AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS)

ARINC CHARACTERISTIC 724B-6

PUBLISHED: February 24, 2012

AN ARINC DOCUMENT

Prepared by AEEC
Published by
AERONAUTICAL RADIO, INC.
2551 RIVA ROAD, ANNAPOLIS, MARYLAND 21401-7435

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Characteristic 724B	Adopted by the AEEC Executive Committee	October 30, 1987
Characteristic 724B	Adopted by the Industry	December 28, 1987

Summary of Document Supplements

Supplement	Adoption Date	Published
Characteristic 724B-1	October 19, 1998	March 3, 1989
Characteristic 724B-2	November 6, 1990	November 10, 1993
Characteristic 724B-3	October 31, 1995	December 15, 1995
Characteristic 724B-4	June 26, 2000	August 15, 2000
Characteristic 724B-5	October 15, 2002	February 21, 2003
Characteristic 724B-6	March 31, 2009	February 24, 2012

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

FOREWORD

Aeronautical Radio, Inc., and the ARINC Standards

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

ARINC Industry Activities organizes and provides the secretariat for international aviation organizations (AEEC, AMC, FSEMC) which coordinate the work of aviation industry technical professionals and lead the development of technical standards for airborne electronic equipment, aircraft maintenance equipment and practices and flight simulator equipment and used in commercial, military, and business aviation. The AEEC, AMC, and FSEMC develop consensus-based, voluntary standards that are published by ARINC and are known as ARINC Standards. The use of ARINC Standards results in substantial technical and economic benefit to the aviation industry.

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 organization 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 forms are included in the back of this document:

An Errata Report solicits any corrections to existing text or diagrams that may be included in a future Supplement to this ARINC Standard.

An ARINC IA Project Initiation/Modification (APIM) form solicits any proposals for the addition of technical material to this ARINC Standard.

1.0 INTRODUCTION

1.1 Purpose of this Document

This document describes the 724B version of the airborne components of the Aircraft Communications Addressing and Reporting System (ACARS). This system is intended for use in conjunction with existing airborne radio equipment to enhance the effectiveness of air-ground operational control communications. This enhancement accrues from the abilities of the system to provide air-to-ground and ground-to-air data communications. Airlines and other ACARS airborne sub-system users should note that part of any commitment to the system is the definition of their planned use of its data communications capability. Such definitions are needed by both the Data Link Service Provider (DSP) on the ground and airborne equipment manufacturers to permit them to generate appropriate software.

The intent of this document is to provide general and specific design guidance for the development and installation of the airborne equipment. As such, this guidance will cover the desired operational capability of the system and the standards necessary to achieve interchangeability of the hardware. Necessary background to this is a summary description of the overall system. This may be found in ARINC Specification 620, wherein are described both the link-control-related functions (i.e., those functions essential to maintaining the air-ground communications link) and the service-related functions of the system. While the airborne sub-system must accommodate all the link control functions in order to be considered part of the system, it need accommodate only those service-related functions requested (per paragraph one above) by the user.

Equipment manufacturers should note that this document aims to encourage them to produce maintenance-free, high performance equipment. They are at liberty to accomplish this by the use of design techniques they consider to be the most appropriate. Their airline customers are more interested in the end result than in the means to achieve it.

1.1.1 Relationship of this Document to ARINC Characteristics 597 and 724

ARINC Characteristic 597: *Aircraft Communications Addressing and Reporting System (ACARS)*, describes ARINC 404A-packaged airborne ACARS Management Unit (MU). This document describes ARINC 600-packaged ACARS equipment intended to interface with ARINC second generation “700-series” equipment. The major advances include the capability to interface with a Multi-Purpose Control and Display Unit (MCDU) and an ARINC 429 data bus configuration in which general bus outputs are employed to achieve greater architectural flexibility.

Note that the configuration described in this document provides the MU access interfaces for three ARINC 739 Multi-Purpose Control and Display Units (MCDU), two ARINC 702 Flight Management Computers (FMC), and ARINC 717 AIDS Digital Flight Data Acquisition Unit, an ARINC 604 Centralized Fault Display Interface Unit (CFDIU), and an ARINC 740 Multi-Input Cockpit Printer.

1.1.2 Relationship of this Document to ARINC Specifications 618, 619, and 620

ARINC Specifications 618, 619, and 620 were written to encompass the provisions necessary to support the ACARS in a documentation structure that would eliminate redundant, and often contradictory, definitions. When these new Specifications are referenced by this Characteristic, the referenced provisions have the same effect as if they were included herein.

1.2 Airborne Sub System Configuration

A single MU configuration is depicted in Attachment 1-1. A dual MU configuration is shown in Attachment 1-2.

COMMENTARY

The illustrations are for information only. ARINC 429 data bus connections in actual aircraft may vary widely from the configuration depicted in the figures.

1.2.1 Management Unit (MU)

The airborne Management Unit (MU) receives ground-to-air digital messages from the air/ground links with which it is connected and controls the transmission of air-to-ground digital messages through the same device. It will transmit such messages: a) when the need arises and b) when it determines that the data channel is free of other traffic.

The MU gathers data for transmission to the ground by way of ARINC 429 data bus inputs using the format defined in ARINC Specification 619. The MU may accept data from the aircrew via as many as three ARINC 739 MCDUs. Data inputs for downlink may be provided from peripheral equipment, automatically, such as ARINC 702 FMCs, the ARINC 717 Digital Flight Data Acquisition Unit (DFDAU), the ARINC 604 CFDIU and the sources of digital Out, Off, On, In (OOOI) data.

1.2.2 Optional Cabin Terminal

The basic ACARS airborne sub-system consists of the MU. The MU, however, provides interface for an additional sub system element with which the aircraft may be equipped at airline option. This device is a terminal providing an additional human interface (display and keyboard facilities) with the system, and possibly located in the cabin. This document places no constraints on the design of this terminal other than it should use the data transfer system used by the FMCs, Aircraft Integrated Data Systems (AIDS), CFDIU (see Section 4.17).

1.2.3 Optional Communications Sub-systems

As an option, the ACARS may be interconnected with communications systems other than the VHF transceiver.

1.2.3.1 Satellite Communications (SATCOM)

The MU may have the capability to interact with the Satellite Data Unit (SDU). Pins are assigned for this use in Attachment 2-1.

Refer to Attachment 1-3 for diagram in which satellite communications are supported.

1.2.3.2 HF Data Communications (HFDL)

The MU may have the capability to interact with the High Frequency (HF) Data Radio (HFDR) in new installations or HF Data Unit (HFDU) in retrofit installations.

Refer to Attachment 1-3 for a configuration diagram in which the HF data link (single, dual, or as backup to SATCOM) is supported.

1.3 Interchangeability

System interchangeability, as defined in Section 2.0 of **ARINC Report 403**: *Guidance for Designers of Airborne Electronic Equipment*, is desired for the ARINC 724B ACARS MU and associated components as described in Section 1.2 and its subsections. The standards necessary to ensure this level of interchangeability are set forth in Chapter 2 of this document.

COMMENTARY

One-way interchangeability, i.e., using an ARINC 724B MU in an ARINC 724 installation was considered, but found to be economically unjustifiable. The interwiring list of Attachment 2 contains a number of pins which are “RESERVED ARINC 724”. These pins have been reserved to retain pin compatibility of ARINC 724B MUs with ARINC 724 MUs. This has been done to retain maximum commonality in manufacturing the two units. Thus cost to users of ARINC 724B MUs is minimized. However, it is possible that an equipment manufacturer might wish to provide unique internal software to enable an ARINC 724B MU to be retrofit into an ARINC 724 installation for its own business (marketing) reasons.

Interchangeability of the optional cabin terminal is not required. However, it should be capable of functioning within the ACARS system philosophy and should provide the standard interfaces for the MU described in this document.

1.4 Regulatory Approval

The equipment should meet all applicable FAA and FCC regulatory requirements. This document does not and cannot set forth the specific requirements that equipment must meet to be assured of approval. Such information must be obtained from the regulatory agencies themselves.

COMMENTARY

Some airlines have reported that the FAA has required to be shown that ACARS can suitably alert pilots when voice communication with them on a company frequency is desired.

Also, some airborne Very High Frequency (VHF) transceivers assigned for ACARS use have needed modification to ensure compliance with the 13K0A2D emission authorized for the system.

2.0 INTERCHANGEABILITY STANDARDS

2.1 Introduction

This chapter sets forth the specific form factor, mounting provisions, interwiring, input and output interfaces and power supply characteristics desired for the ACARS equipment. These standards will permit the parallel but independent design of compatible equipment and airframe installations.

2.2 Form Factors, Connectors, and Index Pin Coding

The MU should comply with the dimensional standards in **ARINC Specification 600:** *Air Transport Avionics Equipment Interfaces*, for the 4 MCU form factor. The MU should also comply with ARINC 600 standards in respect of weight, racking attachments, front and rear projections, and cooling.

The MU should be provided with a low insertion force, size 2 shell ARINC 600 service connector. This connector, which should accommodate service interconnections in its middle and top plugs (MP and TP), and coaxial and power interconnections in its bottom plug (BP), should be located on the center grid of the MU's rear panel. Index pin code 09 should be used.

If bench testing of the MU with automatic test equipment (ATE) necessitates interconnect capabilities that are not covered by the pin assignments on the service connector set forth in Attachment 2 (including pins TP4A through TP4D which are designated for unspecified ATE function use), an auxiliary connector should be provided whose type and location are selected by the equipment manufacturer. As this auxiliary connector will not be used while the MU is installed in the aircraft, it should be provided with a cover to ensure protection from damage, contamination, etc., during that time. The manufacturer should observe the standards of ARINC Specification 600 when choosing the location for the connector. Also, other than accommodating the needs for equipment identification by the ATE described in Chapter 7 of this document, the designer is free to make whatever use of both the service connector ATE pins and the auxiliary connector pins he wishes. The airlines do not want the unassigned ("future spare") pins of the service connector used for functions associated solely with ATE use.

COMMENTARY

The foregoing reflects the airlines' desire to affect the MU/ATE interface primarily through the service connector. The auxiliary connector is specified to permit completion of the interface without recourse to the use of individual "test leads" from the ATE, each of which has to be clipped, or otherwise secured, to a test point on the equipment. However, manufacturers who can convince their customers of the suitability of an alternative approach are not obliged to provide the connector.

2.3 Standard Interwiring

The standard interwiring to be installed for the ACARS MU is set forth in Attachment 2. This interwiring is designed to provide the degree of interchangeability specified for the ACARS avionics components in Section 1.3 of this document.

Manufacturers are cautioned not to rely on special wires, cabling, or shielding for use with particular units because they will not exist in a standard installation.

Where calculations reveal the possibility of using wire sizes with higher gauge numbers than #22 AWG, designers are asked to stop and consider whether the mechanical strength of this wire is adequate for the installation before deciding to use it. The airlines report recent sad experiences with thin wire, and although they are, of course, interested in the weight saving its use affords, they will quickly point out that these savings are rapidly nullified by maintenance costs if frequent breakage occur.

Both installation and equipment designers should give due regard to special cases wherein parallel or series-parallel connected circuits may result in higher currents or voltage drop (effective resistance) than in simple circuits.

2.4 Primary Power Input

The MU should be designed to use 115 Vac, 400 Hz, single phase AC power. However, 28 Vdc should be employed to sustain operation of the Universal Coordinated Time (UTC) clock (see Section 4.6 of this document) and to protect essential memory contents during ac supply interruptions. Equipment manufacturers may elect to draw power from the dc source continuously to achieve these goals or to restrict its use to those times when the ac source is down. In no case, however, should the dc drain exceed 75 Ma. Installation designers should note that the dc should be supplied from a “non-interruptible” source, i.e., not via switching circuits employed to transfer loads from normal dc buses to a battery bus in emergency conditions. Some aircraft do not provide dc power.

Aircraft power supply characteristics, utilization, equipment design limitations and general guidance material are set forth in **ARINC Report No. 413A:** *Guidance for Aircraft Electrical Power Utilization and Transient Protection*. **ARINC Report 609:** *Design Guidance for Aircraft Electrical Power System*, should be consulted for new installations.

The primary power input should be protected by circuit breakers of the size shown in Attachment 2-1.

There should be no master ON/OFF power switching within the ACARS. Any user desiring ON/OFF control should provide, through the medium of a switching function installed in the airframe, means of interrupting the primary power to the system. It is probable, however, that ON/OFF switching will not be needed in most installations and that power will be wired to the system from the circuit breaker panel.

COMMENTARY

Installation designers should note that the dc supply should be available to the MU in flight to prevent possible data loss during transient interruptions to the ac supply. The designers of these units are encouraged to use non-volatile memory, however, so that this external dc power is not required. All equipment designers should note that in the practical aircraft environment, the steady state dc voltage may vary between 18.0 Vdc and 36.0 Vdc, to which the ripple and transient limits defined in ARINC Report 413A should be applied.

Some aircraft do not provide the +28 Vdc power needed to sustain volatile memory. These aircraft are not compliant with this Characteristic. Airline customers are advised to verify the availability of +28 Vdc for memory and clock. Let the buyer beware.

2.5 Signal Characteristics

A list of the system signal characteristics required to ensure the desired level of interchangeability for the MU is set forth in Chapter 4 of this document.

2.6 Environmental Conditions

The MU should be specified environmentally in terms of the requirements of RTCA Document DO-160B, “Environmental Conditions and Test Procedures for Airborne Electronic and Electrical Equipment and Instruments,” dated July 20, 1984. Attachment 3 to this document tabulates the relevant environmental categories.

2.7 Cooling

The MU should be designed to accept, and airframe manufacturers should configure the installation to provide forced air cooling as defined in ARINC Specification 600. The standard installation should provide an air flow rate of 22 Kg/hr of 40 degrees C (max.) air, and the unit should not dissipate more than 100 watts of energy. The coolant air pressure drop through the equipment should be 25 ± 5 mm of water. The MU should be designed to expend this pressure drop to maximize the cooling effect. Adherence to the pressure drop standard is needed to allow interchangeability of the equipment.

COMMENTARY

Equipment failures in aircraft due to inadequate thermal management have plagued the airlines for many years. In Section 3.5 of ARINC Specification 600, they have written down everything they believe airframe and equipment suppliers need to know to prevent such problems in the future. They regard this material as “required reading” for all potential suppliers of ACARS equipment and aircraft installations.

2.8 Grounding and Bonding

The attention of equipment and airframe manufacturers is drawn to the guidance material in Section 3.2.4 of ARINC Specification 600 in Section 6 and Appendix 2 of ARINC Specification 404A on the subject of equipment and radio rack grounding and bonding.

2.9 Standardized Signaling

The standard electrical inputs and outputs from the systems should be in the form of a digital format or switch contact. Standards should be established exactly to assure the desired interchangeability of equipment.

Certain basic standards established herein are applicable to all signals. Unless otherwise specified in Section 4.5 or 4.7, the signals should conform to the standards set forth in the subparagraphs below.

2.9.1 ARINC 429 DITS Data Bus

ARINC Specification 429: *Mark 33 Digital Information Transfer System (DITS),* is the controlling document for data word formats, refresh rates, resolutions, etc. Material in this document on these topics is included for reference purposes only. In the event of conflict between this document and ARINC Specification 429, the latter should be assumed to be correct.

2.9.2 Standard "Open" Output

The standard "open" signal is characterized by a resistance of 100,000 ohms or more with respect to signal common.

COMMENTARY

In many installations, a single switch is used to supply a logic input to several LRUs. One or more of these LRUs may utilize a pull-up resistor in its input circuitry. The result is that an "open" may be accompanied by the presence of +27.5 Vdc nominal. The signal may range from 12 to 36 Vdc.

2.9.3 Standard "Ground" Output

A standard "ground" signal may be generated by either a solid state or mechanical type switch. For mechanical switch-type circuitry, a resistance of 10 ohms or less to signal common would represent the "ground" condition. Semiconductor circuitry should exhibit a voltage of 3.5 Vdc or less with respect to signal common in the "ground" condition.

2.9.4 Standard "Applied Voltage" Output

The standard "applied voltage" is defined as having a nominal value of +27.5 Vdc. This voltage should be considered to be "applied" when the actual voltage under the specified load conditions exceeds 18.5 volts (+36 Vdc maximum) and should be considered to be "not applied" when the equivalent impedance to the voltage source exceeds 100,000 ohms.

2.9.5 Standard Discrete Input

A standard Discrete Input should recognize incoming signals having two possible states, "open" and "ground". The characteristics of these two states are defined in Sections 2.9.2 and 2.9.3 of this Characteristic. The maximum current flow in the "ground" state should not exceed 20 milliamperes.

COMMENTARY

In the past installations, there have been a number of voltage levels and resistances for Discrete states. In addition the assignments of "Valid" and "Invalid" states for the various voltage levels and resistances were sometimes interchanged, which caused additional complications. In this Characteristic, a single definition of Discrete levels is being used in an attempt to "standardize" conditions for Discrete signal.

The voltage levels and resistances used are, in general, acceptable to hardware manufacturers and airlines. This definition of Discrete is also being used in the other 700-Series Characteristics; however, there are few exceptions for special conditions.

The logic sources for the Discrete Inputs to the MU are expected to take the form of switches mounted on the airframe component (flap, including gear, etc.) from which the input is desired. These switches will either connect the Discrete Input pins on the connector to airframe dc ground or leave them open circuit as necessary to reflect the physical condition of the related components. The MU will, in each case, be expected to provide the dc signal to be switched.

Typically, this is done through a pull-up resistor. The MU input should sense the voltage on each input to determine the state (open or closed) of each associated switch.

The selection of the values of voltages (and resistances) which define the state of an input is based on the assumption that the Discrete Input will utilize a ground-seeking circuit. When the circuit senses a low resistance or a voltage of less than 3.5 Vdc, the current flow from the input will signify a “ground” state. When a voltage level between 18.5 and 36 Vdc is present or a resistance of 100,000 ohms or greater is presented at the input, little or no current should flow. The input may utilize an internal pull-up to provide for better noise immunity when a true “open” is present at the input. This type of input circuit seems to be the “favorable” among both manufacturers and users.

Because the probability is quite high that the sensors (switches) will be providing similar information to a number of users, the probability is also high that unwanted signals may be impressed on the inputs to the MU from other equipment, especially when the switches are in the open condition. For this reason, equipment manufacturers are advised to base their logic sensing on the “ground” state of each input. Also, both equipment and airframe suppliers are cautioned concerning the need for isolation to prevent sneak circuits from “fouling up” the logic.

Typically diode isolation is used to prevent this from happening.

2.9.6 Standard Discrete Output

A standard Discrete output should exhibit two states, “open” and “ground” as defined in Sections 2.9.2 and 2.9.3. In the “open” state, provisions should be made to present an output resistance of at least 100,000 ohms. In the “ground” state, provision should be made to sink at least 20 milliamperes of current. Non-Standard current sinking capability may be defined.

COMMENTARY

Not all Discrete output needs can be met by the Standard Discrete output defined above. Some Discrete outputs may need to sink more current than the standard value specified above.

A Discrete output may need to source current. Discrete outputs which are to source current should utilize the standard “Applied Voltage” output defined in Section 2.9.4. These special cases will be noted in the text describing each applicable Discrete output function and in the notes to interwiring.

COMMENTARY

Although defined here, Discrete outputs which provide a current output rather than a current sink are not “Standard Discrete outputs”.

2.9.7 Standard Program Pin Input

Program pins may be assigned on the MU's hardware service connector for the purpose of identifying a specific aircraft configuration or to select (enable) optional performance.

COMMENTARY

Program pins may be used for a variety of purposes. Program pins enable a piece of equipment to be used over a greater number of airframe types. One way this is done is by identifying the unique characteristics of the airframe in which the unit is installed. Another is to identify the location (left, right, and center) of the unit. Often program pins are used to enable (turn on) options for alternate or extend performance characteristics.

The encoding logic of the Program pin relies upon two possible states of the designated input pin. One state is an “open” as defined in Section 2.9.2 of this Characteristic. The other state is a connection (short circuit, i.e., 10 ohms or less) to the pin designated as the “Program Common” pin.

COMMENTARY

Normally, the “primary” location or “usual”, “common”, or “standard” function is defined by the “open” logic and the optional response is programmed (encoded) by connection to Program Common.

3.0 SYSTEM DESIGN

3.1 Introduction

Refer to ARINC Specification 618 for a full description of the ACARS air/ground protocol. The equipment described in this Characteristic is intended to function as the airborne sub-system of the system defined therein.

4.0 MANAGEMENT UNIT DESIGN

4.1 Decoding

Refer to ARINC Specification 618, Section 4.4.2.

4.2 Synchronization

Refer to ARINC Specification 618, Sections 4.2.2 and 4.2.3.

4.3 Uplink Preamble Processing

Refer to ARINC Specification 618, Sections 4.2.2 and 4.2.3.

4.3.1 Start of Header

Refer to ARINC Specification 618, Section 2.2.1.

4.3.2 Mode Character Recognition

Refer to ARINC Specification 618, Section 2.2.2.

4.3.3 Address Recognition

The MU should only process incoming messages from the VHF transceiver intended for the aircraft on which it resides. To screen out unwanted messages, the MU should compare the address of each incoming message with the address of the aircraft. To accomplish this, the MU should have the capability of acquiring the aircraft address from an ARINC 604 Centralized Fault Display Interface Unit (CFDIU) or an equivalent source having compatible coding. As an alternative, the Aircraft Registration and Airline Identification information can be obtained through program pin coding on the service connector. Refer to Attachment 2-1. The MU should hold this address in local memory. To assure that the contents of this memory is correct, the MU should, as a minimum, compare its current contents with the addresses received from the CFDIU. This will ensure that the MU will take the new aircraft address into account when it is moved from one aircraft to another.

COMMENTARY

Although normally available from the CFDIU, aircraft address information may be provided by a different source using the same format.

The MU should check the address of the aircraft in which it is installed by performing a bit-coincidence check on the seven character (56 bits) field of the preamble which immediately follows the mode character. This field will contain either the official registration mark of the aircraft in which the ACARS is installed or the airline identification and flight number.

COMMENTARY

Obviously, the airline code will change when an aircraft changes ownership. However, some novice users have failed to recognize the need to change the aircraft coding (in software or hardware). The result has been that their initial messages were undeliverable. Usually registration assignment will change when the aircraft changes ownership. Each user is responsible for acquiring the appropriate registration assignment from its regulatory authority.

Recognition of own address in a received message should result in the handling of succeeding data as indicated by the label characters. Failure to recognize own address should inhibit further processing of the message and cancel any procedures already initiated due to the recognition of the SOH and Mode characters.

4.3.3.1 Aircraft Registration Number

Forty two program pins are provided on the service connector to encode the seven-character Aircraft Registration number, also known as the “Registration Mark”. Refer to Attachment 2-2 for interwiring. The following procedure applies when the Aircraft Registration number is coded into the service connector.

The seven characters should be encoded using the ISO-5 values provided in Table 3-2 of Attachment 3 to ARINC Specification 618. The 6 least significant bits of the ISO-5 set are mapped into the available pins with the most significant character (character 1) first. The bits of the characters are coded in ascending order; i.e., beginning with Bit 1 (least significant bit). Further specifics are provided in Note 15 of Attachment 2-2.

COMMENTARY

Because all the characters used in the aircraft registration number are either upper case alpha characters, numerics, dashes or periods, it is possible for the MU to infer the proper binary state of bit 7 of each character from the binary state of bit 6. Note that, for these entries, bit 7 is the complement of bit 6. In addition, the correct state of bit 8, the parity bit, can also be determined by the MU. Thus, only 6 bits are necessary to uniquely identify the desired character.

If the Registration number contains less than 7 characters, it will be padded with leading periods as specified in Section 2.2.3 of ARINC Specification 618. Refer to Section 2.3.3.1 of ARINC Specification 618 for the definition of registration information coding on air/ground messages.

4.3.3.2 Airline Identification

Twelve program pins are provided on the service connector to encode the two-character Airline Identification. Refer to Attachment 2-2 for interwiring. The Airline Identification is coded into the service connector using the same mapping scheme described for the Aircraft Registration number in Section 4.3.3.1.

Refer to Section 2.3.3.2 of ARINC Specification 618 for further guidance on the format of the Airline Identifier.

4.3.4 Technical Acknowledgment

Refer to ARINC Specification 618, Section 2.3.4

4.3.5 Label Recognition

Refer to ARINC Specification 618, Section 2.3.5.

4.3.6 Uplink Block Identifier

Refer to ARINC Specification 618, Section 2.3.6.

4.3.7 End of Preamble/Suffix

Refer to ARINC Specification 618, Section 2.3.7.

4.4 Uplink BCS Check

Refer to ARINC Specification 618, Section 2.3.10.

4.5 Input/Output Interfaces

This Section defines the electrical interfaces of the MU with onboard systems that are needed to conduct its responsibilities of delivering uplink messages and routing downlink messages.

The MU may derive information for inclusion in downlink message from a number of sources onboard the aircraft. These same systems are potential recipients of incoming uplink messages. The following systems are interface possibilities in an airborne installation:

SYSTEM	DESCRIPTION	REFERENCE
ATSU / ADSU	ATS Applications	None/Char 745
MCDU (3)	Multi-Purpose Control/Display Unit	Char 739
OOOI	OOOI event digital sources	None
Chronometer	UTC clock	Char 585
DFDAU	Digital Flight Data Acquisition Unit	Char 717
FMC (2)	Flight Management Computer	Char 702
PRINTER	Multi-Input Cockpit Printer	Char 740 Char 744A
CFDIU	Centralized Fault Display Interface Unit	Rpt 604
OAT	Optional Auxiliary Terminal	Char 597
CT (4)	Optional Cabin Terminal Central Warning System	None
XPDR	Mode S Transponder	Char 718
SAT/HF	Satellite System / HF Data Link	Char 741/Char 753

Note: Some MUs designed to this Characteristic have the capability to interface with a dedicated Control/Display Unit as described in Characteristic 724.

The MU must also maintain interfaces with transceivers to downlink messages to the ground and receive uplink messages. Candidate systems that may be used are:

SYSTEM	DESCRIPTION	REFERENCE
VHF	VHF Radio	Char 716
SATCOM	Satellite System	Char 741
HF	HF Data Link	Char 753

The conceptual model of a complete installation is illustrated in Figure 1-1 of Attachment 1. The specifics of the interfaces at the service connector are listed in Attachment 2-1. The protocols to be observed on these interfaces are defined in ARINC Specification 619.

COMMENTARY

Although, within an airline, each aircraft type is normally configured the same, it is possible for each installation to be unique. Throughout the entire air transport industry, there are a wide variety of different configurations involving the above set of equipment.

4.5.1 Management Unit/OOOI Sensor Interfaces

The MU should provide from 0 to 6 ARINC 429 data bus input ports for acquisition of information related to the Out-Off-On-In (OOOI) events in a digital form. These inputs should be software programmable to accept either high or low speed ARINC 429 words. Filtering of this information by the MU may be necessary to determine the OOOI times.

COMMENTARY

One of the earliest applications of the ACARS was to record the departure and arrival times of aircraft. Departure was identified by two events, leaving the gate (Out) and takeoff (Off). Arrival was marked by two events as well, landing (On) and docking at the gate (In).

Some aircraft provide OOOI data in the form of Discrete inputs per ARINC Characteristic 724. Pins allocated for this purpose in ARINC Characteristic 724 are reserved in this Characteristic (see pins MP1A through MP1K and TP15A through TP15K of the interwiring diagram provided in Attachment 2-1).

COMMENTARY

The user may request that these inputs be activated for retrofit of an ARINC Characteristic 724B MU into an aircraft wired for an ARINC Characteristic 724 MU.

One method of providing “ON/OFF” sensing is to use a landing gear strut switch. The “OFF” event is defined as the moment when the landing gear switch first annunciates the extension of the strut. The “OFF” event would be declared valid after ten seconds to twelve seconds have elapsed during which the strut has been extended continuously. If the strut compresses again within ten seconds, the timer should reset to zero and started again when the strut next extends.

The “ON” timer should be started when the landing gear strut switch first annunciates the compression of the strut following the “OFF” event. The “ON” event, however, should not be declared until ten to twelve seconds of continuous strut compression have elapsed. The UTC of the “ON” event is defined as the time at which this final ten second strut compression commences.

Standard OOOI downlink message formats are defined in ARINC Specification 620.

COMMENTARY

However, some airlines choose to use User Defined message formats in which OOOI event times will be transmitted to the ground.

As each event occurs, the UTC associated with it should be stored by the MU until the time of a like event is written over it. The memory used to store this information should be powered from the “non-interruptible” DC supply fed to the MU on connector pins BP10 and BP11. Section 2.4 of this document offers rudimentary guidance on expected aircraft power.

4.5.2 Management Unit/On Board Systems Interface

This Characteristic defines four general data bus groups. General data bus groups #1 and #2 are dedicated to interface with on board systems. The diagram in Attachment 1-1 shows an example interface architecture. Typical of on board

systems which may receive data from (and send data to) the MU by way of an ARINC 429 data bus are: (1) FMS, (2) MCDU, (3) DFDAU, (4) Printer, and (5) CFDIU. These systems (and others) may appear in any combination.

The following tables list the sources of the data buses in groups 1 through 4. Each data bus group is comprised of a single output from the MU and as many as eight associated input data buses. The preferred installation configuration is shown in the SIGNAL SOURCE column.

The following table lists the pins assigned in group #1.

DATA BUS	SIGNAL SOURCE	APPLICABLE ARINC SPEC	PINS ASSIGNED
Output #1	MU	724B	MP15E,F
Input #1A	MCDU #1	739	MP14A,B
Input #1B	Printer	740	MP12J,K
Input #1C	FMC #1	702	MP13G,H
Input #1D	CFDIU	604	MP15J,K
Input #1E	MCDU #3	739	MP14J,K

The following table lists the pins assigned in group #2.

DATA BUS	SIGNAL SOURCE	APPLICABLE ARINC SPEC	PINS ASSIGNED
Output #2	MU	724B	MP15G,H
Input #2A	MCDU #2	739	MP14C,D
Input #2C	FMC #2	702	MP13J,K
Input #2D	DFDAU	717	MP7J,K

The following table lists the pins assigned in group #3.

DATA BUS	SIGNAL SOURCE	APPLICABLE ARINC SPEC	PINS ASSIGNED
Output #3	MU	724B	MP12E,F
Input #3A	Cabin Term #1	---	MP12C,D
Input #3B	Cabin Term #2	---	MP12G,H

The following table lists the pins assigned in group #4.

DATA BUS	SIGNAL SOURCE	APPLICABLE ARINC SPEC	PINS ASSIGNED
Output #4	MU	724B	TP7G,H
Input #4A	**SDU#1**	**741**	**TP2C,D**
Input #4B	**SDU #2 or HFDR #2**	**741, 753**	**TP2E,F**
Input #4C	**HFDR #1**	**753**	**TP10C,D**

See Attachment 1-3 for configuration alternatives for COMM #1, #2, and #3.

The MU should address each system by using its associated System Address Label (SAL). Each word transmitted by the MU to one of the above systems should contain the SAL of the target system. Refer to Attachment 11 of ARINC Specification 429 Part 1 for a complete listing of SALs current at the time of its publication.

4.5.2.1 Management Unit/MCDU Interface

The MU should provide three ARINC 429 input ports for receiving data from three Multi-Purpose Control and Display Units (MCDU). The MCDU is defined by ARINC Characteristic 739. The MU will transmit data to as many as three MCDUs on general output ports #1 and #2.

The MU will receive data inputs related to the associated general bus output as shown in Attachment 1-1. See Attachment 2-1 for interwiring details.

The words addressed to the MU by the MCDUs will be identified by their label which will be the System Address Label of the MU.

The MU should forward display information from uplink messages to the MCDU using ARINC 429 data words on its general output ports #1 and #2. The data words intended for delivery to the MCDU should contain the designated MCDU's SAL in the Label field. The transfer data between the MU and the MCDUs should be treated and formatted in accordance with the data communication protocol described in ARINC Characteristic 739.

The MU should receive ARINC 429 data words from the MCDUs on individual input ports as assigned in the interwiring list of Attachment 2-1. The data words should contain the MU's SAL in the Label field. The transfer data between the MU and the MCDUs should be treated and formatted in accordance with the data communication protocol described in ARINC Characteristic 739.

To maintain the connection between the MU and the MCDU, the MU should transmit Label 172 data words on its general output ports #1 and #2 at a regular rate. Label 172 data words contain the MU's SAL. The Label 172 data word will be used by the MCDUs for dynamic port allocation. Refer to Section 3.7 of ARINC Characteristic 739 for a description of the use of Label 172 data words. ARINC Specification 429 provides a definition of the Label 172 word in Attachment 6, and ARINC Characteristic 739 provides a definition of the format of the Label 172 data word in Attachment 3.

The crew interaction with an MCDU should be menu driven. The ACARS displays presented to the MCDU are managed by the MU.

4.5.2.2 Management Unit/Printer Interface

The MU should provide for an ARINC 429 data bus input port to receive data from a Multi-Input Cockpit Printer. The printer should comply with the provisions defined in ARINC Characteristics 740, 744, or 744A. The MU should transmit data to this printer on its general output port #1. See Attachment 2-1 for interwiring details.

COMMENTARY

Some aircraft do not have printers. Some aircraft configurations will employ multiple printers. The priority for concurrent access and for interrupt may be defined by the user or (by default) by the manufacturer. In brief, "Let the buyer beware".

The data transfer between the MU and the ARINC 740 printer should be in accordance with the data communication protocols described in Attachment 6 of ARINC Specification 619 and Chapter 3 of ARINC Characteristic 740.

The data words sent by the MU on its general output ports to be used by the MCDUs for dynamic port allocation will also be used by the printer for the same purpose.

Since the printer can be connected to systems other than the ACARS, the MU should be capable of buffering the data in case the printer is busy.

4.5.3 Management Unit/Cabin Terminal Interference

The MU may provide an interface for optional Cabin Terminals. The MU may provide one ARINC 429 data bus output port and up to eight ARINC 429 input ports for receiving data from optional Cabin Terminals.

The protocol for data transfer and the format of the exchanged data is defined in ARINC Specification 619.

The user may request the equipment manufacturer to provide a similar interface to a User Defined terminal. The origin/destination information entered into messages to/from a User Defined terminal is defined in ARINC Specification 619. Additional data will be provided by the user.

4.5.4 Optional Auxiliary Terminal

Earlier versions of the ACARS MU (ARINC Characteristics 597 and 724) were designed to interface with an Optional Auxiliary Terminal (OAT). Pins for the OAT have been retained as Reserved. This interface is optional for Characteristic 724B MUs.

4.5.5 Communications System Interface

The MU should provide a general purpose ARINC 429 output port to interface with communication systems such as the HF link and the Satellite link which provide a data link to ground stations. The interface for VHF is through an analog link to the VHF Radio.

The interfaces for other air/ground COMM links are through General Data Bus Output #4 (TP-7G, 7H) as shown in the interwiring list of Attachment 2-1. Three ARINC 429 data bus inputs are provided for air/ground COMM links. The SAT and HF protocol interfaces are defined in ARINC Specification 618.

COMMENTARY

In Supplement 2, there had been an expectation that the MU would need to access the ICAO 24-bit address. A port was designated for connection to the Mode S transponder to obtain the address. However, the protocol to be used on the data bus between the transponder and the MU was not defined. Subsequently, the potential for using MU/transponder connection for this purpose has diminished. This is fortunate because the speed of the transponder output is defined as high speed by ARINC Specification 718 while the speed of the COMM #3 input port is low speed.

4.5.6 Management Unit/Auxiliary Equipment Interface

An ARINC 429 high speed data bus output and a high speed data bus input have been reserved for interface with an auxiliary sub system.

This is a high speed ARINC 429 data bus output (MP12A, MP12B) which may be used to provide data to an alternate display. In some installations of the ARINC 724 ACARS, the display has been an ARINC 708 weather radar display.

COMMENTARY

The auxiliary data bus output is a carryover from the definition of the interfaces established for the ARINC 724 MU. With the advent of new equipment, a high speed input was reserved in anticipation of a user or equipment manufacturer identifying a need for a high speed interface. For example, a possible use was to download data from an airborne computer.

4.5.7 Management Unit/Central Warning System Interface

The MU should output an ARINC 429 data word containing discrete information for use by a central warning system. The ARINC 429 word (label 270) should be repeated at a regular rate of approximately once per second (as specified by ARINC Specification 429) on general data bus outputs #1, #2, #3, and #4. The information transmitted within this word will include the MU's Active/Standby status, unit Fail status, Link Availability status, Voice Go-ahead indication, etc. See Attachment 6 for the word-structure of label 270. See Section 4.7 for a description of the situations to be annunciated and the logic to be followed to reset alerts.

4.6 Universal Coordinated Time (UTC) Clock

The MU should provide the Universal Coordinated Time (UTC), formerly Greenwich Mean Time (GMT), for use in downlink messages such as Departure and Arrival reports.

If the clock is internal to the MU, it should be powered by a "non-interruptible" power supply. Refer to Section 2.4 of this document for a description of expected electrical power provisions.

COMMENTARY

In the future, the SDU or unit housing the GPS/GLONASS Navigation Satellite System will provide UTC information.

See Section 4.8.1 and 4.8.2 of ARINC Specification 618 for more details concerning the inclusion of GMT or UTC in downlinked messages.

4.6.1 Ground GMT Delivery Message (Label 51) Format

Refer to ARINC Specification 620, Chapter 4.

4.6.2 Ground UTC Delivery Message

Refer to ARINC Specification 620, Chapter 4.

4.7 MU Discrete Inputs and Outputs

4.7.1 "No Communications" Alert

When the ACARS MU identifies the conditions that satisfy the No Communications (NO COMM) state as defined in ARINC Specification 618, the MU should generate an NO COMM Alert discrete output and set the NO COMM bit in ARINC 429 data word Label 270.

The NO COMM Alert discrete should take the form of a DC ground on MU connector pin MP9K capable of sinking 200 ma of current when a NO COMM condition exists. Under normal conditions, the output should be an “open”. This signal may be routed to destinations in the aircraft external to the ACARS, such as the processing unit of a central warning system. The switching device in the MU should be capable of holding off 30 Vdc in the “open” state. In the “ground” state, the potential across it should not exceed 2 Vdc.

COMMENTARY

The current handling capabilities and voltage boundaries of this discrete output are an exception to the Standard Ground and Standard Open defined in Sections 2.9.2 and 2.9.3. The more stringent criteria are due to the potential for the MU to be installed on aircraft in which the output is used to sink lamp current directly, rather than a control a lamp driver.

Once activated, the NO COMM Alert discrete output should remain in the “Alert” state until data communications are reestablished on any one of the air/ground links (VHF/SATCOM/HF). Termination of the Alert state may be initiated by crew action.

4.7.2 Voice Go-Ahead (Data to Voice Channel Changeover)

In some aircraft, the VHF transceiver, through which the MU communicates, is shared between voice and data. In the Data mode, the MU exercises control of the transceiver. In the Voice mode, the cockpit crew exercises control. MU control of the transceiver should remain inhibited until the transceiver is released from Voice service. See Section 4.7.8 of this Characteristic for a description of how the MU is made aware whether the VHF transceiver is dedicated or shared.

While in Data mode, the MU maintains Push to talk (PTT) control of the transceiver by maintaining a “ground” on the Voice/Data Mode Annunciation discrete output (TP7F). The MU maintains tuning control of the transceiver by maintaining a “ground” on the DFS Port Selection discrete output (TP7C).

The DFS Port Selection output discrete should be capable of holding off 36 Vdc in the open state. In the ground state, it should be capable of sinking 100 milliamperes of current and the potential across it should not exceed 2 Vdc.

COMMENTARY

The current handling capabilities and voltage boundaries of this discrete output are an exception to the Standard Ground and Standard Open output definitions of Sections 2.9.2 and 2.9.3. The more stringent criteria are due to the potential for the MU to be installed on aircraft in which the discrete is used to sink current from a lamp directly.

The MU may be commanded to switch from Data mode to Voice mode via some cockpit crew action, as defined in Section 6.0 of ARINC Specification 618. When determining the logic for Data/Voice switching, the status of Voice/Data Monitor Discrete (TP7E) must be considered. Refer to Section 4.7.14 for a description of the influence of TP7E. See Section 4.7.6.1 for further details concerning the logic to be exercised at TP7F.

COMMENTARY

Some older ACARS MUs may automatically switch from Data to Voice mode upon receipt of an uplink Voice Go-ahead message (Label 54) when the Automatic/Manual Channel Changeover program pin (TP7D) is an “open” circuit. However, since this implementation causes the transceiver to change modes without direct cockpit crew action, it is not recommended. The MU simply annunciates the receipt of an uplink Label 54 message to the cockpit crew without changing modes automatically. See Section 6.0 of ARINC Specification 618.

When the MU is commanded to switch from Data mode to Voice mode, it should release transceiver PTT control to the cockpit microphones by “opening” the Voice/Data Mode Annunciation discrete output (TP7F). In addition, if the MU is not going to be the source of tuning control in Voice mode, it should also release transceiver tuning control to the cockpit control head by “opening” the DFS Port Selection discrete output (TP7C). Normally, the MU will determine whether or not to tune the transceiver in Voice mode by reading the status of the Voice Channel Frequency Control program pin (TP11C). When pin TP11C is “grounded”, indicating that no cockpit control head exists for the transceiver, the MU maintains tuning control during Voice mode. When pin TP11C is an “open”, indicating that a control head exists for the VHF transceiver, the MU releases tuning control during Voice mode.

NOTE: Care should be taken in the MU design to prevent the MU from maintaining control of the VHF radio under failure conditions.

This operation can be summarized in the following table:

MODE	TP7C	TP7F
Data Mode	Ground	Ground
Voice (with MU tuning)	Ground	Open
Voice (no MU tuning	Open	Open

COMMENTARY

The Radio Management Panel (RMP) installed on some Airbus aircraft will not tune the transceiver in Voice unless Voice Mode is selected on the RMP itself, regardless of the state of TP7C. In addition, if an RMP is not installed, this may not be properly indicated to the MU by a “ground” on pin TP11C. This operation is not per this Characteristic. In short, let the buyer beware.

For more details regarding MU operation during Voice mode, refer to Section 6.0 of ARINC Specification 618.

4.7.3 VHF #2 Select Discrete Output

A pin was assigned to provide VHF#2 select capability, but found to create conflicts for crew access to VHF radio for voice use. The current status of the pin is “reserved.”

4.7.4 Voice to Data Channel Changeover (Shared VHF Transceiver Case)

ACARS installations use manual switching to make Voice-to-Data channel changeovers. In the “Voice” position, voice communications only will be provided.

It is recommended that the MU connector Auto/Manual Channel Changeover Program pin TP7D be connected to program pin common (TP11D) so that only manually switched changeover from Voice to Data and Data to Voice RF channels will be possible. An MCDU action or a remote Voice/Data switch will perform this function. If TP7D is left open, the MU may automatically switch from Voice to Data mode (as defined by the user). See Sections 4.7.2 and 4.7.14 of this document for further detail.

4.7.5 MU Failure Warning

Equipment manufacturers are encouraged to include automatic self checking facilities in the MU. In the event that a malfunction is detected, it should be annunciated by a DC ground at the Fault Annunciation Discrete Output (MU connector pin MP9J) capable of sinking 200 milliamperes of current.

This discrete may be routed to destinations in the aircraft external to the ACARS, such as the processing unit of a central warning system. The DC ground switching device in the MU should be capable of holding off 36 Vdc in the open state. In the ground state, the potential across it should not exceed 2 Vdc.

COMMENTARY

It is not a purpose of this document to suggest particular MU self-check features, as these are matters for manufacturers to decide in conjunction with their customers. However, some airlines have indicated that, if possible, the cockpit crew should be alerted when, for reasons including the failure of a logic input to the MU, an OUT, OFF, ON, or IN event is not declared when it should have been declared. Crew response to such an alert would be to use voice communications to report the undeclared event time.

In some installations, MU Normal/Failure status is also reported to onboard maintenance via ARINC 429 data bus interfaces. Refer to Attachment 1-1, 2-1, and Chapter 6.

4.7.6 Voice/Data Mode Selection and Annunciation

4.7.6.1 Voice/Data Mode Annunciation Output

The Voice/Data Mode Annunciation Discrete Output is used to indicate whether the VHF radio associated with the ACARS MU is to operate in Voice or Data mode. The MU should generate a discrete output whenever it has control of the channel selected on the ACARS associated VHF transceiver (Data mode). This Discrete should consist of a DC ground on pin TP7F of the MU’s service connector.

Standard Ground is defined in Section 2.9.3. This ground should be replaced by an open circuit (see Section 2.9.2 for the definition of a Standard Open) when the VHF transceiver is to operate in the voice mode. This discrete may also be used to control the keying mode of the ARINC 716 VHF transceiver.

A Remote Voice/Data Status Annunciator Discrete Output having identical logic should appear at MU connector pin TP5K for the purpose of operating a status annunciator. The switching component in the MU should be capable of handling 250

milliamperes of current in the “ground” state and of holding off 36 Vdc in the “open” state.

COMMENTARY

The current handling capabilities of this discrete output are an exception to the Standard Ground and Standard Open outputs defined in Sections 2.9.2 and 2.9.3. The more stringent criteria are due to the potential for the MU to be installed on aircraft in which the output is used to sink lamp current directly, rather than a control a lamp driver.

4.7.6.2 Remote Voice/Data Mode Select

The MU should change from Data mode to Voice mode and vice versa whenever a momentary airframe DC ground is applied to the Remote Voice/Data Mode Select Discrete Input located on service connector pin TP5J.

“Momentary” is defined as application of the ground for 50 milliseconds or more. Standard Ground is defined in Section 2.9.3. At all other times this pin should see an open circuit (see Section 2.9.2 for the definition of a Standard Open) to airframe DC ground. One source of this input could be a push-button switch on the VHF COMM transceiver control panel. Manufacturers are urged to provide isolating diodes for the input in both the MU and the source unit to ensure protection from operation via “sneak circuits”.

4.7.7 Captain/First Officer Identification Discrete

Downlinked arrival reports include a field for manually entered information on whether the Captain or the First Officer landed the aircraft. Some airlines may elect to exercise the option of using a remote “Captain/First Officer” switch to provide a discrete input to the MU. The following standards apply to the discrete. When the remote switch is in the “Captain” position, MU service connector pin TP3J should be open circuit (see Section 2.9.2 for the definition of a Standard Open). In the “First Officer” position, this pin should be grounded. Standard Ground is defined in Section 2.9.3.

4.7.8 Dedicated Transceiver Annunciation Program Pin

When the aircraft in which the MU is installed is equipped with a VHF transceiver dedicated to data communications, the Data Transceiver Program Pin (TP11B) should be connected to “Program Pin Common”, (TP11D) on the MU service connector. Section 4.7.2 of this document specifies what the MU should do when installed in such an aircraft. When the transceiver is to be shared with VOICE operations, the Dedicated Transceiver pin should be left open circuit.

4.7.9 Voice Go Ahead Alert Reset Input

The MU should cease to output the Voice Go-ahead alerts for the crew when the voice go ahead alert reset input to the MU is momentarily grounded (see Section 2.9.3 for the definition of a Standard Ground). The reset may also be activated within the MU in response to appropriate flight crew action, e.g., call-up of a message waiting for display. The alert reset input will normally be an open circuit (see Section 2.9.2 for the definition of a Standard Open) at the MU connector pin (MP9C). Either occurrence should re-arm the alerts to permit their output on recognition of the next Voice Go-ahead (Label 54) uplink.

4.7.10 Primary MU Inhibit Discrete Input

In a dual ACARS configuration, the left MU is considered the normal primary unit. A discrete input should be provided (TP6D) to place the MU in the Standby mode. An "open" indicates normal operation, that is, the MU should be active. A "ground" indicates that the unit should be in STBY. This discrete input is wired to switching logic within the aircraft.

4.7.11 MU Active/STBY Discrete Output

An MU Active/STBY Discrete Output should be provided (TP2J) to report the status of operation (Active/STBY). A "ground" indicates that the MU is active. If the MU is in Standby mode, the output should be an "open".

COMMENTARY

Ideally, one MU should always be in the Active mode and the other in Standby mode. Transfer of active status from one MU to the other deserves some forethought. Care should be taken to preclude both ACARS MUs from being commanded to be active or standby simultaneously. Timing of the command, turn on time and turn-off time of the MUs should be considered.

Note: On some aircraft Pin TP2J is used to annunciate the MU's status to the VHF communications control panel. The following logic is used:

- MU Normal = "ground"
- MU Fail or OFF = "open"

4.7.12 Data Loader Discrete Input

The MU should provide a discrete input (TP6E) to monitor the status of a selector switch, located in aircraft wiring, which indicates that the ARINC 429 input and output data buses are connected to the data loader. A "ground" indicates that the data bus is connected. An "open" indicates no connection.

4.7.13 FMC Active Port Select Discrete Input

The MU should provide a discrete input (TP13K) to identify which FMC it should communicate with. An "open" indicates FMC #1 and a "ground" indicates FMC #2. Refer to ARINC Specification 619 for protocol. In some installations, ARINC 429 data words are used to acquire this information. See ARINC Specification 619.

4.7.14 Voice/Data Mode Monitor Discrete Input

The MU should provide a discrete input (TP7E) to monitor whether the MU should operate in Data mode or Voice mode. A "ground" indicates the MU should operate in Data mode, and an "open" indicates the MU should operate in Voice mode. In installations in which the ACARS airborne sub-system controls the VHF transceiver, TP7E is typically strapped to MU connector pin TP7F on the aircraft side of the connector.

4.7.15 Aircraft Configuration

The MU should provide a Program Pin (TP14G) to sense whether the aircraft is wired to accept an MU designed to Characteristic 724 or Characteristic 724B.

Program pin (TP14G) is used to identify the installation as one in which operation in accordance with ARINC Characteristic 724B is expected. Connection from 724/724B Select Program Pin (TP14G) to Program Pin Common (TP11D) at this pin indicates normal operation per ARINC Characteristic 724B. An “open” at this pin indicates operation per ARINC Characteristic 724.

4.7.16 Voice Mode Isolation Discrete

In aircraft configurations where the Voice/Data Mode Annunciation discrete output (TP7F) is not connected directly to the corresponding VHF transceiver input (MPC7), the MU’s Voice Mode Isolation discrete input (MP9D) should be connected to Program Pin Common (TP11D). For MU’s with optional internal Voice mode isolation capability, the Voice Mode Isolation discrete input (MP9D) should also be connected to TP11D when desiring to activate the Voice mode isolation.

In configurations where the Voice/Data Mode Annunciation discrete output (TP7F) is connected to the VHF transceiver and internal Voice mode isolation is not desired, the Voice Mode Isolation discrete input (MP9D) should be left open.

When the Voice Mode Isolation discrete input (MP9D) is connected to Program Pin Common (TP11D), the MU should inhibit any selections for Voice mode operation on ACARS displays, as well as any attempts by the MU to automatically change modes. The MU should still respond to Voice/Data mode changes as commanded by the remote Voice/Data Select discrete (TP5JP) or as indicated by the Voice/Data mode monitor discrete (TP7E). See Section 4.7.6.2 for Voice/Data Select provisions.

COMMENTARY

The Voice Mode Isolation discrete input (MP9D) should be grounded under the following aircraft configurations:

1. The interfacing VHF transceiver will always remain in Data mode, due to airline preference or to unavailability of other aircraft equipment necessary for Voice mode operation, such as appropriate audio select panels.
2. A separate device is used to drive the VHF transceiver Voice/Data mode select to guarantee that the ACARS MU will not interfere with Voice mode operation. In this configuration, the MU is still required to respond to pins TP5J and TP7E in order to respond appropriately for the mode selected by the external device.
3. An MU is installed which integrates internally an independent device or monitor that can guarantee noninterference of the ACARS MU with Voice mode operation. Such optional MU features may be permanently activated or pin selectable via MP9D to allow the choice between Voice mode noninterference or other features such as frequency tuning in Voice mode.

4.7.17 HFDR Configuration Discrete Input

Pins TP12H and TP12J are allocated to identify HF Data Radio (HFDR) installation status. When the MU observes a ground on pin TP12H, the MU should expect HFDR1 to be installed and to support datalink. When the MU

observes a ground on pin TP12J, then the MU should expect HFDR2 to be installed and to support datalink.

4.8 Downlink Message Formats

Refer to ARINC Specification 620 for the definition of message formats. The titles of these subsections are retained for historical reasons.

4.8.1 Departure and Arrival Reports

4.8.1.1 Departure/Arrival Reports

4.8.1.2 Out/Fuel Reports

4.8.1.3 Off Reports

4.8.1.4 On Reports

4.8.1.5 In/Fuel Reports

4.8.1.6 Out/Fuel/Destination Report

4.8.1.7 Off/Destination Report

4.8.2 ETA Reports

4.8.3 Voice Contact Request (System Essential)

4.8.4 Clock Update Advisory

4.8.5 H1 Label Description

4.8.6 Unable to Deliver Uplinked Message (System Essential)

4.8.7 General Response (System Essential)

4.8.8 Link Test

4.8.9 Voice to ACARS Channel Changeover Advisory (System Essential)

4.8.10 Ground UTC Request

4.8.11 Airline Designated Downlink

4.8.12 Delay Message

4.8.13 Data Transceiver Autotune Response

4.8.14 Dedicated Data Transceiver Advisory

4.8.15 Printer Status Reports

4.8.16 Temporary Suspension (System Essential)

4.8.17 Command/Response Downlink

4.8.18 Weather Request

4.8.19 ATIS Request

4.8.20 Out/Return In Report

4.8.21 Out Report

4.8.22 Aircrew Initiated Position Report

4.8.22.1 Alternate Aircrew Initiated Position Report

Some messages will be validated by a CRC. Refer to ARINC Specification 622 for details of the CRC algorithm and its processing.

Refer to ARINC Specification 620 for the definition of message formats. The titles of these subsections are retained for historical reasons.

5.0 PROVISIONS FOR AUTOMATIC TEST EQUIPMENT

5.1 General

To enable Automatic Test Equipment (ATE) to be used in the bench maintenance of the ACARS avionics, those internal circuit functions not available at the MU service connector and considered by equipment manufacturers to be needed for automatic test purposes may be brought to an auxiliary rear connector whose type and location are selected by the manufacturer. This auxiliary connector should be fitted with only that number of contacts as there are functions to be brought to it and should be provided with a protective cover suitable to protect it from damage, contamination, etc., while the MU is installed in the aircraft.

COMMENTARY

See the Commentary following Section 2.2.1 of this document for observations on the status of the ATE connector.

5.2 Unit Identification

Six pins on the ATE connector should be reserved for the implementation of a "resistance coding" scheme for unit identification by the ATE, in which a 1% tolerance resistor is connected from each pin to a common ground in a "star" formation. Values selected should correspond to the standard 10% increments in resistance in order to prevent ambiguities resulting from tolerance build-up and aging. The power handling capability of each resistor need not exceed 0.1 watt.

5.2.1 Pin Allocation

Two pins should be allocated to each of the following functions and one pin to the "star" formation common, i.e., dc chassis ground.

1. Manufacturer Identification (Resistor values to be registered with ARINC when selected)
2. Part No. or Type No. of the Equipment.
3. Modification Status of the Equipment.

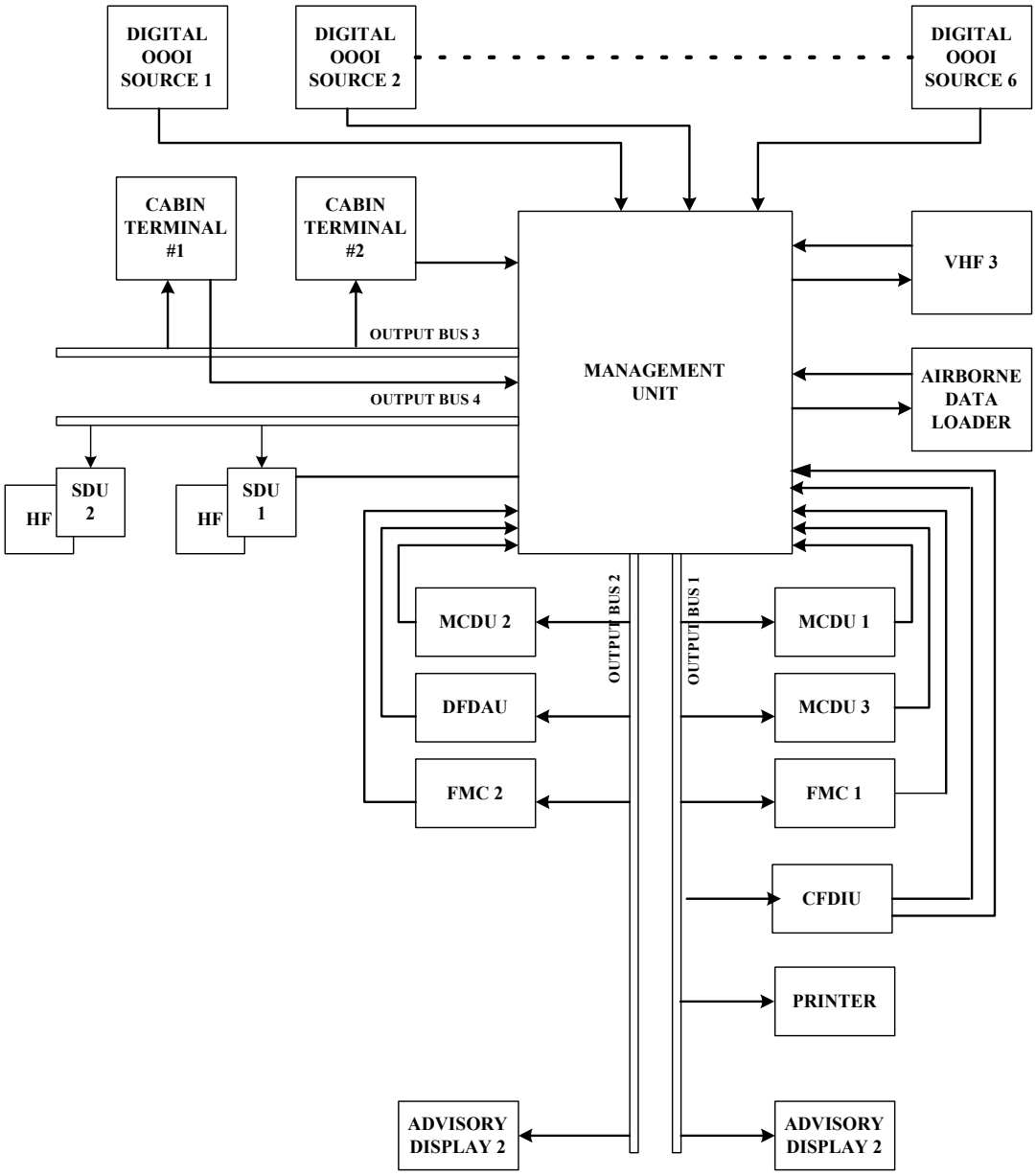
IMPORTANT NOTE: Resistor codes for manufacturer identification will be recorded by ARINC in order to prevent duplication. Such registration, however, should not be confused with assignment. It is the responsibility of each manufacturer to select a code and inform ARINC of his choice. Code assignments for equipment part number and modification status are entirely the province of the manufacturer and do not require registration with ARINC.

5.3 Use of ATLAS Language

Equipment manufacturers should note that the airlines desire to have airborne ACARS equipment test procedures intended for execution by automatic test equipment written in the ATLAS language defined in **ARINC Specification 616:** *Avionics Subset of ATLAS*.

ATTACHMENT 1-1
SINGLE ACARS AIRBORNE SUBSYSTEM BLOCK DIAGRAM

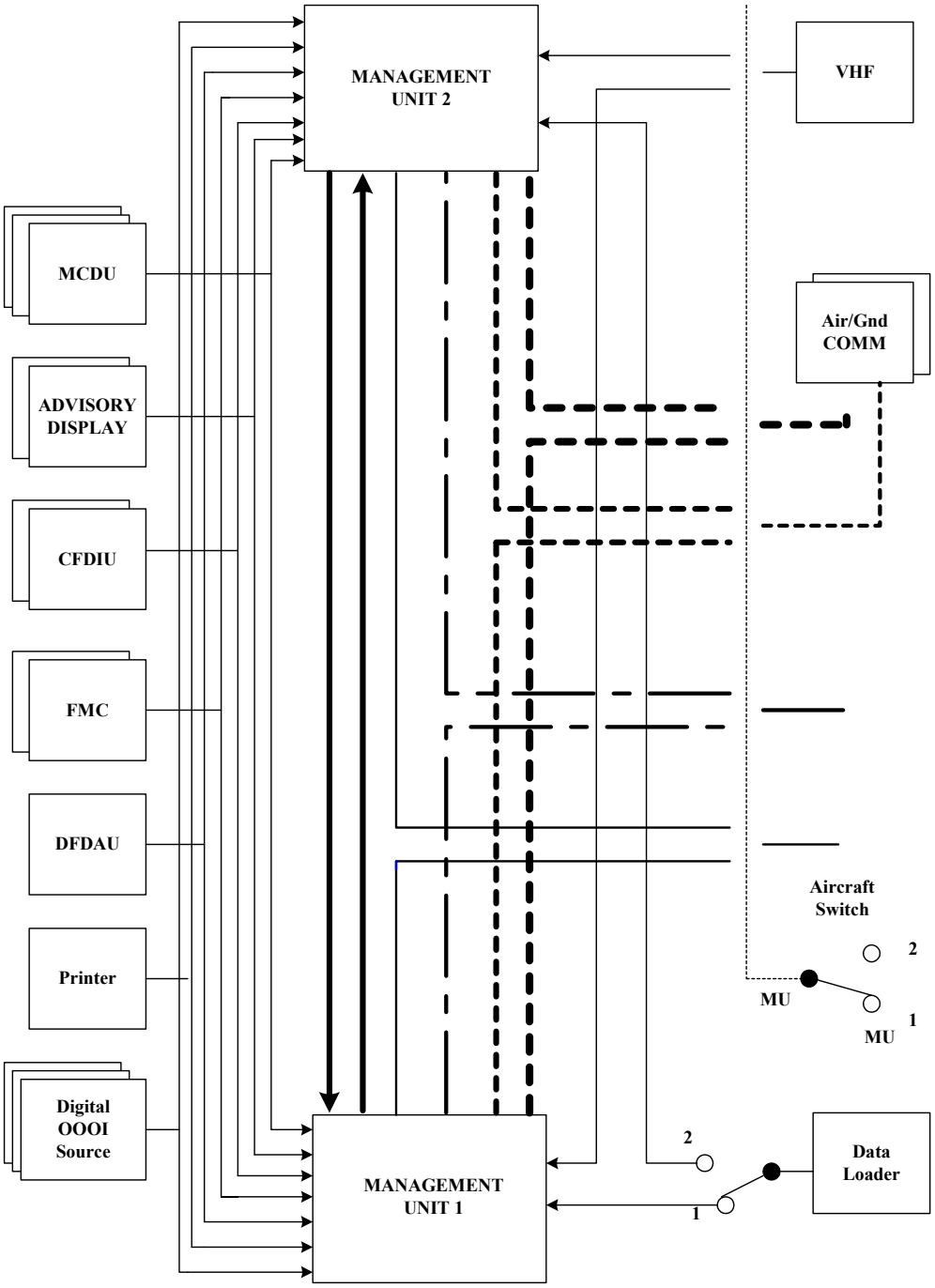
ATTACHMENT 1-1 – SINGLE ACARS AIRBORNE SUBSYSTEM BLOCK DIAGRAM



NOTE: This diagram depicts the subsystems and air/ground transceivers that could be connected to the ACARS MU. Each aircraft configuration is unique.

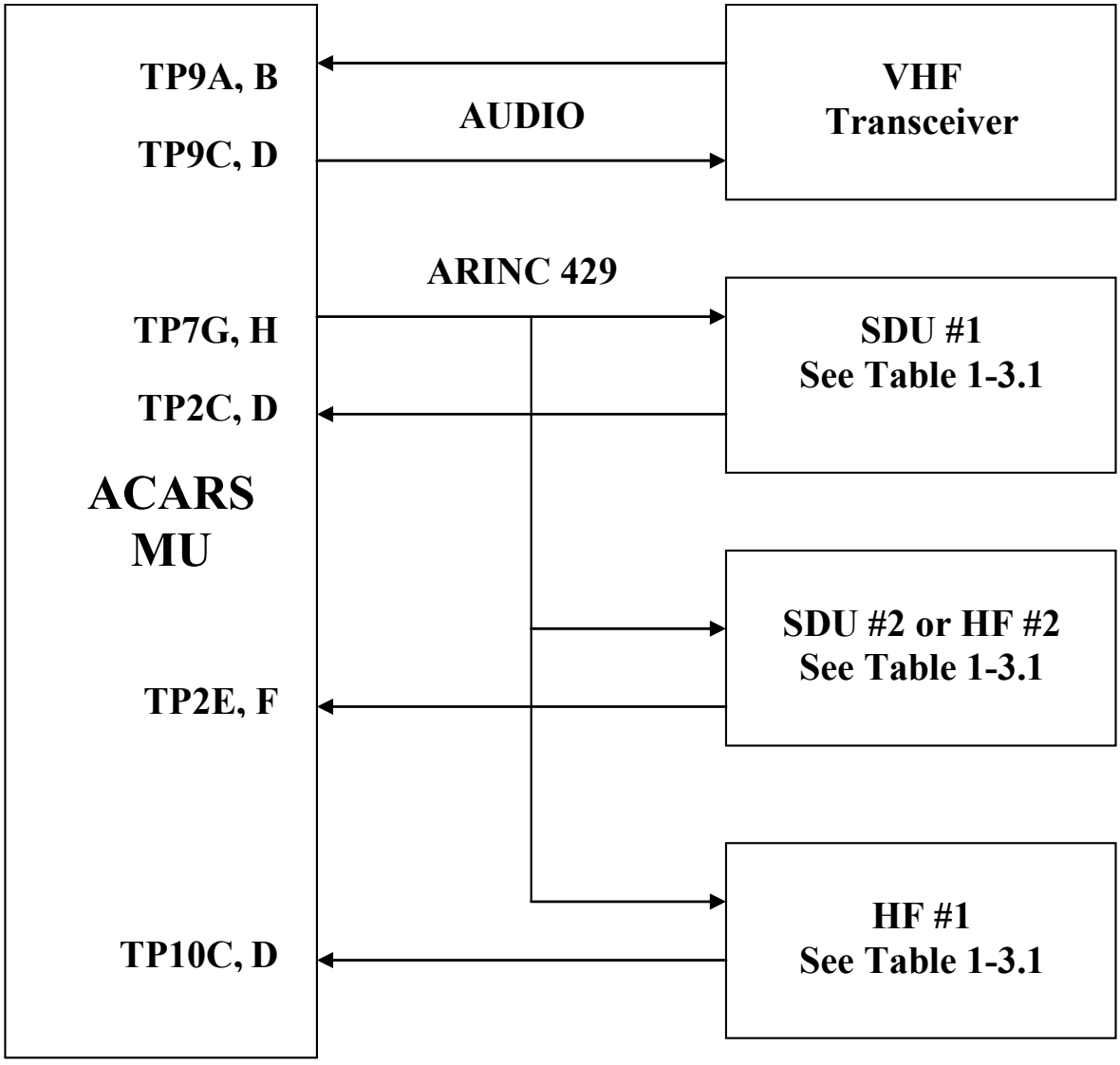
ATTACHMENT 1-2
EXAMPLE DUAL ACARS AIRBORNE SUBSYSTEM BLOCK DIAGRAM

ATTACHMENT 1-2 – EXAMPLE DUAL ACARS AIRBORNE SUBSYSTEM BLOCK DIAGRAM



ATTACHMENT 1-3
MULTIPLE AIR/GROUND INSTALLATION

ATTACHMENT 1-3 – MULTIPLE AIR/GROUND INSTALLATION



ATTACHMENT 1-3
MULTIPLE AIR/GROUND INSTALLATION

Table 1-3.1 – Typical Air/Ground COMM Configurations

Pins	Single SATCOM	Dual SATCOM	Single HF	Dual HF	Notes
TP2C,D	SAT	SAT #1	Note 2	Note 2	
TP2E,F		SAT #2		HF #2	
TP10C,D	Note 1	Note 1	HF	HF #1	

Notes:

1. A single HF system may be used as a backup for either a single or dual SATCOM system.
2. A single SATCOM system may be used as backup for a single or dual HF system.

ATTACHMENT 2-1
STANDARD INTERWIRING

ATTACHMENT 2-1 – STANDARD INTERWIRING

FUNCTION		MU	CDU	AIRCRAFT	NOTES
USER DEFINED DISCRETE	OUT	TP1A			
USER DEFINED DISCRETE	OUT	TP1B			
USER DEFINED DISCRETE	IN	TP1C			21
USER DISCRETE DEFINED	IN	TP1D			
USER DISCRETE DEFINED	IN	TP1E			
OOOI #3	A	TP1F		TO OOOI DIGITAL	
DATA BUS INPUT	B	TP1G		DATA SOURCE #3	10
UTC CLOCK DATA BUS	A	TP1H		TO ARINC 585	
OUTPUT (ARINC 429)	B	TP1J		CHRONOMETER	
FUTURE SPARE		TP1K			
RESERVED UTC CLOCK	A	TP2A		TO ARINC 585	
OUTPUT (ARINC 419)	B	TP2B		CHRONOMETER	
SDU #1	A	TP2C		TO ARINC 741 SDU #1	8
DATA BUS #4A INPUT	B	TP2D			
SDU #2 OR HFDR #2	A	TP2E		TO ARINC 741 SDU #2	8
DATA BUS #4B INPUT	B	TP2F		OR ARINC 753 HF #2	
CMU CROSSTALK	A	TP2G		TO OTHER	
DATA BUS INPUT	B	TP2H		ARINC 724 CMU	
CMU ACTIVE/STBY DISCRETE OUTPUT		TP2J		DUAL CONTROL	14
RESERVED ARINC 724	GND	TP2K			
	A	TP3A			
	B	TP3B			
DATA	IN	TP3C			
TO	IN	TP3D			11
PRINTER	IN	TP3E			
	IN	TP3F			
	IN	TP3G			
RESERVED ARINC 724	GND	TP3H			
CAPT./FIRST OFFICER DISCRETE INPUT		TP3J		SEE SECTION 4.7.7	
FUTURE SPARE		TP3K			
USER DEFINED ATE		TP4A		TO	
USER DEFINED ATE		TP4B		USER	
USER DEFINED ATE		TP4C		DEFINED	
USER DEFINED ATE		TP4D		(ATE)	
OOOI #5	A	TP4E		OOOI	10
DATA BUS INPUT	B	TP4F		DATA SOURCE #5	
OOOI #6	A	TP4G		OOOI	10
DATA BUS INPUT	B	TP4H		DATA SOURCE #6	
OOOI #4 DIGITAL	A	TP4J		OOOI DIGITAL	10
DATA BUS INPUT	B	TP4K		DATA SOURCE #4	
USER	PGM	TP5A			
DEFINED	PGM	TP5B			22
FUNCTIONS	PGM	TP5C			
DATA LOADER	A	TP5D		TO DATA LOADER	9
DATA BUS INPUT	B	TP5E		(ARINC 615)	
RESERVED ARINC 724	A	TP5F			
SERIAL DATA OUTPUT	B	TP5G			
DATA KEY LINE DISC OUTPUT		TP5H		MPD7 ARINC 716 VHF COM R/T	
REMOTE VOICE/DATA SEL DISC INPUT		TP5J		TO REMOTE SWITCH	
REMOTE VOICE/DATA STAT DISC OUT		TP5K		TO STATUS ANNUNCIATOR	

ATTACHMENT 2-1
STANDARD INTERWIRING

FUNCTION	MU	CDU	AIRCRAFT	NOTES
RESERVED ARINC 724 IN	TP6A			
BUFFERED DISCRETES IN	TP6B			11
RESERVED ARINC 724 IN	TP6C			
PRIMARY CMU INHIBIT DISCRETE IN	TP6D			18
DATA LOADER DISC INPUT	TP6E			13
DATA LOADER A	TP6F		TO DATA LOADER	
DATA BUS OUTPUT B	TP6G			9
USER DIGITAL DATA A	TP6H			
DEFINED BUS INPUT B	TP6J			
USER DEFINED DISCRETE OUT	TP6K			
DIGITAL FREQUENCY SELECT A	TP7A		MPA11 ARINC 716	1
(DFS) DATA OUTPUT B	TP7B		MPB11 VHF COM	
DFS PORT SELECT DISCRETE OUTPUT	TP7C		MPD11 R/T	1
AUTO/MANUAL CHANNEL CHANGEOVER PROGRAM	TP7D			3
VOICE/DATA MODE MONITOR DISC INPUT	TP7E			
VOICE/DATA MODE ANNUN. DISCRETE OUTPUT	TP7F		MPC7 ARINC 716 VHF COM R/T	6
GENERAL DATA BUS #4 A	TP7G		ARINC 741 SDU,	8
OUTPUT B	TP7H		OR ARINC 753 HF	
RESERVED, DISC OUT	TP7J		MPD8 ARINC 716 VHF COM R/T	11
DATA KEY LINE RETURN	TP7K			1
USER DEFINED	TP8A			
USER ANALOG IN	TP8B			
DEFINED ANALOG IN	TP8C			
FUNCTIONS ANALOG IN	TP8D			
USER	TP8E			
DEFINED	TP8F			
USER DEFINED A	TP8G			
DATA BUS INPUT B	TP8H			
USER DEFINED DISC OUT	TP8J			
USER DEFINE DISC OUT	TP8K			
AUDIO OUT TO VHF HI	TP9A		MP5A	
TRANSCEIVER LO	TP9B		MPB5	
AUDIO IN TO VHF HI	TP9C		MPB13 ARINC 716	1
TRANSCEIVER LO	TP9D		MPA13 VHF COM R/T	
SIDETONE IN HI	TP9E		MPA15	
FROM TRANSCEIVER LO	TP9F		MPB15	5
VOICE GO-AHEAD	TP9G		SEE SECTION	
CONTACTS	TP9H		4.7.2	
RESERVED ARINC 724 IN	TP9J			
RTS/CTS DISCRETES OUT	TP9K			
USER DEFINED DISC IN	TP10A			
USER DEFINED DISC OUT	TP10B			
HFDR #1 A	TP10C		TO HFDR #1	20
DATA BUS #4C INPUT B	TP10D		TO HFDR #1	
USER DEFINED DISC IN	TP10E			
USER DEFINED DISC OUT	TP10F			
USER DEFINED ANALOG IN	TP10G			
USER DEFINED ANALOG IN	TP10H			
USER DEFINED DISC IN	TP10J			
USER DEFINED DISC IN	TP10K			

ATTACHMENT 2-1
STANDARD INTERWIRING

FUNCTION		MU	CDU	AIRCRAFT	NOTES
RESERVED ARINC 724		TP11A			
DATA TERMINAL READY DISCRETE INPUT					
DATA TRANSCEIVER PROGRAM		TP11B			7
VOICE CHANNEL CONTROL PROGRAM		TP11C			1
PROGRAM PIN COMMON		TP11D			
RESERVED ARINC 724	A	TP11E			
DATA BUS IN	B	TP11F			
OAT DATA	A	TP11G			
DATA BUS OUT	B	TP11H			11
RESERVED ARINC 724	SHLD	TP11J			
RESERVED ARINC 724		TP11K			
AUX. DATA BUS STATUS #1					
RESERVED ARINC 724					
AUX. DATA BUS STATUS #2		TP12A			
CMU CROSSTALK	A	TP12B		OTHER ARINC	
DATA BUS OUTPUT	B	TP12C		724B CMU	
RESERVED ARINC 724	IN	TP12D			
BUFFERED	IN	TP12E			
DISCRETE	IN	TP12F			
INPUT	IN	TP12G			11
HFDR 1 INSTALLED		TP12H			
HFDR 2 INSTALLED		TP12J			
RESERVED ARINC 724 BUFF DISCRETE	IN	TP12K			
RESERVED ARINC 724	OUT	TP13A			
UPLINK INDICATOR DISCRETES	OUT	TP13B			11
RESERVED ARINC 724	OUT	TP13C			
RESERVED ARINC 724	A	TP13D			11
CU OUTPUT DATA BUS	B	TP13E			
RESERVED ARINC 724	A	TP13F			
CU INPUT DATA BUS	B	TP13G			11
RESERVED ARINC 724	A	TP13H			24
FMC #1 OUTPUT DATA BUS	B	TP13J			24
FMC ACTIVE PORT PAIR SELECT DISCRETE INPUT		TP13K		TO FMC SYSTEM	
AIRCRAFT PGM	A	TP14A			
TYPE PGM	B	TP14B			23
IDENTIFIER PGM	C	TP14C			
PGM	D	TP14D			
UNIT LOCATION PROGRAM		TP14E			12
UNIT LOCATION PROGRAM		TP14F			
724/724B SELECT PROGRAM		TP14G			17
RESERVED ARINC 724		TP14H			
ARINC 546, 566A VHF					11
XMTR PTT & DATA KEY		TP14J			
VHF XMTR VOICE PTT DISC INPUT		TP14K			
RESERVED ARINC 724	IN	TP15A			
. .	IN	TP15B			
. .	IN	TP15C			
OOOI	IN	TP15D			
SENSOR	IN	TP15E			
INPUT	IN	TP15F			
. .	IN	TP15G			
. .	IN	TP15H			
. .	IN	TP15J			
RESERVED ARINC 724		TP15K			

ATTACHMENT 2-1
STANDARD INTERWIRING

FUNCTION		MU	CDU	AIRCRAFT	NOTES
RESERVED ARINC 724	IN	MP1A			
. .	IN	MP1B			
. .	IN	MP1C			
OOOI	IN	MP1D			
SENSOR	IN	MP1E			
INPUT	IN	MP1F			
. .	IN	MP1G			
. .	IN	MP1H			
. .	IN	MP1J			
RESERVED ARINC 724		MP1K			
	C1B1	MP2A			
AIRCRAFT	C1B2	MP2B			
REGISTRATION	C1B3	MP2C			15
NUMBER	C1B4	MP2D			
CODING	C1B5	MP2E			
PROGRAM PINS	C1B6	MP2F			
. . .	C2B1	MP2G			
. . .	C2B2	MP2H			
. . .	C2B3	MP2J			
. . .	C2B4	MP2K			
	C2B5	MP3A			
AIRCRAFT	C2B6	MP3B			
REGISTRATION	C3B1	MP3C			
NUMBER	C3B2	MP3D			
CODING	C3B3	MP3E			15
PROGRAM PINS	C3B4	MP3F			
. . .	C3B5	MP3G			
. . .	C3B6	MP3H			
. . .	C4B1	MP3J			
. . .	C4B2	MP3K			
	C4B3	MP4A			
AIRCRAFT	C4B4	MP4B			
REGISTRATION	C4B5	MP4C			
NUMBER	C4B6	MP4D			
CODING	C5B1	MP4E			
PROGRAM PINS	C5B2	MP4F			
. . .	C5B3	MP4G			
. . .	C5B4	MP4H			
. . .	C5B5	MP4J			
. . .	C5B6	MP4K			
	C6B1	MP5A			
AIRCRAFT	C6B2	MP5B			
REGISTRATION	C6B3	MP5C			
NUMBER	C6B4	MP5D			
CODING	C6B5	MP5E			
PROGRAM PINS	C6B6	MP5F			
. . .	C7B1	MP5G			11
. . .	C7B2	MP5H			
. . .	C7B3	MP5J			
. . .	C7B4	MP5K			

ATTACHMENT 2-1
STANDARD INTERWIRING

FUNCTION		MU	CDU	AIRCRAFT	NOTES
	C7B5	MP6A			
RESERVED ARINC 724	C7B6	MP6B			
RESERVED ARINC 724	C1B1	MP6C			
. .	C1B2	MP6D			
. .	C1B3	MP6E			
. .	C1B4	MP6F			11
AIRLINE .	C1B5	MP6G			
IDENTIFIER .	C1B6	MP6H			
CODING .	C2B1	MP6J			15
PROGRAM PINS .	C2B2	MP6K			
AIRLINE	C2B3	MP7A			
IDENTIFIER	C2B4	MP7B			
CODING	C2B5	MP7C			24
PROGRAM PINS	C2B6	MP7D			24
RESERVED ARINC 724	COMM	MP7E			
RESERVED VHF/HF DISC. INPUT		MP7F			
RESERVED ARINC 724	A	MP7G			11
DFDAU DATA BUS OUTPUT	B	MP7H			
DFDAU .	A	MP7J		TO ARINC 717	8
DATA BUS #2 INPUT	B	MP7K		DFDAU	
RESERVED ARINC 724		MP8A			
FREQUENCY SELECTION		MP8B			
RESERVED ARINC 724		MP8C			
RESERVED ARINC 724		MP8D			
. .		MP8E		VHF RADIOS	
FREQUENCY		MP8F		(ARINC 546, 566A)	11
SELECTION		MP8G			
. .		MP8H			
. .		MP8J			
RESERVED ARINC 724		MP8K			
RESERVED ARINC 724					
SUGGESTED SPARE #1		MP9A			
AND #2 TO CU		MP9B			
RESERVED ARINC 724					
VOICE GO-AHEAD ALERT RESET DISC INPUT		MP9C		TO ALERT CANCEL	11
VOICE MODE ISOLATION PROGRAM		MP9D			
AIRCRAFT TYPE EXPANSION PROGRAM		MP9E			11
RESERVED ARINC 724		MP9F			
VOICE GO-AHEAD DISCRETES		MP9G			
RESERVED ARINC 724					
RESERVED ARINC 724		MP9H			
SUGGESTED SPARE #3 TO CU					
FAULT ANNUNCIATION DISCRETE OUTPUT		MP9J		TO REMOTE ANNUNICATOR	
NO COMMUNICATIONS DISCRETE OUTPUT		MP9K		TO REMOTE ANNUNICATOR	19
RESERVED ARINC 724	OUT	MP10A			
. .	OUT	MP10B			
. .	OUT	MP10C			
. .	OUT	MP10D			
FREQUENCY SELECTION	OUT	MP10E			
ARINC 546, 566A	OUT	MP10F			11
VHF COM	OUT	MP10G			
. .	OUT	MP10H			
. .	OUT	MP10J			
. .	OUT	MP10K			

ATTACHMENT 2-1
STANDARD INTERWIRING

FUNCTION		MU	CDU	AIRCRAFT	NOTES
RESERVED ARINC 724	OUT	MP11A			
RESERVED ARINC 724	OUT	MP11B			
CU FAULT DISCRETES	OUT	MP11C			
RESERVED ARINC 724		MP11D			
. .		MP11E			
UNSPECIFIED		MP11F			
FUNCTION		MP11G			11
WIRES TO CU		MP11H			
. .		MP11J			
RESERVED ARINC 724		MP11K			
RESERVED ARINC 724	A	MP12A			16
AUXILIARY H-SPEED DATA BUS #1 OUT	B	MP12B			
CABIN TERMINAL # 1	A	MP12C		TO OPTIONAL CABIN	8
DATA BUS #3A INPUT	B	MP12D		TERMINAL #1	
GENERAL PURPOSE	A	MP12E		TO OPTIONAL CABIN	8
DATA BUS #3A OUTPUT	B	MP12F		TERMINALS	
CABIN TERMINAL # 2	A	MP12G		TO OPTIONAL CABIN	8
DATA BUS #3B INPUT	B	MP12H		TERMINAL #2	
PRINTER	A	MP12J		TO ARINC 740	8
DATA BUS #1B INPUT	B	MP12K		PRINTER	
RESERVED ARINC 724		MP13A			
UNSPECIFIED		MP13B			11
FUNCTION		MP13C			
WIRES		MP13D			
TO CU	GND	MP13E			
RESERVED ARINC 724		MP13F			
FMC #1	A	MP13G		TO ARINC	8
DATA BUS #1C INPUT	B	MP13H		702 FMC #1	
FMC #2	A	MP13J		TO ARINC	8
DATA BUS #2C INPUT	B	MP13K		702 FMC #2	
MCDU #1	A	MP14A		TO ARINC 739	8
DATA BUS #1A INPUT	B	MP14B		MCDU #1	
MCDU #2	A	MP14C		TO ARINC 739	8
DATA BUS #2A INPUT	B	MP14D		MCDU #2	
OOOI #1 DIGITAL	A	MP14E		TO OOOI DIGITAL	10
DATA BUS INPUT	B	MP14F		SOURCE #1	
OOOI #2 DIGITAL	A	MP14G		TO OOOI DIGITAL	10
DATA BUS INPUT	B	MP14H		SOURCE #2	
MCDU #3	A	MP14J		TO ARINC 739	8
DATA BUS #1E INPUT	B	MP14K		MCDU #3	
RESERVED ARINC 573	A	MP15A			11
FDAU DATA BUS INPUT	B	MP15B			
RESERVED ARINC 724	A	MP15C			
(FMC #2 DATA BUS OUTPUT	B	MP15D			
GENERAL	A	MP15E		TO ARINC 702 FMC #1,	8
DATA BUS #1 OUTPUT	B	MP15F		ARINC 739 MCDU #1 & #3	
				ARINC 740 PRINTER AND	
				ARINC 604 CFDIU	
GENERAL	A	MP15G		TO ARINC 702 FMC #2,	8
DATA BUS #2 OUTPUT	B	MP15H		ARINC 739 MCDU #2	
				ARINC 717 DFDAU AND	
				AN OPTIONAL WARNING SYSTEM	
CFDIU	A	MP15J		TO ARINC 604	8
DATA BUS #1D INPUT	B	MP15K		CFDIU	

ATTACHMENT 2-1
STANDARD INTERWIRING

FUNCTION	MU	CDU	AIRCRAFT	NOTES
115 VAC PRIMARY POWER HOT	BP1		115 VAC, 2A C/B	
FUTURE SPARE	BP2			
FUTURE SPARE	BP3			
FUTURE SPARE	BP4			
FUTURE SPARE	BP5			
FUTURE SPARE	BP6			
115 VAC PRIMARY POWER COLD	BP7		AC GROUND	
CHASSIS GROUND	BP8		DC GROUND	
FUTURE SPARE	BP9			
27.5 Vdc				
POWER IN (+)	BP10		27.5 Vdc, 1A C/B	4
POWER IN (-)	BP11		27.5 Vdc	
FUTURE SPARE	BP12			
FUTURE SPARE	BP13			

ATTACHMENT 2-2 – NOTES APPLICABLE TO THE STANDARD INTERWIRING

1. VHF Transceiver Use

   The channel which the VHF radio transceiver should select for ACARS operation will be encoded in the serial digital data stream delivered from MU connector pins TP7A and TP7B for an ARINC 716 unit.

   Transfer of frequency control from the MU to a VHF COM control panel will be achieved by changing the state of the MUs Digital Frequency/Function Selection (DFS) source selection discrete output (TP7C). Attachment 7 shows a schematic diagram of a possible interconnection arrangement for the ARINC 716 R/T.

   See Section 4.7.2 of this document for a description use of programming pins and discrete pins to determine the source of control of the VHF radio frequency.

2. Voice Mode Isolation Program

   Voice Mode Isolation Program Pin MP9D is used to designate the operation of the ACARS MU the VHF radio available to it is switched from Data to Voice mode. Refer to Section 4.7.16 for details of the logic to be used when wiring this pin.

3. Automatic/Manual RF Channel Changeover Program

   Refer to Section 4.7.4.

4. 27.5 Vdc Power

   This 27.5 Vdc supply should be derived from a “non-interruptible” source. See Section 2.4 of this document.

5. Transceiver Sidetone Input

   TP9E - TP9F are assigned as an input of transceiver sidetone to the MU to permit loop checks of the MU modem and transmitter during data transmission.

6. Voice/Data Mode

   TP7E is the connection point for a logic signal to the MU to inform it whether it or the pilot’s microphone has control of the VHF transceiver’s keying, and thus whether it should function in the voice or data mode. See Section 4.7.14.

7. Data Transceiver Program

   Connector pin TP11B should be connected in the aircraft interwiring to “Program Pin Common”, TP11D, when the aircraft is equipped with a VHF transceiver dedicated to data (ACARS) communications. This pin should be left “open” when the aircraft transceiver complement dictates that voice and data communications must share a transceiver.

ATTACHMENT 2-2
NOTES APPLICABLE TO THE STANDARD INTERWIRING

8. General Data Buses #1 - #4

   The ACARS architecture in Attachment 1-1 defines the four groups of data buses. Refer to Section 4.5.2. Pins TP2E and F may be used to connect either SDU #2 or HFDR #2. **Refer to Table 1-3.1 of Attachment 1-3 for connection alternatives.**

9. ADL Data Bus Speed

   The interface with ARINC 615 Airborne Data Loader (ADL) may be high or low speed, depending on aircraft configuration.

10. OOOI Digital Data Source

    The Out, Off, On, and In (OOOI) data source may be different in various installations. One possibility, peculiar to Boeing aircraft, is the Engine Indication Crew Alert System (EICAS). Sources peculiar to Airbus Industrie include the system data acquisition concentrator (SDAC) and the flight warning computer (FWC). This bus may be set as either high or low speed.

11. Reserved ARINC 724

    This Characteristic has set aside as “reserved” the pins which have been assigned (both active and reserved functions) in ARINC Characteristic 724. The reason for this procedure is to retain the maximum amount of commonality between ARINC 724 and ARINC 724B MUs. This results in greater commonality in manufacturing and yields a potential for retrofit of ARINC 724B MUs in ARINC 724 installations.

    All “inputs” should be assumed to be input to the ACARS MU. All “outputs” should be assumed to be output from the MU.

    TP7J, if utilized for an ARINC 724B function, should be assigned as a discrete output to retain consistency with existing wiring and hardware.

12. Unit Location Program Pin

    TP14E and TP14F should be used to designate whether the unit is installed in the left (#1) position or the right (#2) position where dual units are installed. The wiring should be as follows: Left = connect pin TP14E to Program Pin Common TP11D; Right = Connect Pin TP14F to Program Pin Common TP11D; a single MU installation is indicated when both pins are left “open”.

13. Data Loader Discrete Input

    TP6E should be used to designate that the MU is connected to the data loader. Refer to Section 4.7.12.

14. MU Active/STBY Output

    TP2J output should be used to report the operation of the ACARS MU. Refer to Section 4.7.11.

ATTACHMENT 2-2
NOTES APPLICABLE TO THE STANDARD INTERWIRING

15. Address Encoding

The capability to acquire the Aircraft Registration information is usually available through a data bus. However some implementations still exist which require the use of pin programming. The hard-wiring technique for encoding the airframe registration number and the airline identifier as the references for the aircraft address recognition and generation are described in Section 4.3.3 of this document. When used, the order of programming is:

MP2A Character 1 Bit 1

. . .

. . .

MP2F Character 1 Bit 6

and so on through Character 7 Bit 6 (pin MP6B). The notation for these assignments used in the interwiring list is C1B1-C1B6, etc. Pin MP7E serves as Address Program Common.

The Airline Identifier is usually hard coded into the MU software. In some older units, the program pins are still used to acquire the Airline identification. When used, the order of programming is:

MP6C Character 1 Bit 1

. . .

. . .

MP6H Character 1 Bit 6

MP6J Character 2 Bit 1

. . .

. . .

MP7D Character 2 Bit 6

MP7E Address Program Common

Program pins assigned to bits required to take on the binary “one” state in a given code should be left open circuit. Pins assigned to bits required to take on the binary “zero” state in the code should be jumpered to pin MP7E, “Address Program Pin Common”.

16. Auxiliary Data Bus Output

Refer to Section 4.5.6.

17. Aircraft Configuration Program

Refer to Section 4.7.15.

18. Primary MU Inhibit Discrete Input

Discrete input (TP6D) is used to command the MU to assume the Active or STBY mode. Refer to Section 4.7.10.

19. No Communication Discrete Output

Refer to Section 4.7.1.

20. COMM #3 Data Bus

Pins TP10C and TP10D are allocated for connection with HFDR #1 system.

ATTACHMENT 2-2
NOTES APPLICABLE TO THE STANDARD INTERWIRING

21. User Defined Pins

User Defined Pins may be programmed as specified by the user.

22. Commonly Used User Defined Pins

User Defined Program Pins TP5A through TP5C may have been used in older aircraft installations to identify the airframe type in which the ARINC 724 MU is installed.

Airframe Type Program Pins			
TP5A	**TP5B**	**TP5C**	**Aircraft**
0	0	0	Not Assigned
0	0	1	757
0	1	0	737-300
0	1	1	737-400
1	0	0	737-500
1	0	1	F28
1	1	0	F100
1	1	1	737-200

23. Airframe Type Program Pins

Pins MP9E and TP14A through TP14D are used by the MU to determine the aircraft on which it is installed. See also Note 22. Pin MP9E was added by Supplement 6. ACARS MUs developed prior to that do not support pin MP9E as an Airframe Type Program pin.

Airframe Type Program Pins					
MP9E	**TP14A**	**TP14B**	**TP14C**	**TP14D**	**Aircraft**
0	0	0	0	0	
0	0	0	0	1	
0	0	0	1	0	
0	0	0	1	1	
0	0	1	0	0	
0	0	1	0	1	
0	0	1	1	0	
0	0	1	1	1	
0	1	0	0	0	
0	1	0	0	1	
0	1	0	1	0	
0	1	0	1	1	
0	1	1	0	0	
0	1	1	0	1	
0	1	1	1	0	
0	1	1	1	1	Reserved
1	0	0	0	0	B767
1	0	0	0	1	MD90
1	0	0	1	0	Canadair
1	0	0	1	1	B737
1	0	1	0	0	AVRO
1	0	1	0	1	MD95
1	0	1	1	0	A330/A340
1	0	1	1	1	DHC8-Q400
1	1	0	0	0	B747-400

ATTACHMENT 2-2
NOTES APPLICABLE TO THE STANDARD INTERWIRING

Airframe Type Program Pins					
MP9E	**TP14A**	**TP14B**	**TP14C**	**TP14D**	**Aircraft**
1	1	0	0	1	A320/A321
1	1	0	1	0	Fokker 100
1	1	0	1	1	MD11
1	1	1	0	0	MD10
1	1	1	0	1	B757
1	1	1	1	0	MD80
1	1	1	1	1	Other

Pins assigned to bits required to take on the binary “one” state in a given code should be left open circuit. Pins assigned to bits required to take on the binary “zero” state in the code should be jumpered to pin TP11D, “Program Pin Common”.

24. Reserved for VDLM2 AOA

Pins TP3H, TP13J and MP7C, MP7D are defined by ARINC Characteristic 758 for the ARINC 429 interface with VDR 3. A vendor is allowed to use these pins as they are defined in ARINC Characteristic 758 for the purpose of retrofitting VDL mode 2 and AOA to an ARINC 724B wired aircraft.

Pins TP13H and TP13J are defined as reserved for backward compatibility with ARINC Characteristic 724 and many implementations will continue to use them in this manner. Airlines would have to give up this backward compatibility in order to retrofit the aircraft with VDL mode 2 and AOA.

Pins MP7C and MP7D are defined as airline identification program pins. Some ACARS implementations do not use these pins thus allowing them to be used as defined in ARINC Characteristic 758 for interfacing with VDR 3.

25. HFDR Installed Discrete Inputs

Pins TP12H and TP12J are defined to identify the presence of HF Data Radio (HFDR) 1 and HFDR 2 respectively. The logic to be followed is: the MU should interpret a ground on the input as indicating the presence of the HFDR, e.g., a ground on TP12J indicates that HFDR 2 is installed.

ATTACHMENT 2-3
CONNECTOR INSERT LAYOUT

ATTACHMENT 2-3 – CONNECTOR INSERT LAYOUT

Top Insert (TP)

	A	B	C	D	E	F	G	H	J	K
1	User Defined Discrete					OOOI #3 Data Bus Input		UTC Clock Data Bus Output (ARINC 429)		Future Spare
	o Disc Out	o Disc Out	o In	o Disc In	o Disc In	o A	o B	o A	o B	o
2	Reserved UTC Clock Output (ARINC 419)		SDU #1 Data Bus #4A Input		SDU #2 or HFDR #2 Data Bus #4B Input		MU Crosstalk Data Bus Input		CMU Act/STBY	Reserved ARINC 724
	o A	o B	o A	o B	o A	o B	o A	o B	o Disc Out	o
3	Data to Printer							Reserved ARINC 724	Capt/ First Officer	Future Spare
	o A	o B	o In	o In	o In	o In	o In	o Gnd	o In	o
4	User Defined ATE				OOOI #5 Data Bus Input		OOOI #6 Data Bus Input		OOOI #4 Digital Data Bus Input	
	o	o	o	o	o A	o B	o A	o B	o A	o B
5	User Defined Functions			Data Loader Data Bus Input		Reserved ARINC 724 Serial Data Output		Data Key Line	Remote V/D Sel	Remote V/D Ann
	o PGM	o PGM	o PGM	o A	o B	o A	o B	o Disc Out	o Disc In	o Disc Out
6	Reserved ARINC 724 Buffered Discrete			Primary CMU In hi	Data Loader	Data Loader Disc Output		User Defined Digital Data Loader Disc Input		User Defined
	o In	o In	o In	o Disc In	o Disc In	o A	o B	o A	o B	o Disc Out
7	Digital Freq Sel Data Bus Output		DFS Port Select	Auto/Man Chan Sel	V/D Mode Monitor	V/D Mode Annun	General Data Bus #4 Output		Reserved	Data Key Line
	o A	o B	o Disc Out	o PGM	o Disc In	o Disc Out	o A	o B	o Disc Out	o Return
8	User Defined	User Defined Analog Input			User Defined		User Defined Data Bus Input		User Defined	
	o	o Analog	o Analog	o Analog	o	o	o A	o B	o Disc Out	o Disc Out
9	Audio Out to VHF Transceiver		Audio In to VHF Transceiver		Sidetone In from Transceiver		Voice Go-Ahead Discrete Contacts		Reserved ARINC 724 RTS/CTS	
	o Hi	o Lo	o Hi	o Lo	o Hi	o Lo	o	o	o In	o Out
10	User Defined ARINC 724 Discrete		HFDR #1 Data Bus #4C Input		User Defined Functions					
	o In	o In	o A	o B	o Disc In	o Disc In	o Analog Out	o Analog In	o Disc In	o Disc In
11	Reserved ARINC 724	DataRec/Trans	Voice Chan/Control	Program Pin	Reserved ARINC 724 (OAT Data					Reserved ARINC 724
	o In	o PGM	o PGM	o Common	o A	o B	o A	o B	o Shld	o In
12	Reserved ARINC 724	CMU Crosstalk Data Bus Output			Buffered Discrete Input			HFDR # 1	HFDR # 2	Reserved ARINC 724
	o In	o A	o B	o In	o In	o In	o In	o Installed	o Installed	o In
13	Reserved ARINC 724 Uplink Indicator Discrete			Reserved ARINC 724 CU Output Data Bus	Reserved ARINC 724 CU Input Data Bus			Reserved ARINC 724 FMC #1 Output Data Bus		FMC Active Port Select
	o Out	o Out	o Out	o A	o B	o A	o B	o A	o B	o Disc In
14	User Defined Program Pins Aircraft Type Identifier				Unit Location	Unit Location	724/724B Select	Reserved ARINC 724 Functions		VHF XMTR VOICE PTT
	o PGM A	o PGM B	o PGM C	o PGM D	o PGM	o PGM	o PGM	o	o	o Disc In
15	Reserved ARINC 724 Functions OOOI Sensor Input									
	o	o	o	o	o	o	o	o	o	o

ATTACHMENT 2-3
CONNECTOR INSERT LAYOUT

Middle Insert (MP)

	A	B	C	D	E	F	G	H	J	K
1	Reserved ARINC 724 Functions OOOI Sensor Program Pins o	o	o	o	o	o	o	o	o	o
2	Aircraft Registration Number Coding Program Pins o C1B1	o C1B2	o C1B3	o C1B4	o C1B5	o C1B6	o C2B1	o C2B2	o C2B3	o C2B4
3	Aircraft Registration Number Coding Program Pins o C2B5	o C2B6	o C3B1	o C3B2	o C3B3	o C3B4	o C3B5	o C3B6	o C4B1	o C4B2
4	Aircraft Registration Number Coding Program Pins o C4B3	o C4B4	o C4B5	o C4B6	o C5B1	o C5B2	o C5B3	o C5B4	o C5B5	o C5B6
5	Aircraft Registration Number Coding Program Pins o C6B1	o C6B2	o C6B3	o C6B4	o C6B5	o C6B6	o C7B1	o C7B2	o C7B3	o C7B4
6	Reserved ARINC 724 Registration Number Coding o C7B5	o C7B6	Airline Identifier Coding Program Pins o C1B1	o C1B2	o C1B3	o C1B4	o C1B5	o C1B6	o C2B1	o C2B2
7	Airline Identifier Coding Program Pins o C2B3	o C2B4	o C2B5	o C2B6	Rsvd 724 Comm o	Reserved VHF/HF o Disc In	Reserved ARINC 724 DFDAU Data Bus Output o A	o B	DFDAU Data Bus #2D Input o A	o B
8	Reserved ARINC 724 Functions Frequency Selection ARINC 546, 566A VHF COM o	o	o	o	o	o	o	o	o	o
9	Suggested Spares to CU #1 o	#2 o	Go-Ahead Alert Rst o Disc In	V/Mode Isolation o Program	Aircft Type Expansion o Program	Voice Go-Ahead Discretes o		Suggested Spare #3 o	Fault Annun o Disc Out	No Comm o Disc Out
10	Reserved ARINC 724 Functions Frequency Selection for ARINC 546, 566A VHF COM o Out	o Out	o Out	o Out	o Out	o Out	o Out	o Out	o Out	o Out
11	Reserved 724 o Out	Reserved ARINC 724 CU Fault Discretes o	o	o	o	o	Reserved ARINC 724 Unspecified Function Wires to CU o	o	o	o
12	Auxiliary High Speed Data Bus #1 Out o A	o B	Cabin Terminal #1 Data Bus #3A In o A	o B	General Purpose Data Bus #3A Out o A	o B	Cabin Terminal #2 Data Bus #3B In o A	o B	Printer Data Bus #1B In o A	o B
13	Unspecified Function Wires to CU o	o	o	o	o	o	FMC #1 Data Bus #1C Input o A	o B	FMC #2 Data Bus #2C Input o A	o B
14	MCDU #1 Data Bus #1A In o A	o B	MCDU #2 Data Bus #2A In o A	o B	OOOI #1 Digital Data Bus In o A	o B	OOOI #2 Digital Data Bus In o A	o B	MCDU #3 Data Bus #1E In o A	o B
15	Reserved ARINC 573 FDAU Data Bus In o A	o B	Reserved ARINC 724 FMC #2 Data Bus Out o A	o B	General Data Bus #1 Output o A	o B	General Data Bus # 2 Output o A	o B	CFDIU Data Bus #1D Input o A	o B

ATTACHMENT 2-3
CONNECTOR INSERT LAYOUT

<table>
<tr><td>Future
Spare

o
4</td><td>Future
Spare

o
3</td><td>Future
Spare

o
2</td><td>115 Vac Hot

o
1</td></tr>
<tr><td>Future
Spare

o
6</td><td rowspan="2">Chassis
Ground

o
8</td><td rowspan="2">Primary
Cold

o
7</td><td>Future
Spare

o
5</td></tr>
<tr><td rowspan="2">27.5 Vdc Positive

o
10</td><td rowspan="2">Future
Spare

o
9</td></tr>
<tr><td colspan="2">27.5 Vdc Negative

o
11</td></tr>
<tr><td colspan="2">Future
Spare

o
13</td><td colspan="2">Future
Spare

o
12</td></tr>
</table>

ATTACHMENT 3 – ENVIRONMENTAL TEST CATEGORIES

The following DO-160B categories apply to the environmental specification of the ACARS.

ENVIRONMENT	DO-160B SECTION	UNIT LOCATION ELECTRONICS RACK or COCKPIT	
Temperature & Altitude	4	CAT A1	CAT A1
Temperature Variation	5	CAT C	CAT C
Humidity	6		
Shock	7		
Vibration [1]	8	CAT O or B [2]	CAT K or A
Explosion	9	CAT X	CAT X
Waterproofness	10	CAT X	CAT X
Hydraulic Fluid	11	CAT X	CAT X
Sand & Dust	12	CAT X	CAT X
Fungus	13	CAT X	CAT X
Salt Spray	14	CAT X	CAT X
Magnetic Effect	15	CAT A or B	CAT A
Power Input	16	CAT A	CAT A
Conducted Voltage Transient	17	CAT A	CAT A
Audio Frequency Conducted Susceptibility	18		
Inducted Signal Susceptibility	19	CAT A	CAT A
Radio Frequency Susceptibility (Radiated & Conducted)	20	CAT Z	CAT Z
Spurious Radio Frequency Emission	21	CAT A	CAT A

Notes:

1. The use of alternative categories may be necessary if the installation is to be made in other than turbine-powered fixed-wing aircraft. Refer to RTCA DO-160.
2. Allows the alternative already provided by DO-160 (sinewave or random).

ATTACHMENT 4 – FREQUENCY CONTROLS

The diagrams below show possible arrangements for shared Data/Voice use of an ARINC 716 VHF COM transceiver. The transceiver is tuned to the channel selected on the VHF COM control panel for voice communications and to the channel defined in the ACARS MU for data communications. The arrangements indicate that ACARS has ultimate control over the VHF radio frequency. Typically, ACARS is certificated to a lower level of criticality than the VHF radio. To prevent downgrading the VHF radio, it is recommended that the ACARS, or ACARS installation, protect the radio from interference due to an ACARS failure. This protection should be a level of integrity equal to, or higher than, the VHF radio (improbable failure rate). In installations in which the remote Voice/Data switch is not required, it should be omitted. It may be noted that either or both ACARS units may be removed from the aircraft without compromising the availability of the VHF transceiver for voice communications. The reader is reminded that the illustrations above are only representative - there is no assurance that these configurations will be deemed acceptable by the regulatory authorities.

One possible location for the remote Mode annunciator and the remote Voice/Data switch is on the console as illustrated in Figure 4-1. A second possible location for the remote Mode annunciator and the remote Voice/Data switch is the VHF Radio (ARINC 716) Control Panel as illustrated in Figure 4-2.

ATTACHMENT 4
FREQUENCY CONTROLS

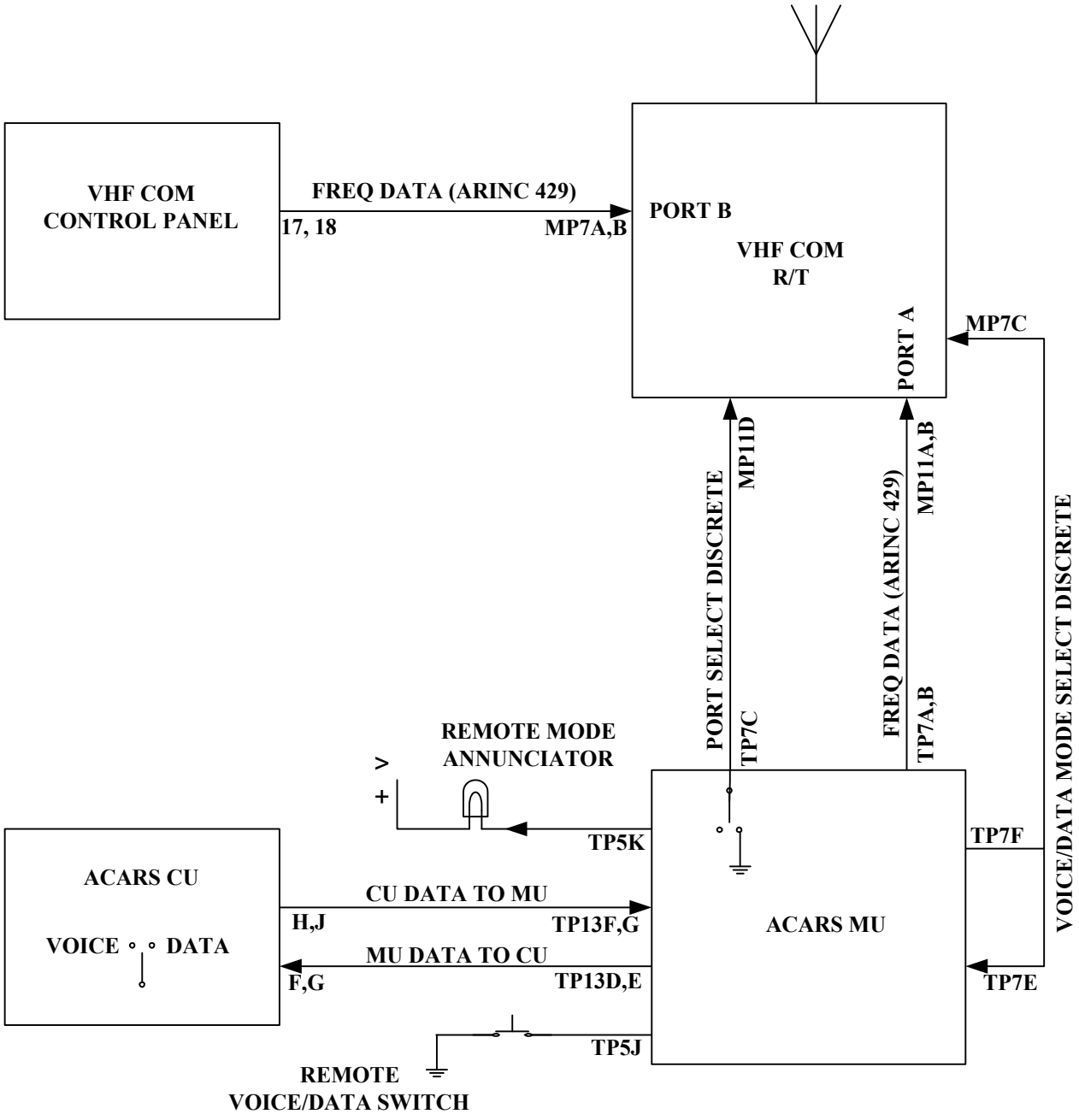


Figure 4-1 – Data/Voice Annunciation, Example 1

ATTACHMENT 4
FREQUENCY CONTROLS

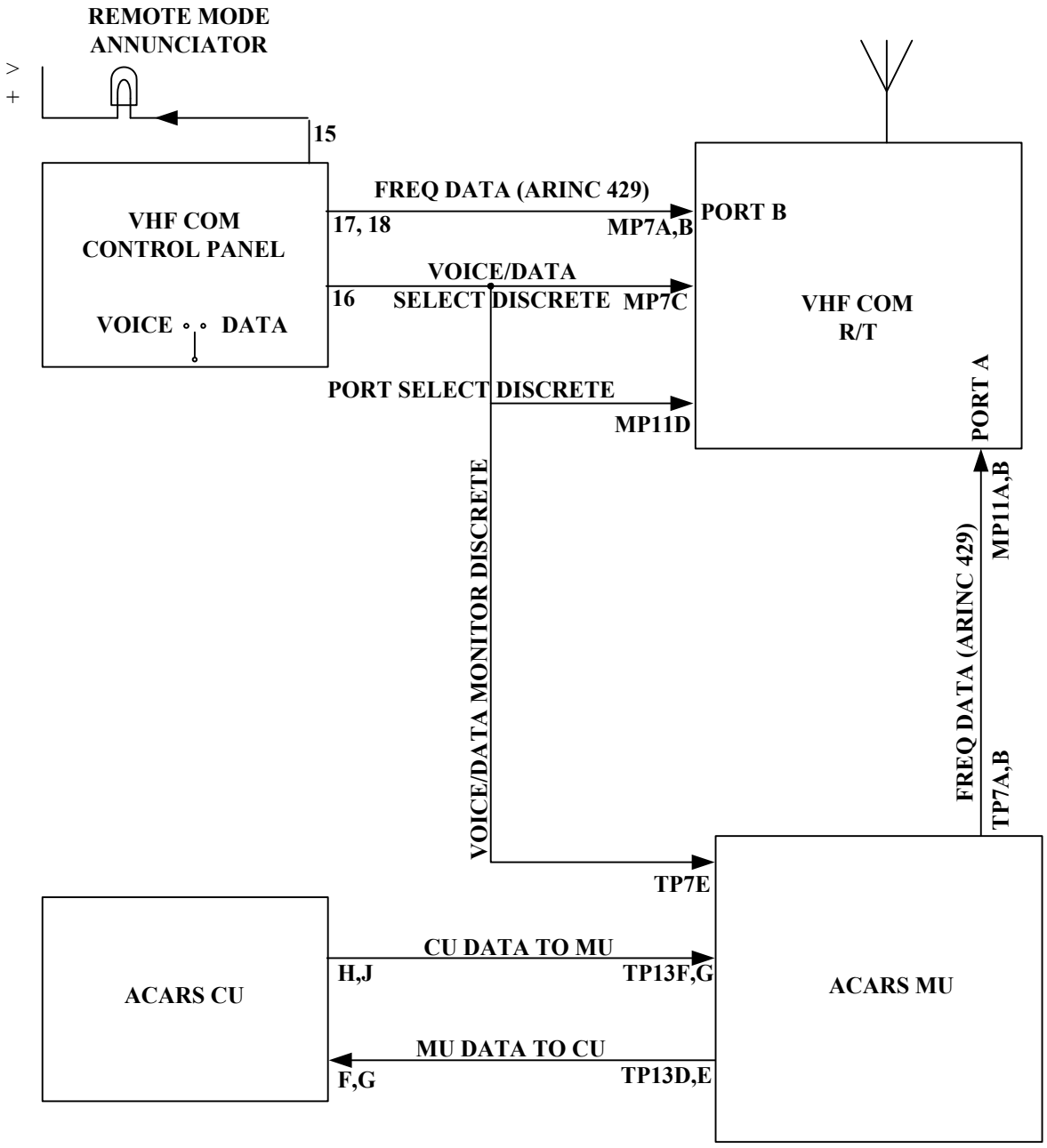


Figure 4-2 – Data/Voice Annunciation, Example 2

Note:

See Attachment 7 of ARINC Characteristic 597 for details of MU/ARINC 546/566A R/T interconnection. The remote voice/data switch will operate as shown above, however.

ATTACHMENT 5 – SERIAL DIGITAL CHANNEL SELECTION

A5-1.0 General

Refer to Section 4.6.2.1 of ARINC Specification 618 for additional description of the serial frequency tuning process.

ARINC Specification 720: *Digital Frequency/Function Selection (DFS) System,* describes the approach to be taken to frequency selection for the ARINC 716 VHF Communications Transceiver. The serial digital interface between the source of channel selection information and the transceiver is described in **ARINC Specification 429**: *Mark 33 Digital Information System (DITS)*. DFS operation may be summarized as follows.

The ARINC 716 transceiver provides two ports, “A” and “B”, for the input of serial digital channel selection data. The binary state of the Port Selection discrete input identifies which of these ports is active. In installations in which the transceiver is tuned from one source only, a VHF COM control panel for example, that source is connected to port “B”. Port “A” and the source selection discrete input are unused. In installations in which the transceiver may be tuned from more than one source, such as the redundant input facilities of the ARINC 720 DFS, the “prime” source is connected to Port “A” and the “back-up” source to port “B”. The state of the source selection discrete, and thus the choice of active port, is controlled through the DFS system.

If the ACARS is to tune an ARINC 716 transceiver on an aircraft on which a single control panel is the only other source of channel selection information, the ACARS output should be connected to port “A” on the transceiver and the control panel to port “B”. The source selection discrete should be wired such that it is placed at airframe ground potential (0 to +3.5 Vdc) when the ACARS is to have control and at a potential of +18.5 to +36 Vdc (or open circuit) when the control panel is the desired tuning data source. The ground available at MU connector pin TP7C during ACARS operations may be the source of this discrete input to the transceiver. This ground will be removed by receipt of a “Voice Go-Ahead” (label 54) uplink, so transferring frequency control of the transceiver to the control panel. On the completion of the voice conversation the ground will re-appear, once again placing frequency control responsibility with the ACARS. Sections 4.1.7.2 and 4.1.7.4 of this document refer. Manual transfer of frequency control from the MU to the control panel and vice versa is also described in these Sections and in Section 4.2.1.4.

If the ACARS is installed on an aircraft with an ARINC 720, or equivalent, DFS controls transceiver channel selection, it will be necessary to interface the ACARS with the DFS in the manner defined in the DFS specification.

ATTACHMENT 5
SERIAL DIGITAL CHANNEL SELECTION

A5-2.0 Serial Digital Channel Selection Word Format

NOTE: The following information is for reference purposes only. **ARINC Specification 429**: *Mark 33 Digital Information Transfer System (DITS),* is the controlling document for these standards. In the event of conflict between the material herein and ARINC Specification 429, the latter should be assumed to be correct.

The standard DITS 32-bit BCD word should be transmitted by the ACARS at the low bit rate defined in ARINC Specification 429. Bit numbers 1 through 8 should contain octal label 030, bits 9 and 10 should be reserved for the Source/Destination Identifier function defined in ARINC Specification 429 (these bits are normally set to 00), bits 11 through 29 should contain the BCD representation of the least significant figures of the frequency to which the transceiver should tune, bits 30 and 31 should constitute the size/status matrix for the word, and bit 32 should be encoded to render word parity odd. The nominal update rate for the word should be 5 times per second.

Word Format Example

VHF/COM

Parity (Odd)	Sign/Status Matrix	10 MHz (3)	1 MHz (1)	0.1 MHz (5)	.01 MHz (5)	0.001 MHz (0)	Reserved (SDI)	Label VHF COM Frequency (030)
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
0	0 0	0 1 1	0 0 0 1	0 1 0 1	0 1 0 1	0 0 0 0	0 0	0 0 0 1 1 0 0 0
		----------< **131.550** >----------						

Since the “hundredths MHz” character in the frequency is always decimal 1, it is not included in the frequency word.

Frequency Range: 118.000 MHz to 136.975 MHz

Frequency Selection Increment: 25 kHz

ATTACHMENT 6 – DIGITAL WORD FORMAT

Table A6-1 – MU OUTPUT DATA WORD, COMMUNICATIONS LINK STATUS - Label 270

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																			SDI		Octal Label 270							
																								0	0	0	1	1	1	0	1

Bit	Description			Coding	Note
1	Label 270			1	
2	.			0	
3	.			1	
4	.			1	
5	.			1	
6	.			0	
7	.			0	
8	Label 270			0	
9	SDI				1
10	SDI				
11	Message Waiting	1 = Message Waiting	0 = No Message Waiting		
12	Link Availability	1 = No Link Available	0 = Channel Available (SAT, VHF, HF or Mode S)		3
13	VHF Voice	1 = Set to Voice Mode	0 = Data Mode		
14	Voice Go Ahead	1 = Voice Go Ahead	0 = Normal		
15	Voice Busy	1 = Voice Circuits Busy	0 = Normal		
16	MU Fail	1 = Fail	0 = Normal		
17	SAT or HF Data Link	1 = No Link Available	0 = Link Available		4
18	VHF Data Link	1 = No Link Available	0 = Link Available		
19	Mode S	1 = No Link Available	0 = Link Available		
20	Active/STANDBY	1 = Active	0 = STANDBY		
21	Printer Message	1 = Printer Not Available	0 = Printer Available		
22	Printer Status	1 = Printer Not Available	0 = Printer Available		
23	ACARS ALERT	1 = Alert	0 = No Alert		
24	HF Data Link	1 = Link Available	0 = No Link Available		
25	Gatelink	1 = Link Available	0 = No Link Available		
26	Reserved: Airframe Specific				
27	Reserved: Airframe Specific				
28	Reserved: Airframe Specific				
29	Reserved: Airframe Specific				
30	SSM				
31	SSM				
32	Parity – Odd				2

ATTACHMENT 6
DIGITAL WORD FORMAT

Notes:

1. SDI Pin Coding

Bits		Meaning
9	**10**	
0	0	Single
0	1	Left
1	0	Right
1	1	Not Used See Note 12 of Attachment 2-2.

2. Sign Status Matrix (SSM) Discrete

Bits		Meaning
31	**30**	
0	0	Valid
0	1	No Computed Data
1	0	Functional Test
1	1	Failure Warning

3. The state of this bit will be derived from bits 17, 18, 19, 24, and 25. Logic will be defined by the user.
4. This bit was redefined (from SATCOM Data Link Available to SATCOM or HF Data Link (HFDL) Available) to avoid the need to reprogram existing FMCs in retrofit installations. Data Word 276 provides further data to fully describe air/ground connectivity status.

ATTACHMENT 6
DIGITAL WORD FORMAT

Table A6-2 – MU OUTPUT DATA WORD, PIN PROGRAM STATUS - Label 276

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																			SDI		Octal Label 276							
																								0	1	1	1	1	1	0	1

Bit	Description			Coding	Note
1	Label 276			1	
2	.			0	
3	.			1	
4	.			1	
5	.			1	
6	.			1	
7	.			1	
8	Label 276			0	
9	SDI				
10	SDI				1
11	Med Level Comm Msg	1 = ACARS Message	0 = No Message		3
12	Low Level Comm Msg	1 = ACARS Message	0 = No Message		
13	Med Level ACARS ATC Msg	1 = ACARS ATC Msg	0 = No Message		3
14	Low Level ACARS ATC Msg	1 = ACARS ATC Msg	0 = No Message		
15	Med Level Printer Message	1 = Printer Message	0 = No Message		3
16	Low Level Printer Message	1 = Printer Message	0 = No Message		
17	Med Lvl Printer ATC Message	1 = Printer ATC Message	0 = No Message	1	3
18	Low Lvl Printer ATC Message	1 = Printer ATC Message	0 = No Message	0	
19	SAT Data Link	1 = No Link Available	0 = Available	1	
20	HF #1 Voice	1 = HF #1 in Voice Mode	0 = HF #1 Not in Voice Mode	1	4
21	HF #2 Voice	1 = HF #2 in Voice Mode	0 = HF #2 Not in Voice Mode	1	4
22	Spare				5
23	.				.
24	.				.
25	.				.
26	.				.
27	.				.
28	.				.
29	Spare				5
30	SSM				2
31	SSM				
32	Parity – Odd				

ATTACHMENT 6
DIGITAL WORD FORMAT

Notes:

1. SDI coding is the same as Label 270 (see Table A6-1).
2. The SSM coding is the same as Label 270 (see Table A6-1).
3. Medium level COMM messages to the aircrew have an associated aural alert.
4. The status of HF #x Voice should be derived from Bit 13 of label 270 data words from the HFDR (see Section 7.3.1 of ARINC Specification 635). If label 270 data word are inactive (not received), the MU should set the HF Voice bit to “1 = HF in Voice”. The MU should also indicate an HFDL system fault in label 350 data words output by the MU per the definition of label 350 in Table A6-x.
5. Spare bits are set to zero (0).

ATTACHMENT 6
DIGITAL WORD FORMAT

Table A6-3 – MU Output Data Word, Failure Status - Label 350

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																			SDI		Octal Label 350							
																								0	0	0	1	0	1	1	1

Bit	Description			Coding	Note
1	Label 350			1	
2	.			1	
3	.			1	
4	.			0	
5	.			1	
6	.			0	
7	.			0	
8	Label 350			0	
9	SDI			1	1
10	SDI			1	
11	MU Failure	1 = Failure	0 = Normal		
12	OOOI #1 Input (L)	1 = Inactive	0 = Active		6
13	OOOI #2 Input (R)	1 = Inactive	0 = Active		6
14	MCDU #1 Input (L)	1 = Inactive	0 = Active		6
15	Printer Input	1 = Inactive	0 = Active		6
16	FMC #1 Input (L)	1 = Inactive	0 = Active		6
17	DFDAU Input	1 = Inactive	0 = Active		6
18	MCDU #2 Input (R)	1 = Inactive	0 = Active		6
19	MCDU #3 Input (C)	1 = Inactive	0 = Active		6
20	FMC #2 Input (R)	1 = Inactive	0 = Active		6
21	CFDIU Input	1 = Inactive	0 = Active		6
22	Cabin Terminal #1 Input	1 = Inactive	0 = Active		6
23	SDU #1 Input (SDU-L)	1 = Inactive	0 = Active		6
24	Crosstalk Data Bus	1 = Inactive	0 = Active		6
25	HFDU/HFDR #1 (HF-L)	1 = Inactive	0 = Active		6
26	SDU #2 Input (SDU-R)	1 = Inactive	0 = Active		6
27	HFDU/HFDR #2 (HF-R)	1 = Inactive	0 = Active		6
28	Cabin Terminal #2 Input	1 = Inactive	0 = Active		6
29	Spare				5
30	SSM				2
31	SSM				2
32	Parity – Odd				

ATTACHMENT 6
DIGITAL WORD FORMAT

Notes:

1. SDI coding is the same as Label 270 (see Table A6-1).
2. The SSM coding is the same as Label 270 (see Table A6-1).
3. Bit 11, MU Failure: The MU should set this bit to a “1” when it detects an internal failure. The MU should reset this bit to a “0” when it passes self test. The default value is “0”.
4. Bits 12-28, Input Bus Activity Flags: All of the input bus activity bits should be initialized to a “1”, then set or reset as the MU determines their activity status. Unconnected input ports should be declared inactive, and the corresponding bit should be set to “1”.
5. Spare bits are set to zero (0).
6. See Table A6-3A for Data Word label and transmission rate.

ATTACHMENT 6
DIGITAL WORD FORMAT

The Data Word labels listed below are recommended for activity monitoring.

Table A6-3A – LRU ACTIVITY LABELS

LRU CONNECTION	ACTIVITY LABEL	TRANSMISSION RATE
Cabin Terminal #1	172	1 Hz
Cabin Terminal #2	172	1 Hz
CFDIU	125	1 Hz
Crosstalk Bus	270	1 Hz
DFDAU	172	1 Hz
FMC #1 Input (FMC-L)	270	1 Hz
FMC #2 Input (FMC-R)	270	1 Hz
HFDU/HFDR #1 Input (HF-L)	270	1 Hz
HFDU/HFDR # 2 Input (HF-R)	270	1 Hz
MCDU #1 Input (MCDU-L)	172	1 Hz
MCDU #2 Input (MCDU-R)	172	1 Hz
MCDU #3 Input (MCDU-C)	172	1 Hz
OOOI #1 Input (EIU-L)	Aircraft Specific	1 Hz
OOOI #2 Input (EIU-R)	Aircraft Specific	1 Hz
Printer Input	350	1 Hz
SDU #1 Input (SDU-L)	270	1 Hz
SDU #2 Input (SDU-R)	270	1 Hz

ATTACHMENT 6
DIGITAL WORD FORMAT

Table A6-4 – MU OUTPUT DATA WORD, FAILURE STATUS - Label 351

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																			SDI		Octal Label 351							
																								1	0	0	1	0	1	1	1

Bit	Description			Coding	Note
1	Label 351			1	
2	.			1	
3	.			1	
4	.			0	
5	.			1	
6	.			0	
7	.			0	
8	Label 351			1	
9	SDI				1
10	SDI				
11	Unassigned				
12	Unassigned				
13	VDR #1 (L)	1 = Inactive	0 = Inactive		6
14	VDR #2 (R)	1 = Inactive	0 = Inactive		6
15	VDR #1 (C)	1 = Inactive	0 = Inactive		6
16	Reserved XPDR #1 (L)	1 = Inactive	0 = Inactive		6
17	Reserved XPDR #2 (R)	1 = Inactive	0 = Inactive		6
18	OOOI #3 Input	1 = Inactive	0 = Inactive		6
19	OOOI #4 Input	1 = Inactive	0 = Inactive		6
20	OOOI #5 Input	1 = Inactive	0 = Inactive		6
21	OOOI #6 Input	1 = Inactive	0 = Inactive		6
22	Spare				5
23	Spare				5
24	Spare				5
25	Spare				5
26	Spare				5
27	Spare				5
28	Spare				5
29	Spare				5
30	SSM				2
31	SSM				
32	Parity – Odd				

ATTACHMENT 6
DIGITAL WORD FORMAT

Notes:

1. SDI coding is the same as Label 270 (see Table A6-1).
2. The SSM coding is the same as Label 270 (see Table A6-1).
3. Bits 11-21, Input Bus Activity Flags: All of the input bus activity bits should be initialized to a “1”, then set or reset as the MU determines their activity status. Unconnected input ports should be declared inactive, and the corresponding bit should be set to “1”.
4. Spare bits are set to zero (0).
5. See Table A6-4a for Data Word label and transmission rate.

ATTACHMENT 6
DIGITAL WORD FORMAT

The Data Word labels listed below are recommended for activity monitoring.

Table A6-4A – LRU ACTIVITY LABELS

LRU CONNECTION	ACTIVITY LABEL	TRANSMISSION RATE
OOOI #1 Input	Aircraft Specific	1 Hz
OOOI #2 Input	Aircraft Specific	1 Hz
OOOI #3 Input	Aircraft Specific	1 Hz
OOOI #4 Input	Aircraft Specific	1 Hz
Unassigned		1 Hz
Unassigned		1 Hz
VDR #1 Input (VDR-L)	270	1 Hz
VDR #2 Input (VDR-R)	270	1 Hz
VDR #3 Input (VDR-C)	270	1 Hz
XPDR #1 Input (XPDR-L)	270	1 Hz
XPDR #2 Input (XPDR-R)	270	1 Hz

APPENDIX A ACRONYMS

ACARS	Aircraft Communications Addressing and Reporting System
AIDS	Aircraft Integrated Data System
ATE	Automatic Test Equipment
BP	Bottom Insert
CFDIU	Centralized Fault Display Interface Unit
DFS	Digital Frequency/Function Selection
DITS	Digital Information Transfer System
DSP	Data Link Service Provider
FMC	Flight Management Computer
GMT	Greenwich Mean Time
HF	High Frequency
HFDL	HF Data Link
HFDR	HF Data Radio
HFDU	HF Data Unit
MU	Management Unit
MCDU	Multi-Purpose Control and Display Unit
MP	Middle Insert
NO COMM	No Communications
OAT	Optional Auxiliary Terminal
OOOI	Out, Off, On, In
PTT	Push to Talk
RMP	Radio Management Panel
SAL	System Address Label
SATCOM	Satellite Communications
SDU	Satellite Data Unit
TP	Top Insert
UTC	Universal Coordinated Time
VHF	Very High Frequency

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SUPPLEMENT 1
TO
ARINC CHARACTERISTIC 724B
AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS)

Published: March 3, 1989

Prepared by the AEEC

Adopted by the AEEC Executive Committee: October 19, 1988

A. PURPOSE OF THIS DOCUMENT

This Supplement provides updates to document the reassignment of connector pins. Complementary chances were made to Notes to the interwiring.

B. ORGANIZATION OF THIS SUPPLEMENT

In the past, changes introduced by a Supplement to an ARINC Standard were identified by vertical change bars with an annotation indicating the change number. Electronic publication of ARINC Standards has made this mechanism impractical.

In this document **blue bold** text is used to indicate those areas of text changed by the current Supplement only.

C. CHANGES TO ARINC CHARACTERISTIC 724B INTRODUCED BY THIS SUPPLEMENT

This section presents a complete listing of the changes to the document introduced by this Supplement. Each change is identified by the section number and the title as it will appear in the complete document. Where necessary, a brief description of the change is included.

4.5.2 Management Unit/On-Board Systems Interface

Delete sixth paragraph containing language stating that the connections of systems to the MU could vary from that shown in Attachment 1-1 and Attachment 2-2 Note 8, 9 and 10.

4.5.2.1 Management Unit/ARINC 739 Multi-Purpose Control/Display Unit Interface

Add text in first paragraph to indicate that the receive lines are associated with the general data bus output.

4.5.2.2 Management Unit/ARINC 740 Multi-Purpose Cockpit Printer Interface

In first paragraph reduce number of printer interfaces from two to one and add references to interwiring attachments.

Add commentary.

4.5.3 Management Unit/Optional Cabin Terminal Interface

Correct section reference.

4.5.4 Communications System Interface

In the first paragraph the references to VHF transceiver and satellite data unit were separated for clarity. Connection to the Mode S transponder was introduced.

4.5.6 Management Unit/Central Warning System Interface

This section was revised to include the ARINC 429 data rate.

4.7.2 Voice Go-Ahead (ACARS to Voice Channel Changeover)

Editorial changes were made to clarify the Digital to Voice Switching process. The reference to Attachment 2 was corrected to correctly reference Attachment 2-2.

4.7.3 VHF #1/#2 Select Discrete Output

Change Section title. Delete previous section entitled MU to Warning System Discrete. Replace with new subject.

4.7.4 Voice to ACARS Channel Changeover (Shared VHF Transceiver Case)

Extensive editorial changes to the first paragraph to clarify the voice to digital data changeover process. Editorial changes to the fourth paragraph to clarify the need for the ACARS to re-enter the frequency acquisition process following voice to data changeover.

4.7.10 Primary MU Inhibit Discrete Input

New Section added.

4.7.11 MU Active/STBY Discrete Output

New Section added.

4.7.12 Data Loader Discrete Input

New Section added.

4.7.13 FMC Active Port Select Discrete Output

New Section added.

4.8.15 Printer Status Reports

Correct section reference in first sentence.

4.8.19 ATIS Request

Correct section reference from 4.8.11 to 4.8.1.1.

4.8.32 Oceanic Clearance Readback

New Section added.

4.9 Priorities

Add new text to describe the need for interleaving messages and describe the method which interleaving is to be accomplished.

4.9.2 User Defined Priority Messages

Delete “Although there is no further discussion on priorities in this document,” from the first sentence of the second paragraph of commentary.

4.9.3 Priority Guidelines

New Section added.

4.10 Polled Mode/Demand Mode Changeover

The word “communications” was added after “downlink” in the second sentence. The incorrect section reference 3.7.2.2 was corrected to read 3.7.1.2.

4.11.4 Mode Character

Editorial change was made in which the information to be transmitted was numbered to distinctly identify them.

4.11.5 Aircraft Address (Registration Mark)

Correct section reference from 4.3.3 to 4.3.3.1.1.

4.12.5 BCS Suffix Character

Add section references.

4.17.5 Labels

Revise text to delete specific call-out of system address label, but retain reference to attachment containing the system address label list.

4.18 Character-Oriented Communications Protocol

Change section title. Delete reference to MU protocol with FMC, DFDAU etc in first paragraph. Add reference to new MU/SDU protocol section. Add new second paragraph under “B” defining the size of the buffer (s). Delete the commentary under Subsection “B”. Add text to provide for only the transfer of entire blocks of data in paragraph four of Sub-section H. Change the definition of bits 9-10 from Expected Block Word Count to Optional Error Code in NAK word in Sub-section I. Add text to clarify that the receiving system may ignore this information.

4.20 MU Interfaces with On-Board Avionics

Add description of protocol options (character-oriented and bit-oriented) for communication with other systems. Add commentary.

4.20.1 MU/DFDAU Interface

Change section title. Correct section reference.

4.20.2 MU/FMC Interface

Change section title from “Flight Management Computer” to “FMC”. Add provision for MU/FMC interface to use bit-oriented link layer protocol. ISO 8208 may be used at the network layer as an option. Correct typographical error “MB” to “MD”.

4.20.3 MU/CFDIU Interfaces

Changed section title (deleted “ARINC 604”). Corrected section reference from 4.20.5.6 and 7 to 4.2.0.5 and 6.

4.20.4 Data Transfer from the MU to FMC, DFDAU and CFDIU

Modify Header table and describe DLU Sequence field. Change section title from “Data Transfer from the MU to AIDS, FMC and CFDIU” to “Data Transfer from the MU to FMC, DFDAU and CFDIU”. Clarify the availability of two network protocols, IDO 8208 and ARINC 429, in first paragraph. Define two data link protocols, bit-oriented and character-oriented, in the second paragraph. Describe the use of label H1 in uplinks in the third paragraph.

4.22 Data Transfer To/From Satellite Data Unit (SDU)

This section was revised to describe OSI architecture. The new bit-oriented MU/SDU data link protocol and ISO 8208 network protocols were specified.

4.23 Data Transfer To/From the Mode S Transponder

New Section added.

ATTACHMENT 1

Add connection to Mode S Transponder.

ATTACHMENT 2-1

Revise assignments for pins TP-2J, 6D, 7J, 10C, 10D, and 14E. Editorial corrections to MP-7J, 7K, 12C, 12G, 14K, 15B and 15K.

ATTACHMENT 2-2

Note 8: Add MCDU at MP-14J, K

Change Input #1D from:
CFDIU 604 MP-7J, K to
CFDIU 604 MP-15J, K

Note 9: Change Input #2D from:

AIDS 717 MP-15J, K to
DFDAU 717 MP-7J, K
Input #2B from:
MCDU #3 740 MP-14J, K to
--- --- ---

Note 11: Add SDU #2 and Mode S.

Note 17: Add text explaining reserved pin.

Note 24: Add new note.

ATTACHMENT 2-3

Change assignments per Attachment 2-1.

ATTACHMENT 9

Add Purpose/Nature codes for Fuel Data, Landing Data, Position Reports and User Defined.

ATTACHMENT 13

Revise Table.

ATTACHMENT 14B, 14C, 14D

Add new data word formats.

ATTACHMENT 15

Add new attachment.

APPENDIX 1

The following new entries were added:
AN, BF, CG, CT, PF, TG and TV.

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SUPPLEMENT 2
TO
ARINC CHARACTERISTIC 724B
AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS)

Published: November 10, 1993

Prepared by the AEEC

Adopted by the AEEC Executive Committee: November 6, 1990

A. PURPOSE OF THIS DOCUMENT

This Supplement introduces changes to ARINC Characteristic 724B. These changes include additions to the interchangeability standards contained in Chapter 2 and revisions to the interwiring list provided in Attachments 2-1 through 2-3.

B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document, printed on goldenrod-colored paper, is the Supplement itself. It contains descriptions of the changes introduced into the Characteristic and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Characteristic, modified as required by the Supplement. The modified and added material on each replacement page is identified in the margin by a “c-2” indicator.

C. CHANGES TO ARINC CHARACTERISTIC 724B INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Characteristic introduced by this Supplement. Each change or addition is identified either by the section number and the title currently employed in the Characteristic 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. A replacement white page for each of these pages is included in the second part of this document, as noted in B above. In this way an accurate record of the development of the Characteristic is preserved.

The interwiring only was corrected. Further change is needed to text to complete the definitions. Future changes in work will result in the development of Project Papers 618, 619 and 620.

2.9 Standardized Signaling

New Section added.

ATTACHMENT 1-1 - SINGLE ACARS AIRBORNE SUBSYSTEM BLOCK DIAGRAM

Figure 1-1 revised.

ATTACHMENT 1-2 - DUAL ACARS AIRBORNE SUBSYSTEM BLOCK DIAGRAM

New Figure 1-2 added.

ATTACHMENT 2-1 - AIRCRAFT COMMUNICATIONS ADDRSSSING AND REPORTING SYSTEM (ACARS)

Interwiring revised.

ATTACHMENT 2-2 - ACARS NOTES APPLICABLE TO THE STANDARD INTERWIRING

Notes 5, 6, 17, 18, 19, 20, 22, 23, 24 were revised. Notes 25, 26 and 27 were added.

ATTACHMENT 2-3 - CONNECTOR INSERT LAYOUT

The connector layout was revised to reflect the changes to Attachment 2-1.

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SUPPLEMENT 3
TO
ARINC CHARACTERISTIC 724B
AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS)

Published: December 15, 1995

Prepared by the AEEC

Adopted by the AEEC Executive Committee: October 31, 1995

A. PURPOSE OF THIS DOCUMENT

AEEC commissioned the ACARS Subcommittee to develop new documentation for the ACARS network and its utilization in order to eliminate the redundancy and contradictions evident in Characteristics 597, 724 and 724B. The ACARS Subcommittee prepared and the AEEC adopted:

Specification 618, “Air/Ground Character-Oriented Protocol Specification”.

Specification 619, “ACARS Protocols for Avionic End Systems”.

Specification 620, “Data Link Ground System Standard”.

The provisions in these new documents supersede the provisions defined in Characteristic 724B-2. This Supplement removes these provisions and replaces them with references to the new material.

This Supplement removes the definitions of air/ground protocol and replaces them with references to Specification 618, “Air/Ground Character-Oriented Protocol Specification”. Onboard protocols define the interface with FMCs DFDAUs, etc.

This Supplement removes the definitions of onboard protocol and replaces them with references to Specification 619, “ACARS Protocols for Avionic End Systems”.

This Supplement removes the definitions of air/ground Airline Operational and Control (AOC) messages and replaces them with references to Specification 620, “Data Link Ground System Standard”.

B. ORGANIZATION OF THIS DOCUMENT

This Supplement introduces a major rework of ARINC Characteristic 724B. The normal practice of publishing a separate supplement to update the existing document has not been followed. The extensiveness of the changes introduced by Supplement 3 has resulted in the impracticality of producing a separate set of replacement pages. Supplement 3 is therefore available only as an integral part of ARINC Characteristic 724B-3. The modified and added material on each page is identified by a “c-3” in the margins.

C. CHANGES TO ARINC CHARACTERISTIC 724B INTRODUCED BY THIS DRAFT SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Characteristic to be introduced by this Supplement. Each change or addition is defined by the section number and the title that will be employed when the Supplement is eventually incorporated. In each case a brief description of the change or addition is included.

1.1 Purpose of This Document

Editorial changes including replacement of a reference to Characteristic 597 with a reference to Specification 620.

1.1.1 Relationship of This Document to ARINC Characteristics 597 and 724

Clarifying text regarding the use of a general data bus interface structure and the ability to interface with a MCDU was added.

1.1.2 Relationship of This Document to ARINC Specifications 618, 619 and 620

New Section added.

1.2 Airborne Sub-System Configuration

Editorial change: replaced “airborne Subsystem” with “single MU configuration.” Reference to dual MU configuration was added. Commentary was added.

1.2.1 Management Unit (MU)

Editorial changes for clarification.

1.2.3.1 Satellite Communications (SATCOM)

New section title inserted. Reference to configuration diagram using satellite system(s) was added.

1.2.3.2 HF Data Communications (HFDL)

New section added.

1.3 Interchangeability

Editorial changes for clarification.

2.3 Standard Interwiring

Editorial changes for clarification including the addition of material moved from Attachment 2-2, notes to interwiring clarifying the factors in selecting of wire sizes.

2.4 Primary Power Input

Editorial changes for clarification.

2.9.2 Standard "Open" Output

Title change - added "Output".

3.1 Introduction

ARINC Specification 618 was developed to encompass all common air/ground protocols in a single document. Much of the protocol information that was superseded was included in ARINC Characteristic 597. The entry in Section 3.1 was changed to refer the reader to Specification 618 rather than Characteristic 597 for air/ground protocol information.

4.0 Management Design

ARINC Specification 618 was developed to encompass all common air/ground protocols in a single document. The material in Specification 618 supersedes air/ground protocol provisions defined in Characteristic 724B. Chapter 4 was the most highly impacted. To retain continuity with the previous Supplement, section titles have been retained. References to the new location of the information was inserted to help the reader locate the desired material.

4.1 Decoding

Section 4.1 has been replaced by a reference to Specification 618.

4.2 Synchronization

Section 4.2 and its subsections have been replaced by references to Specification 618.

4.3 Address Recognition

Although the Address Program pins are seldom used, the definition of coding these was added. The text is essentially identical to that of Characteristic 724. Subsections affected include 4.3.3.1 and 4.3.3.2.

Text of subsections of Section 4.3 that were superseded by ARINC Specification 618 were replaced by a reference to same.

4.4 Uplink BCS Check

This text, superseded by ARINC Specification 618, was replaced by a reference to same.

4.5 Input/Output Interfaces

Editorial changes were made to enumerate the interface possibilities in tabular form and to clarify that the configuration is optional.

4.5.1 Management Unit/OOOI Sensor Interfaces

The number of OOOI sources was increased from 2 to 6. Added reference to Specification 620 for OOOI messages. Added commentary.

4.5.2 Management Unit/On-Board Systems Interface

Specific identification of pin assignments for general bus outputs and corresponding inputs was moved to this section from the notes to Interwiring, Attachment 2-2. Editorial changes were made to clarify references.

4.5.2.1 Management Unit/MCDU Interface

Editorial changes were made to clarify the interface responsibilities of the MU and added references to MCDU Characteristic 739.

4.5.2.2 Management Unit/Printer Interface

Editorial changes were made to clarify the interface responsibilities of the MU and added references to Printer Characteristic 740.

4.5.3 Management Unit/Cabin Terminal Interference

Editorial changes were made to clarify that the user may define his/her own version of a Cabin Terminal. Added references to Specification 619 for interface protocol.

4.5.4 Optional Auxiliary Terminal

New section added.

4.5.5 Communications System Interface

Section number changed to accommodate the addition of new Section 4.5.4. Editorial changes were made to clarify function and references to Specification 618 and Characteristic 718 were added.

4.5.6 Management Unit/Auxiliary Equipment Interface

Section number changed to accommodate the addition of new Section 4.5.4. Function logic was moved to this Section from Note 22 of the Notes to Interwiring (Attachment 2-2).

4.5.7 Management Unit/Central Warning System Interface

Section number changed to accommodate the addition of new Section 4.5.4.

4.6 Universal Coordinated Time (UTC) Clock

Editorial changes. Commentary added.

The text of subsections was replaced with references to ARINC Specification 620 which supersedes the original material.

Original text replaced by a reference to Specification 620.

4.7.1 "No Communications" Alert

Editorial changes to clarify function. Specifically that, once activated, the NOCOMM alert condition would persist until (any) one air/ground connection was re-established. Added commentary and references to Specification 618. Function logic was moved to this Section from Note 25 of the Notes to Interwiring (Attachment 2-2).

4.7.2 Voice Go-Ahead (Data to Voice Channel Changeover)

This section was re-written in its entirety to provide a clearer description and to correct inconsistencies contained in the previous text.

4.7.3 VHF #2 Select Discrete Output

This function was previously defined, but was found to create conflicts in ensuring unimpeded handover of VHF frequency control when a radio was set to the Voice mode. New text removes this function.

4.7.4 Voice to Data Channel Changeover (Shared VHF Transceiver Case)

The description of actions taken by the MU were deleted. This description is included in Specification 618. Refer to appropriate section of Specification 618. Function logic was moved to this Section from Note 3 of the Notes to Interwiring (Attachment 2-2).

4.7.6.1 Voice/Data Mode Annunciation Output

Added commentary.

4.7.10 Primary MU Inhibit Discrete Input

Function logic was moved to this Section from Note 18 of the Notes to Interwiring (Attachment 2-2).

4.7.11 MU Active/STBY Discrete Output

Function logic was moved to this Section from Note 14 of the Notes to Interwiring (Attachment 2-2).

4.7.12 Data Loader Discrete Input

Function logic was moved to this Section from Note 13 of the Notes to Interwiring (Attachment 2-2).

4.7.14 Voice/Data Mode Monitor Discrete Input

New Section added.

4.7.15 Aircraft Configuration

New Section containing function logic moved to this Section from Note 17 of the Notes to Interwiring (Attachment 2-2).

4.7.16 Voice Mode Isolation Discrete

New Section added.

4.8 through 4.8.32

The contents of Section 4.8 (definitions of downlink message text) and its Subsections were deleted and replaced by a reference to Specification 620 which now contains this information.

4.9 through 4.23

The contents of these sections were deleted and replaced by a reference to Specification 620 which now contains this information.

Attachment 1-1

The configuration diagram for a single MU installation was modified to provide LRU identifiers using acronyms from AEEC standards in place of the airframe-specific terms. The number of OOOI sources was increased from 2 to 6.

Attachment 1-2

The configuration diagram for a single MU installation was modified to provide LRU identifiers using acronyms from AEEC standards in place of the airframe-specific terms.

Editorial changes to wiring illustrations were made to clarify the diagram.

Attachment 1-3

New Attachment added.

Attachment 2-1

The titles of pins TP15A-K were revised from “OOOI Sensor Program” to “OOOI Sensor Input”. The titles of pins MP1A-K were revised from “OOOI Sensor Input” to “OOOI Sensor Program”. The word “General” was removed from data bus input identifiers.

Pin TP10C was redefined as Comm #3. Pin MP9D was redefined as the Voice Mode Isolation Program pin. Pin MP9E was redefined as the Aircraft Type Expansion Program pin. This pin effectively doubles the number of different aircraft types that can be identified.

Attachment 2-2

Logic descriptions were removed from the original set of notes and placed in text as follows:

NOTE	SECTION
3	4.7.4
8	4.5.2
9	4.5.2
10	4.5.2
11	4.5.2
19	4.7.12
20	4.7.11
22	4.5.6
23	4.7.15
24	4.7.10
25	4.7.1

These notes now contain a reference to the Section containing the logic description. The wire size considerations of Note 2 were moved to Section 2.3. The contents were replaced with new material defining the new Voice Isolation Mode Program pin. Redundant material was deleted, resulting in renumbering.

The title of Note 20 was changed to reflect the variable interface to air/ground systems (SATCOM, etc.). The text was substantially revised.

Notes 22 and 23 were added.

Attachment 2-3

The titles of pins were changed to reflect the changes to the interwiring list in Attachment 2-1.

Attachment 3

Minor editorial changes were made e.g., deleting a reference to Mark 2 ACARS in the text.

Attachment 4

The contents of Attachment 4 were deleted. Refer to Chapter 4 of Specification 620 for the formats of Command Response, OOOI and link test uplink messages.

The contents of Attachment 7 were moved to Attachment 4 and given a new title, “Frequency Control”. New introductory text was added to define ACARS control.

A second example wiring was added as Figure 4-2.

Attachment 5

The contents of Attachment 5 were deleted. Refer to Specification 618 for this material. The contents of Attachment 8 were moved to Attachment 5.

Attachment 6

The contents of Attachment 6 were deleted. Refer to Specification 618 for a description and listing of Message Originator codes. The contents of Attachment 9 were moved to Attachment 6. Format definitions were added for Data labels 276, 350 and 351.

Attachment 7

The contents of Attachment 7 were moved to Attachment 4 and given a new title, “Frequency Control”.

Attachment 8

This attachment was deleted in Supplement 3. Data now found in Attachment 5.

Attachment 9

This attachment was deleted in Supplement 3. The information contained in Table 9-1, Origin/Destination Codes, is now found in Attachment 3 of ARINC Specification 619. The information contained in Table 9-2, Purpose/Nature Codes, is now found in Attachment 4 of ARINC Specification 619.

Attachment 10

This attachment was deleted by Supplement 3. Refer to Attachment 3 of Specification 618 for this material.

Attachment 10A

This attachment was deleted by Supplement 3. Refer to Attachment 3 of Specification 618 for this material.

Attachment 11

This attachment was deleted by Supplement 3. Refer to Section 2.2.3 of Specification 622 for a description of the text-imbedded Cyclical Redundancy Check (CRC).

Attachment 12

This attachment was deleted by Supplement 3. Refer to Attachment 6 of Specification 618 for a listing of mode character coding definitions.

Attachment 13

This attachment was deleted by Supplement 3. Refer to Part 1 of Specification 429 for System Address Label (SAL) assignments.

Attachment 14

All ARINC 429 Williamsburg word definitions were deleted in Supplement 3. Refer to Part 3 of Specification 429. The remaining information (data word 270) was moved to Table A6-1 of Attachment 6.

Attachment 15

The table enumerating the direction information flow for reporting satellite communication status was deleted by Supplement 3.

Attachment 16

The protocol determination procedure was deleted by Supplement 3. Refer to Part 3 of ARINC Specification 429 for this material.

Attachment 17

An obsolete diagram depicting the OSI network concept was deleted by Supplement 3. Refer to Part 2 of ARINC 741 for this material.

Attachment 18

Obsolete information listing Facility field definition was deleted by Supplement 3. This material does not apply to ACARS MUs, only CMUs. Refer to ARINC Specification 637 for this material.

Attachment 19

The listing of message priority was deleted by Supplement 3. Refer to Section 3.8 of Specification 618 for this material.

Appendix 1

This appendix, “Text Standards for Ground Computer/Airborne Computer Message Exchanges via ACARS” was deleted by Supplement 3. Refer to Characteristic 702 for this material.

Appendix 2

An obsolete copy of the “Aeronautical Telecommunications Network Addressing Plan” was deleted by Supplement 3. Refer to Specification 637 for this material. RTCA and SARPs material also apply.

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SUPPLEMENT 4
TO
ARINC CHARACTERISTIC 724B
AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS)

Published: August 15, 2000

Prepared by the AEEC

Adopted by the AEEC Executive Committee: June 26, 2000

A. PURPOSE OF THIS DOCUMENT

This Supplement incorporates a variety of changes to clarify provisions, add new assignments to the Aircraft Type Program Pin list, and makes editorial improvements.

B. ORGANIZATION OF THIS DOCUMENT

The first part of this document, printed on goldenrod-colored paper is the Supplement itself. It contains descriptions of the changes introduced into the Characteristic and, where appropriate, extracts from the original text for comparison purposes. The second part consists of replacement white pages for the Characteristic, modified as required by the Supplement. The modified and added material on each page is identified by a “c-4” in the margins.

C. CHANGES TO ARINC CHARACTERISTIC 724B INTRODUCED BY THIS DRAFT SUPPLEMENT

This section presents a complete tabulation of the changes and additions to the Characteristic to be introduced by this Supplement. Each change or addition is defined by the section number and the title that will be employed when the Supplement is eventually incorporated. In each case a brief description of the change or addition is included.

4.5.2 Management Unit/On-Board Systems Interface

Attachment reference was corrected.

4.7.2 Voice Go-Ahead (Data to Voice Channel Changeover)

Section reference added. The paragraph concerning DFS port selection and its associated commentary was moved from the penultimate paragraph to the third paragraph.

4.7.4 Voice to Data Channel Changeover (Shared VHF Transceiver Case)

Editorial change: identified Auto/Manual Channel Changeover Program as the signal to be available at pin TP7D.

4.7.6 Voice/Data Mode Selection and Annunciation

New section title.

4.7.6.1 Remote Voice/Data Mode Selection

Subsection renumbered, previously 4.7.6.2.

4.7.6.2 Voice/Data Mode Annunciation Ouput

Subsection renumbered; previously 4.7.6.1.

4.7.8 Dedicated Transceiver Annunciation Program Pin

Title changed.

ATTACHMENT 1-1 – EXAMPLE SINGLE ACARS AIRBORNE SUBSYSTEM BLOCK DIAGRAM

References to ADSU/ATSU removed.

ATTACHMENT 2-1 – AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS) STANDARD INTERWIRING

New format.

ATTACHMENT 2-2 – AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS) NOTES APPLICABLE TO STANDARD INTERWIRING

Note 23 was revised to add B717, MD10, and de Havilland DHC8 assignments.

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SUPPLEMENT 5
TO
ARINC CHARACTERISTIC 724B
AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS)

Published: February 21, 2003

Prepared by the AEEC

Adopted by the AEEC Executive Committee: October 15, 2002

A. PURPOSE OF THIS SUPPLEMENT

This Supplement provides updates to Attachment 2-1 “Aircraft Communications Addressing and Reporting System (ACARS) Standard Interwiring”. Updates are also provided to Attachment 2-2 “Aircraft Communications Addressing and Reporting System (ACARS) Notes Applicable to the Standard Interwiring. Incorporating the changes of this draft, allows operators of ARINC 724B wired aircraft to upgrade to VDL Mode 2 AOA equipment with minimal wiring changes and cost.

B. ORGANIZATION OF THIS SUPPLEMENT

The first part of this document printed on golden-rod paper contains descriptions of changes introduced into this Characteristic by this Supplement. The second part consists of replacement white pages for the Characteristic modified to reflect the changes. The modified and added material on each page is identified by a “c-5” in the margins. Existing copies of ARINC Characteristic 724B may be updated simply by inserting the replacement white pages where necessary and discarding the pages they replace. The golden-rod pages are inserted inside the rear cover of the Characteristic.

C. CHANGES TO ARINC CHARACTERISTIC 724B INTRODUCED BY THIS SUPPLEMENT

This section presents a complete tabulation of the changes and additions to ARINC Characteristic 724B, introduced by Supplement 5. Each change or addition is defined by the section number and title currently employed in Characteristic 724B. In each case a brief description of the change or addition is included.

ATTACHMENT 2-1 – AIRCRAFT COMMUNICATIONS ADDRESING AND REPORTING SYSTEM (ACARS) STANDARD INTERWIRING

In Attachment 2-1, remove Note 11 from TP13J, and add note 24 to Pins TP13H, TP13J, MP7C, and MP7D.

ATTACHMENT 2-2 – AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS) NOTES APPLICABLE TO THE STANDARD INTERWIRING

[23] Airframe Type Program Pins, In the second sentence “Note 28” should be “Note 22”.

In Attachment 2-2, add note 24.

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SUPPLEMENT 6
TO
ARINC CHARACTERISTIC 724B
AIRCRAFT COMMUNICATIONS ADDRESSING AND REPORTING SYSTEM (ACARS)

Published: February 24, 2012

Prepared by the AEEC

Adopted by the AEEC Executive Committee: March 31, 2009

A. PURPOSE OF THIS DOCUMENT

This Supplement provides updates to document the reassignment of connector pins. Several changes were made to Notes to the interwiring.

B. ORGANIZATION OF THIS SUPPLEMENT

In the past, changes introduced by a Supplement to an ARINC Standard were identified by vertical change bars with an annotation indicating the change number. Electronic publication of ARINC Standards has made this mechanism impractical.

In this document **blue bold** text is used to indicate those areas of text changed by the current Supplement only.

C. CHANGES TO ARINC CHARACTERISTIC 724B INTRODUCED BY THIS SUPPLEMENT

This section presents a complete listing of the changes to the document introduced by this Supplement. Each change is identified by the section number and the title as it will appear in the complete document. Where necessary, a brief description of the change is included.

4.5.2 Management Unit/On-Board Systems Interface

Group #4 pins were re-assigned:

DATA BUS	Supplement 5 SIGNAL SOURCE ASSIGNMENT	Supplement 6 SIGNALS SOURCE ASSIGNMENT
Output #4	MU	MU
Input #4A	COMM#1	SDU#1
Input #4B	COMM #2	SDU #2 or HFDR #2
Input #4C	COMM #3	HFDR #1

4.5.5 Communications System Interface

The following sentence was deleted: "*A potential input port is available for the Mode S transponder. If the Mode S transponder is connected to the MU, the COMM #3 port should be used. Refer to Section 4.5.2 for a list of input connections.*"

4.7.17 HFDR Configuration Discrete Input

Pins TP12H and TP12 J were formerly assigned as Buffered Input Discretes. Supplement 6 changed these pin assignments to indicate the presence of HF Data Radio (HFDR) 1 and 2 (respectively).

ATTACHMENT 1-3 – MULTIPLE AIR/GROUND INSTALLATION

Notes 1 and 4 to Table 1-3.1, Typical Air/Ground COMM Configurations, were deleted. These previously read:

[1] The precedence of pin assignments shown in this illustration and the associated table are arbitrary. Actual aircraft installations may vary; i.e., pins TP2C,D are not necessarily the first choice for the assignment of the SDU. And

[4] If installed, the Mode S transponder can only be connected to pins TP10C,D.

References to these notes were removed from the table and the reference to Note 3 (now Note 2) was revised accordingly.

ATTACHMENT 2-1 – STANDARD INTERWIRING

Pins TP12H and TP12J were reassigned from Buffered Input Discrete to HFDR 1 and HFDR 2 Discrete Inputs.

Comm #1, #2, and #3 Pins (TP2C-2D, TP2E-2F, and TP10C-10D respectively) also were reassigned per Section 4.5.2.

ATTACHMENT 2-2 – NOTES APPLICABLE TO THE STANDARD INTERWIRING

New Note 25 was added to document the programming of HFDR Installed Discrete pins TP12H and TP12J.

Minor changes were made to Notes 8 and 20 accommodate the reassignment of Comm #3 to HFDR #1.

ATTACHMENT 2-3 – CONNECTOR INSERT LAYOUT

The assignment of pins TP12H and TP12 J was changed from Buffered Input Discrete to HFDR 1 and HFDR 2 Discrete Inputs.

Comm #1, #2, and #3 Pins (TP2C-2D, TP2E-2F, and TP10C-10D respectively) also were reassigned consistent with Attachment 2-1.

ARINC Standard – Errata Report

1. Document Title

(Insert the number, supplement level, date of publication, and title of the document with the error)

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 *(Optional)*

(State why the correction is necessary.)

6. Submitter (Optional)

(Name, organization, contact information, e.g., phone, email address.)

Please return comments to fax +1 410-266-2047 or standards@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: _____ **Engineer Assigned:** _____

Review Status: _____

ARINC Project Initiation/Modification (APIM)

1.0 Name of Proposed Project **APIM # _____**

(Insert name of proposed project.)

1.1 Name of Originator and/or Organization

(Insert name of individual and/or the organization that initiated the APIM)

2.0 Subcommittee Assignment and Project Support

2.1 Suggested AEEC Group and Chairman

(Identify an existing or new AEEC group.)

2.2 Support for the activity (as verified)

Airlines: (Identify each company by name.)

Airframe Manufacturers:

Suppliers:

Others:

2.3 Commitment for Drafting and Meeting Participation (as verified)

Airlines:

Airframe Manufacturers:

Suppliers:

Others:

2.4 Recommended Coordination with other groups

(List other AEEC subcommittees or other groups.)

3.0 Project Scope (why and when standard is needed)

3.1 Description

(Insert description of the scope of the project.)

3.2 Planned usage of the envisioned specification

Note: New airplane programs must be confirmed by manufacturer prior to completing this section.

Use the following symbol to check yes or no below. ☒

New aircraft developments planned to use this specification yes ❑ no ❑

Airbus: (aircraft & date)

Boeing: (aircraft & date)

Other: (manufacturer, aircraft & date)

Modification/retrofit requirement yes ❑ no ❑

Specify: (aircraft & date)

Needed for airframe manufacturer or airline project yes ❑ no ❑

Specify: (aircraft & date)

Mandate/regulatory requirement yes ❑ no ❑

Program and date: (program & date)

Is the activity defining/changing an infrastructure standard? yes ❑ no ❑

Specify (e.g., ARINC 429)

When is the ARINC Standard required?

_____(month/year)_____

What is driving this date? _____(state reason)_____

Are 18 months (min) available for standardization work? yes ❑ no ❑

If NO please specify solution: _____

Are Patent(s) involved? yes ❑

If YES please describe, identify patent holder: _____

3.3 Issues to be worked

(Describe the major issues to be addressed.)

4.0 Benefits

4.1 Basic benefits

Operational enhancements yes ❑ no ❑

For equipment standards:

a. Is this a hardware characteristic? yes ❑ no ❑

b. Is this a software characteristic? yes ❑ no ❑

c. Interchangeable interface definition? yes ❑ no ❑

d. Interchangeable function definition? yes ❑ no ❑

If not fully interchangeable, please explain: _____

Is this a software interface and protocol standard? yes ❑ no ❑

Specify: _____

Product offered by more than one supplier yes ❑ no ❑

Identify: (company name)

4.2 Specific project benefits (Describe overall project benefits.)

4.2.1 Benefits for Airlines

(Describe the benefits unique to the airline point of view.)

4.2.2 Benefits for Airframe Manufacturers

(Describe the benefits unique to the airframe manufacturer's point of view.)

4.2.3 Benefits for Avionics Equipment Suppliers

(Describe the benefit unique to the equipment supplier's point of view.)

5.0 Documents to be Produced and Date of Expected Result

Identify Project Papers expected to be completed per the table below.

5.1 Meetings and Expected Document Completion

The following table identifies the number of meetings and proposed meeting days needed to produce the documents described above.

Product/Activity	Mtgs	Mtg-Days (Total)	Expected Start Date	Expected Completion Date
Document a	*# of mtgs*	*# of mtg days*	*mm/yyyy*	*mm/yyyy*
Document b	*# of mtgs*	*# of mtg days*	*mm/yyyy*	*mm/yyyy*

Please note the number of meetings, the number meeting days and the frequency of web conferences to be supported by the IA staff.

6.0 Comments

(Insert any other information deemed useful to the committee for managing this work.)

6.1 Expiration Date for this APIM

April/October 20XX

For IA staff use only

Date Received: IA staff : _____

Potential impact: _____

*(**A**. Safety **B**. Regulatory **C**. New aircraft/system **D**. Other)*

Resolution: _____

Authorized, Deferred, Withdrawn, More Detail Needed, Rejected)

Assigned to SC/WG:_____

Submit completed form to the AEEC Executive Secretary.