10B, 304 10A, 304 10B, 305 10A, 305 10B, 306 10D, 310 114, 311 114, 312 114, 313 114, 316 10A, 316 10B, 320 035, 321 10A, 321 10B, 322 10A, 322 10B, 323 10A, 323 10B, 324 10A, 324 10B, 325 10A, 325 10B,326 10A, 326 10B, 327 10A, 327 10B, 330 10A, 330 10B, 331 10A, 331 10B, 335 10A, 335 10B, 336 002, 336 10A, 336 10B, 337 002, 337 002, 337 10A, 337 10B, 341 10A, 341 10B, 342 10A, 342 10B, 343 10A, 343 10B, 344 10A, 344 10B, 345 10A, 345 10B, 346 10A, 346 10B, 347 10A, 347 10B, 350 10A, 350 10B, 350 114, 350 115, 351 10A, 351 10B, 351 114, 352 10A, 352 10B, 352 114, 353 10A, 353 10B, 353 114, 354 10A, 354 10B, 357 035, 360 10A, 360 10B, 360 TBD, 361 10A, 361 10B, 362 10A, 362 10B, 362 115, 363 10A, 363 10B, 365 TBD, 372 10A, 372 10B, 373 10A, 373 10B, 374 10A, 374 10B, 374 TBD, 375 10A, 375 10B, 375 TBD.

Revised label 130 035 from "Traffic Advisory Range" to "Intruder Range".

Revised label 131 035 from "Traffic Advisory Altitude" to "Intruder Altitude".

Revised label 132 035 from "Traffic Advisory Bearing" to "Intruder Bearing".

Removed label 130 030 Traffic Advisory Range.

Removed label 131 030 Traffic Advisory Altitude.

Removed label 132 030 Traffic Advisory Bearing Estimate.

Removed label 270 030 Transponder Discrete.

Removed label 347 030 Sector Control.

Removed label 347 035 Antenna Control.

### ATTACHMENT 1 – EQUIPMENT CODES

The following codes have been given new assignments:

113, 114,115, 116, 117, 118, 119, 11A, 123, 124, 125, 126, 127, 128, 129, 15A, 15B, 15C, 15D, 15E, 16A, 16B, 16C, 16D, 16E, 17A, 17B, 17C, 18A, 18B, 18C, 18D, 18E, 18F.

### ATTACHMENT 2 – DATA STANDARDS

Tables 1, 2 updated to reflect changes to Attachment 1.

Binary Data notes 6, 7 and 8 added.

Discrete Data Standards entered for new labels:

272 002, 271 018, 272 018, 273 018, 275 018, 276 018, 277 018, 274 018, 270 035, 271 035, 273 035, 274 035, 275 035, 013 0B8, 016 0B8, 161 10A, 161 10B, 350 114, 351 114, 352 114, 353 114, 270 115, 350 115.

### ATTACHMENT 6 – GENERAL WORD FORMATS AND ENCODING EXAMPLES

Add format for TCAS Intruder Range label 130.

Add format for TCAS Intruder Altitude label 131.

Add format for TCAS Intruder Bearing label 132.

Add format for Transponder Altitude/TCAS Own A/C Altitude label 203.

Removed 730 ASAS Sector Control Word example.

Removed 730 TCAS Traffic Advisory Range Word example.

Removed 730 TCAS Traffic Advisory Altitude Word example.

Removed 730 TCAS Traffic Advisory Bearing Estimate word example.

### ATTACHMENT 9B – GENERAL AVIATION WORD EXAMPLES

Add new Company Name Identifier.

### ATTACHMENT 10 – VARIABLES OF BIT-ORIENTED PROTOCOL

Add new Attachment.

### ATTACHMENT 11 – BIT-ORIENTED DATA FILE TRANSFER WORD FORMATS

Add new Attachment.

### ATTACHMENT 11A – DESTINATION CODES

Add new Attachment.

### ATTACHMENT 11B – STATUS CODES

Add new Attachment.

### ATTACHMENT 11C – ALOHA/ALOHA RESPONSE PROTOCOL WORDS

Add new Attachment.

### ATTACHMENT 12 – FILE TRANSFER EXAMPLE

Add new Attachment.

### ATTACHMENT 12A – FILED MAPPING EXAMPLE

Add new Attachment.

### ATTACHMENT 13 – PROTOCOL DETERMINATION PROCEDURE DIAGRAMS

Add new Attachment.

### ATTACHEMENT 14 – SYSTEM ADDRESS LABELS

Add new Attachment.

### ATTACHMENT 15 – LINK LAYER CRC DATA EXAMPLE

Add new Attachment.

### APPENDIX 6 – FORMER MAINTENANCE, AIM AND FILE TRANSFER TECHNIQUES

Add new Appendix.

### APPENDIX 7 – MATHMATICAL EXAMPLE OF CRC ENCODING/DECODING

Add new Appendix.

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# SUPPLEMENT 13

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: December 30, 1991

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: October 8, 1991

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces changes made to the Williamsburg protocol as a result of its initial implementation. This protocol supports the transfer of binary and character data. In addition, this Supplement introduces new label assignments and equipment identification codes.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper contains descriptions of changes introduced into this Specification by this Supplement. The second part consists of replacement white pages for the Specification, modified to reflect the changes. The modified and added material on each page is identified by a c-13 in the margins. Existing copies of ARINC Specification 429 may be updated by simply inserting the replacement white pages where necessary and destroying the pages they replace. The goldenrod pages are inserted inside the rear cover of the Specification.

## C. CHANGES TO ARINC SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is defined by the section number and the title currently employed in the Specification or by the section name and title that will be employed when the Supplement is eventually incorporated. In each case a brief description of the change or addition is included.

AEEC STAFF NOTE: THESE CHANGES APPLY TO ARINC 429, PART 3 ONLY.

### 2.3.1.5 File Data Transfer

An editorial change, correction to section numbering.

### 2.3.1.5.1 Bit-Oriented Protocol Determination

New Section added to describe ALO/ALR protocol process to be used when a bilingual Link Layer protocol system needs to determine necessary bit-oriented interfaces.

### 2.5 Bit-Oriented communications Protocol

Included term “Williamsburg” parenthetically since this terminology well-known in industry. Added commentary to explain non-negotiation or parameters in this protocol.

D. Corrected Network Layer definition.

### 2.5.2 Link Data Unit (LDU) Size and Word Count

Added second paragraph to text, since it is a requirement, and removed second paragraph from commentary.

### 2.5.4 Bit Rate and Word Timing

Corrected the commentary to change the more ambiguous term “message” to LDU.

### 2.5.5.3 Destination Code

An editorial change was made.

### 2.5.6 Response to RTS

The last sentence in the second paragraph was reworded and moved to a more appropriate section, 2.5.6.2.

### 2.5.6.1 Clear to Send (CTS)

In the second to last sentence, the word “valid” was added to clarify the Not clear to send condition. The last sentence was added to clarify the resetting of RTS counters.

### 2.5.6.2 Not Clear to Send (NCTS)

The first paragraph was updated to include the information deleted from Section 2.5.6 and to clarify the validity requirements. The second paragraph was updated to describe that and NCTS counter would be reset upon a valid CTS response. The last sentence in the third paragraph was deleted and it’s content expanded in the following commentary of that section.

### 2.5.6.3 Destination Busy

The second paragraph of this section was updated to indicate that a BUSY counter should be reset with a valid CTS response to RTS.

### 2.5.7 No Response to RTS

The first paragraph of this section was updated to describe proper response to RTS.

### 2.5.9 Unexpected RTS

This section was updated to include editorial changes and a description of the correct responses to RTS. The last sentence was deleted as redundant to Section in 2.5.13.1 and in conflict with other possible responses.

### 2.5.11 Data

The fourth paragraph of this section was updated to describe the proper ending of an LDU transmission, and to include the optional NAK response for receipt of an incomplete octet.

### 2.5.11.3 Character Data Words

In the last paragraph, the “note” designator was removed and the text clarified for the transfer of characters with a parity bit.

### 2.5.13 Negative Acknowledgement (NAK)

This section was updated to clarify conditions for sending the NAK word.

### 2.5.13.1 Missing SOT word

Text was corrected to refer to "reception" instead of "transmission" of a valid SOT word. Also, incorrect text referring to the NAK response timing was deleted.

### 2.5.13.2 LDU Sequence Number Error

The original text was omitted. Sections 2.5.13.1 – 2.5.13.7 were renumbered.

### 2.5.13.3 Parity Errors

A commentary section was added to describe the procedures for receiving words with bad parity.

### 2.5.13.4 Word Count Errors

This section was updated to clarify the NAK response time for word count errors.

### 2.5.13.5 CRC Errors

This section was updated to clarify the NAK response time for CRC errors.

### 2.5.13.6 Time Out Errors

This section was renumbered.

### 2.5.13.7 Restart Initialization

This section was omitted due to potential conflicts with the ALO/ALR procedures.

### 2.5.14 LDU Transfer Acknowledgement (ACK)

Text was revised to include LDU conditions for sink acknowledgement transmission.

### 2.5.14.1 Duplicate LDU

This section was added to describe duplicate LDU occurrences.

### 2.5.14.2 Auto-Synchronized Files

This section was added to describe the method of handling auto-synchronized files.

### 2.5.15 SYN Word

New text was added to describe SYN response times for non-consecutive LDU Sequence numbers. The last paragraph was incorrect and deleted.

### 2.5.16 Response to ACK/NAK/SYN

New text was added to describe actions when NAK and SYN are detected during a transmission.

### 2.5.19 ALO Response

A new section was added and updated to describe ALO responses.

### ATTACHMENT 10 – VARIABLES OF BIT ORIENTED PROTOCOL

Tables 10-1 and 10-3 were updated to include events $N_5$, $N^6$, and time $T_{12}$. Options $0_7$ and $0_{12}$ in Table 10-4 were changed to spares for consistency with corresponding text updates.

### ATTACHMENT 11C – ALOHA/ALOHA RESPONSE PROTOCOL WORD DEFINITION

Table 11C-3 was added to clarify protocol version number assignments, and is referenced by "note 1". "Note 2" was added to describe the GFI field of the ALOHA word.

### ATTACHMENT 12A – FIELD MAPPING EXAMPLE

$B_k$ was changed to $B_{24}$ in the data word map, "nibble" was changed to "semi-octet", and semi-octet arrow lengths were shortened to correspond to the proper four and eight-bit lengths.

### APPENDIX 7 – MATHEMATICAL EXAMPLE OF CRC ENDODING/DECODING

Format (alignment) changes were made in the polynomial divisions, "(X)" was corrected to "Q(x)", and the transmission order for the LDU Mapping of the 24-bit example was deleted to avoid possible misinterpretation.

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# SUPPLEMENT 14

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: January 4, 1993

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: November 4, 1992

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces changes made to increase the efficiency of data transfer across an ARINC 429 high speed bit-oriented link. This protocol supports the transfer of binary and character data.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper, contains descriptions of changes introduced into this Specification by this Supplement. The second part consists of replacement white pages for the Specification, modified to reflect the changes. The modified and added material on each page is identified by a c-14 in the margins. Existing copies of ARINC 429 may be updated by simply inserting the replacement white pages where necessary and destroying the pages they replace. The goldenrod pages are inserted inside the rear cover of the Specification.

## C. CHANGES TO ARINC SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change and addition is defined by the section number and the title currently employed in the Specification or by the section name and title that will be employed when the Supplement is eventually incorporated. In each case a brief description of the change or addition is included.

AEEC STAFF NOTE: THESE CHANGES APPLY TO ARINC 429, PART 3 ONLY.

### 2.3.1.5 File Data Transfer

An editorial change was needed to reference new section.

### 2.3.1.5.1 Bit-Oriented Protocol Determination

This section was expanded to include determination of different version numbers of the bit-oriented protocol, and was moved to Section 2.5.19.

### 2.5 Bit-Oriented Communication Protocol

An editorial change references a new section number.

### 2.5.4 Bit Rate and Word Timing

A maximum word gap of 64 bit-times, (averaged over the LDU transmission) was added to eliminate excessive delay in source transmission time.

Note: Sections 2.5.5 through 2.7 have been renumbered and reordered for consistency.

### 2.5.5 Word type

The basic definition of “word type” was corrected to include bits 31-29 in all bit-oriented words of an LDU.

### 2.5.6 Protocol Words

This section was added to specifically define the word type for protocol words.

### 2.5.6.1 Protocol Identifier

This section was added to clarify the definition of bits 28-25 for protocol words and to specify the relevant addition for error conditions.

### 2.5.6.2 Destination Code

This section was updated, and a commentary added, to clarify the role of the link layer protocol for upward compatibility with changing network functionality. The requirement for Destination code validation is not a link layer function.

### 2.5.6.3 Word Count

This section was renumbered.

### 2.5.7 Request to Send (RTS)

This section was previously titled “Response to TS”, and has been renumbered. The title was changed for consistency, and an introductory paragraph added to clarify the basic RTS function.

### 2.5.7.1 Clear to Send (CTS)

This section was renumbered.

### 2.5.7.2 Not Clear to Send (NCTS)

This section was renumbered.

### 2.5.7.3 Destination Busy

This section was renumbered, and an introductory replacement paragraph inserted to clarify the “optional” BUSY response, which may be used when a system cannot accept a transmission by the source in a “timely manner”. New commentary equates a “timely manner” to the shorter retry sequence of the NCTS series.

### 2.5.7.4 No Response to RTS

This section was renumbered, and the ALOHA word was included in the logic for error determination.

### 2.5.10 Start of Transmission (SOT)

Timer $T_{13}$ was added as a requirement on the source to begin transmission of an LDU within a specified interval after receipt of the CTS word from the sink.

### 2.5.10.1 General Format Identifier (GFI)

This section was updated, and commentary added to clarify the role of the GFI in pre-OSI as well as OSI environments. Validation of the GFI code is required by a high level entity (network layer) in both environments to determine the format of the data words to follow. GFI validation is not necessarily a link layer function.

### 2.5.11 Data

All references to Character Data word formats were deleted.

### 2.5.11.3 Character Data Words

This section was deleted. The Character Data Word format was removed from Supplement 14, as the format is incompatible with those for Full and Partial Data word formats. Currently, both binary and character data are transmitted in octets defined by the other two data word formats. The special character data format is not required.

### 2.5.12.1 CRC Encoding

References to character data words were deleted. The text for equation: M9x) = $x^{16}G(x) + R(x)$ was corrected by moving the "bar" from G(x) to R(x).

### 2.5.13 Negative Acknowledgement (NAK)

NAK word interpretation was changed to remove constraint on source for specific order of file sequencing (i.e. Allows source to restart file with new FSN if necessary).

### 2.5.14.1 Duplicate LDU

This first paragraph was rewritten to clarify.

### 2.5.14.3 Incomplete File Timer

This section was added to allow the sink to discard a partial file of multiple LDUs when the $T_{14}$ timeout between LDU transmissions is exceeded. It ensures that a source device cannot "lock-up" a sink.

### 2.5.15 SYN Word

The LDU sequence anomalies which generate a SYN response by the sink were clarified.

### 2.5.16 Response to ACK/NAK/SYN

The $T_{16}$ timer was introduced to replace $T_{10}$ and $T_8$. Also, the action taken by the source upon receipt of a SYN word was updated, which relaxes requirements to maintain a specific File Sequence ordering by the source.

### 2.5.19 Protocol Initialization

### 2.5.19.1 Bit-Oriented Protocol Version,

### 2.5.19.2 ALOHA Response, and

### 2.5.19.3 Character-429 Determination

This section has been added to replace and expand on the definition of the process to determine the link layer protocol version supported by an interfacing system. These sections replace three sections from Supplement 13.

### 2.3.1.5.1 Bit-Oriented Protocol Determination

### 2.5.19 ALO Response, and

### 2.5.20 Bit Protocol Verification

### 2.6 Windowed Bit-Oriented Protocol

This is a completely new section which contains the system description of the new LLC2-like bit-oriented link layer protocol for 429. It is based on Section 2.5, "Bit-Oriented Communications Protocol", with expanded text as specified to allow for more efficient use of the 429 high (or low) speed data bus through "windowing". The definition includes provision for a Link Control Word prior to each LDU.

### ATTACHMENT 1 – EQUIPMENT CODES

New Equipment Code Identifiers were added.

### ATTACHEMENT 6 – WORD FORMATS AND ENCODING EXAMPLES

Example added for label 171.

### ATTACHMENT 10 – VARIABLES OF BIT ORIENTED PROTOCOL

Table 10-1 was updated to include a standard value for $N_7$, the maximum number of LDUs in a window (see Section 2.6 "Windowed Bit-Oriented Protocol").

Table 10-3 deleted Option 6 ($O_6$) for NAK Send Time, and deleted Option 9 ($O_9$) for the Character Data Word, both of which are no longer used.

Table 10-4 was revised to include columns for low speed maximum and minimum values. These values were established for timers and as response time design goals for incoming transmissions. Timers $T_{13}$ through $T_{16}$ were added.

Table 10-5 was added to include a definition of high speed maximum and minimum values for timers and response time design goals. The format is the same as the revised Table 10-4. Timer $T_{10}$ is not used in the high speed protocol.

Table 10-6 was added to include notes to Tables 10-1 through 10-5.

### ATTACHMENT 11 – BIT-ORIENTED DATA FILE TRANSFER WORD FORMATS

Table 11-1A added "spares" for the deleted Character Data Formats and corrected "Protocol Data Word" to read "Protocol Word".

Table 11-4 updated definitions for bits 9 through 24 of the ALO and ALR words, and added the LCW (LDU Control Word) format definition.

Table 11-4A was added as a partial replacement for ATTACHMENT 11C and Table 11-4B was added to define the new window definitions for the Windowed Bit-Oriented protocol in Section 2.6.

Table 11-6A was revised, changing the former GFI bit pattern (0001) for ISO 8208 to "unassigned". The bit pattern (0100) for ISO 8473 was changed to a more

## ATTACHMENT 11 – BIT-ORIENTED DATA FILE TRANSFER WORD FORMATS (cont'd)

generic ISO 9577 definition. The bit pattern 1110 (hex"E") is now defined as "ACARS VHF Format".The "NOTES" in ATTACHMENT 11 have been renumbered to correspond to the new table definitions.

## ATTACHMENT 11C – ALOHA/ALOHA RESPONSE PROTOCOL WORD DEFINITION

This Attachment has been deleted. This information has been moved to Tables 11-4, 11-4A, and 11-4B.

## ATTACHMENT 13A – ALOHA VERSION DETERMINATION SEQUENCE

This Attachment was added to support the ALOHA version determination sequence called out in Section 2.5.19.1.1.

## ATTACHMENT 14 – SYSTEM ADDERESS LABELS

New System Address Labels (SAL) were added.

## ATTACHMENT 16 – SEQUENCE OF PROTOCOL AND DATA WORDS IN WINDOW TRANSFER

This Attachment was added to illustrate the window transfers for new Section 2.6.

## ATTACHMENT 17 – FLOW DIAGRAM USED TO DETERMINE CHARACTER-ORIENTED VS BIT-ORIENTED PROTOCOL

This Attachment was added to illustrate the logic flow that determines whether a character-oriented or bit-oriented link layer protocol interface is to be used.

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# SUPPLEMENT 15

# TO

# ARINC SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published: September 1, 1995

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: April 18, 1995

## A. PURPOSE OF THIS DOCUMENT

This Supplement introduces new label assignments, equipment IDs, system address labels and updates to the 429W protocol.

## B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod paper contains descriptions of changes introduced into this Specification by this Supplement. The second part consists of replacement white pages for the Specification, modified to reflect the changes. The modified and added material on each page is identified by a c-15 in the margins. Existing copies of ARINC Specification 429 may be updated by simply inserting the replacement white pages where necessary and destroying the pages they replace. The goldenrod pages are inserted inside the rear cover of the Specification.

## C. CHANGES TO ARINC SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is defined by the section number and the title currently employed in the Specification or by the section name and title that will be employed when the Supplement is eventually incorporated. In each case a brief description of the change or addition is included.

### 2.0 Digital Information Transfer System Standards

Numerous changes were made to the protocol throughout this Section.

### 2.1.5.3 Discrete Data Words

The technique for encoding SSM bits in discrete words were revised.

ORIGINAL TEXT FOLLOWS:

### 2.1.5.3 Discrete Data Words

A source system should annunciate any detected failure that could cause one or more of the words normally output by that system to be unreliable. Three methods are defined. The first method is to set bit numbers 30 and 31 in the affected word(s) to the "Failure Warning" code defined in the table below. This is the preferred method. Words containing the "Failure Warning" code should continue to be supplied to the data bus during the failure condition. When using the second method, the equipment may stop transmitting the affected word or words on the data bus. The third method applies to data words which are defined such that they contain failure information within the data field. For these applications, refer to the associated ARINC equipment characteristic to determine the proper SSM reporting.

The "No Computed Data" code should be annunciated in the affected Discrete Data word(s) when a source system is unable to compute reliable data for reasons other than system failure.

When the "Functional Test" code appears as a system output, it should be interpreted as advice that the data in the Discrete Data word contents are the result of the execution of a functional test.

DISCRETE DATA WORDS

| Bit | | Meaning |
|---|---|---|
| 31 | 30 | |
| 0 | 0 | Verified Data, Normal Operation |
| 0 | 1 | No Computed Data |
| 1 | 0 | Functional Test |
| 1 | 1 | Failure Warning |

### 2.2.2 Modulation

The following Commentary was added:

"Avionics manufacturers are warned that bus activity monitoring should be implemented with caution. Crossed wiring (interchanging A and B) at one end of the bus, which will cause improper LRU/system operation, may not necessarily be detected by a "simple" bus activity monitor."

### 2.2.4.2 Receiver Input Impedance

The word "parallel" was changed to "combination".

### Figure 3.1 Radio Systems Management Word Formats

VHF Com Frequency Word - Bits 7,8,20,23 changed to "0" and bits 15,16,21,28 changed to "1".

### ATTACHMENT 1 - LABEL CODES

This attachment was updated according to the tables on the following pages.

Designation for label 155 027 changed from BCD to BNR.

### ATTACHMENT 1 - LABEL CODES

The following new equipment codes were assigned:
03D, 053, 05A, 0D0, 0E0, 12C, 160, 19F, 13B

### ATTACHMENT 2 - DATA STANDARDS

This attachment was updated according to the tables on the following pages. Newly assigned discrete word formats are included.

In word 270 115, bit 12 was changed from "pad" to "Tune". AUTOTUNE was assigned for "1" and NO AUTOTUNE was assigned to "0".

Word 155 027 moved from Table 1 to Table 2.

In Table 2 "SIG DIG" was changed to "SIG BIT".
In Table 2 under label 077, "0--" was changed to "037".

Duplicate 244 08D word removed.

ATTACHMENT 6 - GENERAL WORD FORMATS AND ENCODING EXAMPLES

Table 2 - examples for Flight Director Pitch and Total Air Temp corrected.

Examples for the following tables added.

Manufacturer Specific Data Word
  010101 assigned to Garmin
  010110 assigned to ARNAV Systems

Bit 11 modified for label 150 to include reference to precision source.

Word format for label 077 00B removed (from two places).

ATTACHMENT 9B - GENERAL AVIATION WORD EXAMPLES

Manufacturer Specific Data Word
  010101 assigned to Garmin
  010110 assigned to ARNAV Systems

ATTACHMENT 10 - VARIABLES OF BIT-ORIENTED PROTOCOL

Revised Notes 1 and 4.

Table 10-3 BIT-ORIENTED PROTOCOL OPTIONS - Added Option $0_{12}$

Table 10-5 VARIABLES OF HIGH SPEED BIT-ORIENTED PROTOCOL - Revised Time $T_{10}$ min and max values.

ATTACHMENT 11 - BIT-ORIENTED DATA FILE TRANSFER WORD FORMATS

Table 11-6A GENERAL FORMAT IDENTIFIER (GFI) - Revised “Reserved ISO 9577” to “ISO 9577”

ATTACHMENT 11A - DESTINATION CODES

Added Cabin Packet Data Function. Corrected Ground Station bit encoding.

ATTACHMENT 11B - STATUS CODES

Revised description of Code 86. Added entries for Code 8E through 95.

ATTACHMENT 14 - SYSTEM ADDRESS LABELS

The following labels were added:

| | |
|---|---|
| 170 | DFDAU (Mandatory Load Function) |
| 266 | Cabin Video System (Airshow) |
| 334 | Cabin Telecommunications Unit (CTU) |
| 340 | HF Data Radio/Data Unit #1 |
| 344 | HF Data Radio/Data Unit #2 |

The following labels were revised:

| | |
|---|---|
| 175 | HGA HPA |
| 176 | Spare |
| 177 | LGA HPA |

APPENDIX 8 - INTEROPERABILITY OF BIT-ORIENTED LINK LAYER PROTOCOL

Appendix added.

APPENDIX 9 - SDL DIAGRAMS OF THE WILLIAMSBURG PROTOCOL

Appendix added.

# NEW AND REVISED BNR LABEL ASSIGNMENTS

| | LABEL | EQ ID | PARAMETER | BINARY UNITS | RANGE | SIG | RESOL | MIN TI | MAX TI | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| New | 061 | 002 | ACMS Information | | | | | | | See Att. 6 |
| New | 062 | 002 | ACMS Information | | | | | | | See Att. 6 |
| New | 063 | 002 | ACMS Information | | | | | | | See At. 6 |
| New | 145 | 002 | TACAN Control | See Section 3.1.4 | | | | 180 | 220 | See Att. 6 |
| Add | 226 | 002 | Min Op. Fuel Temp (non-conflicting) | | | | | | | |
| New | 233 | 002 | ACMS Information | | | | | | | See Att. 6 |
| New | 234 | 002 | ACMS Information | | | | | | | See Att. 6 |
| New | 235 | 002 | ACMS Information | | | | | | | See Att. 6 |
| New | 236 | 002 | ACMS Information | | | | | | | See Att. 6 |
| Revise | 265 | 002 | Min Buffet Airspeed | | | 11 | | | | |
| Revise | 360 | 002 | Flight information | | | | | | | See Att. 6 |
| Revise | 370 | 004 | g | | | | | | | |
| Revise | 014 | 005 | Magnetic Heading | Deg | | | | | | |
| Revise | 370 | 005 | g | | | | | | | |
| Revise | 205 | 006 | Mach | | 4096 | | | | | |
| Revise | 205 | 01A | Mach | | 4096 | | | | | |
| New | 034 | 025 | VOR/ILS Frequency | | | | | 125 | 250 | |
| New | 035 | 025 | DME Frequency | | | | | 125 | 250 | |
| New | 060 | 025 | S/G HARDWARE PART NO. | | | | | | | See Att. 6 |
| New | 061 | 025 | S/G HARDWARE PART NO. | | | | | | | See Att. 6 |
| New | 101 | 025 | Selected Heading | Deg/180 | + - 180 | 12 | 0.05 | 125 | 250 | |
| New | 121 | 025 | Pitch Limit | Deg/180 | + - 180 | 14 | 0.01 | 125 | 250 | |
| New | 145 | 025 | Discrete Status 2 EFIS | | | | | | | |
| New | 146 | 025 | Discrete Status 3 EFIS | | | | | | | |
| New | 147 | 025 | Discrete Status 4 EFIS | | | | | | | |
| New | 155 | 025 | Discrete Status 5 EFIS | | | | | | | |
| New | 160 | 025 | Discrete Status 6 EFIS | | | | | | | |
| New | 161 | 025 | Discrete Status 7 EFIS | | | | | | | |
| New | 162 | 025 | ADF brg left/right | Deg/180 | + - 180 | 12 | 0.05 | 125 | 250 | SDI-01 = left / SDI-10 = right |
| New | 207 | 025 | OP, SOFTWARE PART NO. | | | | | | | See Att. 6 |
| New | 272 | 025 | Discrete Data #3 | | | | | | | |
| New | 273 | 025 | Discrete Data #4 | | | | | | | |
| New | 276 | 025 | Discrete Status 8 EFIS | | | | | | | |
| New | 054 | 037 | Zero Fuel Weight (kg) | kg | 655360 | 15 | 20 | 100 | 200 | |
| New | 074 | 037 | Zero Fuel Weight (lb) | lb | 1310720 | 15 | 40 | 100 | 200 | |
| Correction | 076 | 037 | Longitudinal C/G | | 163.84 | | | | | |
| New | 077 | 037 | Lateral C/G | %MAC | 131.072 | 17 | 0.01 | 100 | 200 | |
| New | 107 | 037 | Long, Zero Fuel C/G | %MAC | 163.84 | 14 | 0.01 | 100 | 200 | |
| DELETE | 256 | 037 | | | | | | | | |
| DELETE | 257 | 037 | | | | | | | | |
| DELETE | 347 | 037 | | | | | | | | |
| Revise | 205 | 038 | Mach | | 4096 | | | | | |
| Revise | 342 | 038 | EPR Limit | | 4 | 12 | 0.001 | 150 | 250 | |
| Revise | 342 | 038 | N1 Limit | %RPM | 256 | 14 | 0.015 | 150 | 250 | |

# NEW AND REVISED BNR LABEL ASSIGNMENTS

| | LABEL | EQ ID | PARAMETER | BINARY UNITS | RANGE | SIG | RESOL | MIN TI | MAX TI | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| New | 227 | 03D | AVM Command | | | | | | | See Att. 2 |
| New | 270 | 03D | Discrete Data #1 | | | | | | | See Att. 2 |
| New | 350 | 03D | Maintenance Data #1 | | | | | | | See Att. 2 |
| New | 353 | 03D | Maintenance Data #4 | | | | | | | See Att. 2 |
| New | 354 | 03D | N1 Vibration | Scalar | 5.12 | 9 | 0.01 | | | Bit 11-Chan. A/Bit 12-Chan. B |
| New | 355 | 03D | N2 Vibration | Scalar | 5.12 | 9 | 0.01 | | | Bit 11-Chan. A/Bit 12-Chan. B |
| New | 356 | 03D | N3 Vibration | Scalar | 5.12 | 9 | 0.01 | | | Bit 11-Chan. A/Bit 12-Chan. B |
| New | 357 | 03D | BB Vibration | Scalar | 5.12 | 9 | 0.01 | | | Bit 11-Chan. A/Bit 12-Chan. B |
| New | 360 | 03D | N1 Rotor Imbalance Angle | Deg. | +-180 | 9 | 1 | | | Bit 11-Chan. A/Bit 12-Chan. B |
| New | 361 | 03D | LPT Rotor Imbalance Angle (737 only) | Deg. | +-180 | 9 | 1 | | | |
| New | 025 | 04D | Load SEL Control | na | 204700 | 11 | 100 | | | |
| New | 156 | 04D | L TANK FAULTS | | | | | TBD | TBD | See Att. 2 |
| New | 157 | 04D | R TANK FAULTS | | | | | TBD | TBD | See Att. 2 |
| New | 160 | 04D | C TANK FAULTS | | | | | TBD | TBD | See Att. 2 |
| New | 161 | 04D | A TANK FAULTS | | | | | TBD | TBD | See Att. 2 |
| New | 241 | 04D | FQIS SYSTEM DATA | | See Att. 6 | | | 500 | 1024 | See Att. 6 |
| New | 254 | 04D | Actual Fuel Quan (teat) | Lbs | 262144 | 15 | 8 | 500 | 1000 | |
| New | 255 | 04D | Fuel Quantity (gal) | Gallons | 32768 | 15 | 1 | 500 | 1000 | |
| New | 256 | 04D | FUEL DISCRETES | | | | | TBD | TBD | See Att. 2 |
| New | 262 | 04D | T/U CAP-L TANK 1-4 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 263 | 04D | T/U CAP-L TANK 5-8 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 264 | 04D | T/U CAP - L TANK 9-12 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 265 | 04D | T/U CAP - L TANK 13-14 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 266 | 04D | T/U CAP - C TANK 1-4 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 267 | 04D | T/U CAP - C TANK 5-8 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 270 | 04D | T/U CAP - C TANK 9 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 271 | 04D | T/U CAP - A TANK 1-4 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 272 | 04D | T/U CAP - A TANK 5-8 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 273 | 04D | T/U CAP -A TANK 9-11 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 274 | 04D | T/U CAP - R TANK 1-4 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 275 | 04D | T/U CAP - R TANK 5-8 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 276 | 04D | T/U CAP - R TANK 9-12 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 277 | 04D | T/U CAP - R TANK 13-14 | PF | 655.35 | 16 | 0.01 | TBD | TBD | |
| New | 310 | 04D | COMP CAP-TANK | PF | 327.67 | 15 | 0.01 | TBD | TBD | See Att. 6 for SDI encoding |
| New | 320 | 04D | DENSITY-TANK | LB/GAL | 8.191 | 13 | 0.001 | TBD | TBD | See Att. 6 for SDI encoding |
| New | 324 | 04D | TANK VSO QUANTITY | GALS | 32767 | 15 | 1 | TBD | TBD | See Att. 6 for SDI encoding |
| New | 326 | 04D | UPLIFT QUANTITY | LBS | 1638300 | 14 | 100 | TBD | TBD | |
| New | 327 | 04D | UPLIFT DENSITY | LB/GAL | 8.181 | 13 | 0.001 | TBD | TBD | |
| New | 341 | 04D | I/O S/W REV 1&2 | | (1) | 16 | N/A | TBD | TBD | |
| New | 342 | 04D | S/W REV-TANK | | (1) | 16 | N/A | TBD | TBD | See Att. 6 for SDI encoding |
| New | 344 | 04D | FUEL DISCRETES | | | | | 50 | 100 | See Att. 2 |
| New | 345 | 04D | DISCRETES STATUS 1&3 | | | | | 100 | 200 | See Att. 2 |
| New | 346 | 04D | CABLE CAP-HI-Z | PF | 65535 | 16 | 1 | 100 | 200 | See Att. 6 for SDI encoding |

# NEW AND REVISED BNR LABEL ASSIGNMENTS

| | LABEL | EQ ID | PARAMETER | BINARY UNITS | RANGE | SIG | RESOL | MIN TI | MAX TI | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| New | 350 | 04D | MAINT. DATA FQIS 1-3 | | | | | 100 | 200 | See Att. 2 |
| New | 351 | 04D | MAINT. DATA FQIS 1&3 | | | | | 100 | 200 | See Att. 2 |
| New | 352 | 04D | MAINT. DATA FQIS 1-4 | | | | | 100 | 200 | See Att. 2 |
| New | 353 | 04D | MAINT. DATA FQIS 1-4 | | | | | 100 | 200 | See Att. 2 |
| New | 354 | 04D | FQIS TANK ID | | | | | 100 | 200 | See Att. 2, Att. 6 for SDI |
| New | 355 | 04D | MAINT. DATA FQIS 2-4 | | | | | 100 | 200 | See Att. 2 |
| New | 357 | 04D | MAINT. DATA FQIS 2-3 | | | | | 100 | 200 | See Att. 2 |
| New | 151 | 05A | LB/KG Control Word | | | | | | | See Att. 2 |
| Revise | 176 | 05A | Fuel Temperature - Set to Zero | Deg. C | 512 | 11 | 0.25 | 100 | 200 | |
| Revise | 177 | 05A | Fuel Temp. Left Wing Tank | Deg. C | 512 | 11 | 0.25 | 100 | 200 | |
| Delete | 200 | 05A | | | | | | | | |
| Revise | 201 | 05A | Fuel Temp. Right Wing Tank | Deg. C | 512 | 11 | 0.25 | 100 | 200 | |
| Revise | 202 | 05A | Fuel Temperature - Set to Zero | Deg. C | 512 | 11 | 0.25 | 100 | 200 | |
| New | 247 | 05A | Total Fuel | lb | 655360 | 14 | 40 | 100 | 200 | |
| New | 250 | 05A | Preselected Fuel Quantity | lb | 655360 | 14 | 40 | 100 | 200 | |
| New | 256 | 05A | Fuel Quantity - Left Outer Cell | lb | 131072 | 15 | 4 | 100 | 200 | Zero for A-321 |
| New | 257 | 05A | Fuel Quantity Left W/T Tank | lb | 131072 | 15 | 4 | 100 | 200 | |
| New | 260 | 05A | Fuel Quantity Center Tank | lb | 131072 | 15 | 4 | 100 | 200 | |
| New | 261 | 05A | Fuel Quantity Right I/C or W/T Tank | lb | 131072 | 15 | 4 | 100 | 200 | |
| New | 262 | 05A | Fuel Quantity - Right Outer Cell | lb | 131072 | 15 | 4 | 100 | 200 | Zero for A-321 |
| New | 270 | 05A | Discrete Data #1 | | | | | 100 | 200 | |
| New | 271 | 05A | Discrete Data #2 | | | | | 100 | 200 | |
| New | 276 | 05A | Discrete Data #7 | | | | | 100 | 200 | |
| New | 300 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 301 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 302 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 303 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 304 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 305 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 306 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 307 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 310 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 311 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 312 | 05A | Fuel Quantity ACT 1 | lb | 131072 | 15 | 4 | 100 | 200 | |
| New | 313 | 05A | Fuel Quantity ACT 2 | lb | 131072 | 15 | 4 | 100 | 200 | |
| New | 314 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 315 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 316 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 317 | 05A | Internal Para. For SPARTIAAL | | | | | | | |
| New | 324 | 05A | Effective Pitch Angle | Deg./180 | +-180 | 14 | 0.01 | | | |
| New | 325 | 05A | Effective Roll Angle | Deg./180 | +-180 | 14 | 0.01 | | | |
| New | 356 | 05A | Maintenance Word | | | | | | | |
| Revise | 244 | 08D | Fuel Flow Rate | | 32768 | | | | | |

# NEW AND REVISED BNR LABEL ASSIGNMENTS

| | LABEL | EQ ID | PARAMETER | BINARY UNITS | RANGE | SIG | RESOL | MIN TI | MAX TI | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| New | 155 | 0BB | Maintenance Data #6 | | | | | | | |
| New | 156 | 0BB | Maintenance Data #7 | | | | | | | |
| New | 157 | 0BB | Maintenance Data #8 | | | | | | | |
| New | 160 | 0BB | Maintenance Data #9 | | | | | | | |
| New | 276 | 0BB | Discrete Data #5 | | | | | | | |
| New | 354 | 0BB | Maintenance Data #5 | | | | | | | |
| New | 005 | 0D0 | Engine Discrete | | | | | | | Bit 11-Chan. A/Bit 12-Chan. B |
| New | 006 | 0D0 | Engine Discrete | | | | | | | |
| New | 073 | 0D0 | Engine Oil Quantity | US Pint | 128 | 9 | 0.25 | | | SDI1 = L/SD12 = R |
| New | 173 | 0d0 | Hydraulic Oil Quantity | US Pint | 128 | 9 | 0.25 | | | SDI1 = L/SD12 = B |
| New | 174 | 0D0 | Hydraulic Oil Pressure | PSI | 4096 | 12 | 1 | | | SDI1 = A/SD12 = B |
| New | 316 | 0D0 | Engine Oil Temperature | Deg. C | 2048 | 12 | 0.5 | | | SDI1 = L/SD12 = R |
| New | 317 | 0D0 | Engine Oil Pressure | PSI | 4096 | 14 | 0.25 | | | SDI1 = L/SD12 = R |
| New | 344 | 0D0 | N2 | %RPM | 256 | 13 | 0.03 | | | SDI1 = L/SD12 = R |
| New | 345 | 0D0 | EGT | Deg. C | 2048 | 12 | 0.5 | | | SDI1 = L/SD12 = R |
| New | 346 | 0D0 | N1 | %RPM | 256 | 13 | 0.03 | | | SDI1 = L/SD12 = R |
| New | 347 | 0D0 | Fuel Flow | Lb/Hr | 32768 | 12 | 8 | | | SDI1 = L/SD12 = R |
| New | 353 | 0D0 | Vibration | Scalar | 5.12 | 8 | 0.02 | | | SDI1 = L/SD12 = R |
| Revise | 360 | 10A | Throttle Rate of Change | | 16 | 9/9 | | | | |
| New | 146 | 112 | TACAN Control | See Section 3.1.4 | | | | 180 | 220 | |
| New | 222 | 112 | TACAN Control | Deg/180 | +-180 | 12 | 0.05 | 180 | 220 | |
| New | 101 | 114 | C/G Target | % | 164 | 8 | 0.01 | 100 | 200 | |
| Revise | 270 | 115 | Stored TACAN Control Word | | | | | 25 | 50 | See Att. 2 |
| New | 221 | 12C | Indicated Angle of Attack (Ave.) | Deg/180 | +-180 | 12 | 0.05 | 31.3 | 62.5 | |
| New | 222 | 12C | Indicated Angle of Attack (#1 left) | Deg/180 | +-180 | 12 | 0.05 | 31.3 | 62.5 | |
| New | 223 | 12C | Indicated Angle of Attack (#1 right) | Deg/180 | +-180 | 12 | 0.05 | 31.3 | 62.5 | |
| New | 224 | 12C | Indicated Angle of Attack (#2 left) | Deg/180 | +-180 | 12 | 0.05 | 31.3 | 62.5 | |
| New | 225 | 12C | Indicated Angle of Attack (#2 right) | Deg/180 | +-180 | 12 | 0.05 | 31.3 | 62.5 | |
| New | 114 | 13A | Ambient Pressure | PSIA | 32 | 14 | 0.002 | 100 | 200 | |
| New | 130 | 13A | Inlet Temperature | Deg. C | 128 | 11 | 0.0625 | 100 | 200 | |
| New | 131 | 13A | Inlet Pressure | PSIA | 32 | 13 | 0.004 | 100 | 200 | |
| New | 134 | 13A | Throttle Lever Angle | Deg/180 | +-180 | 12 | 0.05 | 25 | 50 | |
| New | 254 | 13A | N1 Cruise | %N1 Nom | 256 | 14 | 0.015 | 100 | 200 | |
| New | 255 | 13A | N1 Climb | %N1 Nom | 256 | 14 | 0.015 | 100 | 200 | |
| New | 264 | 13A | Burner Pressure | PSIA | 512 | 14 | 0.031 | 100 | 200 | |
| New | 340 | 13A | N1 Take Off | %N1 Nom | 256 | 14 | 0.015 | 25 | 50 | |
| New | 341 | 13A | N1 Reference | %N1 Nom | 256 | 14 | 0.015 | 25 | 50 | |
| New | 344 | 13A | N2 Speed | %RPM | 256 | 14 | 0.015 | 25 | 50 | |
| New | 345 | 13A | EGT Trimmed | Deg. C | 2048 | 12 | 0.5 | 25 | 50 | |
| New | 346 | 13A | N1 Speed Actual | %N1 Nom | 256 | 14 | 0.015 | 25 | 50 | |
| New | 347 | 13A | Fuel Flow | Lb/Hr | 32768 | 14 | 2 | 50 | 100 | |
| New | 364 | 13A | N1 APR Rating | %N1 Nom | 256 | 14 | 0.015 | 100 | 200 | |
| New | 365 | 13A | N1 Max Reverse | %N1 Nom | 256 | 14 | 0.015 | 100 | 200 | |

# NEW AND REVISED BNR LABEL ASSIGNMENTS

| | LABEL | EQ ID | PARAMETER | BINARY UNITS | RANGE | SIG | RESOL | MIN TI | MAX TI | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|
| New | 366 | 13A | IGV Position | Deg./180 | +-180 | 12 | 0.05 | 100 | 200 | |
| New | 367 | 13A | IGV Request | Deg./180 | +-180 | 12 | 0.05 | 100 | 200 | |
| New | 341 | 160 | Tank Unit Data | | | | | | | |
| New | 147 | xxx | TACAN Control Word | | | | | 100 | 200 | |
| Correction | 171 | xxx | Manu. Specific Status Word | | | | | | | See Att. 6 |
| New | 214 | xxx | ICAO Aircraft Address (part 1) | | | | | | | See Att. 6 |
| New | 316 | xxx | ICAO Aircraft Address (part 2) | | | | | | | |
| New | 375 | xxx | GPS Differential Correction Word A | | | | | | | See ARINC 743A |
| New | 376 | xxx | GPS Differential Correction Word B | | | | | | | See ARINC 743A |
| Revised | 021 | 002 | Selected EPR | EPR | 0-3 | 4 | 0.001 | 100 | 200 | |
| New | 027 | 002 | TACAN Selected Course | Degrees | 0-359 | 3 | 1 | 167 | 333 | |
| Revised | 020 | 020 | Selected Vertical Speed | Ft/Min | 0-6000 | 4 | 1 | 100 | 200 | |
| Revised | 021 | 020 | Selected EPR | EPR | 0-3 | 4 | 0.001 | 100 | 200 | |
| New | 047 | 020 | VHF Com Frequency | See Chap. 3 | | | | 100 | 200 | |
| New | 047 | 024 | VHF Com Frequency | See Chap. 3 | | | | 100 | 200 | |
| Revised | 155 | 027 | MLS Selected GP Angle | Degrees | | | | 100 | 200 | |
| Revised | 065 | 037 | Gross Weight | | 0-19999 | | | | | |
| New | 163 | 037 | Zero Fuel Weight (lb) | Lbs | 0-19999 | 5 | 1 | 100 | 200 | |
| New | 243 | 037 | Zero Fuel Weight (kg) | KG | 0-19999 | 5 | 1 | 100 | 200 | |
| New | 52 | 037 | Long. Zero Fuel CG | %MAC | 0-100.00 | 5 | 0.01 | 100 | 200 | |
| New | 012 | 04D | QTY-LD SEL (LB) | Lbs | 0-79999 | 19 | 100 | | | |
| New | 013 | 04D | QTY - FLT DECK (LB) | Lbs | 0-79999 | 19 | 100 | | | |
| New | 017 | 04D | TOTAL-FLT DECK (LB) | Lbs | 0-79999 | 19 | 100 | | | |
| New | 020 | 04D | TNK-LD SEL(LB) | Lbs | 0-79999 | 19 | 100 | | | |
| New | 022 | 04D | QTY-LD SEL (KG) | KG | 0-79999 | 19 | 100 | | | |
| New | 023 | 04D | QTY-FLT DECK (KG) | KG | 0-79999 | 19 | 100 | | | |
| New | 027 | 04D | TOTAL-FLT DECK (KG) | KG | 0-79999 | 19 | 100 | | | |
| New | 030 | 04D | TNK-LD SEL(KG) | KG | 0-79999 | 19 | 100 | | | |
| New | 135 | 05A | ACT 1 Fuel Quan. Display | KG/LB | 0-9999 | 16 | 100 | 100 | 200 | |
| New | 136 | 05A | ACT 2 Fuel Quan. Display | KG/LB | 0-9999 | 16 | 100 | 100 | 200 | |
| New | 137 | 05A | Center+ACT+ACT FQ Display | KG/LB | 0-9999 | 16 | 100 | 100 | 200 | |
| New | 140 | 05A | Actual Fuel Quan. Display | KG/LB | 0-9999 | 16 | 100 | 100 | 200 | |
| New | 141 | 05A | Preselected Fuel Quan. Display | KG/LB | 0-9999 | 16 | 100 | 100 | 200 | |
| New | 142 | 05A | Left Wing Fuel Quan. Display | KG/LB | 0-9999 | 16 | 100 | 100 | 200 | |
| New | 143 | 05A | Center Wing Fuel Quan. Display | KG/LB | 0-9999 | 16 | 100 | 100 | 200 | |
| New | 144 | 05A | Right Wing Fuel Quan. Display | LG/LB | 0-9999 | 16 | 100 | 100 | 200 | |
| New | 272 | 05A | Fuel Density | KG/M3 | 0-9999 | 16 | 0.0001 | 100 | 200 | |
| New | 273 | 05A | Sensor Values Left Wing Tank | pF | 0-100 | 13 | 0.1 | 100 | 200 | |
| New | 274 | 05A | Sensor Values Center Wing Tank | pF | 0-100 | 13 | 0.1 | 100 | 200 | |
| New | 275 | 05A | Sensor Values Right Wing Tank | pF | 0-100 | 13 | 0.1 | 100 | 200 | |
| New | 047 | 086 | VHF Com Frequency | See Chap. 3 | | | | 100 | 200 | |
| Revised | 021 | 0A1 | Selected EPR | EPR | 0-3 | 4 | 0.001 | 100 | 200 | |
| New | 201 | 112 | TACAN Distance | N.M. | 0-399.99 | 5 | 0.01 | 190 | 210 | |

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# SUPPLEMENT 16

# TO

# ARINC  SPECIFICATION 429

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

Published:  September 27, 2001

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: November 14, 2000

## A. PURPOSE OF THIS SUPPLEMENT

This Supplement introduces new label assignments, equipment IDs, and System Address Labels (SAL) to ARINC Specification 429.

## B. ORGANIZATION OF THIS SUPPLEMENT

The material in Supplement 16 is integrated into ARINC Specification 429 to form an updated version of the standard. Changes introduced by Supplement 16 are identified using change bars and are labeled by a "c-16" symbol in the margin.

## C. CHANGES TO ARINC SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is defined by the section number and the title currently employed in the Specification or by the section name and title that will be employed when the Supplement is eventually incorporated. In each case a brief description of the change or addition is included.

### ATTACHMENT 1-1 - LABEL CODES

Attachment 1-1 was updated to include new label assignments, of these new assignments 35 labels were revised and 3 label assignment deletions. A summary of label codes added by Supplement 16 is reproduced as Attachment 1-16 to this Supplement.

The deleted labels are:

| Label Code | PARAMETER |
|---|---|
| 053 | Track Angle Magnetic |
| 217 | Average Static Pressure |
| 231 | Total Air Temperature |

### ATTACHMENT 1-2 - EQUIPMENT CODES

Attachment 1-2 was updated to include new equipment codes:

| EQ ID | EQUIPMENT TYPE |
|---|---|
| 055 | Multi-Mode Receiver (MMR) (755) |
| 056 | GNSS Navigation Landing Unit (GNLU) (756) |
| 057 | Cockpit Voice Recorder (CVR) (757) |
| 058 | Communication Management Unit Mark 2 (758) |
| 060 | GNSS Navigation Unit (GNU) (760) |
| 061 | Satellite Terminal Unit (STU) (761) |
| 0BB | Flap Control Unit (B747-400)/Flap Slat Electronics Unit (B767-400) |
| 108 | Electronic Engine Control (EEC) Channel A (B737-700) |
| 109 | Electronic Engine Control (EEC) Channel B (B737-700) |
| 122 | Ground Auxiliary Power Unit (A320/319/321) |
| 12D | Logic Drive Control Computer (B747/B767) |
| 12E | Cargo Control Logic Unit (B767) |
| 12F | Cargo Electronics Interface Unit (B767) |
| 13B | Audio Entertainment System (AES) Controller (Boeing) |
| 13F | Camera Interface Unit (A340/B777) |
| 130 | Load Management Unit (LMU) Airbus |
| 140 | Supersonic Air Data Computer (Honeywell) |
| 142 | ADS-B Link Display Processor Unit (LPDU) |
| 143 | Vertical/Horizontal Gyro (Litton) |
| 167 | Air Traffic Service Unit (Airbus) |
| 168 | Integrated Standby Instrument System (A340/330, A320/319/321) |
| 169 | Data Link Control and Display Unit (A340/330) |
| 200 | Versatile Integrated Avionics Unit (B717/MD-10) |
| 201 | Electronic Spoiler Control Unit (B717) |
| 202 | Brake Control Unit (B717) |
| 203 | Pneumatic Overheat Detection Unit (B717) |
| 204 | Proximity Switch Electronics Unit (B717) |
| 205 | APU Electronic Control Unit (B717) |
| 206 | Aircraft Interface Unit (MD-10) |
| 207 | Fuel Quantity Gauging Unit (MD-10) |

### ATTACHMENT 2 - DATA STANDARDS

Attachment 2 was updated to reflect new data standards. The basis of the changes introduced in Supplement 16 are reproduced as Attachment 1-16 to this Supplement.

### ATTACHMENT 4 - INPUT/OUTPUT CIRCUIT STANDARDS

Text was added to identify the drawing as defining total system characteristics.

### ATTACHMENT 6 - GENERAL WORD FORMATS AND ENCODING EXAMPLES

The text describing Label 150 bit 11 was revised to reflect the contents of ARINC Characteristic 743A, GNSS Sensor.

The text describing Label 214 and Label 216 was revised to reflect the contents of ARINC Characteristic 758, Communications Management Unit.

### ATTACHMENT 8 - OUTPUT SIGNAL TIMING TOLERANCES

The text was modified to define pulse rise and fall times.

## ATTACHMENT 11 - SYSTEM ADDRESS LABELS

The following System Address Labels were added:

| SAL OCTAL LABEL | SYSTEM |
|---|---|
| 157 | CVR |
| 210 | FCMC Com A340-500/600 |
| 211 | FCMC Mon A340-500/600 |
| 212 | FCMC Int A340-500/600 |
| 225 | HUD |
| 241 | APM-MMR |
| 242 | MMR |
| 244 | ILS |
| 245 | MLS |
| 246 | AHRS |
| 251 | VDR #1 |
| 252 | VDR #2 |
| 253 | VDR #3 |
| 310 | GPWS |
| 311 | GNLU 1 |
| 312 | GNLU 2 |
| 313 | GNLU 3 |
| 314 | GNU 1 |
| 315 | GNU 2 |
| 316 | GNU 3 |
| 321 | AUTOTHROTTLE COMPUTER |
| 322 | FCC 1 |
| 323 | FCC 2 |
| 324 | FCC 3 |
| 325 | APU |
| 326 | APU CONTROLLER |
| 327 | Mode Control Panel (MCP) |
| 330 | FMC 3 |
| 331 | ATC TRANSPONDER |
| 332 | DADC |
| 362 | Passenger Services System (PSS) 767-300,400 |
| 363 | Cabin Service System (CSS) 747-400 |
| 364 | Audio Entertainment System (AES) Boeing |
| 366 | Multicast |
| 367 | Bridge |

## APPENDIX E – GUIDELINES FOR LABEL ASSIGNMENTS

Labels 171, 172, 214 and 216 were removed from spare labels (item 3).

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 001 | BCD | 056 | Distance To Go | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 001 | BCD | 060 | Distance To Go | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 002 | BCD | 056 | Time To Go | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 002 | BCD | 060 | Time To Go | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 012 | BCD | 056 | Ground Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 012 | BCD | 060 | Ground Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 017 | BCD | 055 | Selected Runway Heading | Degrees | 0-359.9 | 4 | 0.1 | | |
| 020 | Discrete | 06D | Landing Gear Position Infor & System Status | | | | | 90 | 100 |
| 021 | Discrete | 06D | Landing Gear Position Infor & System Status | | | | | 90 | 100 |
| 022 | Discrete | 06D | Landing Gear Position Infor & System Status | | | | | 90 | 100 |
| 023 | Discrete | 06D | Landing Gear Position Infor & System Status | | | | | 90 | 100 |
| 024 | Discrete | 06D | Landing Gear Position Infor & System Status | | | | | 90 | 100 |
| 027 | BCD | 056 | TACAN Selected Course | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 027 | BCD | 060 | TACAN Selected Course (Bcd) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 033 | BCD | 055 | Landing System Mode/Frequency | | | | | | |
| 033 | BCD | 056 | ILS Frequency | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 033 | BCD | 060 | ILS Frequency | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 034 | BCD | 056 | VOR/ILS Frequency | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 034 | BCD | 060 | VOR/ILS Frequency #1 | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 035 | BCD | 055 | Paired DME Frequency | MHz | 1008-135.9 | 4 | 0.05 | | |
| 035 | BCD | 056 | DME Frequency | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 035 | BCD | 060 | DME Frequency #1 | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 036 | BCD | 055 | MLS Channel Selection | | 500-600 | 3 | 1 | | |
| 036 | BCD | 056 | MLS Frequency Channel | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 036 | BCD | 060 | MLS Frequency/Channel | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 041 | BCD | 056 | Set Latitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 041 | BCD | 060 | Set Latitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 042 | BCD | 056 | Set Longitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 042 | BCD | 060 | Set Longitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 043 | BCD | 056 | Set Magnetic Heading | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 043 | BCD | 060 | Set Magnetic Heading | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 052 | BNR | 004 | Body Pitch Accel | Deg/Sec$^2$ | ± 64 | 15 | 0.002 | 50 Hz | 117 Hz |
| 052 | BNR | 038 | Body Pitch Accel | Deg/Sec$^2$ | ± 64 | 15 | 0.002 | 50 Hz | 117 Hz |
| ~~053~~ | ~~BCD~~ | ~~004~~ | ~~Track Angle Magnetic~~ | ~~Degree~~ | ~~1~~ | ~~3~~ | ~~1~~ | ~~250~~ | ~~500~~ |
| 053 | BNR | 004 | Body Roll Accel | Deg/Sec$^2$ | ± 64 | 15 | 0.002 | 50 Hz | 117 Hz |
| 053 | BNR | 038 | Body Roll Accel | Deg/Sec$^2$ | ± 64 | 15 | 0.002 | 50 Hz | 117 Hz |
| 054 | BNR | 004 | Body Yaw Accel | Deg/Sec$^2$ | ± 64 | 15 | 0.002 | 50 Hz | 117 Hz |
| 054 | BNR | 038 | Body Yaw Accel | Deg/Sec$^2$ | ± 64 | 15 | 0.002 | 50 Hz | 117 Hz |
| 056 | BCD | 056 | ETA (Active Waypoint) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 056 | BCD | 060 | ETA (Active Waypoint) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 061 | BNR | 00B | Pseudo Range | Meters | ±268435456 | 20 | 256 | 200 | 1200 |
| 061 | BNR | 056 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 061 | BNR | 060 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 062 | BNR | 00B | Pseudo Range Fine | Meters | 256 | 11 | 0.125 | 200 | 1200 |
| 062 | BNR | 056 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 062 | BNR | 060 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 063 | BNR | 00B | Range Rate | M/S | ±4096 | 20 | 0.0039 | 200 | 1200 |
| 063 | BNR | 056 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 063 | BNR | 060 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 064 | BNR | 00B | Delta Range | Meters | ±4096 | 20 | 0.0039 | 200 | 1200 |
| 065 | BNR | 00B | SV Position X | Meters | ±67108864 | 20 | 64 | 200 | 1200 |
| 066 | BNR | 00B | SV Position X Fine | Meters | 64 | 14 | 0.0039 | 200 | 1200 |
| 070 | BNR | 00B | SV Position Y | Meters | ±67108864 | 20 | 64 | 200 | 1200 |
| 070 | BNR | 056 | Reference Airspeed (Vref) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 070 | BNR | 060 | Reference Airspeed (Vref) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 071 | BNR | 00B | SV Position Y Fine | Meters | 64 | 14 | 0.0039 | 200 | 1200 |
| 072 | BNR | 00B | SV Position Z | Meters | ±67108864 | 20 | 64 | 200 | 1200 |
| 073 | BNR | 00B | SV Position Z Fine | Meters | 64 | 14 | 0.0039 | 200 | 1200 |
| 074 | BNR | 00B | UTC Measure Time | Seconds | 10.0 | 20 | 9.536743µs | 200 | 1200 |

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 074 | BNR | 056 | Zero Fuel Weight | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 074 | BNR | 060 | Zero Fuel Weight | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 074 | BNR | 114 | Zero Fuel Weight | Pounds | 1310680 | 15 | 40 | 100 | 400 |
| 075 | Discrete | 008 | Maximum Hazard Alert Level Output | | | | | | |
| 075 | BNR | 114 | Aircraft Gross Weight | Pounds | 1310680 | 15 | 40 | 100 | 200 |
| 076 | BNR | 00B | GNSS Altitude (Msl) | Feet | ±131072 | 20 | 0.125 | 200 | 1200 |
| 076 | Discrete | 008 | Hazard Azimuth Output | | | | | | |
| 076 | BNR | 114 | Aircraft Longitudinal Center Of Gravity | Percent | 163.83% | 14 | 0.01% | 100 | 200 |
| 077 | Discrete | 008 | Hazard Range Output | | | | | | |
| 077 | BNR | 056 | Target Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 077 | BNR | 060 | Target Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 077 | BNR | 114 | Zero Fuel Center Of Gravity | Percent | 163.83% | 14 | 0.01% | 100 | 200 |
| 100 | BNR | 056 | Selected Course #1 | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 100 | BNR | 060 | Selected Course #1 | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 101 | BNR | 00B | HDOP | N/A | 1024 | 15 | 0.031 | 200 | 1200 |
| 102 | BNR | 00B | VDOP | N/A | 1024 | 15 | 0.031 | 200 | 1200 |
| 102 | BNR | 056 | Selected Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 102 | BNR | 060 | Selected Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 103 | BNR | 00B | GNSS Track Angle | Degrees | ±108° | 15 | 0.0055° | 200 | 1200 |
| 103 | BNR | 056 | Selected Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 103 | BNR | 060 | Selected Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 104 | BNR | 056 | Selected Vertical Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 104 | BNR | 060 | Selected Vertical Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 105 | BNR | 055 | Selected Runway Heading | Degrees | ± 180 | 11 | 0.1 | | |
| 105 | BNR | 056 | Selected Runway Heading | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 105 | BNR | 060 | Selected Runway Heading | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 106 | BNR | 060 | Selected Mach | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 106 | BNR | 056 | Selected Mach | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 107 | BNR | 056 | Selected Cruise Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 107 | BNR | 060 | Selected Cruise Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 110 | BNR | 00B | GNSS Latitude | Degrees | ±108° | 20 | 0.000172° | 200 | 1200 |
| 111 | BNR | 00B | GNSS Longitude | Degrees | ±108° | 20 | 0.000172° | 200 | 1200 |
| 112 | BNR | 00B | GNSS Ground Speed | Knots | 4096 | 15 | 0.125 | 200 | 1200 |
| 114 | BNR | 056 | Desired Track | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 114 | BNR | 060 | Desired Track | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 115 | BNR | 056 | Waypoint Bearing | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 115 | BNR | 060 | Waypoint Bearing | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 116 | BNR | 00B | Horizontal GLS Deviation Rectilinear | Feet | ± 24000 | 18 | .00915 | | 100 |
| 116 | BNR | 055 | Horizontal GLS Deviation Rectilinear | Feet | ± 24000 | 18 | 00915 | | 100 |
| 116 | BNR | 056 | Cross Track Distance | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 116 | BNR | 060 | Cross Track Distance | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 117 | BNR | 00B | Vertical GLS Deviation Rectilinear | Feet | ± 1024 | 14 | .0625 | | 100 |
| 117 | BNR | 055 | Vertical GLS Deviation Rectilinear | Feet | ± 1024 | 14 | .0625 | | 100 |
| 117 | BNR | 056 | Vertical Deviation | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 117 | BNR | 060 | Vertical Deviation | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 120 | BNR | 00B | GNSS Latitude Fine | Degrees | 0.000172° | 11 | 8.38-E-8° | 200 | 1200 |
| 120 | BNR | 056 | Range to Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 120 | BNR | 060 | Range To Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 121 | BNR | 00B | GNSS Longitude Fine | Degrees | 0.000172° | 11 | 8.38-E-8° | 200 | 1200 |
| 121 | BNR | 056 | Horizontal Command Signal | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 121 | BNR | 060 | Horizontal Command Signal | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 122 | BNR | 056 | Vertical Command Signal | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 122 | BNR | 060 | Vertical Command Signal | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 124 | Discrete | 00B | Digital Time Mark | - | | | | 200 | 1200 |
| 125 | BCD | 00B | UTC | Hr:Min | 23:59.9 | 5 | 0.1 Min | 200 | 1200 |
| 125 | BCD | 002 | Universal Coordinate Time | Hr-Min | 0-23.59.9 | 4 | 0.1 | 100 | 200 |
| 125 | BCD | 056 | Universal Coordinated Time (UTC) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 125 | BCD | 060 | Universal Coordinated Time (UTC) | The Same Parameters as the FMS EQ ID 002 | | | | | |

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 126 | BNR | 056 | Vertical Deviation (Wide) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 126 | BNR | 060 | Vertical Deviation (Wide) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 130 | BNR | 00B | Aut Horiz Integ Limit | NM | 16 | 17 | 1.2E-4 | 200 | 1200 |
| 133 | BNR | 00B | Aut Vert Integ Limit | Feet | 32, 768 | 18 | 0.125 | 200 | 1200 |
| 136 | BNR | 00B | Vertical Figure Of Merit | Feet | 32, 768 | 18 | 0.125 | 200 | 1200 |
| 137 | BNR | 140 | Flap Angle | Degrees | 180 | 12 | 0.05 | 62.5 | 200 |
| 140 | BNR | 00B | UTC Fine | Seconds | 1 | 20 | 0.953674µs | 200 | 1200 |
| 140 | Discrete | 114 | Pump Contactor States | | | | | | |
| 141 | BNR | 00B | UTC Fine Fractions | Seconds | 0.9536743µs | 10 | 0.9313225ns | 200 | 1200 |
| 141 | Discrete | 114 | Pump Contactor and Pushbutton States | | | | | | |
| 142 | Discrete | 114 | Pump Push Button and LP Switch State | | | | | | |
| 143 | Discrete | 114 | Pump LP Switch State and FCMC Commands | | | | | | |
| 144 | Discrete | 114 | Valve Feedback | | | | | | |
| 145 | Discrete | 114 | Valve Feedback | | | | | | |
| 146 | Discrete | 114 | Valve Feedback | | | | | | |
| 147 | Discrete | 114 | Valve Feedback | | | | | | |
| 150 | BNR | 00B | UTC | Hr:Min:S | ±23:59:59 | 17 | 1.0 sec | 200 | 1200 |
| 150 | BNR | 056 | Universal Coordinated Time | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 150 | BNR | 060 | Universal Coordinated Time | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 150 | Discrete | 114 | FCMC Valve Commands | | | | | | |
| 151 | BNR | 055 | MLS AZ Deviation | mV | ± 2400 | 15 | 0.0732 | | |
| 151 | BNR | 056 | Localizer Bearing (True) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 151 | BNR | 060 | Localizer Bearing (True) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 151 | Discrete | 114 | FCMC Valve Commands | | | | | | |
| 152 | BNR | 055 | MLS GP Deviation | mV | ± 2400 | 15 | 0.0732 | | |
| 152 | Discrete | 114 | Overhead Panel Switch/ Pushbutton & Refuel Panel Battery Power Supply Switch States | | | | | | |
| 153 | BNR | 055 | MLS Selected Azimuth | Degrees | 0-359 | 9 | 1 | | |
| 153 | Discrete | 114 | Level States | | | | | | |
| 154 | BNR | 055 | MLS Max Selectable GP | Degrees | ±51.1 | 9 | 1 | | |
| 154 | BNR | 056 | Runway Heading (True) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 154 | BNR | 060 | Runway Heading (True) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 154 | Discrete | 114 | Level States and Low Warning and Transfer Indications | | | | | | |
| 155 | BNR | 055 | MLS Selected Glide Path | Degrees | ±51.1 | 9 | 0.01 | | |
| 155 | Discrete | 114 | XFR Pump Faults & Wing Imbalance Warning | | | | | | |
| 156 | BNR | 055 | MLS Basic Data Wd 1 | N/A | N/A | N/A | N/A | | |
| 156 | Discrete | 114 | Refuel Panel Switch States | | | | | | |
| 157 | SAL | | System Address Label For CVR | | | | | | |
| 157 | BNR | 055 | MLS Basic Data Wd 2 | N/A | N/A | N/A | N/A | | |
| 157 | BCD | 114 | Trim Tank Probe Capacitance | pf | 0-400 | 14 | 0.1 | | |
| 160 | BNR | 055 | MLS Basic Data Wd 3 | N/A | N/A | N/A | N/A | | |
| 160 | Discrete | 114 | Valve Feedback | | | | | | |
| 161 | BNR | 055 | MLS Basic Data Wd 4 | N/A | N/A | N/A | N/A | | |
| 161 | Discrete | 114 | Indicated Pump Status | | | | | | |
| 162 | BNR | 055 | MLS Basic Data Wd 5 | N/A | N/A | N/A | N/A | | |
| 162 | Discrete | 114 | Indicated Pump Status | | | | | | |
| 162 | BNR | 140 | Density Altitude | Feet | 131072 | 16 | 2 | 250 | 500 |
| 163 | BNR | 055 | MLS Basic Data Wd 6 | N/A | N/A | N/A | N/A | | |
| 163 | Discrete | 114 | Indicated Pump Status | | | | | | |
| 164 | BNR | 055 | MLS ABS GP Angle | Degrees | ± 41 | 15 | 0.00125 | | |
| 164 | Discrete | 114 | Indicated Pump Status | | | | | | |
| 165 | BNR | 00B | Vertical Velocity | Feet/Min | ±32768 | 15 | 1.0 | 200 | 1200 |
| 165 | BNR | 055 | MLS ABS Azimuth Angle | Degrees | ± 82 | 16 | 0.00125 | | |
| 165 | Discrete | 114 | Indicated Valve Status | | | | | | |
| 166 | BNR | 00B | North/South Velocity | Knots | ±4096 | 15 | 0.125 | 200 | |
| 166 | Discrete | 114 | Indicated Valve Status | | | | | | |
| 167 | BNR | 002 | EPU Estimate Position Uncertainty/ (ANP) Actual Navigation Performance | NM | 0-128 | 16 | 0.00195 | | |

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 167 | Discrete | 114 | Indicated Valve Status | | | | | | |
| 170 | Discrete | 114 | Wing Imbalance And FQI Failure Warning | | | | | | |
| 171 | BNR | 002 | RNP  Reduced Navigation Performance | NM | 0-128 | 16 | 0.001953 | | |
| 171 | BNR | 056 | Current RNP | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 171 | BNR | 060 | Current RNP | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 172 | | | Subsystem Identifier | | | | | | |
| 173 | BNR | 055 | Localizer Deviation | DDM | ± 0.4 | 12 | 0.0001 | | |
| 174 | BNR | 00B | East/West Velocity | Knots | ±4096 | 15 | 0.125 | 200 | 1200 |
| 174 | BNR | 055 | Glide Slope Deviation | DDM | ± 0.8 | 12 | 0.0002 | | |
| ~~176~~ | ~~BNR~~ | ~~00B~~ | ~~GLONASS Satellite Deselection W #1~~ | | | ~~17~~ | | | |
| 176 | BNR | 0AD | Static Pressure Left, Uncorrected, mb | mb | 2048 | 18 | 0.008 | 20 | 200 |
| 176 | BNR | 038 | Left Static Pressure Uncorrected, mb | mb | 2048 | 18 | 0.008 | 20 | 200 |
| 176 | BNR | 114 | Left Outer Tank Fuel Temp & Advisory Warn | Degree C | ±512 | 11 | 0.025 | | |
| ~~177~~ | ~~BNR~~ | ~~00B~~ | ~~GLONASS Satellite Deselection W #2~~ | | | ~~17~~ | | | |
| 177 | BNR | 0AD | Static Pressure Right, Uncorrected, mb | mb | 2048 | 18 | 0.008 | 20 | 200 |
| 177 | BNR | 038 | Right Static Pressure, Uncorrected, mb | mb | 2048 | 18 | 0.008 | 20 | 200 |
| 177 | BNR | 055 | Distance To Runway Threshold | Nmiles | 1024 | 16 | 0.007812 | | |
| 177 | BNR | 114 | Inner Tank 1 Fuel Temp & Advisory Warning | Degree C | ±512 | 11 | 0.025 | | |
| 200 | BCD | 056 | Drift Angle | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 200 | BCD | 060 | Drift Angle | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 200 | BNR | 114 | Inner Tank 2 Fuel Temp & Advisory Warning | Degree C | ±512 | 11 | 0.025 | | |
| 201 | BNR | 114 | Inner Tank 3 Fuel Temp & Advisory Warning | Degree C | ±512 | 11 | 0.025 | | |
| 201 | BNR | 140 | Mach Maximum Operation (Mmo) | Mach | 4.096 | 12 | 0.001 | 62.5 | 125 |
| 201 | BNR | 142 | Projected Future Latitude | Degrees | ± 180 | 20 | 0.000172 | 150 | 400 |
| 202 | BNR | 114 | Inner Tank 4 Fuel Temp & Advisory Warning | Degree C | ±512 | 11 | 0.025 | | |
| 202 | BNR | 140 | Mach Rate | M/minute | 4.096 | 12 | 0.001 | 62.5 | 125 |
| 202 | BNR | 142 | Projected Future Latitude Fine | Degrees | .000172 | 11 | $2^{-}$E-32 Cir | 150 | 400 |
| 203 | BNR | 114 | Trim Tank Fuel Temp & Advisory Warning | Degree C | ±512 | 11 | 0.025 | | |
| 203 | BNR | 140 | Altitude | Feet | 131072 | 17 | 1 | 31.25 | 62.5 |
| 204 | BNR | 056 | Baro Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 204 | BNR | 060 | Baro Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 204 | BNR | 114 | Right Outer Tank Fuel Temp & Advisory Warning | Degree C | ±512 | 11 | 0.025 | | |
| 204 | BNR | 140 | Baro Corrected Altitude | Feet | 131072 | 17 | 1 | 31.25 | 62.5 |
| 205 | BNR | 140 | Mach | Mach | 4.096 | 16 | 0.0000625 | 62.5 | 125 |
| 206 | BNR | 056 | Computed Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 206 | BNR | 060 | Computed Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 206 | BNR | 140 | Computed Airspeed (CAS) | Knots | 1024 | 14 | 0.0625 | 62.5 | 125 |
| 207 | BNR | 140 | Airspeed Maximum Operating (VMO) | Knots | 1024 | 12 | .025 | 62.56 | 125 |
| 210 | BNR | 140 | True Airspeed | Knots | 2048 | 15 | 0.0625 | 62.5 | 125 |
| 210 | SAL | | FCMC Com A340-500/600 | | | | | | |
| 211 | BNR | 0AD | Total Air Temperature Indicated | Degree C | 512 | 12 | 0.125 | 250 | 500 |
| 211 | BNR | 140 | Total Air Temp (TAT) | Degree C | 512 | 11 | 0.25 | 250 | 500 |
| 211 | BNR | 142 | Projected Future Longitude | Degrees | ± 180 | 20 | 0.000172 | 150 | 400 |
| 211 | SAL | | FCMC M on A340-500/600 | | | | | | |
| 212 | BNR | 056 | Alititude Rate | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 212 | BNR | 060 | Alititude Rate | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 212 | BNR | 140 | Altitude Rate | Ft/Min | 32768 | 11 | 16 | 31.25 | 62.5 |
| 212 | BNR | 142 | Projected Future Longitude Fine | Degrees | .000172 | 11 | 2E -32 Cir | 150 | 400 |
| 212 | SAL | | FCMC Int A340-500/600 | | | | | | |
| 213 | BNR | 140 | Static Air Temp (SAT) | Degree C | 512 | 11 | 0.25 | 250 | 500 |
| 213 | BNR | 142 | Vertical Time Interval | Minute | 265 min | 10 | .25 mile | 500 | 2000 |
| 215 | BNR | OAD | Impacted Pressure, Uncorrected, mb | mb | 512 | 16 | 0.008 | 20 | 40 |
| 215 | BNR | O38 | Impacted Pressure, Uncorrected, mb | mb | 512 | 14 | 0.03125 | 62.5 | 125 |
| 215 | BNR | 006 | Impacted Pressure, Uncorrected, mb | mb | 512 | 14 | 0.03125 | 62.5 | 125 |
| 215 | BNR | 140 | Impact Pressure Subsonic | mb | 512 | 14 | 0.03125 | 62.5 | 125 |
| ~~217~~ | ~~BNR~~ | ~~0AD~~ | ~~Average Static Pressure~~ | ~~mb~~ | ~~2048~~ | ~~18~~ | ~~0.008~~ | ~~20~~ | ~~200~~ |
| 217 | BNR | 002 | Geometric Vertical Rate | Ft/Min | 20000 | 11 | 16 | | |

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 217 | BNR | 006 | Static Pressure, Corrected (In. Hg) | Inches Hg | 64 | 16 | 0.001 | 20 | 200 |
| 217 | BNR | 038 | Static Pressure, Average, Corrected (In. Hg) | Inches Hg | 64 | 16 | 0.001 | 20 | 200 |
| 217 | BNR | 140 | Static Pressure Corrected (In. Hg) | Inches Hg | 64 | 16 | 0.001 | 62.5 | 125 |
| 220 | | 056 | MCDU #1 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 220 | | 060 | MCDU #1 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 220 | BNR | 140 | Baro Corrected Altitude #2 | Feet | 131072 | 17 | 1 | 31.25 | 62.5 |
| 221 | | 056 | MCDU #2 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 221 | | 060 | MCDU #2 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 221 | BNR | 140 | Angle Of Attack Indicated Average | Degrees | 180 | 12 | 0.05 | 31.25 | 62.5 |
| 222 | | 056 | MCDU #3 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 222 | | 060 | MCDU #3 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 222 | BNR | 140 | Angle Of Attack, Indicated #1 Left | Degrees | 180 | 12 | 0.05 | 31.5 | 62.5 |
| 223 | | 056 | Printer #1 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 223 | | 060 | Printer #1 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 223 | BNR | 140 | Angle Of Attack, Indicated #1 Right | Degrees | 180 | 12 | 0.05 | 31.5 | 62.5 |
| 224 | | 056 | Printer #2 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 224 | | 060 | Printer #2 Address Label | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 224 | BNR | 140 | Angle Of Attack, Indicated #2 Left | Degrees | 180 | 12 | 0.05 | 31.5 | 62.5 |
| 225 | SAL | | System Address Label For HUD | | | | | | |
| 225 | BNR | 056 | Minimum Maneuvering Air Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 225 | BNR | 060 | Minimum Maneuvering Air Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 225 | BNR | 140 | Angle Of Attack, Indicated #2 Right | Degrees | 180 | 12 | 0.05 | 31.5 | 62.5 |
| 226 | | 00B | Data Loader Responses | | | | | 200 | 1200 |
| 227 | Discrete | 019 | CFDS Bite Command Summary For HFDR | | | | | | |
| 227 | Discrete | 053 | CFDS Bite Command Word For HFDU | | | | | | |
| 230 | BCD | 114 | Left Outer Probes Capacitance | pf | 0-400 | 14 | 0.1 | | |
| ~~231~~ | ~~BCD~~ | ~~0AD~~ | ~~Total Air Temperature~~ | ~~Degree C~~ | ~~512~~ | ~~12~~ | ~~20~~ | ~~200~~ | |
| 231 | BCD | 114 | Inner 2 Tank Probe Capacitance | pf | 0-400 | 14 | 0.1 | | |
| 232 | File Format | 002 | Active Intent Data Block | | | | | | |
| 232 | DISC | 055 | GLS Airport ID | | | | | | |
| 232 | Discrete | 056 | Active Intent Data Block | | | | | | |
| 232 | | 060 | Active Intent Data Block | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 232 | BCD | 114 | Inner 4 Tank Probe Capacitance | pf | 0-400 | 14 | 0.1 | | |
| 233 | BNR | 056 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 233 | BNR | 060 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 233 | BCD | 114 | Right Outer Probe Capacitance | pf | 0-400 | 14 | 0.1 | | |
| 234 | BNR | 056 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 234 | BNR | 060 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 235 | BNR | 056 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 235 | BNR | 060 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 236 | BNR | 056 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 236 | BNR | 060 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 237 | BNR | 00B | Horizontal Uncertainty Level | Nm | 16 | 17 | 0.000122 | | 1200 |
| 237 | BNR | 002 | ACMS Information | | | | | | |
| 237 | BNR | 056 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 237 | BNR | 060 | ACMS Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 241 | SAL | | System Address Label For APM-MMR | | | | | | |
| 241 | BNR | 056 | Min. Airspeed for Flap Extension | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 241 | BNR | 060 | Min. Airspeed for Flap Extension | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 241 | BNR | 140 | Angle Of Attack, Corrected | Degrees | 180 | 12 | 0.05 | 31.5 | 62.5 |
| 242 | SAL | | System Address Label for MMR | | | | | | |
| 242 | BNR | 0AD | Total Pressure, Uncorrected, mb | | | | | | |
| 242 | File Format | 002 | Modified Intent Data Block | | | | | | |
| 242 | BNR | 056 | Modified Intent Data Block | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 242 | | 060 | Modified Intent Data Block | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 242 | BNR | 140 | Total Pressure | mb | 2048 | 16 | 0.03125 | 62.5 | 125 |
| 243 | DISC | 055 | GLS Runway Selection | | | | | | |

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 244 | SAL | | System Address Label for ILS | | | | | | |
| 244 | BNR | 140 | Angle Of Attack, Normalized | Ratio | 2 | 11 | 0.001 | 62.5 | 125 |
| 245 | SAL | | System Address Label For MLS | | | | | | |
| 245 | BNR | 0AD | Average Static Pressure mb, Uncorrected | mb | 2048 | 18 | 0.008 | 20 | 200 |
| 245 | BNR | 038 | Average Static Pressure mb, Uncorrected | | | | | | |
| 245 | BNR | 056 | Minimum Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 245 | BNR | 060 | Minimum Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 245 | BNR | 140 | Static Pressure, Uncorrected | mb | 2048 | 16 | 0.03125 | 62.5 | 125 |
| 246 | SAL | | System Address Label for AHRS | | | | | | |
| 246 | BNR | 038 | Average Static Pressure mb, Corrected | | | | | | |
| 246 | BNR | 056 | General Max Speed (Vcmax) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 246 | BNR | 060 | General Max Speed (Vcmax) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 246 | BNR | 140 | Static Pressure, Corrected | mb | 2048 | 16 | 0.03125 | 62.5 | 125 |
| 247 | BNR | 00B | Horizontal Figure Of Merit | NM | 16 | 18 | 6.1 E-5 | 200 | 1200 |
| 247 | BNR | 056 | Control Minimum Speed (Vcmin) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 247 | BNR | 060 | Control Minimum Speed (Vcmin) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 247 | BNR | 114 | Fuel On Board | Pounds | 655320 | 13 | 40 | | |
| 247 | BNR | 140 | Airspeed Minimum Vmc | Knots | 512 | 11 | 0.25 | 62.5 | 125 |
| 250 | BNR | 0AD | Indicated Side Slip Angle or AOS | Deg/180 | ±180 | 14 | 0.01 | 31.3 | 200 |
| 250 | BNR | 114 | Preselected Fuel Quantity | Pounds | 655320 | 13 | 40 | | |
| 251 | SAL | | System Address Label VDR #1 | | | | | | |
| 252 | SAL | | System Address Label VDR #2 | | | | | | |
| 253 | SAL | | System Address Label VDR #3 | | | | | | |
| 254 | Discrete | 055 | GBAS ID | | | | | | 200 |
| 254 | BNR | 140 | Altitude Rate | Ft/Min | 131072 | 13 | 16 | 31.25 | 62.5 |
| 255 | Discrete | 055 | GBAS Airport ID | | | | | | 200 |
| 255 | BNR | 140 | Impact Pressure | mb | 4096 | 17 | 0.03125 | 62.5 | 125 |
| 256 | BLOCK | 055 | MLS Station ID #1 | | | | | | |
| 256 | BNR | 056 | Time For Climb | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 256 | BNR | 060 | Time For Climb | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 256 | BNR | 114 | Left Outer Tank Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 256 | BNR | 140 | Equivalent Airspeed | Knots | 1024 | 14 | 0.0625 | 62.5 | 125 |
| 257 | BLOCK | 055 | MLS Station ID #2 | | | | | | |
| 257 | BNR | 056 | Time For Descent | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 257 | BNR | 060 | Time For Descent | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 257 | BNR | 114 | Inner Tank 1 Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 257 | BNR | 140 | Total Pressure (High Range) | mb | 4096 | 17 | 0.03125 | 62.5 | 125 |
| 260 | BCD | 00B | Date | dd:Mo:Yr | dd:mm:yr | 6 | 1 day | 200 | 1200 |
| 260 | BCD | 056 | Date/Flight Leg | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 260 | BCD | 060 | Date/Flight Leg | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 260 | BNR | 114 | Collector Cell 1 and 2 Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 261 | BCD | 056 | Flight Number (BCD) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 261 | BCD | 060 | Flight Number (BCD) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 261 | BNR | 114 | Fuel On Board At Engine Start | Pounds | 131068 | 15 | 4 | | |
| 262 | BNR | 056 | Documentary Data | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 262 | BNR | 060 | Documentary Data | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 262 | BNR | 114 | Center Tank Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 263 | BLOCK | 055 | Ground Station/Approach | | | | | | |
| 263 | BNR | 056 | Min. Airspeed For Flap Retraction | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 263 | BNR | 060 | Min. Airspeed For Flap Retraction | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 263 | BNR | 114 | Collector Cell 3 And 4 Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 264 | BLOCK | 055 | Ground Station/Approach | | | | | | |
| 264 | BNR | 056 | Time To Touchdown | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 264 | BNR | 060 | Time To Touchdown | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 264 | BNR | 114 | Spare | | | | | | |
| 265 | BNR | 056 | Min. Buffet Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 265 | BNR | 060 | Min. Buffet Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 265 | BNR | 114 | Inner Tank 3 Fuel Quantity | Pounds | 131068 | 15 | 4 | | |

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 266 | BNR | 114 | Inner Tank 2 Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 267 | BNR | 056 | Max. Maneuver Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 267 | BNR | 060 | Max. Maneuver Airspeed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 267 | BNR | 114 | Inner Tank 4 Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 270 | Discrete | 024 | MU Output Data Word, Communication Link Status | | | | | | |
| 270 | Discrete | 039 | MCDU Normal Discrete Word | | | | | | |
| 270 | Discrete | 041 | SDU To ACARS MU/CMU Status Word | | | | | | |
| 270 | Discrete | 050 | VDR Status Word | | | | | | |
| 270 | Discrete | 053 | HFDL Status Word | | | | | | |
| 270 | DISC | 055 | MLS Discrete | | | | | | |
| 270 | Discrete | 056 | Status Discretes | | | | | | |
| 270 | Discrete | 058 | Output Status Word #1 | | | | | | |
| 270 | DISC | 060 | Intent Status | | | | | | |
| 270 | DISC | 060 | Status Discretes | | | | | | |
| 270 | DISC | 060 | Discrete Data #1 | | | | | | |
| 270 | Discrete | 114 | Unusable, and Empty Warning | | | | | | |
| 270 | Discrete | 140 | Discrete Data # 1 | | | | | 250 | 500 |
| 270 | Discrete | 142 | Aircraft Category (Disc Data 1) | | | | | 5000 | 15000 |
| 271 | Discrete | 041 | SDU To ACARS MU/CMU Join /Leave Message | | | | | | |
| 271 | DISC | 055 | MMR Discrete | | | | | | |
| 271 | Discrete | 056 | Discrete Data #2 | | | | | | |
| 271 | DISC | 060 | Discrete Data #2 | | | | | | |
| 271 | Discrete | 114 | Fuel Transfer Indication | | | | | | |
| 271 | Discrete | 140 | Discrete Data # 2 | | | | | 250 | 500 |
| 271 | Discrete | 142 | Altitude Filter Limits (Disc Data 2) | | | | | 500 | 2000 |
| 272 | Discrete | 053 | HFDL Slave (Disc Data 3) | | | | | | |
| 272 | Discrete | 056 | Discrete Data #3 | | | | | | |
| 272 | DISC | 060 | Discrete Data #3 | | | | | | |
| 272 | Discrete | 114 | Fuel Transfer Indication | | | | | | |
| 272 | Discrete | 140 | Discrete Data # 3 | | | | | 250 | 500 |
| 273 | DIS | 00B | GNSS Sensor Status | N/A | | | | 200 | 1200 |
| 273 | DISC | 055 | GNSS Status | | | | | | |
| 273 | Discrete | 114 | Memos And Status | | | | | | |
| 274 | Discrete | 114 | Fuel Transfer Indications | | | | | | |
| 275 | Discrete | 038 | IR Discrete Word #2 | | | | | | |
| 275 | Discrete | 056 | Discrete Data #6 | | | | | | |
| 275 | DISC | 060 | Discrete Data #6 | | | | | | |
| 275 | Discrete | 114 | Miscellaneous Warning | | | | | | |
| 276 | Discrete | 024 | MU Output Data Word, Pin Program Status | | | | | | |
| 276 | Discrete | 041 | SDU To EICAS/ECAM/EDU For Dual SATCOM | | | | | | |
| 276 | Discrete | 050 | VDR Mode Command | | | | | | |
| 276 | Discrete | 056 | Discrete Data #7 | | | | | | |
| 276 | Discrete | 058 | Output Status Word #2 | | | | | | |
| 276 | DISC | 060 | Discrete Data #7 | | | | | | |
| 276 | Discrete | 114 | Miscellaneous Discrete | | | | | | |
| 277 | Discrete | 004 | IRS Maintenance Discrete | | | | | | |
| 277 | Discrete | 114 | Fuel Transfer and CG Status | | | | | | |
| 301 | | 056 | Application Dependent | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 301 | | 060 | Application Dependent | | | | | | |
| 302 | | 056 | Application Dependent | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 302 | | 060 | Application Dependent | | | | | | |
| 303 | | 056 | Application Dependent | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 303 | | 060 | Application Dependent | | | | | | |
| 310 | SAL | | System Address Label for GPWS | | | | | | |
| 310 | BNR | 056 | Present Position Latitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 310 | BNR | 060 | Present Position Latitude | The Same Parameters as the FMS EQ ID 002 | | | | | |

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 310 | BNR | 114 | Right Outer Tank Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 311 | SAL | | System Address Label for GNLU 1 | | | | | | |
| 311 | BNR | 056 | Present Position Longitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 311 | BNR | 060 | Present Position Longitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 311 | BNR | 114 | Trim Tank Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 312 | SAL | | System Address Label for GNLU 2 | | | | | | |
| 312 | BNR | 056 | Ground Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 312 | BNR | 060 | Ground Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 312 | BNR | 114 | Additional Center Tank (Act 1) Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 313 | SAL | | System Address Label For GNLU 3 | | | | | | |
| 313 | BNR | 056 | Track Angle True | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 313 | BNR | 060 | Track Angle True | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 313 | BNR | 114 | Additional Center Tank (Act 2) Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 314 | SAL | | System Address Label For GNU 1 | | | | | | |
| 314 | BNR | 114 | Rear Center Tank (RCT) Fuel Quantity | Pounds | 131068 | 15 | 4 | | |
| 315 | SAL | | System Address Label For GNU 2 | | | | | | |
| 315 | BNR | 056 | Wind Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 315 | BNR | 060 | Wind Speed | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 316 | SAL | | System Address Label For GNU 3 | | | | | | |
| 316 | BNR | 056 | Wind Direction (True) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 316 | BNR | 060 | Wind Direction (True) | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 317 | BNR | 056 | Track Angle Magnetic | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 317 | BNR | 060 | Track Angle Magnetic | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 320 | BNR | 05A | Fuel Quantity Act 3 | | | | | | |
| 320 | BNR | 056 | Magnetic Heading | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 320 | BNR | 060 | Magnetic Heading | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 321 | SAL | | System Address Label for Autothrottle Computer | | | | | | |
| 321 | BNR | 056 | Drift Angle | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 321 | BNR | 060 | Drift Angle | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 322 | SAL | | System Address Label for FCC 1 | | | | | | |
| 322 | BNR | 056 | Flight Path Angle | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 322 | BNR | 060 | Flight Path Angle | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 323 | SAL | | System Address Label For FCC 2 | | | | | | |
| 323 | BNR | 002 | Geometric Altitude | Feet | 50000 | 17 | 1 | | |
| 323 | BNR | 056 | Geometric Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 323 | BNR | 060 | Geometric Altitude | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 324 | SAL | | System Address Label For FCC 3 | | | | | | |
| 324 | BNR | 056 | Estimated Position Uncertainty | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 324 | BNR | 060 | Estimated Position Uncertainty | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 324 | BNR | 114 | Effective Pitch Angle | Degrees | ±180 | 13 | 0.02 | | |
| 325 | SAL | | System Address Label For APU | | | | | | |
| 325 | BNR | 114 | Effective Roll Angle | Degrees | ±180 | 13 | 0.02 | | |
| 326 | SAL | | System Address Label For APU Controller | | | | | | |
| 327 | SAL | | SAL Mode Control Pane (MCP) | | | | | | |
| 330 | SAL | | System Address Label For FMC 3 | | | | | | |
| 331 | SAL | | System Address Label For ATC Transponder | | | | | | |
| 332 | SAL | | System Address Label For DADC | | | | | | |
| 335 | BNR | 002 | Track Angle Rate | Deg/Sec | 32 | 11 | 0.015 | 10 | 20 |
| 335 | BNR | 056 | Track Angle Rate | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 335 | BNR | 060 | Track Angle Rate | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 340 | BNR | 004 | Inertial Yaw Rate | Deg/Sec | 128 | 13 | 0.015 | 10 | 20 |
| 340 | BNR | 004 | Track Angle Grid | Degree | ± 180 | 15 | 0.0055 | 20 Hz | 110 Hz |
| 340 | BNR | 005 | Inertial Yaw Rate | Deg/Sec | 128 | 13 | 0.015 | 10 | 20 |
| 340 | BNR | 140 | Pressure Ratio (Pt/Ps) | Ratio | 16 | 14 | 0.001 | 62.5 | 125 |
| 341 | BNR | 004 | Grid Heading | Degree | ± 180 | 15 | 0.0055 | 20 Hz | 110 Hz |
| 341 | BNR | 038 | Grid Heading | Degree | ± 180 | 15 | 0.0055 | 20 Hz | 110 Hz |
| 341 | BNR | 140 | Pressure Ratio (Ps/Pso) | Ratio | 4 | 12 | 0.001 | 62.5 | 125 |

## ATTACHMENT 1-16
## SUPPLEMENT 16 UPDATES TO LABEL CODES

| Code No. (Octal) | Data | Eqpt. ID (Hex) | Parameter | Units | Range | Sig Bits | Resolution | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|
| 342 | BNR | 140 | Air Density Ratio | Ratio | 4 | 12 | 0.001 | 250 | 500 |
| 350 | Discrete | 004 | IRS Maintenance Discrete | | | | | | |
| 350 | Discrete | 018 | Maintenance Data #1 | | | | | | |
| 350 | Discrete | 019 | CFDS Bite Fault Summary Word For HFDR | | | | | | |
| 350 | Discrete | 024 | MU Output Data Word Failure Status | | | | | | |
| 350 | Discrete | 038 | IRS Maintenance Word #1 | | | | | | |
| 350 | Discrete | 050 | VDR Fault Summary Word | | | | | | |
| 350 | Discrete | 053 | CFDS Bite Fault Summary Word For HFDU | | | | | | |
| 350 | DISC | 055 | ILS Maintenance Word | | | | | | |
| 350 | Discrete | 058 | Maintenance Word #1 | | | | | | |
| 350 | BCD | 114 | Fuel Density | kg/l | 0-.999 | 4 | 0.01 | | |
| 350 | Discrete | 140 | Maintenance Data # 1 | | | | | 250 | 500 |
| 351 | Discrete | 024 | MU Output Data Word, Failure Status | | | | | | |
| 351 | Discrete | 038 | IRS Maintenance Word #2 | | | | | | |
| 351 | DISC | 055 | MMR Maintenance Word | | | | | | |
| 351 | Discrete | 058 | Maintenance Word #2 | | | | | | |
| 351 | BCD | 114 | Inner Tank 1 Probe Capacitance | pf | 0-400 | 14 | 0.1 | | |
| 351 | Discrete | 140 | Maintenance Data # 2 | | | | | 250 | 500 |
| 352 | DISC | 055 | MLS Bite Status | | | | | | |
| 352 | Discrete | 058 | Maintenance Word | | | | | | |
| 352 | BCD | 114 | Center, ACT & RCT Probe Capacitance | pf | 0-400 | 14 | 0.1 | | |
| 352 | Discrete | 140 | Maintenance Data # 3 Flight Count | | 524287 | | | 250 | 500 |
| 353 | Discrete | 038 | IRS Maintenance Word #3 | | | | | | |
| 353 | BCD | 114 | Inner Tank 3 Probe Capacitance | pf | 0-400 | 14 | 0.1 | | |
| 354 | | 056 | Maintenance Data #5 | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 354 | | 060 | Maintenance Data #5 | | | | | | |
| 355 | DIS | 00B | GNSS Fault Summary | - | | 21 | | 200 | 1200 |
| 355 | Discrete | 038 | IRS Maintenance Word #4 | | | | | | |
| 357 | ISO-5 | 056 | ISO Alphabet #5 Message | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 357 | ISO-5 | 060 | ISO Alphabet #5 Message | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 360 | BNR | 056 | Flight Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 360 | BNR | 060 | Flight Information | The Same Parameters as the FMS EQ ID 002 | | | | | |
| 360 | BNR | 142 | RAIM Status Word | NM | 16 | 13 | 0.00195 | | |
| 362 | SAL | | System Address Label For PSS | | | | | | |
| 363 | SAL | | System Address Label For CSS | | | | | | |
| 364 | SAL | | System Address Label For AES | | | | | | |
| 366 | SAL | | System Address Label For Multicast | | | | | | |
| 367 | SAL | | System Address Label For Bridge | | | | | | |
| 370 | BNR | 00B | GNSS Height WGS-84 (Hae) | Feet | ±131,072 | 20 | 0.125 | | 1200 |
| 370 | BNR | 00B | GNSS Height | Feet | ±131,072 | 20 | 0.125 | 200 | 1200 |
| 375 | BNR | 004 | Along Hdg Accel | Gs | 4 | 18 | 1.53E-5 | 50 Hz | 110Hz |
| 375 | BNR | 038 | Along Hdg Accel | Gs | 4 | 18 | 1.53E-5 | 50 Hz | 110Hz |
| 376 | BNR | 004 | Cross Hdg Accel | Gs | 4 | 18 | 1.53E-5 | 50 Hz | 110Hz |
| 376 | BNR | 038 | Cross Hdg Accel | Gs | 4 | 18 | 1.53E-5 | 50 Hz | 110Hz |

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# SUPPLEMENT 17

# TO

# ARINC SPECIFICATION 429 P1

# MARK 33 DIGITAL INFORMATION TRANSFER SYSTEM (DITS)

# PART 1

# FUNCTIONAL DESCRIPTION, ELECTRICAL INTERFACE,
LABEL ASSIGNMENTS AND WORD FORMATS

Published: May 17, 2004

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: May 5, 2004

## A. PURPOSE OF THIS DOCUMENT

This Supplement introduces new label assignments, equipment IDs, system address labels and updates to ARINC Specification 429.

## B. ORGANIZATION OF THIS SUPPLEMENT

The material in Supplement 17 is integrated into ARINC Specification 429 to form an updated version of the standard.

Changes introduced by Supplement 17 are identified using change bars and are labeled by a “c-17” symbol in the margin.

## C. CHANGES TO ARINC SPECIFICATION 429 INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Specification introduced by this Supplement. Each change or addition is defined by the section number and the title currently employed in the Specification or by the section name and title that will be employed when the Supplement is eventually incorporated. In each case a brief description of the change or addition is included.

### 3.1.4.6 VHF Communications

The Frequency Range and Frequency Selection Increments were revised to reflect 8.33 kHz spacing.

### ATTACHMENT 1-1 LABEL CODES

This Attachment was updated according to ARINC 429 New and Revised Label Assignments Table on page 3.

A Note was added to label 377 to clarify the SSM.

### ATTACHMENT 1-2 - EQUIPMENT CODES

The following Equipment Codes were added:

| EQ ID | EQUIPMENT TYPE |
|---|---|
| 061 | High-Speed Data Unit (HSDU) |
| 0C4 | A429W SDU Controller |
| 11E | Integrated Static Probe |
| 120 | Multifunctional Air Data Probe |
| 144 | CDTI Display Unit |
| 14A | Slide Slip Angle (SSA) |
| 171 | Electronic Flight Bag |
| 1E2 | ADS-B LDPU Controller |

### ATTACHMENT 2 - DATA STANDARDS

This Attachment was updated according to ARINC 429 New and Revised Label Assignments Table on page 3.

### ATTACHMENT 6 – GENERAL WORD FORMATS AND ENCODING EXAMPLES

Table 6-17 was revised to correct the error in the SSM.

Table 6-24 was revised to correctly identify SPI. In addition, bit 17 was revised to indicate Hijack Mode.

Table 6-39 (ICAO Address) will be removed from Part I and added to Part II

Tables 6-49, 6-50, and 6-51 were added by this Supplement.

### ATTACHMENT 10 – MANUFACTURER-SPECIFIC STATUS

Bits 9 and 10 were revised to indicate SDI and Note B was added.

Company identification was added for RYAN.

### ATTACHMENT 11 - SYSTEM ADDRESS LABELS

The following System Address Labels were added or revised:

| SAL OCTAL LABEL | SYSTEM |
|---|---|
| 156 | CVR #2 |
| 174 | HGA/IGA HPA |
| ~~175~~ | ~~HGA/HPA Starboard~~ |
| 177 | LGA HPA |
| 247 | High-Speed Data (HSDU #1) |
| 250 | High-Speed Data (HSDU #2) |
| 254 | Network Server System |
| 255 | Electronic Flight Bag Left |
| 256 | Electronic Flight Bag Right |
| 345 | Remote Data Concentrator |

### APPENDIX E – GUIDELINES FOR LABEL ASSIGNMENTS

Item 2 was revised to clarify the confusion on the SSM for label 377 Equipment Identification.

## ARINC 429 NEW AND REVISED LABEL ASSIGNMENTS

|  | LABEL | Data | EQ ID | PARAMETER | UNITS | RANGE | SIG Bits | RESOL | MIN TX | MAX TX |
|---|---|---|---|---|---|---|---|---|---|---|
| New | 101 | Binary | 05A | FQIC | Lbs | 4- 65532 | 14 | 4 | 900 | 1100 |
| New | 124 | Binary | 1E2 | Horizontal Alarm Limit | Meters | 0 – 8190 | 13 | 1meter | 800 | 1200 |
| New | 124 | Binary | 0A5 | Client Device for GNSS Receiver | Meters | 8192 | 13 | 1 meter |  | 200 |
| New | 127 | Binary | 1E2 | Vertical Alarm Limit | Meters | 0 – 255 | 8 | 1 meter | 800 | 1200 |
| Revised | 141 | Binary | 00B | UTC Fine Fractions | Seconds | 0.9536743µs | 10 | 0.931225ns | 200 | 1200 |
| New | 152 | Binary | 038 | Cabin Pressure | mB | 2048 | 16 | 0.03125 | 62.5 | 125 |
| New | 152 | Binary | 0AD | Cabin Pressure | mB | 2048 | 18 | 0.008 | 20 | 200 |
| Revised | 155 | Discrete | 05A | FQIC |  |  |  |  | 900 | 1100 |
| New | 156 | SAL |  | CVR #2 |  |  |  |  |  |  |
| Revised | 171 |  |  | Manufacturer-Specific Status |  |  |  |  |  |  |
| New | 171 | BINARY | 0A5 | Vertical Alarm limit (VAL) and SBAS System Identifier | Meters | 256 | 8 | 1 meter |  | 200 |
| Revised | 214 | Discrete | xxx | ICAO Aircraft Address Part 1 |  |  |  |  |  |  |
| Revised | 216 | Discrete | xxx | ICAO Aircraft Address Part 2 |  |  |  |  |  |  |
| New | 247 | SAL |  | High-Speed Data Unit #1 (HSDU #1) |  |  |  |  |  |  |
| New | 250 | SAL |  | High-Speed Data Unit #2 (HSDU #2) |  |  |  |  |  |  |
| New | 254 | SAL |  | Network Server System (NSS) |  |  |  |  |  |  |
| New | 255 | SAL |  | Electronic Flight Bag – Left |  |  |  |  |  |  |
| New | 256 | SAL |  | Electronic Flight Bag – Right |  |  |  |  |  |  |
| New | 261 | Binary | 144 | Range Ring Radius | NM | 512 | 15 | 1/64 NM | 800 | 1200 |
| New | 262 | Binary | 144 | Display Range | NM | 512 | 14 | 1/32 NM | 800 | 1200 |
| New | 270 | Discrete | 144 | Display Mode |  |  |  |  | 800 | 1200 |
| New | 271 | Discrete | 144 | Altitude Filter Setting |  |  |  |  | 800 | 1200 |
| New | 272 | Discrete | 144 | Target Selection Word |  |  |  |  | 800 | 1200 |
| New | 272 | Discrete | 005 | Air Data AHARS |  |  |  |  | 250 | 500 |
| New | 276 | Discrete | 058 | VDR Mode |  |  |  |  | 250 | 500 |
| deleted | ~~320~~ | ~~Binary~~ | ~~05A~~ | ~~Fuel Quantity ACT 3~~ |  |  |  |  |  |  |
| New | 345 | SAL |  | Remote Data Concentrator |  |  |  |  |  |  |
| New | 350 | Discrete | 144 | CDTI Fault Summary Word |  |  |  |  | 800 | 1200 |
| New | 357 | Discrete | 05A | Part Number (manufacturer-Specific) |  |  |  |  |  |  |
| New | 377 | Discrete | xxx | Equipment Identification |  |  |  |  |  |  |

# ARINC IA Project Initiation/Modification (APIM) Guidelines for Submittal

(Wednesday, May 19, 2004)

## 1. ARINC Industry Activities Projects and Work Program

A project is established in order to accomplish a technical task approved by one or more of the committees (AEEC, AMC, FSEMC) Projects generally but not exclusively result in a new ARINC standard or modify an existing ARINC standard. All projects are typically approved on a calendar year basis. Any project extending beyond a single year will be reviewed annually before being re-authorized. The work program of Industry Activities (IA) consists of all projects authorized by AEEC, AMC, or FSEMC (The Committees) for the current calendar year.

The Committees establish a project after consideration of an ARINC Project Initiation/Modification (APIM) request. This document includes a template which has provisions for all of the information required by The Committees to determine the relative priority of the project in relation to the entire work program.

All recommendations to the committees to establish or reauthorize a project, whether originated by an airline or from the industry, should be prepared using the APIM template. Any field that cannot be filled in by the originator may be left blank for subsequent action.

## 2. Normal APIM Evaluation Process

### Initiation of an APIM

All proposed projects must be formally initiated by filling in the APIM template. An APIM may be initiated by anyone in the airline community, e.g., airline, vendor, committee staff.

### Staff Support

All proposed APIMs will be processed by committee staff. Each proposal will be numbered, logged, and evaluated for completeness. Proposals may be edited to present a style consistent with the committee evaluation process. For example, narrative sentences may be changed to bullet items, etc. When an APIM is complete, it will be forwarded to the appropriate Committee for evaluation.

The committee staff will track all ongoing projects and prepare annual reports on progress.

### Committee Evaluation and Acceptance or Rejection

The annual work program for each Committee is normally established at its annual meeting. Additional work tasks may be evaluated at other meetings held during the year. Each committee (i.e., AMC, AEEC, FSEMC) has its own schedule of annual and interim meetings.

The committee staff will endeavor to process APIMs and present them to the appropriate Committee at its next available meeting. The Committee will then evaluate the proposal. Evaluation criteria will include:

- Airline support – number and strength of airline support for the project, including whether or not an airline chairman has been identified
- Issues – what technical, programmatic, or competitive issues are addressed by the project, what problem will be solved
- Schedule – what regulatory, aircraft development or modification, airline equipment upgrade, or other projected events drive the urgency for this project

Accepted proposals will be assigned to a subcommittee for action with one of two priorities:

- High Priority – technical solution needed as rapidly as possible
- Routine Priority – technical solution to proceed at a normal pace

Proposals may have designated coordination with other groups. This means that the final work must be coordinated with the designated group(s) prior to submittal for adoption consideration.

Proposals that are not accepted may be classified as follows:

- Deferred for later consideration - the project is not deemed of sufficient urgency to be placed on the current calendar of activities but will be reconsidered at a later date
- Deferred to a subcommittee for refinement – the subcommittee will be requested to, for example, gain stronger airline support or resolve architectural issues
- Rejected – the proposal is not seen as being appropriate, e.g., out of scope of the committee

## 3. APIM Template

The following is an annotated outline for the APIM. Proposal initiators are requested to fill in all fields as completely as possible, replacing the italicized explanations in each section with information as available. Fields that cannot be completed may be left blank. When using the Word file version of the following template, update the header and footer to identify the project.

# ARINC IA Project Initiation/Modification (APIM)

## Name of proposed project APIM #: _____

*Name for proposed project.*

## Suggested Subcommittee assignment

*Identify an existing group that has the expertise to successfully complete the project. If no such group is known to exist, a recommendation to form a new group may be made.*

## Project Scope

*Describe the scope of the project clearly and concisely. The scope should describe "what" will be done, i.e., the technical boundaries of the project. Example: "This project will standardize a protocol for the control of printers. The protocol will be independent of the underlying data stream or page description language but will be usable by all classes of printers."*

## Project Benefit

*Describe the purpose and benefit of the project. This section should describe "why" the project should be done. Describe how the new standard will improve competition among vendors, giving airlines freedom of choice. This section provides justification for the allocation of both IA and airline resources. Example: "Currently each class of printers implements its own proprietary protocol for the transfer of a print job. In order to provide access to the cockpit printer from several different avionics sources, a single protocol is needed. The protocol will permit automatic determination of printer type and configuration to provide for growth and product differentiation."*

## Airlines supporting effort

*Name, airline, and contact information for proposed chairman, lead airline, list of airlines expressing interest in working on the project (supporting airlines), and list of airlines expressing interest but unable to support (sponsoring airlines). It is important for airline support to be gained prior to submittal. Other organizations, such as airframe manufacturers, avionics vendors, etc. supporting the effort should also be listed.*

## Issues to be worked

*Describe the major issues to be addressed by the proposed ARINC standard.*

## Recommended Coordination with other groups

*Draft documents may have impact on the work of groups other than the originating group. The APIM writer or, subsequently, The Committee may identify other groups which must be given the opportunity to review and comment upon mature draft documents.*

### Projects/programs supported by work

*If the timetable for this work is driven by a new airplane type, major avionics overhaul, regulatory mandate, etc., that information should be placed in this section. This information is a key factor in assessing the priority of this proposed task against all other tasks competing for subcommittee meeting time and other resources.*

### Timetable for projects/programs

*Identify when the new ARINC standard is needed (month/year).*

### Documents to be produced and date of expected result

*The name and number (if already assigned) of the proposed ARINC standard to be either newly produced or modified.*

### Comments

*Anything else deemed useful to the committees for prioritization of this work.*

### Meetings

*The following table identifies the number of meetings and proposed meeting days needed to produce the documents described above.*

| **Activity** | **Mtgs** | **Mtg-Days** |
|---|---|---|
| *Document a* | *# of mtgs* | *# of mtg days* |
| *Document b* | *# of mtgs* | *# of mtg days* |
| | | |
| | | |

***For IA staff use***

Date Received____________ IA staff assigned: ______________________________________

Potential impact: ____
(A. Safety B. Regulatory C. New aircraft/system D. Other)

Forward to committee(s) (AEEC, AMC, FSEMC): __________ Date Forward:____________

Committee resolution: ____
(0. Withdrawn 1. Authorized 2. Deferred 3. More detail needed 4. Rejected)

Assigned Priority: ____ Date of Resolution:____________________

A. – High (execute first) B. – Normal (may be deferred for A.)

Assigned to SC/WG __________________________________________

# ARINC Standard – Errata Report

## 1. Document Title

**ARINC Specification 429P1-17:** *Mark 33 Digital Information Transfer System (DITS) Part 1, Functional Description, Electrical Interface, Label Assignments and Word Formats*

## 2. Reference

Page Number:______ Section Number: ______________ Date of Submission: ______________

## 3. Error

*(Reproduce the material in error, as it appears in the standard.)*

## 4. Recommended Correction

*(Reproduce the correction as it would appear in the corrected version of the material.)*

## 5. Reason for Correction

*(State why the correction is necessary.)*

## 6. Submitter (Optional)

*(Name, organization, contact information, e.g., phone, email address.)*

Note: Items 2-5 may be repeated for additional errata. All recommendations will be evaluated by the staff. Any substantive changes will require submission to the relevant subcommittee for incorporation into a subsequent Supplement.

Please return comments to fax +1 410-266-2047 or standards@arinc.com