ARINC

DATA LINK GROUND SYSTEM STANDARD AND INTERFACE SPECIFICATION (DGSS/IS)

ARINC SPECIFICATION 620-5

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

FOREWORD

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

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

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

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

There are three classes of ARINC Standards:

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

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

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

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

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

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

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

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1.0 INTRODUCTION

1.1 Purpose of this Document

This document sets forth the desired interface characteristics of the data link service provider to the data link user. The intent of this document is to provide data link users the information needed to develop applications and to encourage uniformity and standardization, to the extent possible, among the various data link service providers. This document contains general and specific guidance concerning the interfaces between the data link service providers and both the airborne and ground user.

1.2 Scope

This document describes the inputs, functions and outputs of the data link service provider system from the perspective of the data link user. The functions are described in the detail necessary to provide a complete understanding of what the functions do while not restricting the data link service provider network internal implementation. Where there are differences in message formats or functions provided between the various service providers which affect the data link user interface, the differences are specifically described.

1.3 Relationship of the Specification to Other Standards

The documentation of the protocols to be exercised within the ACARS environment is shown pictorially in Figure 1-1, ACARS Documentation.

The protocols used onboard the aircraft by subsystems participating in ACARS are defined in **ARINC Specification 619:** *ACARS Protocols for Avionic End Systems.*

The protocols and procedures to be used for ACARS communications between the airborne user and the data link service provider network are described in **ARINC Specification 618:** *Air-Ground Character-Oriented Protocol Specification.*

The capabilities of the onboard equipment are defined in ARINC Characteristics 724B, 716, 750 and 758 as applicable. Provisions defined within from these Specifications and Characteristics are not duplicated in this document except as necessary to clarify the data link service provider to data link user interface.

COMMENTARY

Legacy ACARS Management Units, defined by ARINC Characteristics 597 and 724 may still be in service.

The ACARS communications function may be provided by a Communications Management Unit (CMU) in lieu of an ACARS MU. The CMU is described in ARINC Characteristic 758. When acting as an ACARS MU, the CMU utilizes the protocols and procedures defined in ARINC Specification 618.

1.0 INTRODUCTION

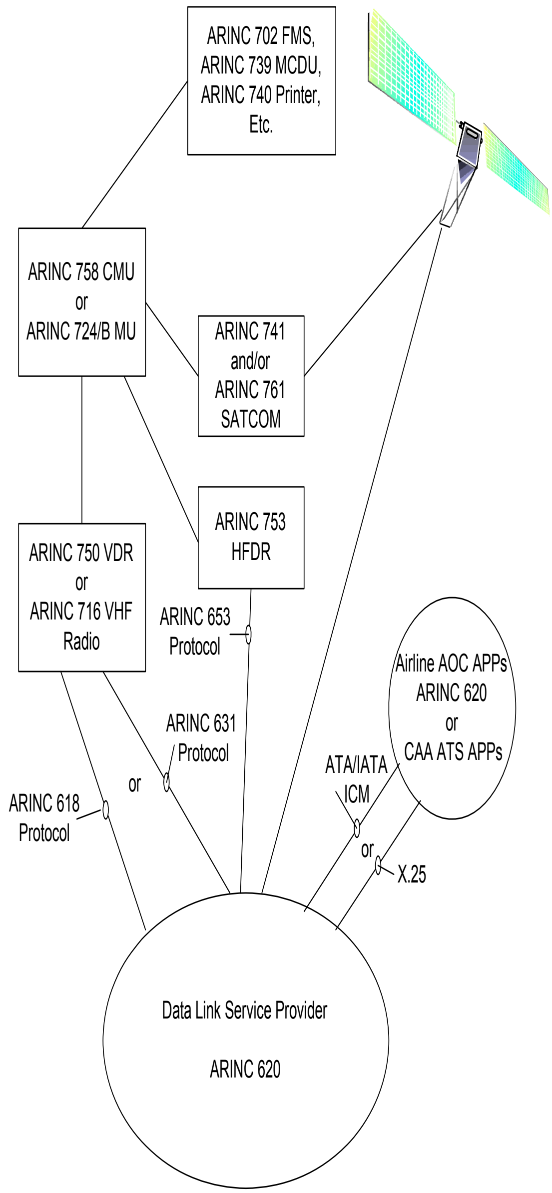


Figure 1-1 - ACARS Documentation

1.0 INTRODUCTION

The CMU is designed to support bit-oriented message transfer utilizing the protocols and procedures for routing. The CMU will interact with onboard systems that supply mobile air-ground communications over VHF, satellite and HF media. These subnetworks are described by AEEC standards:

VHF Data Radio (VDR)	**ARINC Characteristic 750**
Aviation Packet Communications	ARINC Specification 631
Aviation Satellite System	ARINC Characteristics 761 and 741 Part 1 and Part 2
HF Data Link System	ARINC Characteristic 753
HF Data Link Protocols	ARINC Specification 635

The CMU provides routing and transport services for the aircraft per ARINC Characteristic 758.

The protocols and procedures to be administered by the data link service provider are contained herein.

The protocols used between the ground-based user and the data link service provider network are described in the ATA/IATA Interline Communications Manual (ICM).

1.4 System Description

The transport of ACARS Application data over the air-ground segment can be accomplished using services which are two-fold:

- The ACARS Communications Service defined in ARINC Specification 618, which specifies the use VHF, AMSS Data-2 and HF data links as candidate air-ground data links.
- The ICAO-compliant communications services described in ARINC Characteristic 758 for interfacing to the ICAO-compliant subnetworks.

This document specifies a common ACARS user interface to access both Communications Services over the air-ground segment**.**

1.4.1 ACARS System Description

The character-oriented version of mobile communications is referred to as the Aircraft Communications Addressing and Reporting System (ACARS). This system enables aircraft to function as mobile communications terminals. With ACARS, aircraft operate as integral parts of an airline's command, control and management systems.

ACARS provides message transfer between airborne users and ACARS ground users via air-ground links and ACARS ground networks.

Figure 1-1 of Attachment 1-1 shows a typical end-to-end communications environment and applicable Characteristics/manuals.

1.0 INTRODUCTION

The protocols and formats used to transmit messages between the ACARS ground user and the data link service provider network (ground-ground segment) differs from the protocols and formats used to exchange messages between airborne user and the data link service processor (air-ground segment). It is the responsibility of the data link service provider to provide translation between these protocols and formats as well as to provide proper message routing. The formats of messages exchanged between the ACARS ground data link user and the data link service provider network are fully described in this document. The format for ACARS Application text to be exchanged between the airborne user and the data link service provider network is also defined in this document.

The format used to transmit messages between the ACARS ground user and the ACARS ground network is referred to as Standard Message Text (SMT), which uses Standard Message Identifiers (SMI) and Text Element Identifiers (TEI). See Appendix B for SMI/TEI descriptions. The data link service provider is responsible for putting messages received from aircraft (downlink ACARS messages) into SMT format for consumption by the ground data link user, and sending them to their ultimate destination(s). Similarly, data link service providers reformat messages received in SMT from the data link ground based user into air-ground message formats having labels/sublabels/ACARS text and then pass the reformatted messages on to the airborne user.

1.4.2 ACARS Use of ICAO-Compliant Communication Services

1.4.2.1 ICAO Compliant Subnetworks

The early ARINC 618-compliant subnetworks (VHF ACARS, HF ACARS, AMSS Data-2 ACARS) are being replaced by a new generation of air-ground communications.

These new air-ground subnetworks such as VDL (VHF Digital Link) and AMSS Data-3 offer bit-oriented air-ground data communication services based on the Open Systems Interconnect (OSI) architecture and provide the communication framework supporting the Aeronautical Telecommunication Network (ATN) over VHF and Satellite media. Other ICAO-compliant Subnetwork are being specified such as HFDL or Iridium systems which are also potential candidate for transfer of ACARS application data over the air-ground segment.

In particular, the VHF air-ground subnetwork is termed VDL (VHF Digital Link) by ICAO. The two primary standardization organizations that have developed the VDL subnetwork are ICAO Aeronautical Mobile Communication Panel (AMCP) and Airlines Electronic Engineering Committee (AEEC). The AMCP specified and validated VHF Digital Link (VDL) Standard and Recommended Practices (SARPs) for the Air Traffic Services (ATS) community. **ARINC Specification 631:** *Aviation VHF, Digital Link Implementation Provisions* makes direct reference to the ICAO VDL SARPs and is updated to accommodate ACARS use of this new air-ground protocol.

1.4.2.2 ICAO ATN Communications Services

A new architecture for the use in the Aeronautical Telecommunications Network (ATN) environment offers interoperability among various terrestrial, air-ground and avionics subnetworks through conformance with a single bit-oriented ATN Internetworking Protocol, ATN Addressing Plan, and ATN Routing Plan.

1.4.2.3 ACARS Transition Aspects

COMMENTARY

The means for ACARS Applications to benefit from the ICAO-compliant communications service have been implemented.

2.0 DATA LINK SYSTEM

2.1 Overview

Data link is the generic term for air-ground communications which allow transfer of digital information between aircraft and ground based computers connected through a data link service provider's transport network. Possible ways of communicating between a point on the ground and an aircraft in flight are line-of-sight VHF, HF and satellite. As data link use increases, it becomes necessary to have data link channels constantly available. Data link service providers usually have both satellite systems as well as VHF facilities to present precisely the same interface to user's ground based computers.

Introduction of digital air-ground communications (data link) enables direct connection between equipment onboard an aircraft in flight and a service provider's transport network. For the flight crew, this means being able to generate and receive messages as if they had teletype facilities. Furthermore, text-editing capabilities of modern terminals reduce to a minimum the data entry workload on the crew. As well as message exchange capability between aircraft and any destination connected to a service provider's transport network, it is possible to offer interactive access to databases located on the ground. The direct, real-time data exchange allows information to be passed to the aircraft, only involving the crew when necessary for flight operation.

Direct connection of onboard equipment to a modern ground-based data transport network, gives air-ground communications (data link) the benefit of improved accuracy due to automatic error detection.

In addition to manual data entry and printer equipment interfacing with the crew, onboard data link avionics can be connected to other onboard computer-based systems. Some of these are Aircraft Integrated Monitoring System (AIMS), Flight Management System (FMS), and Centralized Maintenance Computer (CMC). These systems send and receive information via data link without requiring crew intervention. Onboard computer systems interface with user's ground based computers which themselves may be fully automatic or manually operated.

The concept of data link is that digital data are passed between an aircraft and a ground station. Equipment required onboard for data link is known as an ACARS Management Unit (MU). ACARS is an acronym for Aircraft Communication Addressing and Reporting System. This name comes from Airlines Electronic Engineering Committee (AEEC) documentation which defines equipment and protocols used on the air-ground channel. The MU is connected to a standard airborne transceiver for data link communication, and may be connected to other airborne equipment via an airborne communication bus defined in ARINC Specification 429.

Equipment necessary on the ground side of data link has a function similar to the ACARS MU. It is generally known as a Remote Ground Station (RGS).

In a data link system, multiple users make use of the same RGS thus optimizing the sharing of resources among members. To achieve this sharing, all stations are connected to a central exchange system. All communications between a data link user and its aircraft pass through this data link processor. The data link processor performs more than a concentration function. In order to avoid each user having to develop a system using ACARS protocol, it performs this service. It also performs a tracking function used to choose which RGS communicates with what aircraft.

Communication between the data link user's ground based computers and the service provider's data link processor conforms to protocols and formats defined in the ATA/IATA Interline Communications Manual (ICM).

2.2 Message Transport

Message transport describes the mechanisms involved with the delivery of messages from source to sink. An aircraft or a ground user can either be a source or a sink. When an aircraft (source) initiates message traffic, a service provider will forward the contents of the message (downlink message) to the appropriate ground user (sink). When a ground user (source) initiates message traffic, a service provider will attempt to deliver the contents of the message (uplink message) to the appropriate aircraft (sink).

2.2.1 Uplink Message Handling

Ground user generated uplink messages are sent to data link service providers as Type-B SMT messages (see Chapter 3.0 and ATA/IATA ICM for details).

If the uplink message is formatted properly and contains the information necessary for proper delivery to the aircraft (See Section 3.2.1.), the DSP will convert (reformat) the SMT ground-ground message into air-ground message. See Section 2.2.5 for handling of improperly formatted messages and unsuccessful delivery of messages.

2.2.2 Downlink Message Handling

Aircraft generated downlink air-ground messages are converted by the DSP (reformatted) into an SMT ground-ground message and forwarded to the proper address(es). Refer to Section 2.2.5 for air-ground messages that cannot be properly reformatted or addressed.

2.2.3 Accountability

The acknowledgment of a ground user uplink message by the DSP implies that the DSP will deliver the uplink message to the aircraft specified or return an intercept message to the message originator specifying the reason for non-delivery.

If an aircraft generated downlink message passes all validation criteria and data link service providers acknowledge (ACK) the message, then data link service providers accept responsibility to deliver that message to the ground user (airline or other host computer) identified in the downlink message. Data link service providers have the option not to acknowledge (ACK) an aircraft generated downlink message.

Data link messages are fully protected from source to sink, however, there is no end-to-end acknowledgment process. End-to-end acknowledgments are the responsibility of the end systems. Message originators receive positive acknowledgment (ACKs) from interim/final handlers only when error free transmissions have been logged to safe storage. These ACK processes are documented in both the ATA/IATA ICM for TYPE-B message switching traffic and in ARINC Specification 618 for air-ground transmissions.

2.2.3.1 Internetworking

Data link service providers may offer internetworking as a service option. Using internetworking capabilities, a data link service provider transfers to another data link service provider uplink messages destined for aircraft not currently listed in the initial data link service provider's aircraft location information. Similarly, a data link service provider accepts uplink messages from another data link service provider unable to deliver the messages.

Data link service providers that initially accept (ACK) uplink messages are responsible either to ensure that messages are delivered, or to intercept unformattable/undeliverable uplink messages to ground users (airline or other host computers).

2.2.4 Prioritization

Data link service providers use a prioritization scheme which emphasizes minimum end-to-end delay to ensure prompt and safe delivery of uplink messages from ground users (airline or other host computers) to aircraft, and downlink messages from aircraft to ground users.

Network management functions take highest precedence in the prioritization scheme to ensure proper link operations.

Acknowledgments to downlink messages from an aircraft are sent upon successful receipt by data link service providers with a priority higher than that of uplink messages to that aircraft.

All voice channel requests are processed prior to any other service related messages scheduled to be delivered to any particular aircraft.

Uplink and downlink message processing are independent processes having no prioritization scheme between them.

Note: In addition, message prioritization is handled by the DSP in such a manner to ensure that no individual ground user is favored over another.

2.2.5 Intercept Message Handling

Messages which cannot be transmitted, reformatted or successfully delivered by the DSP will be intercepted by the DSP and forwarded to the appropriate ground user. See Section 3.3 for detailed format information for intercepted messages.

2.2.5.1 Untransmittable Uplink Messages

Uplink SMT messages which cannot be properly reformatted into air-ground message blocks will be intercepted by the DSP and returned to the message originator with the reason for message interception.

2.2.5.2 Undeliverable Uplink Messages

Uplink SMT messages which were properly reformatted but not successfully delivered to the aircraft will be intercepted by the DSP and returned to the message originator with the reason for message interception. The simplest case is when an aircraft is out of range of a DSP's coverage area, and the DSP receives no acknowledgment from the aircraft.

2.2.5.3 Unformattable Downlink Messages

Downlink messages that cannot be properly reformatted by the DSP will be intercepted and delivered to the ground user address associated with the label/sublabel combination specified in the downlink air-ground message.

Downlink messages that cannot be properly addressed by the DSP will also be intercepted and delivered to a central ground user address designated to handle intercepted messages.

Finally, downlink messages which cannot be identified by agency will be intercepted and delivered to a DSP intercept handling site and then manually interpreted.

2.3 Flight Following

Data link service providers maintain information on the last known transmission path of all aircraft in their area of coverage. Aircraft transmission path information for enroute aircraft is kept for a period of at least x minutes (see Appendix D). Information concerning on-ground aircraft is maintained based on each DSP's requirements.

2.3.1 Aircraft Tracking

Aircraft transmission path information enables data link service providers to identify the last known approximate location of all aircraft kept in the data link system for the interval of time that aircraft transmission paths are maintained.

2.3.2 Optional Geographic Locator (GL) or Airport Locator (AP)

Data link service providers accept uplink messages with or without the geographic locator (GL) or the airport locator (AP) text element identifier TEI, and deliver uplink messages using the best available aircraft location information.

2.3.3 Aircraft Identification

Data link service providers accept uplink messages addressed by Flight-ID (FI) or by Aircraft-Number (AN). For this reason, they maintain a correspondence table that is updated by each downlink message in order to locate the uplink path for the message based on the addressing format used.

Even though the aircraft tracking table can be updated with every downlink, the updating of the Flight-ID table should obey the following rules:

- Do not update the table for a Flight-ID that does not correspond to the definition of the field contained in Sections 2.3.3 of ARINC Specification 618.
- Do not update the table for values that are known to be wrong (e.g., all NULs).
- Do not update the table when the downlink message is a H1 message.

COMMENTARY

H1 downlink messages contain a Flight-ID value that is generated by a peripheral device which may not have been initialized properly.

2.4 Network Management

Station advisory messages are used to inform the ground user (airline or other host computer) of the current status of a data link service provider ground station.

2.4.1 Data Link Station Outage Status (AOS)

Station advisory outage messages provide a current list of inoperable data link stations whenever a station becomes inactive.

2.4.2 Data Link Station Restoral (ARA)

Station restoral advisory messages provide the ground user (airline or other host computer) with a list of data link stations which were recently restored to service.

2.4.3 Data Link Station Addition (ASA)

Station addition advisory messages inform the ground user (airline or other host computer) of the existence of new data link stations available for data link traffic.

2.4.4 Data Link Station Deletion (ASD)

Station deletion advisory messages inform the ground user (airline or other host computer) of the permanent removal of data link stations from the network.

2.5 DSP Connectivity Offering

As a service option, data link service providers may provide connectivity to other data link service providers, agencies, and networks.

An outside agency (e.g., ATC) is one who has direct access to aircraft to provide services usually accomplished by ground users (airline or other host computers). Authority for this access must be obtained from both the ground user and from the data link service provider(s).

The DSP interaction with the Data Link Service User concerning error handling is reporting by exception, that is, the user may assume the message has been delivered unless a reject message is returned.

2.5.1 Data Link Service Provider Exchanges

A ground user (airline or other host computer) may contract with a single (primary) data link service provider. If so, this data link service provider has established, or will establish, message handling agreements with other data link service providers to assure that messages are forwarded to/received from specified aircraft addresses.

Aircraft location information of ground users (airline or other host computers) that contract for internetworking services with multiple data link service providers is exchanged between the contracted data link service providers so that ground user (airline or other host computer) uplink messages are efficiently delivered. Services include:

- Data Link Station Restoral (ARA).
- Data Link Station Addition (ASA).
- Data Link Station Deletion (ASD).

See Sections 2.4.2, 2.4.3, and 2.4.4 for the definitions of ARA, ASA and ASD.

2.6 Function Summary

A summary of data link system functions provided by each data link service provider is presented in Appendix F.

3.0 MESSAGE HANDLING

3.1 Introduction

This chapter describes the handling of messages by the data link provider. The messages are identified in two categories of traffic flow:

- Downlink: from the aircraft to the ground user.
- Uplink: from the ground user to the aircraft.

The path of the ACARS data link messages is broken into two segments as illustrated in Figure1-1 of Attachment 1.

This chapter provides information on the format of messages in each direction of traffic flow. This chapter also includes a description of the service messages and Network Advisory messages sent to the ground user by the DSP to indicate the status of the ground station network.

3.1.1 Chapter Outline

This chapter is broken down into several sections as follows:

Section 3.1 provides basic definitions and a brief an outline of this chapter.

Section 3.2 describes the handling of ground-ground messages by the data link service provider and the conversion rules that are applied by the DSP to forward message to and from the air-ground and Ground segment. It specifies the use on the DSP interface to ground systems of the IATA Standard Message Text (SMT) format. The function of ACARS messages is indicated on the interface to the ground systems by a three-character Standard Message Identifier (SMI) and on the interface to the aircraft by a two-character ACARS label.

Sub-section 3.2.1 specifies ground-ground message formats and content in each direction of traffic flow in the form of characters encoded as 7-bit binary codes using the ASCII or ISO No. 5 alphabet, limiting the content of the user data to the codes which represent printable characters.

Sub-section 3.2.2 describes the downlink conversion function that generates ground-ground data elements from air-ground data elements.

Sub-section 3.2.3 describes the uplink conversion function that generates air-ground data elements from ground-ground data elements.

Section 3.3 includes a description of the service messages sent to the ground users by the DSP on the ground-ground segment.

Section 3.4 includes the network advisory messages sent to the ground users by the DSP indicating the status of the ground station network.

Section 3.5 specifies a generic user interface by a set of primitives used between the 620 ACARS Messaging Function of the air-ground segment and either the **ARINC Specification 618**, *ACARS Communications Service,* defined in ARINC Specification 618 or the emulation of the ARINC 618 ACARS service.

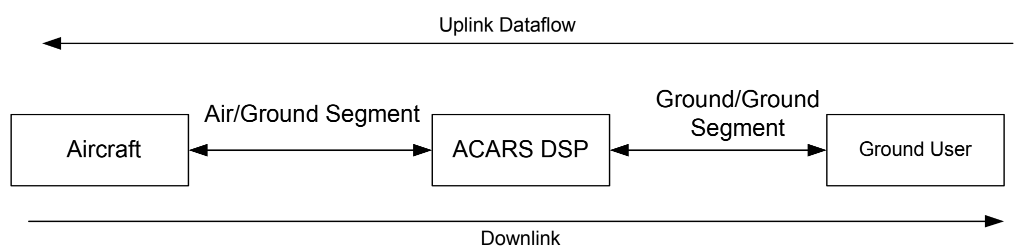
Section 3.6 introduces some of the constraints that are imposed on the application and the ground-ground connection because of the need for these messages to transit the air-ground link.

3.1.2 Definitions

The messages are identified in two categories of traffic flow:

- Downlink: from the aircraft to the ground user
- Uplink: from the ground user to the aircraft

The path of the ACARS data link messages is broken into two segments as illustrated in the figure in Section 1.3 below, the ground-ground and air-ground segments, as illustrated below. See also Figure 1-1 of Attachment 1.

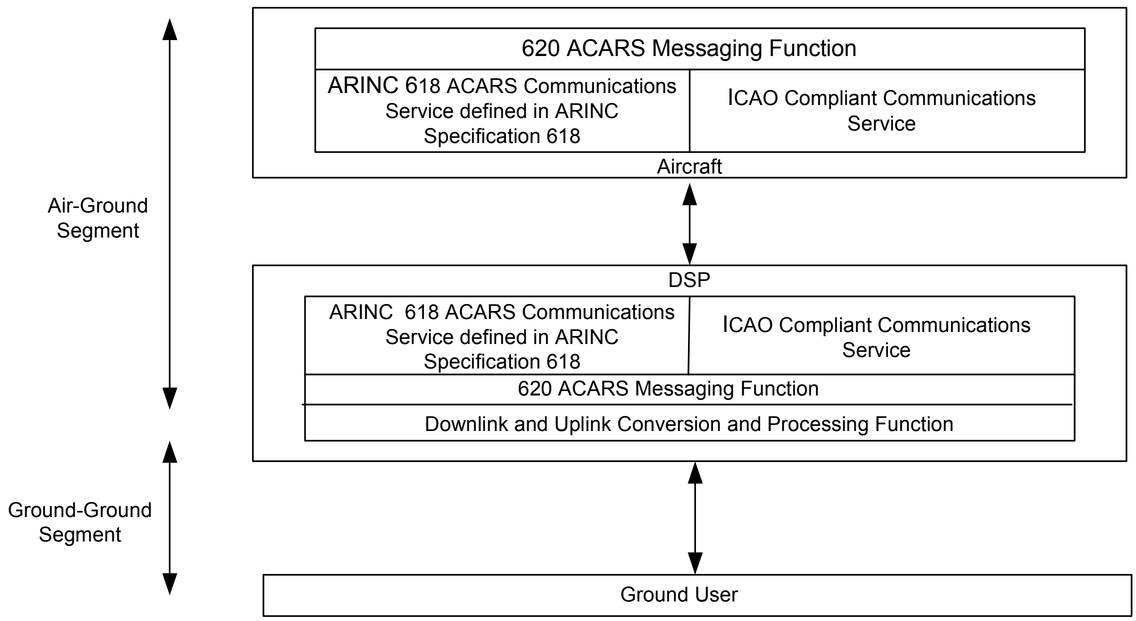


This chapter fully specifies the handling of uplink and downlink traffic flows as far as message format and protocol used on the DSP to ground user interface (ground-ground segment), as well as the conversion rules the DSP applies between the air-ground and ground-ground segment (e.g., SMI/Label conversion). The air-ground segment starts with the 620 ACARS Messaging Function which accepts and forwards ACARS application data from upper layer to the lower layer of the Communications services, and vice versa. The transport of ACARS application data over the air-ground segment can be accomplished using services which are two-fold:

1. The ARINC 618 ACARS communications service defined in ARINC Specification 618.
2. The ICAO-compliant communications service.

A common interface of access to both services from the 620 ACARS Messaging Function is specified in Section 3.5 of this chapter. It should be noted that DSP should stand for data link service provider in a broad sense and not restricted to data link service processor. The figure below summarizes the architectural concept presented in this chapter.

3.0 MESSAGE HANDLING



3.2 Ground-Ground Segment Specification (DSP to Ground User Interface)

3.2.1 General Ground-Ground Message Format

The format of the ground-ground messages is governed by the IATA Systems and Communications Reference (SCR) Manual.

Table 3.2.1-1 - General Format of Ground-Ground Messages

Line	Contents	Example
1	Priority/Destination Address	QU ADRDPAL
2	Signature/Transmission time	.DSPXXXX 121212
3	Standard Message Identifier (SMI)	AGM
4-m	Text Elements	FI XX0001/AN N123XX
m-n	Free Text	- UPLINK OR DOWNLINK

This section describes how each part of the ground-ground message is formed.

Line 1 of the ground-ground message is the Priority/Destination Address line (also known as simply the Address line). The Destination Address line is composed of the priority of the ground message and the address list of the intended recipients. The two-character Priority identifier is used to indicate the priority of the message. There is only one priority code in use, thus all messages are encoded with the characters QU. This is followed by a SPACE and then the Destination Address list. Each address is 7 characters long. If more than one address is included, they are separated by a SPACE. This line ends with a [CARRIAGE RETURN/LINE FEED] <cr/lf>. The maximum number of addresses is 16.

Line 2, the Signature line begins with the PERIOD character <.> and is followed by the address of the sender. After the sender's address it is possible to add a timestamp in the format ddhhmm (day/hour/minute). It is possible to enter further signature information after the timestamp. This line ends with [CARRIAGE RETURN/LINE FEED] <cr/lf>.

Line 3, the Standard Message Identifier (SMI) line contains a three character code. The line terminator for the SMI line is a [CARRIAGE RETURN/LINE FEED] <cr/lf> sequence. Further information concerning the use of SMIs is provided in Appendix B and Appendix C. Section B.1 of Appendix B contains a list of assigned SMI codes. Section B.3 lists the rules for SMI and TEI use. Table C-1 and C-2 of Appendix C lists the SMIs and their respective Label/Sublabel assignments.

Line 4, the Text Element field of the message, is a series of Text Elements. Each Text Elements is composed of 3 parts: Text Element Identifier (TEI), Data, and a Text Element Terminator (TET). Text Element syntax is provided in Table 3.2.2-2.

Table 3.2.1-2 - Text Element Structure

Field	Length	Coding
Text Element Identifier (TEI)	2 characters	Alpha/Numeric
Text Element delimiter	1 character	space
Text Element Data field	Variable (depends on TEI)	
Text Element Terminator	1 character	</> if another Text Element follows or <cr/lf> if this is the final Text Element

The first Text Element is usually the Flight Identifier (FI). The Flight Identifier is composed of a two character Airline Identifier and a four character Flight Number. Refer to ARINC Specification 618 for definition of Flight ID.

Further information concerning the use of TEIs is provided in Appendix B. Section B.2 contains a list of assigned TEI codes and the composition of the respective data elements. Section B.3 lists the rules for TEI use.

Line 5, the final segment of the ground-ground message is free text. Free text is optional. Free text is not part of a message's structured text. If free text is included in the message, it immediately follows the last line of the structured text portion of the Text Element field. A unique TEI is used to indicate the start of the free text portion of message. This TEI is the DASH <-> character followed by a SPACE $<_{sp}>$ character; i.e. $<-_{sp}>$. This TEI appears only at the beginning of the first line of free text. The TEI is itself followed by a SPACE character to separate it from the first character of the free text; therefore the complete message structure is [DASH SPACE SPACE] $<-_{spsp}>$ free text.

3.2.2 Downlink Conversion and Processing Function

This section specifies the conversion rules that are applied on the receipt of a downlink ACARS message to generate a downlink ground-ground message to the target Ground Users.

Airborne generated ACARS messages are received by the data link service provider (DSP) through a ground station. When the DSP receives a downlink ACARS message from an aircraft, the Label within the ACARS message indicates whether a ground-ground message should be generated and sent by the DSP to the user. The DSP transmits these messages to the ground user as ATA/IATA standard messages (Type B). Ground-ground messages should have the following structure:

Table 3.2.2-1 - General Format of Ground-Ground Downlink Messages

Line	Contents	Example
1	Priority/Destination Address	QU ADRDPAL
2	Signature/Transmission Time	DSPXXXX 121212
3	Standard Message Identifier	AGM
4	Text Elements	FI XX0001/AN N123XX
5	Communication Service Line	DT DSP RGS 121212 M01A
6-n	Free Text	- DOWNLINK

Note: The contents of this table are entered in an abbreviated and symbolic format. The conventions used to describe the contents are shown in Table 3.2.2-2.

Table 3.2.2-2 - Notes to ACARS Messages

Entry	Interpretation	Range Of Values
underlined UPPER CASE characters	Fixed Text for display/printing	(A .. Z) + (0 .. 9) + Punctuation
lower case characters	Description of fixed text character for display/ printing or display/printer control	
<lower case characters>	Description of variable text for display/printing	
	<yymmdd>	Year (00 ..99) Month (00 .. 12) Day (00 .. 31)
	<ddhhmm> or <hhmm>	Day (00 .. 31) Hours (00 .. 23) Minutes (00 .. 59)
N	Numeric character only for display/printing	0 .. 9
A	Alpha character only for display/printing	A .. Z
H	Hexadecimal	(0 .. 9) + (A .. F)
X	Alphanumeric character for display/printing	(A .. Z) + (0 .. 9)

Lines 1, 2, 3, 4 and 6-n are constructed the same as their corollary lines in the general format described in Section 3.2.1 The descriptions below expand on the use of these fields for downlink messages.

Destination Address line: QU ADRDPAL

In Line 1, the Destination Address line, the list of addresses to be used when sending the message is defined by: (1) the Airline and Label/Sublabel, (2) the Airline and Label/Sublabel/MFI combination and Supplemental Addresses in the ACARS downlink.

Signature line: .DSPXXXX 121212

Line 2, the Signature line, contains the IATA address of the data link service provider (DSP), followed by the date and time at which the message is sent into the ground network by the DSP.

SMI Line: AGM

Line 3, the Standard Message Identifier (SMI) line, is dependent on the label and sub-label of the ACARS message. See ARINC Specification 618 for an explanation of how the SMI is associated with the label and sub-label. Appendix C gives a full list of the conversion between message label and SMI and between Sublabel and SMI.

As an example, the SMI of ETA is always assigned as the SMI for a Label Q2 (estimated time of arrival) downlink message. However, DSPs may assign any one (of many) SMIs to a Label Q1 downlink message [e.g., DEP (departure report), ARR (arrival report), or AGM (miscellaneous air-ground message)], depending on what data is presented in the Text field.

TE Line: FI XX0001/AN N123XX
Line 4, the Text Element line(s), consists of a sequence of text elements beginning with the Flight Identifier and the aircraft Registration Number. The presence of other text elements depends on whether there is a fixed part included in the Application Text portion of the downlink ACARS message. All TEIs and their associated data are contained on the TE line, except the free text TEI (see free text below).

Filling a field with NULs will result in the corresponding TEI being omitted from the TE line. Filling a field with spaces will result in the corresponding TEI being included on the TE line with a data field filled with spaces.

ARINC strips leading periods from the Registration Number (AN field) and leading zeros from the FI field. SITA does not strip either periods or zeros.

DT Line: DT DSP RGS 121212 M01A
Line 5, the communication service line, contains the text element Identifier DT. The communication service line contains the last text element. It consists of four fields:

- DSP Identifier (e.g., DDL - see below).
- Ground Station of reception of the downlink ACARS message. Specifically when using ARINC 618 ACARS Communications Service, the ground station that should be retained is the one having received the first 618 block of the downlink ACARS message.
  - For VHF, the Remote Ground Station (RGS) Identifier.
  - For SAT, the Ground Earth Station (GES) Identifier.
  - For HF, the HF Ground Station Identifier.
- Message Reception time stamp (UTC in the form: date, hours, minutes).
- Message Sequence Number as provided in the downlink ACARS message. Specifically when using ARINC 618 ACARS Communications, the message sequence number that should be retained is the one assigned to the first 618 block of the downlink ACARS message.

Table 3.2.2-3 - ICAO/IATA DSP Identifier Letter Codes

Service Provider	DSP Identifier Letter Codes	
	ICAO Ground to Ground	IATA Air to Ground
Honeywell	ASA	AS
ARINC	DDL	XA
AVICOM Japan	JDL	JD
Brazil	DPV	XB
Brazil/SITA Internetworking	QXB	[1]
China	BJS	XA
Satellite AIRCOM	QXT	Not Applicable
SITA AIRCOM	QXS	XS
SITA/AVICOM Internetworking	QXJ	[1]
AEROTHAI	BKK	XA

Note: Internetworked service providers (e.g., QXB) do not have two character IATA air-to-ground codes associated with it since the service provider will only advertise its own ID. The three character code will appear only in the formatted ground-ground messages.

Free Text: - DOWNLINK

Many messages contain free text. The free text field follows any fixed text elements (see Chapter 5). When the Application Text field contains fixed text elements, then the fixed text elements and the associated TEIs are added to the TE line. The free text portion of the Application Text downlink field is contained in the free text section of the Ground-ground message. The free text section of the ACARS ground-ground message consists of the TEI (DASH SPACE) <-$_{SP}$> followed by a SPACE <$_{SP}$> as a separator, then the non-structured text part of the ACARS message.

For some message types it is possible to include Supplementary Addresses in the message text. See ARINC Specification 618 for further details.

Example of downlink label Q1 message application text:
QU <USER ADDRESS> .DSPXXXX AGM FI XX300/AN N1003XX/AD SEA/OT 1259/OF 1305/ON 2134/IN 2145/FB 0123/DS DFW DT DSP RGS 182111 M01A -<sp><sp>FREE TEXT

While processing a downlink Label Q1 message, DSPs may identify the following Text Element Identifiers (TEIs):

Table 3.2.2-4 - Example TEI List

TEI	Description	Coding
FI	Flight Identifier	2 Alpha/Numeric plus 1-4 Alpha/Numeric
AD	Destination Airport	3 Alpha Characters (IATA format)
AN	Aircraft Identifier	1-7 Alpha/Numeric
OT	OUT Time	4 Numeric Characters
OF	OFF Time	4 Numeric Characters
ON	ON Time	4 Numeric Characters
IN	IN Time	4 Numeric Characters
FB	Fuel On Board	4 Numeric Characters
DS	Destination Station	3 Alpha Characters (IATA format)
<-$_{SP}$>	Free Text	

See Appendix B.1 for a full listing of TEIs.

Data link service providers assign an SMI for the Label Q1 message as follows:

- DEP (departure report) SMI. Assigned if either the Out-time or the Off-time fields or both fields contain data.
- ARR (arrival report) SMI. Assigned if either the On-time or the In-time fields or both fields contain data.
- AGM (miscellaneous air-ground message) SMI. Assigned if:
  - Out-time, Off-time, On-time and In-time fields all contain data.
  - Illogical data is contained in text (e.g., Out-time and On-time fields contain data, but Off-time and In-time fields do not).

3.2.2.1 Downlink Addressing

The DSP uses several elements of a downlink ACARS message in order to determine where to sent it. The label, sublabel, MFI and supplementary address fields are used by the DSP to determine where to send copies of the downlink message. Some downlinks contain all four fields and some downlink message definitions include only one of these fields. Some fields are optional depending on the message content and originator. The following subsections clarify the allowable configurations. Chapter 5, which defines the downlink message formats, explicitly identifies which fields are available for addressing purposes in each downlink.

The destination address(es) is placed in the Priority/Destination line, Line 1, of the ground-ground message per Section 3.2.1.

The address(es) of a downlink message is determined by the DSP. The DSP uses the label and either the Airline Identifier or Aircraft Registration Number to determine where to forward the downlink message. The DSP translates the label into an SMI. See Table C-2 of Appendix C. The DSP maintains a table for each customer that is used to correlate the downlink address with the proper ground address for routing.

Extensions of the basic addressing scheme are described in Sections 3.2.2.1.1 and 3.2.2.1.2.

3.2.2.1.1 Downlink Addresses of Messages From an ACARS Peripheral

When the message originator is an ACARS peripheral then the downlink addressing scheme is augmented by the addition of a Sublabel field. Each ACARS peripheral is assigned a unique sublabel. Thus the combination of label (H1 for ACARS peripherals) and sublabel unambiguously identifies the message originator and thus permits the DSP to deliver an AOC message to the address(es) in its look up table. See Table D-1 of Appendix D to Specification 622 for a listing of ACARS peripheral sublabels.

Recently, a second addressing mechanism was defined in order to augment the routing of ATS messages originating from ACARS peripherals. A field called Message Function Identifier (MFI) was created in order to identify ATS functions from an ACARS peripheral. By including the MFI as the first element of the Supplementary Address field, it is now possible for the DSP to route messages from ATS functions (applications) in an ACARS peripheral to peer ATS functions on the ground. The DSP uses the MFI as an additional index into its lookup table in order to determine the ground address(es) of the ATS message. The coding and use of the downlink MFI is defined in Sections 5.3.38 through 5.3.51.

COMMENTARY

The MFI field was created because it is needed for ATS messages. Subsequently some AOC messages have been defined that contain the MFI as well. See Table C-2B of Appendix C for a listing of MFI assignments.

3.2.2.1.2 Downlink Supplementary Addresses

For some downlink message types it is possible to include Supplementary Addresses in the message text. These messages are shown in Table 3.2.2.1.2-1.

Table 3.2.2.1.2-1 - Downlink Messages with Possible Supplementary Addresses

Description	Label
Undelivered Uplink Report	HX
Aircrew addressed	80 to 8~
User Defined Message	M2
Optional Auxiliary Terminal	H1
Command Response Downlink	RB (Command/Response Downlink)
Air Traffic Service Messages	Bx (B0 to B9, and BA to BF)
Vendor Defined Downlink	VA to VZ and V0 to V9
VHF Network Statistics Report	S1
LRU Configuration Report	S3

A Supplementary Address is normally either 7, 4, or 3 characters in length. If an MFI is included as the first entry of the Supplementary Address field, it is 2 characters in length. All other Supplemental Addresses in a single message must be of the same length.

COMMENTARY

The 3 character codes are from the International Air Transport Association (IATA) Table and the 4 character codes are from the International Civil Aviation Organization (ICAO) Table of Addresses. ARINC does not currently support the use of 3 character optional addressing. Each message type has the potential to be delivered to a different address at the same airport or ATC facility.

In the case of a 7-character Supplementary Address, the address information is moved, without any translation, from the ACARS downlink block to the address line of ACARS ground-ground message. In case of 3 (or 4) character code Supplementary Addresses, a conversion table maintained by the DSP is used to derive an associated 7-character address to be entered in the Destination Address line, Line 1, of the ground-ground message in place of the 3 or 4 character code. One 3 (or 4) character code can generate several Supplementary Addresses. Agencies should inform DSPs as the need for 3 and 4 character codes arise so that the DSP Tables can be properly configured.

COMMENTARY

The translation of 3 or 4 character addresses into a 7 character address by the service provider should be both label-sensitive and airline-sensitive. Each message type has the potential to be delivered to a different address at the same airport or ATC facility.

3.2.2.1.3 Supplementary Address Field

When Supplementary addresses are included in the downlink, the Supplementary Address field begins with the Slash character </> and is immediately followed by the first character of the first address. If the downlink is a message from an ACARS peripheral, the first entry in this field may be a 2-character MFI. Subsequent addresses in the Supplementary Address field are separated by a space <sp> character. The last address in the list is followed by a period <.> character. The maximum number of Supplementary Addresses is 16.

The Supplementary Address field for an AOC or an ATS message that does not contain an MFI is constructed as follows:

Character No.	Description	Notes
1	Slash	
2-n	Supplementary Address	1
n-m	Optional Additional Supplementary Address(es)	1,2
m+1	Period	

Notes:

1. Length can be 3, 4 or 7 characters; all addresses are the same length.
2. Quantity variable; each address is separated by a space.

AOC Message Examples:	
/CHIVUUA .	(to Chicago)
/CHIVUUA <$_{sp}$> SANKLUA .	(to Chicago and San Diego)

ATS Message Examples:	
/LAX0501.	(to Los Angeles)
/LAX0501 <sp> ORDONY1 <sp> PITK123.	(to Los Angeles, Chicago and Pittsburgh)

The Supplementary Address field for an AOC or an ATS message that does contain an MFI is constructed as follows:

Character No.	Description	Notes
1	Slash	
2-3	MFI	
4	Space	
5-n	Supplementary Address	1
n-m	Optional Additional Supplementary Address(es)	1, 2
m+1	Period	

Notes:

1. Length can be 3, 4, or 7 characters; all addresses are the same length.
2. Quantity variable; each address is separated by a space.

AOC Message Examples:	
/H2 <sp> CHIVUUA .	(to Chicago)
/H2 <sp> CHIVUUA <sp> SANKLUA .	(to Chicago and San Diego)

3.2.2.1.4 Downlink Address Conversion

The Table below summarizes the conversion rules applied by the DSP to convert a downlink ACARS message parameters into downlink ground-ground message parameters. The first column entails the air-ground input parameters extracted out of the downlink ACARS message to generate the ground-ground output parameters found in the last column. The output parameters are needed to format the downlink ground-ground message sent to the user. The center column lists the processing functions involved in the conversion.

Table 3.2.2.1.4-1 - Downlink Conversion and Processing Function

ACARS Messaging Function →

Air-Ground Input Parameters	**DSP Processing**	**Ground-Ground Output Parameters**
Airline Code Label/Sublabel MFI 7-character Supplemental Address(es) 3-character IATA or 4-character ICAO code	QU Address Line generation	7-character destination address list
	Originator generation	7-character address of the DSP
Label/Sublabel	SMI generation	SMI
Aircraft Tail Number Flight Identifier	AN/FI TEI generation	/FI /AN
Label/Sublabel ACARS Text	Additional TEI generation	TEI list
MSN	DT line generation	3-character DSP ID Ground Station-ID UTC Time MSN
Label/Sublabel/ACARS Text	Free Text generation	Free Text

3.2.3 Uplink Conversion and Processing Functions

Uplink ground-ground messages received by the DSP for transmission to an aircraft are accepted if the following conditions are fulfilled:

- The timestamp of the message indicates a ground transit time less than the stale message rejection limit.
- The SMI is valid and is approved for use by the ACARS user.
- The SMT contains either an Aircraft Registration Number (AN) text element or a Flight Identifier (FI) text element and the corresponding text element is valid. Refer to Appendix B2. If the DSP does not have tracking information for the aircraft addressed, the following supplementary condition applies:
- If the SMT contains either a GL text element (approximate geographic location of aircraft) or an AP text element (airport location of aircraft) and that text element identifies an airport or city known to the DSP, the DSP uses this information to determine the ground station for transmission to the aircraft.
- The Application Text is preceded by the special TEI - also referred to as dash space <-$_{sp}$> . Note that an additional space is used as a separation. The Application Text may consist of entirely free text, entirely fixed text or a combination of fixed text followed by free text. See Appendix B2.
- The address of the DSP is contained in the Priority/Destination line, Line 1, of the ground-ground message as described in Section 3.2.

If the incoming ground message fails to meet these criteria the data link service provider will intercept the uplink message (see Section 3.3).

The text elements defined for use in the Text Element line of uplink ground-ground messages are listed in Table 3.2.3-1.

Table 3.2.3-1 - Uplink Message Text Element Set

TEI	Description	Text Element Syntax	Notes
FI	Flight Identifier	2 Alphanumeric characters + 1-4 Numeric characters	1
AN	Aircraft Number	1-7 Alpha/Numeric characters	2
GL	Ground station	3-4 Alpha characters	
AP	Airport station	3-4 Alpha characters	
TP	Transmission path	3 Alpha Characters	3
MA	Message Assurance	3 Numeric followed by an Alpha Character	

Notes:

1. Some users may provide a 3-character Airline Identifier.
2. The Aircraft Registration Number may be padded with leading periods.
3. Codes are VHF, SAT, HFD

Only some combinations of the TEIs listed in Table 3.2.3-1 are valid. The valid combinations are listed in Table 3.2.3-2.

Table 3.2.3-2 - Valid FI, AN, GL and AP TEI Sequences

Sequence	Alternate	Comment
FI	FI/GL; FI/AP	
AN	AN/GL; AN/AP	
AN/FI	AN/FI/GL; AN/FI/AP	

3.2.3.1 TEI Processing of Uplink Ground-Ground Message

3.2.3.1.1 AN (Aircraft Tail Number) and FI (Flight Identifier) TEI Processing

To forward incoming uplink messages, the DSP will need the address of the aircraft. This information is contained in the first part of the TE line, Line 4, of the ground-ground message.

For uplink messages, the address of the aircraft (to which the message is to be delivered) is provided in the Aircraft Address field. The value in the Aircraft Address field may take two forms, as defined in Sections 2.3.3 and 3.3 of ARINC Specification 618. The aircraft may be identified by: (1) its Registration Number, or (2) its current Flight Identifier. See ARINC Specification 618 for details.

The aircraft address is constructed using information from the Text Element (TE) line. The Flight Identifier and the Aircraft Number in this line indicate the aircraft to which the message is to be sent. The Aircraft Number is preferred, but the user may specify either or both of these values when addressing a message.

The DSP records the flight identifier for each aircraft from the aircraft's downlink messages. If the TEI FI is used subsequently in addressing an uplink message, the message is sent to the aircraft with the AN or FI address depending on the input TEI. If the DSP cannot perform this conversion but the user has included GL or AP TEIs, the uplink ACARS message will be sent through the station specified with the flight identifier in the address field.

Ground users address an airframe by Aircraft-Number (AN) and/or by Flight ID (FI). The DSP will forward the uplink to the aircraft without providing AN or FI address conversion, in the following manner:

If the user provides the Airline Identifier as a 3-letter code (as defined by ICAO) the DSP has the responsibility to translate the Airline Identifier to the appropriate 2-character IATA equivalent. See Section 2.3.3.2 ARINC Specification 618 for a detailed description of these elements.

AN Address:
If only the Aircraft-Number (AN) element (e.g., N1003X) is provided in the TEI line of the ground-ground user uplink message, then the Aircraft-Number is used in the Aircraft Address field of the uplink ground-air message.

FI Address:
If only the Flight-Id (FI) element (e.g., ZZ0300) is provided in the TEI line of the ground-ground uplink message, then the Flight-Id is used in the Aircraft Address field of the uplink ground-air message.

AN + FI Addresses: xxxx SITA specific xxxx
If the originator of the uplink message provides both the Aircraft-Number (AN) and the Flight-Id (FI) elements in the TEI line of the ground-ground message, SITA will verify that they match the information maintained in its FI/AN correspondence table and will take one of the two following actions:

- If the AN and FI elements correspond exactly to the information contained in the FI/AN correspondence table, the uplink is attempted with the first parameter named in the TEI line of the ground-ground user uplink message and it will be included in the Aircraft Address field of the ground/air uplink block.
- If the AN and FI elements DO NOT correspond exactly to the information contained in the FI/AN correspondence table, the uplink is NOT attempted and the message is rejected back to the originator with the service message code 240.

AN + FI Addresses: xxxx ARINC Specific xxxx
If the originator provides both the Aircraft-Number (AN) and the Flight-Id (FI) elements on the TEI line of the ground-ground uplink message, ARINC will give preference to the Aircraft-Number (AN) element and it will be used in the Aircraft Address field of the ground/air uplink block.

COMMENTARY

The ground user should address ATS messages to the aircraft by its Aircraft Registration Number (AN). Although the AN is preferred, AOC messages may use the aircraft's Flight Identifier (FI). Owners and operators of business and most commercial aircraft employ the aircraft address (AN), rather than a light number (FI), to identify the aircraft in uplink messages. For those operators, the Flight ID field may be used for other purposes. Often a fixed value (e.g., UV0000) is used.

AN + FI Addresses: xxxx Air Canada and AVICOM specific xxxx.
If the originator of the uplink provides both the Aircraft Number (AN) and the Flight Identifier (FI) elements in the TEI line of the ground-ground message, then AVICOM will reject the uplink.

3.2.3.1.2 GL (Ground Locator) /AP (Airport Locator) and TP (Transmission Path) TEIs Processing

If supported by the DSP, the user may insert an additional TEI in the text element line of the ground-ground message to specify which transmission path (TP) is preferred for delivery of the message. Depending on which media code is associated with the TP TEI, delivery attempts will only be made on this media. If a GL TEI is also specified, the media of the ground station must match that of the TP TEI otherwise the message will be intercepted. Use of the TP TEI is optional and when used, message delivery will only be attempted over the specified media.

For an uplink message that requires delivery to an aircraft not active in the system, DSPs start with the Geographic Locator (GL) or Airport Locator (AP) specified by the ground user (airline or other host computer). Delivery through each possible locator is attempted a configurable number of times.

The GL and AP text element identifiers (TEIs) are used to indicate to the DSP through which ground station the aircraft can be reached; they cannot be used together.

Use of GL is optional. If GL is used in conjunction with the TP TEI, the media of the ground station must match that specified by the TP TEI.

In the SITA network the Transmission Path TP Text Element indicates to the DSP which service providers network or which media in the case of internetworking should be used in order to uplink the message.

ARINC has implemented the TP TEI in order to enable users to specify which media is used for delivery of the uplink. The appropriate code is used along with the TEI to tell the DSP to only attempt delivery of the message using the specified media.

See Appendix B for values of TP TEI.

Undeliverable uplink messages are intercepted and processed as described in Section 3.3.

3.2.3.1.3 MA (Message Assurance) TEI Processing

Normally uplink messages are generated by the user and delivered to the aircraft by the DSP without confirmation to the sender. Delivery is assumed. If the message cannot be delivered, the DSP will provide a notice to the user by sending the appropriate reject messages of Section 3.3.

If supported by the DSP, the user may have the option of obtaining a confirmation of message delivery, i.e., a positive indication of the delivery of the message to the aircraft, from the DSP. This is accomplished by including an additional Text Element, including the Text Element Identifier MA as the final Text Element (preceding the free text portion) of the uplink message. The details of the uplink message construction are described below. See Sections 3.3, 3.3.1, 3.3.2, 3.3.3 and 3.3.4 for the definition of DSP responses.

Table 3.2.3.1.3-1 - Format of Ground-Ground Uplink Message With Message Assurance

Line	Contents	Example	Notes
1	Priority / DSP Address	QU CTYDPAL	
2	Signature / Transmission time	.QXSXMXS	
3	Standard Message Identifier	AGM	
4	Text Elements	AN N123/MA 123A	1
5-n	Free Text	- UPLINK	

Note:

1. In Line 4, the Text Element line, the format of the Data field of the Text Element MA is: MA NNNC.

   where:

   - NNN is the Serial Number of the message
   - C is the Function Indicator with two possible values, A or I where

     A = Request delivery indication only (coded, e.g., MA 123A)

     I = Request delivery indication and link acknowledgment (coded, e.g., MA 123I)

The sender of the uplink message is responsible for managing the serial numbers sent to the DSP. On initialization, the user should send the Serial Number 000 and for each subsequent message should increment the number. After using 999, the sender should increment to 001. The DSP will simply copy the serial number supplied by the sender in all replies. This serial number will not be used to detect duplicate uplink messages unless specifically negotiated with the DSP.

3.2.3.2 Uplink Addressing

The address of the uplink message is always the aircraft address. When the message is to be processed by the ACARS MU, this address is adequate. When the final destination onboard the aircraft is a peripheral to the ACARS, the Label H1 is used and additional addressing is included in a Sublabel field.

Uplink messages also contain address information that can be used by the end system on the aircraft for sending a response.

3.2.3.2.1 Uplink Addresses for Messages Delivered to an ACARS Peripheral

As with messages delivered to the ACARS MU, the Aircraft Address is the same as described in Section 3.2.3.2. When the uplink message is sent to a peripheral to the MU, such as the FMC, the value H1 will be used in the Label field.

Messages to be delivered to an ACARS peripheral will carry the intended destination information in the Sublabel field. See Table D-1 of Appendix D to Specification 622 for listings of the Sublabels applicable to ATS messages delivered to an ACARS peripheral. Thus, the addressing consists of the (1) Aircraft Address, (2) the Label and the Sublabel.

Example: .N12345 H1 M1 (for a message to be delivered to the Left FMC)

3.2.3.3 Uplink Supplementary Address(es)

Some uplink messages permit the inclusion of a Supplementary Address field. The Supplementary Address field of the uplink message, if present, will contain the address of the source to which the downlink response should be routed. For AOC messages, this will typically be the airlines' host computer. In the case of ATS messages, the Supplementary Address will typically be that of the ATC facility that is responsible for the airspace in which the aircraft is located, or into which the aircraft is expected to travel.

The information in the Supplementary Address field is used to address the response, to the message, if any. The Supplementary Address field may contain additional addresses, designating secondary recipients of any subsequent downlink generated by the aircraft avionics in response to the uplink message.

For ATS uplink messages to be delivered to a peripheral of the ACARS MU, the Supplementary Address field has been expanded to include a 2 character Message Function Identifier (MFI) as the first entry followed by a space character $<_{sp}>$ as a separator. The coding and use of the uplink MFI is defined in Section 4.3.5. The remainder of the Supplementary Address field will contain the address of the End System that is providing the uplink message and any Supplemental Addresses.

DSPs should perform a Supplementary Address validity check before forwarding an uplink message to an aircraft. As a minimum, the DSP should verify that the address is either 3, 4 or 7 characters. Uplink messages with improperly formatted addresses will be rejected by the DSP. The DSP may also compare the address with a list of known valid addresses within its tables.

The table below summarizes the conversion rules applied by the DSP to convert uplink ground-ground message parameters into uplink ACARS message parameters. The first column entails the ground-ground input parameters extracted out of the uplink ground-ground message to generate the air-ground output parameters found in the last column. These output parameters are needed to format the uplink air-ground message sent to the aircraft. The center column lists the processing functions involved in the conversion.

Table 3.2.3.3-1 - Uplink Conversion and Processing Function

Ground-Ground Input Parameters	DSP Processing	Air-Ground Output Parameters
7-character DSP Destination Address	Destination Address Validation	
7 character Ground User Originator Address	Originator Address Validation	
UTC Originator Time	Message Too Old processing	
SMI	Label/Sublabel generation	Label/Sublabel
AN and/or FI TEIs	AN/FI Processing	Aircraft Address
GL/AP/TP TEIs	Uplink Route processing	
MA TEI	Message Assurance Processing	
ACARS Text	ACARS Text generation	ACARS Text

ACARS Messaging Function

3.3 Service Messages

Service messages are messages provided by the DSP to the ground user carrying information concerning the delivery status of uplink messages.

Table 3.3-1 - General Format of Ground-Ground Service Message

Line	Contents	Example	Notes
1	Priority / Destination	QU CTYZZZZ CPYXXXX CTYXXXX	1
2	Signature / Transmission time	.DSPXXXX (ddhhmm)	1
3	Standard Message Identifier	SVC (obligatory)	1
4	Intercept Information	- UP UNKNOWN SMI	2
5	Carriage Return Line Feed	<cr/lf>	1
6-n	Text of message		1

Notes:

1. Lines 1, 2, 3, and 5-n are constructed the same as their corollary lines in the general format described in Section 3.2.

2. Line 4, the Intercept Information line, contains the Type/Reason/Code. The contents of these fields is described in the following sections.

The 3 digit service message code is placed in the sixtieth column of the intercept line. It can be interpreted as follows:

Digit 1 indicates the category of the service message:

Category 1	Category 2	Category 3
Downlink messages that cannot be reformatted	Uplink messages that cannot be transmitted	Undelivered on-board messages

Digit 2 indicates the class of the service message:

For Categories 1 and 2, the following classes exist			
Class 1	**Class 2**	**Class 3**	**Class 4**
Identification error	Formatting error	Addressing error	Other error

For Category 3 the classes are:		
Class 1	**Class 2**	**Class 3**
No contact with aircraft	Message rejected after contact - printer	Message rejected after contact - others

Digit 3 indicates the service message within the category and class.

3.3.1 Uplink Message Receipt Confirmation

If an uplink sent to the DSP contained a request for Message Assurance service with Link Acknowledgment (see Section 3.2.3.1.3) i.e., containing an MA Text Element with the Function code set to I, the DSP should acknowledge receipt of the ground-ground uplink message. If the Message Assurance function can be supported for the message, the DSP will immediately send the following message to the originator as a ground-ground link acknowledgment.

Table 3.3.1-1- Format of Ground-Ground Link Acknowledgment Message

Line	Contents	Example	Notes
1	Priority/Destination	QU CTYDPAL	
2	Signature/Transmission time	.QXSXMXS	
3	Standard Message Identifier	MAS (obligatory)	
4	Text Elements	AN N123/FI XX1234/MA 123L	

If the Message Assurance function is not supported by the DSP, the DSP should return the following message to inform the user that a confirmation will not be provided.

Table 3.3.1-2 - Format of Ground-Ground Message With Acknowledgment Not Supported Response

Line	Contents	Example	Notes
1	Priority/Destination	QU CTYDPAL	
2	Signature/Transmission time	.QXSXMXS	
3	Standard Message Identifier	MAS	
4	Text Elements	AN N123/FI XX1234/MA 123X	

COMMENTARY

SITA and ARINC support the Message Assurance functions. For SITA, the Function Indicator code of X will be used in the case of certain messages sent through internetworking. In this case, successful delivery assurance may not be possible. Some DSPs will simply not respond at all.

3.3.2 Uplink Message Delivery Confirmation

In the event of successful uplink message delivery, the following delivery confirmation report will be sent by the DSP to the sender.

Successful delivery is interpreted to mean that all the ACARS blocks resulting from the uplink message sent to the DSP were positively acknowledged by the aircraft. The delivery confirmation simply indicates that the uplink message was received by the ACARS Management Unit. Receipt of Uplink Message Delivery Confirmation does not provide an indication of receipt or acknowledgment by the flight crew or any avionics subsystem.

Table 3.3.2-1 - Format of Ground-Ground Message Delivery Confirmation

Line	Contents	Example	Notes
1	Priority / Destination	QU CTYDPAL	
2	Signature / Transmission time	.QXSXMXS	
3	Standard Message Identifier	MAS	1
4-m	Text Elements	AN N123/FI XX1234/MA 123S	2
m+1	DT Text Element	DT QXS RGS 312355 5524	3

Notes:

1. Line 3, the Standard Message Identifier line, will contain the SMI MAS.

2. Line 4, the Text Element line, will contain the AN and FI Text Elements, filled with the values from the downlink block sent by the ACARS MU acknowledging the final uplink block of the uplink message followed by the MA Text Element.

3. Line m+1, the DT Text Element line, is used to report the time and identify the Remote Ground Station that accepted the air-ground acknowledgment for the message; or the final block if an ACARS multiblock message is involved.

3.3.3 Untransmittable Uplink Service Messages

Untransmittable uplink messages are those messages that cannot be sent on from the DSP to the aircraft either:

- Because there is a format error in the message
- The message does not contain enough information for the DSP to identify either the aircraft or the aircraft's location

- The message has one of the following routing errors as defined in Specification 622:
  - The message was sent from an unauthorized ground ATS facility.
  - The message was sent with an invalid SMI.
  - With an invalid MFI or with an invalid Supplementary Address.

For example, in the SATCOM environment, an aircraft is reachable by the SATCOM DSP only after the aircraft has logged on (and initiated a downlink to the DSP) to establish the link. In the event that an unsolicited uplink is sent by the user to be delivered to an aircraft which is not logged on, the DSP will be unable to identify any connection to the aircraft.

If an uplink message is found to be untransmittable, a service message is sent to the origin address indicating why the message is untransmittable and including a copy of the untransmittable message. The general format of the ground-ground service message generated to report an untransmittable uplink message is:

Table 3.3.3-1 - Format of Message to Report an Untransmittable Uplink

Line	Contents	Example	Notes
1	Priority and Destination	QU CTYZZZZ CPYXXXX CTYXXXX	
2	Signature and Transmission Time	.XXXXXXX (ddhhmm)	
3	Standard Message Identifier	SVC	2
4	Intercept Information	- UP INTERCEPT reason 2XY	3
5	Carriage Return Line Feed	<cr/lf>	
6-n	Text of Uplink Message	QU DSPXXXX .HDQCMUA CMD AN N123XX/MA 123A - AMEND RLS IFR PER RLS 03… (up to 220 characters)	

Notes:

1. The specification of the contents of this table are entered in an abbreviated and symbolic format. The conventions used to describe the contents are show in Table 3.2.2-2.
2. The SMI of SVC is obligatory.
3. Reason code is located in columns 60-62. Two spaces follow the dash <-> character.

3.3.3.1 Message Assurance Report - Untransmittable Uplink

When an End System on the ground generates an uplink message, it may request confirmation that the message was sent as an uplink to the aircraft by inserting MA in the Text Element field of the message. If the message cannot be transmitted, the DSP should advise the End System by sending a (ground-ground) message to report the problem. Since this function is redundant to the already existing function defined in Section 3.3.3, the message may carry an SMI of SVC or MAS.

COMMENTARY

Some service providers may use the SMI code of SVC for intercepting a message which contains an MA and is untransmittable because of format or other errors (e.g., message too old). In this case, the SVC intercept message would include the MA TEI within the text contained in the intercept message.

The general format of the ground-ground service message generated to report an Untransmittable Uplink Message with Message Assurance is:

Table 3.3.3.1-1 - Format of Message Assurance Report

Line	Contents	Example [1]	Notes
1	Priority and Destination	QU CTYZZZZ CPYXXXX CTYXXXX	2
2	Signature and Transmission Time	.XXXXXXX (ddhhmm)	2
3	Standard Message Identifier	MAS or SVC	3
4	Text Elements	AN N123XX/MA 123F	4
5	Intercept Information	- UP INTERCEPT reason 2XY	6
6	Carriage Return Line Feed	<cr/lf>	
7-n	Text of Uplink Message	QU DSPXXXX .HDQCMUA CMD AN N123XX/MA 123A - AMEND RLS IFR PER RLS 03... (up to 220 characters)	5

Notes:

1. The specification of the contents of this table are entered in an abbreviated and symbolic format. The conventions used to describe the contents are shown in Table 3.2.2-2.

2. Lines 1 and 2 are constructed the same as their corollary lines in the general format described in Section 3.2.

3. Line 3, the SMI line, will contain MAS.

4. Line 4, the Text Element line, will contain a copy of the Text Element line from the uplink message with the Function Indicator in the MA Text Element set to F. If both the FI and the AN were included in the ground-ground uplink message, the service provider may report both the FI and AN of the designated recipient.

5. Line 7-n should be the same as in the Table above.

6. Reason code is located in columns 60-62. Two spaces follow the dash <-> character.

Service providers may report both the AN and FI of the designated recipient.

3.3.4 Undeliverable Uplink Service Messages

Undeliverable uplink messages are those messages that are sent on to the aircraft from the DSP but which do not reach their final destination.

The simplest case is that where no acknowledgment is received for the message because the aircraft is not within range of any of the ground stations through which the message is sent.

The second case is that where the aircraft does reply to the message but with a label or technical acknowledgment field which indicates that the message could not be delivered to its destination within the aircraft's avionics. When the DSP receives one of these labels in response to an uplink message, it returns a copy of the uplink message to the originator inside a service message with an indication of the reason for rejection.

The downlink rejection labels are generated by the airborne avionics in case of an abnormal situation when receiving an uplink message. This situation can be a printer fault or that a peripheral is not ready to accept a block, in which case a Q5 or CA-CF label is sent. If the DSP receives a Q5 or CA-CF in response to an uplink message, it retries the transmission of the uplink message after a delay. Only after receiving the Q5 or CA-CF a configurable number of times (see Appendix D) is the uplink message returned to the originator. The DSP may also receive a QX downlink. In this case, the DSP generates an Undeliverable Uplink (ground-ground) report to the originating host.

If a message cannot be delivered by the DSP, a service message is sent to the origin address of the undeliverable ground-ground message. The general format of the ground-ground service message generated to report for an undeliverable uplink message is:

Table 3.3.4-1 - Format of Message For Reporting an Undeliverable Uplink Message

Line	Contents	Example	Notes
1	Priority and Destination	QU CTYZZZZ CPYXXXX CTYXXXX	2
2	Signature and Transmission Time	.XXXXXXX (ddhhmm)	2
3	Standard Message Identifier	SVC	2,3
4	Intercept Information	- reason 3xy	4
5	Aircraft Registration Number	ADDRESSEE:.N123XX	5
6	carriage return-line feed	<cr/lf>	
7-n	Text of Uplink Message	QU DSPXXXX .HDQCMUA CMD AN N123XX - AMEND RLS IFR PER RLS 03... (up to 220 characters)	6

Notes:

1. The specification of the contents of this table are entered in an abbreviated and symbolic format. The conventions used to describe the contents are shown in Table 3.2.2-2.

2. Lines 1, 2, 3, and 6-n are constructed the same as their corollary lines in the general format described in Section 3.2.

3. The SMI of SVC is obligatory.

4. Line 4, the Intercept Information line, contains the reason the uplink message cannot be transmitted. A list of reasons and their associated codes is listed in Table 2-3 of Attachment 2. The reason code is listed in columns 60-62.

5. Line 5, the Aircraft Registration Number line, usually contains only the aircraft registration number, a subset of the information included in a Text Element. Refer to ARINC Specification 618 for coding of the aircraft registration number.

6. Line 7-n contains the original uplink message that could not be transmitted. If the message is long, it should be limited (truncated) such that the overall length of the message returned to the user does not exceed 220 characters.

If the user has requested Message Assurance by including the MA Text Element and the DSP fails to deliver the message to the aircraft, the message will be returned to the originator as a reject message, modified as shown in Table 3.3.4-1.

3.3.4.1 Message Assurance Reports

When an End System on the ground generates an uplink message, it may request confirmation that the message was delivered to the MU onboard the aircraft by inserting MA in the Text Element field of the message. If the message cannot be delivered (aircraft out of coverage, congestion problems, etc.) or the aircraft fails to acknowledge receipt of the uplink, the DSP must assume that the message was not delivered and should send a (ground-ground) message reporting the negative results to the End System. The message will carry the SMI of MAS. The general format of the ground-ground service message generated to report an undeliverable uplink message with Message Assurance is:

Table 3.3.4.1-1 - Format of Message For Reporting an Undeliverable Uplink Message With Message Assurance Requested

Line	Contents	Example	Notes
1	Priority and Destination	QU CTYZZZZ CPYXXXX CTYXXXX	2
2	Signature and Transmission Time	.XXXXXXX (ddhhmm)	2
3	Standard Message Identifier	MAS	3
4-m	Text Elements	AN N123XX/FI XX1234/MA 123F	4
m+1	Intercept Information	- reason xyz	6
m+2	Aircraft Identification	ADDRESSEE: .N123XX	
m+3	carriage return line feed	<cr/lf>	
n	Text of Uplink Message	QU DSPXXXX .HDQCMUA CMD AN N123XX/FI XX1234/MA 123A - AMEND RLS IFR PER RLS 03 (up to 220 characters)	5

Notes:

1. The specification of the contents of this table are entered in an abbreviated and symbolic format. The conventions used to describe the contents are shown in Table 3.2.2-2.

2. Lines 1 and 2 are the same as the table above.

3. Line 3, the SMI line, will contain MAS. The SMI of MAS is obligatory.

4. Line 4, the Text Element line, will contain a copy of the Text element line from the uplink message with the appropriate function indicator in the MA Text Element set to F.

5. Line n is the same as the table above.

6. Reason code is located in columns 60-62.

3.3.5 Unformattable Downlink Service Messages

Unformattable downlink messages are air-ground messages that the DSP cannot convert into a ground-ground message because there is a format error in the message. In this case, a service message is sent to the airline address configured for service messages, indicating why the message is unformattable.

Table 3.3.5-1 - Format of Ground-Ground Message to Report Unformattable Downlink

Line	Contents	Example	Notes
1	Priority / Destination	QU XXXXXXX	2
2	Signature / Transmission time	.DSPXXXX (ddhhmm)	2
3	Standard Message Identifier	SVC (obligatory)	2
4	Intercept Information	- DN INTERCEPT reason 1XY	3
5	carriage return line feed	<cr/lf>	
6-n	Copy of Intercepted Downlink Message	QU DSPXXXX .HDQCMUA CMD AN N123XX - AMEND RLS IFR PER RLS 03... (up to 220 characters)	2

Notes:

1. The specification of the contents of this table are entered in an abbreviated and symbolic format. The conventions used to describe the contents are shown in Table 3.2.***2***-2.

2. Lines 1, 2, 3, and 6-n are constructed the same as their corollary lines in the general format described in Section 3.2.

3. Line 4, the Reason/Code line, contains the reason the downlink message cannot be delivered. A list of reasons and their associated codes is listed in Table 2-1 of Attachment 2. The reason code is displayed in columns 60-62.

3.3.5.1 Incomplete Downlink Service Message Intercept

Specifically when using the ARINC 618 ACARS Communications service, for multiblock messages all ACARS blocks of the same message are reassembled by the DSP before transmission in a single ground-ground message to the ground user. A reassembly session is closed by one of the following events:

- The last ACARS block of the message is received.
- The Incomplete Downlink Message Delivery timer, VGT4, expires. See Section 5.4.1 of ARINC Specification 618 for a list and description of ground based timers. If timer VGT4 expires, the DSP will act in the following manner:
  - xxxx SITA specific xxxx
    The string QTB is appended to the ground-ground message built with the ACARS blocks received. An Incomplete message report is also generated if the message is missing one or more blocks
  - xxxx ARINC Specific xxxx
    An Incomplete Downlink message report is sent with the SMI of SVC and the Reason Code of 143 (No QTB). An incomplete message report is also generated if the message is missing one or more blocks
- The maximum number of blocks allowed in a multi-block message (see Appendix D) is reached. In this case, the string QTB is appended to the ground-ground message built with the ACARS blocks received

3.4 Network Advisory Messages

Network advisory messages are used to notify users of additions, deletions, outages and return to service of ACARS ground stations. These messages are designed to be processed by a computer. They follow the ATA/IATA ICM format. The SMIs for Network advisory messages are included in Appendix C to this Specification.

ACARS Station Advisory messages use the SMI of AAM. Each part of a Station Advisory Message begins with a Message Text Delimiter (MTD). These are not TEIs. The valid delimiters are:

Table 3.4-1 - ACARS Station Advisory Messages

MTD	Definition
AOS/	ACARS Station Status section within AAM
ARA/	ACARS Restoral Advisory section within AAM
ASA/	ACARS Station Addition section within AAM
ASD/	ACARS Station Deletion section within AAM
REM/	Optional Remarks section

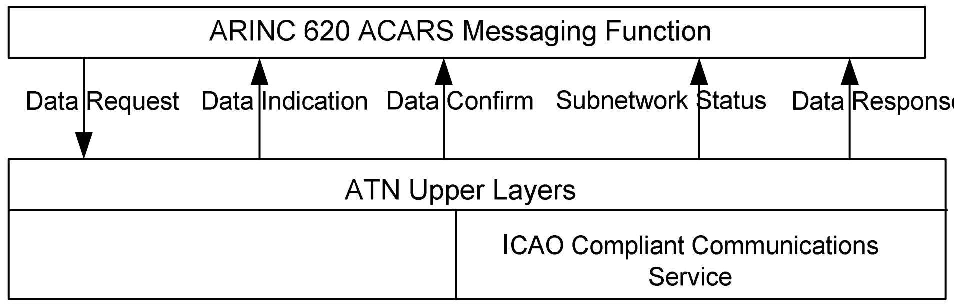
Each section except the optional Remarks section, may contain the following subsections:

Effective: (ddhhmm).	Day/Hour/Minute of Occurrence
STNS: (LAX SIN).	Precedes the list of stations. If no stations names are included, contains NONE.

NETWORK ADVISORY MESSAGE
QU ADRDPAL .DSPXXXX DDHHMM AAM AOS/ACARS OUTAGE STATUS.STNS: (SIN). ARA/ACARS RESTORAL ADVISORY EFFECTIVE (DDHHMM).STNS: (YYZ). ASA/ACARS STATION ADDITION.STNS: (LAX). ASD/ACARS STATION DELETION.STNS: (PAR). REM/REMARKS: (DEMONSTRATION MESSAGE).

3.5 ACARS Messaging Function Primitives

A service is formally specified by a set of primitives (or operations) available to the user of those services. The basic primitives that will be used are the Request, Indication, Response and the Confirm primitives. A service can be confirmed, whereby an explicit response is required or unconfirmed. A service relates to an interface between two layers, and it should be noted that the present specification does not describe how these primitives are implemented.



This diagram is general in nature. Generic primitives have been defined to be used between the ACARS Messaging Function and ATN protocol stack.

3.6 Air-Ground Messages

Character-oriented messages (uplink/downlink) can be delivered over any of the air-ground links defined in ARINC Specification 618. Each link and service provider combination have specific characteristics concerning the length of the message that can transit the link.

Length limitations need to be observed in preparing the messages defined herein unless other arrangements have been made with the service provider. Some new air-ground media may support larger messages than defined for the original ACARS network. Where a maximum size of the Application Text is specified, this value should be observed. Where no length maximum is specified, the length should be considered media dependent. Refer to ARINC Specification 618 for this data.

COMMENTARY

Many messages were defined for an ACARS VHF environment wherein the length of the Application Text was constrained to a single block consisting of a maximum of 220 characters of text. Where the Application Text format specifies this 220 character maximum, it may be necessary to comply with this constraint even though the medium (e.g., SATCOM) may allow greater length across the air-ground link.

4.0 UPLINK MESSAGE TEXT FORMATS

4.1 Introduction

This chapter contains a listing of the Message Texts of uplink messages to be passed from an originating End System at an airline host or at an ATC agency to the Data Link Service Provider (DSP) and then to the designated End System on the aircraft. Sections 4.2 through 4.4 list the uplink texts: System Control, Service Related and User Defined.

Each application text definition contains a description of the message, a listing of the fields of the message and a graphic layout of the message construction. The figures in the following subsections illustrate the format of messages which are exchanged between an airborne end system and a ground based end system. The illustrations cover two legs of the total path: between the aircraft and the DSP on the ground and between the DSP and the ATC facility. Where appropriate, timing diagrams showing the sequence of message exchanges are also provided. The sequence and direction of message travel are illustrated in the figure below depicting both direction (downlink and uplink) and source/sink (aircraft, DSP or user Host). As many as four separate messages may be needed to complete an exchange.

> Note: The form of the messages depicted in the examples do not necessarily typify the format in which these same messages will be presented in an actual implementation.

The whole message should be transmitted. Any of the fixed format fields for which no data has been entered should be filled with <NUL>s.

4.2 Uplink Message Formats, System Control

The system control uplink messages are included in Tables C1 and C2 of Appendix C.

4.2.1 General Response - Label _DEL

When the only reason for the DSP to uplink a response is the need for a technical acknowledgment to the previous downlink, this message should contain Label characters <_DEL>.

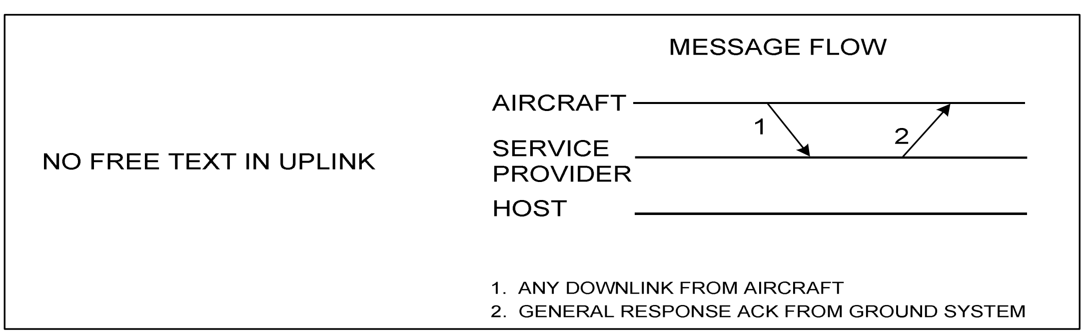


Figure 4.2.1-1 - General Response Uplink

4.2.2 General Response, Polled Mode - Label _j

This mode is not used. Label characters _j are reserved.

4.2.3 ACARS Frequency Uplink - Label 54 or Voice Go-Ahead - Label 54

The range of authorized VHF channel names is from 118.000 mHz thrugh 136.975 MHz. A list of channel names is maintained in ARINC Characteristic 716. ICAO Annext 10 has precedence over ARINC Characteristic 716.

The following fixed format text field will be used in uplinked Label 54 messages containing VHF channel names:

Character No.	Character Content
1	Frequency in Mhz (Hundreds)
2	Frequency in Mhz (Tens)
3	Frequency in Mhz (Units)
4	Frequency in Mhz (Tenths)
5	Frequency in Mhz (Hundredths)
6	Frequency in Mhz (Thousandths)
7-n	Free Text (n < 220): Text be may present depending on the service provider

The decimal point between the units and tenths Mhz characters will not be included in the ground-to-air message. It should, however, be generated in the airborne sub-system, i.e., the MU, and included in the information displayed.

COMMENTARY

While the format of the Voice Go-Ahead uplink provides for free text, the displaying of free text by the avionics was not originally required, and may not be supported in some avionics. Users who desire to utilize the free text field should first confer with their avionics suppliers. Some Label 54 uplinks may contain only the first 5 digits for 25 kHz channel naming to be consistent with radio control panels.

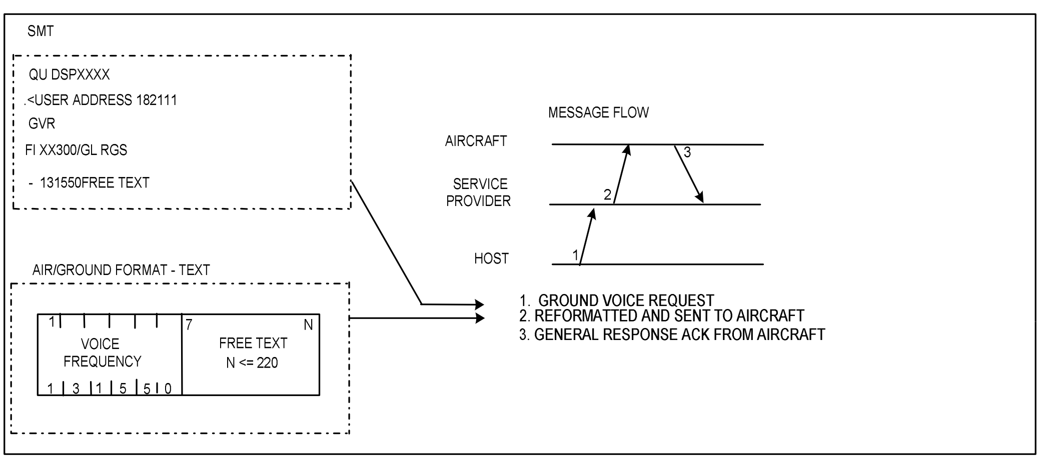


Figure 4.2. 3-1 - Voice Frequency Uplink or Voice Go-Ahead

4.2.4 Voice Circuit Busy – Label Q4

This message is not supported.

4.2.5 Uplink Squitter - Label SQ

Three versions of Uplink Squitter Messages are defined. Version 0 is the basic message. Version 1 contains Remote Ground Station (RGS) identification. Version 2 expands the content to include the RGS geographic location and VDL ground station capability. The fixed fields will be preserved in future versions for backward interoperability. The avionics should not check for additional fields so that future extensions will be accepted.

The format of Version 0 is as follows:

Character No.	Character Content	Note
1-2	Version Number (00)	
3-4	Service Provider (XA, XS, etc.)	1
5-n	Free Text (n≤ 220)	

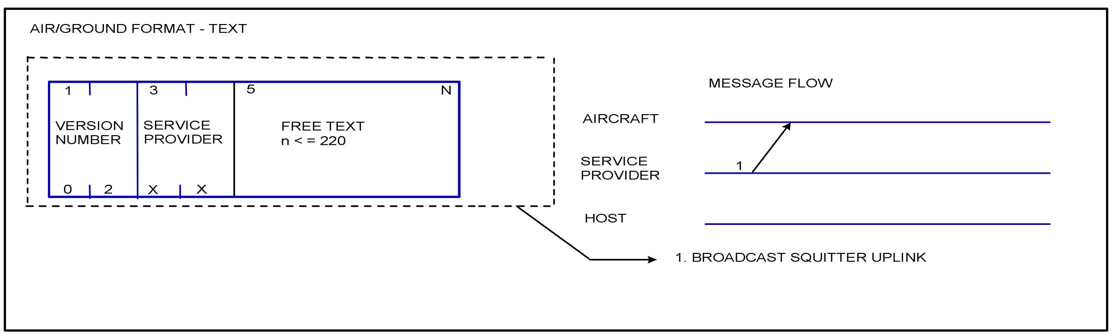


Figure 4.2.5-1 - Squitter Message, Version 0

The format of Version 1 is as follows:

Character No.	Character Content	Notes
1-2	Version Number (01)	
3-4	Service Provider (XA, XS, etc.)	1
5-7	IATA Station ID (e.g. CID)	
8-11	ICAO Station ID (e.g. KCID)	
12	Station Number ID (e.g. 2)	
13-n	Free Text (n< 220)	

The format of Version 2 is as follows:

Number of Characters			Character Content	Notes
2			Version Number (02)	
2			Service Provider (XA, XS, etc.)	1
3			IATA Station ID (e.g. CID)	
4			ICAO Station ID (e.g. KCID)	
1			Station Number ID (e.g. 1)	
5			Latitude	2
6			Longitude	2
Variable	7		Alternate Service Availability Frequency (7-character string consisting of a Flag Character and Frequency)	3, 4
	8-m		Optional Comma Delimiter <,> and Ground Station Address (7-character string consisting of 24-bit ICAO Address and Station Type). Additional Ground Station Addresses, separated by commas, may be added, 8 characters per instance. Each instance consists of Comma Delimiter <,> and Ground Station Address (7-character string consisting of 24-bit ICAO Address and Station Type). Where m = number of addresses.	3, 5, 6
	8-n or m-n	8	Optional Dash delimiter <-> and Alternate Availability Frequency (7-Character Service String consisting of a Flag Character and Frequency). When several alternate service availability entries appear, each is preceded by a dash. Where n = number of alternate frequencies.	3, 4
	$\sum_{n=1}^{N} 8k_n$	$8k_n$	Optional Comma Delimiter <,> and Ground Station Address (7-Character String consisting of 24-bit ICAO Address and Station Type). Additional Ground Station Addresses, separated by commas, may be added, 8 characters per instance. Each instance consists of Comma Delimiter <,> and Ground Station Address (7-Character String consisting of 24-bit ICAO Address and Station Type).	3, 5, 6
n+1			Slash Delimiter </>	3, 8
n+2 to z			Free Text ($z \leq 220$)	

Notes:

1. Refer to Table 3.2.2-3 for a listing of Data Link Service Provider (DSP) designations.

2. Position of RGS:

   Latitude in 4 numeric characters for degrees (2) and minutes (2) followed by N or S (e.g., 4620N).

   Longitude in 5 numeric characters for degrees (3) and minutes (2) followed by E or W (e.g., 12005W).

3. Since the definition of Characters 24 through n + 1 was added by Supplement 4, the content of characters 1 through 23 were retained without change to permit backward compatibility.

4. Alternate service capability will be announced by one or more 7-character strings consisting of a one character Flag and six character Frequency format:

   ANNNNNN

   Where A is a flag identifying the service and NNNNNN identifying the frequency of the service in kHz.

   The following identifying flag and service characters have been defined:

   Service available should be ordered as follows: AOA services first (V), followed by AOA and ATN services (B), followed by ATN only services (A).

Flag	Service
V	VDL Mode 2 AOA Only
A	VDL Mode 2 ATN Only
B	VDL Mode 2 AOA and ATN

5. After each 7-character string annunciating a VDL Mode 2 service, the Squitter may contain a list of one or more candidate VDL Mode 2 Ground Station Addresses. The beginning of the ground station list is indicated by the comma character <,> as a delimiter. This delimiter will precede every ground station address. The comma is not used at the end of the list.

6. This is an ordered list of ground station addresses where the first ground station address is considered to be the first to use by the CMU to establish a VDL link. Bit-to-hex conversion specified in ARINC Specification 622 should be used. The first nibble, containing the Type field, should be padded with zero in Bit 28. (See VDL SARPS Table 6-7 for the coding of the ICAO address.)

Example:

52ABCDE

COMMENTARY

	Bits	Hex Char	ISO-5 bits
Type field	0,b27,b26,b25	5	0011 0101
ICAO Address	b24,b23,b22,b21	2	0011 0010
	b20,b19,b18,b17	A	0100 0001
	b16,b15,b14,b13	B	0100 0010
	b12,b11,b10,b9	C	0100 0011
	b8,b7,b6,b5	D	0100 0100
	b4,b3,b2,b1	E	0100 0101

7. If more than one alternate service list is included then the lists are separated by a dash <-> character.

8. The end of the Alternate Service list is indicated by the slash character </> as a delimiter.

Examples of Uplink Squitter Version 2

Example 1. with service availability extension

02XACIDKCID14153N09143WV136975,52ABCDE,52ABCDF-V136925/FreeText

The above example shows:

- Version Number 2 (02)
- Service provider ARINC (XA)
- Cedar Rapids Ground Station (IATA = CID; ICAO = KCID)
- Station Number ID of 1
- Availability of a VDL Mode 2 service (Flag = V) on the frequency:
  - 136975 kHz. There are two candidate VDL Mode 2 ground stations with the addresses.
    - 52ABCDE.
    - 52ABCDF.
- Availability of a VDL Mode 2 service (Flag = V) on the frequency:
  - 136925 kHz. No ground station addresses are provided in this example.

Example 2. without service availability extension and without free text.

02XACIDKCID14153N09143W

The above example shows:

- Version Number 2 (02)
- Service provider ARINC (XA)
- Cedar Rapids Ground Station (IATA = CID; ICAO = KCID)
- Station Number ID of 1

Example 3. without service availability extension and with free text

02XACIDKCID14153N09143W /FreeText

The above example shows:

- Version Number 2 (02)
- Service provider ARINC (XA)
- Cedar Rapids Ground Station (IATA = CID; ICAO = KCID)
- Station Number ID of 1

Example 4. with service availability extension

02XACIDKCID14153N09143WV136975/FreeText

The above example shows:

- Version Number 2 (02)
- Service provider ARINC (XA)
- Cedar Rapids Ground Station (IATA = CID; ICAO = KCID)
- Station Number ID of 1
- Availability of a VDL Mode 2 service (Flag = V) on the Frequency 136975

COMMENTARY

The original Version 2 message defined only Characters 1 through 23. Characters 24 and higher were introduced later to enable the avionics to detect VDL Mode 2 availability and identify VDL Mode 2 capable ground stations. If multiple VDL services are available, there will be multiple entries of VDL Flag and associated frequency and ground station address list (if used).

4.0 UPLINK MESSAGE TEXT FORMATS

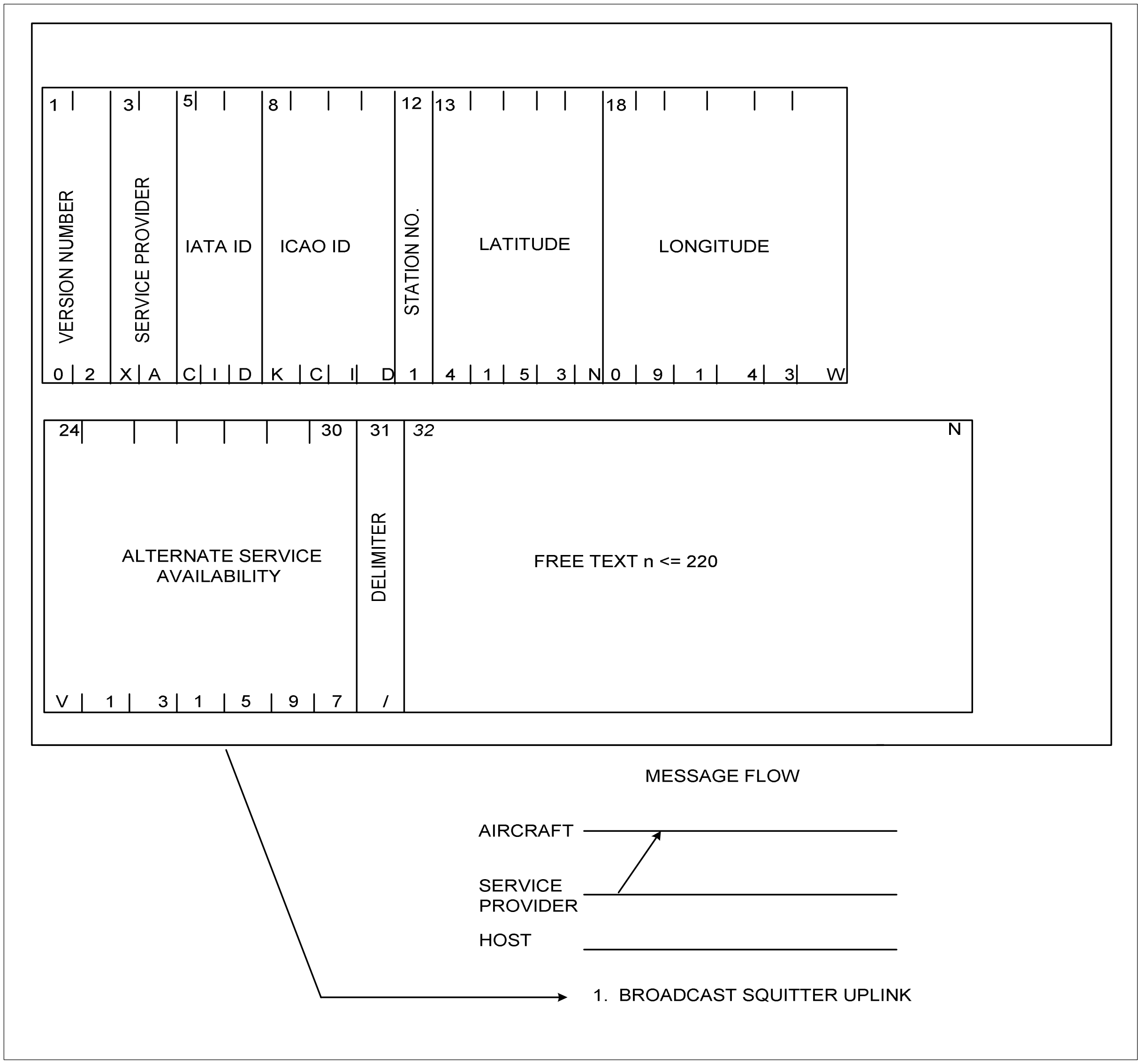


Figure 4.2.5-2 - Squitter Message, Version 2

4.2.6 Data Transceiver Autotune - Label :;

When the MU receives a Data Transceiver Autotune Uplink containing Label Characters:; it should respond on the old frequency with a technical acknowledgment message containing Label characters _DEL. Only one transmission should be made.

Character No.	Character Content
1	Frequency in MHz (Hundreds)
2	Frequency in MHz (Tens)
3	Frequency in MHz (Units)
4	Frequency in MHz (Tenths)
5	Frequency in MHz (Hundredths)
6	Frequency in MHz (Thousandths)
7	Number of seconds (Thousands) (optional)
8	Number of seconds (Hundreds) (optional)
9	Number of seconds (Tens) (optional)
10	Number of seconds (Units) (optional)

Notes:

1. Characters 7-10 are used only when the aircraft is on AOA and are optional.
2. The description of the proper response to be followed by the MU is described in ARINC Specification 618.

4.2.7 DSP Autotune Broadcast Uplink Label – Label ::

The Service Provider will use the DSP Autotune Broadcast uplink during recovery from an interruption of service and is intended to result in rapid redistribution of ACARS avionics from the base frequency to a group of alternate frequencies with a single transmission. The message will use the Squitter address of all NULS. The text of the message includes a list of candidate alternate frequencies that the aircraft, on the base, can tune to based on the aircraft flight phase (Onground, Terminal, or Enroute). The remaining free text, if provided would contain a message from the DSP for possible display to the crew.

The format for this message is as follows:

Character No.	Character Content
1-2	Version Number (01)
3-4	Service Provider (XA, XS, SC, etc.)
5	Delay Link Establishment: 0 = Off, 1 = Enabled
6-8	Delay Time in Seconds Range: 0 to 999
	Number of Alternate Ground Frequencies to Follow
	Number of Alternate Terminal Frequencies to Follow
	Number of Alternate Enroute Frequencies to Follow
	First Ground Frequency in Mhz (Hundreds)
	First Ground Frequency in Mhz (Tens)
	First Ground Frequency in Mhz (Units)
	First Ground Frequency in Mhz (Tens)
	First Ground Frequency in Mhz (Hundreds)
	First Ground Frequency in Mhz (Thousands)
	Second Ground Frequency in Mhz (Hundreds)
…	… … … … … … … …… … … … … …
Varies	First Terminal Frequency in Mhz (Hundreds)
Varies	First Terminal Frequency in Mhz (Tens)
…	… … … … … … … … … … … … … … …
Varies	Last Terminal Frequency in Mhz (Hundreds)
Varies	Last Terminal Frequency in Mhz (Tens)
Varies	Last Terminal Frequency in Mhz (Units)
Varies	Last Terminal Frequency in Mhz (Tenths)
Varies	Last Terminal Frequency in Mhz (Hundredths)
Varies	Last Terminal Frquency in Mhz (Thousandths)
Varies	First Enroute Frequency in Mhz (Hundreds)
Varies	First Enroute Frequency in Mhz (Tens)
…	… … … … … … … … … … … … … … …
Varies	Last Enroute Frequency in Mhz (Hundreds)
Varies	Last Enroute Frequency in Mhz (Tens)
Varies	Last Enroute Frequency in Mhz (Units)
Varies	Last Enroute Frequency in Mhz (Tenths)
Varies	Last Enroute Frequency in Mhz (Hundredthss)
Varies	Last Enroute Frequency in Mhz (Thousandths)
n-220	Optional Free text

Refer to ARINC Specification 618 for the ACARS MU use of this message.

4.2.8 POA to AOA Retune - Label :}

The DSP will use the AOA Autotune to command the aircraft to change its operating frequency from Legacy ACARS to VDL Frequency. In addition to the VDL Frequency Value (in MHz), the message may contain the address of the VDL Ground Station proposed by the DSP (optional). The description of the proper response to be followed by the CMU is described in ARINC Specification 618.

The format of the POA to AOA Autotune is as follows:

Character No	Character Content	Notes
1	Frequency in MHz (Hundreds)	
2	Frequency in MHz (Tens)	
3	Frequency in MHz (Units)	
4	Frequency in MHz (Tenths)	
5	Frequency in MHz (Hundredths)	
6	Frequency in MHz (Thousandths)	
7-8	Service Provider (XA, XS, etc.)	
9-n (if used)	7-character string(s) representing the 24-bit ICAO address and Station type of the proposed ground station(s).	1

Note: OPTIONAL: This is an ordered list of 7-Character Addresses where the first ground station address is considered to be the first to use by the CMU to establish a VDL link. Bit-to-hex conversion specified in ARINC Specification 622 should be used. The first nibble should be padded with 1 zero.

Example:
52ABCDE

ICAO Address	Hex Character	ISO-5 Bits
0,b27,b26,b25	5	0011 0101
b24,b23,b22,b21	2	0011 0010
b20,b19,b18,b17	A	0100 0001
b16,b15,b14,b13	B	0100 0010
b12,b11,b10,b9	C	0100 0011
b8,b7,b6,b5	D	0100 0100
b4,b3,b2,b1	E	0100 0101

Two consecutive addresses should be delimited by the comma character <,>.

Example of POA to AOA Autotune: 136975XS52ABCDE,52ABCDF

4.3 Uplink Message Formats, Service Related

Service messages are used by the aircraft to facilitate operations. Air Traffic Service (ATS) messages are also classed as Service Related uplinks. See Section 4.5 for ATS message formats.

Two different formats are defined in the sub-sections that follow: those with Headers and those with no Header. The [DASH SPACE] <- > character sequence is used to terminate the Header, if present, and announce the beginning of the Application Text Field. If no Header is used, the Text Field simply begins with the [DASH SPACE] <-$_{sp}$> character sequence. For messages that contain a sub-label, the

[DASH SPACE POUNDSIGN] <-$_{sp}$#> character sequence is used to indicate that the Application Text Field begins with a sub-label.

Ground-ground Messages:
The form of the ground-ground messages destined for processing by the ACARS Management Unit (MU) serving as an End System should have the format defined in Chapter 3. The overall form is repeated diagrammatically here for reference.

Refer to Table C1 and C2 of Appendix C for a listing of Messages, their associated label, SMI and section reference.

Table 4.3-1A - Ground-Ground Message Format For Uplink Messages Sent To The MU

Standard format:
QU CTYDPAL
.QXSXMSX ddhhmm
SMI
AN N1002x/GL MAN or FI xx1234/GL MAN
- Application text

Air-ground Messages:
The form of air-ground uplink messages destined for processing by the ACARS Management Unit (MU) as an end system should have the following format.

Table 4.3-1B - Air-Ground Message Format For Uplink Messages Sent To The MU

		Aircraft Address		**Label**			**Optional Supplementary Address**	**Message Text**
		.N1234x or .xx1234		xx			/PIKCLXS.	Application text

Aircraft Address:
Refer to ARINC Specification 618.

Message Label:
The air-ground uplink message contains a 2-Character Label. In most cases, the label is used by the ACARS Management Unit (MU) to identify the content and format of the message.

Uplink messages may also be delivered to other onboard systems for processing. Label H1 is used to identify messages exchanged across the air-ground medium that are to be delivered to a peripheral of the MU. See Section 4.3.5 for the format of messages delivered to a peripheral of the MU.

Optional Supplementary Address:
The Supplementary Address Field will contain the address of the source (End System) that is providing the uplink message. In most cases this will be the airline host. Refer to Section 4.5 for a description of the Supplementary Address for ATC messages.

If the message is sent to a peripheral of the MU, such as the FMC, the Label H1 will be used. In this case, the Supplementary Address Field will be expanded with a 2-character MFI. See Section 4.4 of this Specification for a more detailed description.

Message Text:
In general, the message text of uplink messages should be constructed in the format: ------application text------.

4.3.1 Ground GMT Update - Label 51

The message should be transmitted whenever the pilot signifies his desire for clock update action from the ground.

Character No.	Character Content
1	GMT Hours (Tens) (MSC)
2	GMT Hours (Units)
3	GMT Minutes (Tens) (MSC)
4	GMT Minutes (Units)
5	GMT Seconds (Tens) (MSC)
6	GMT Seconds (Units)

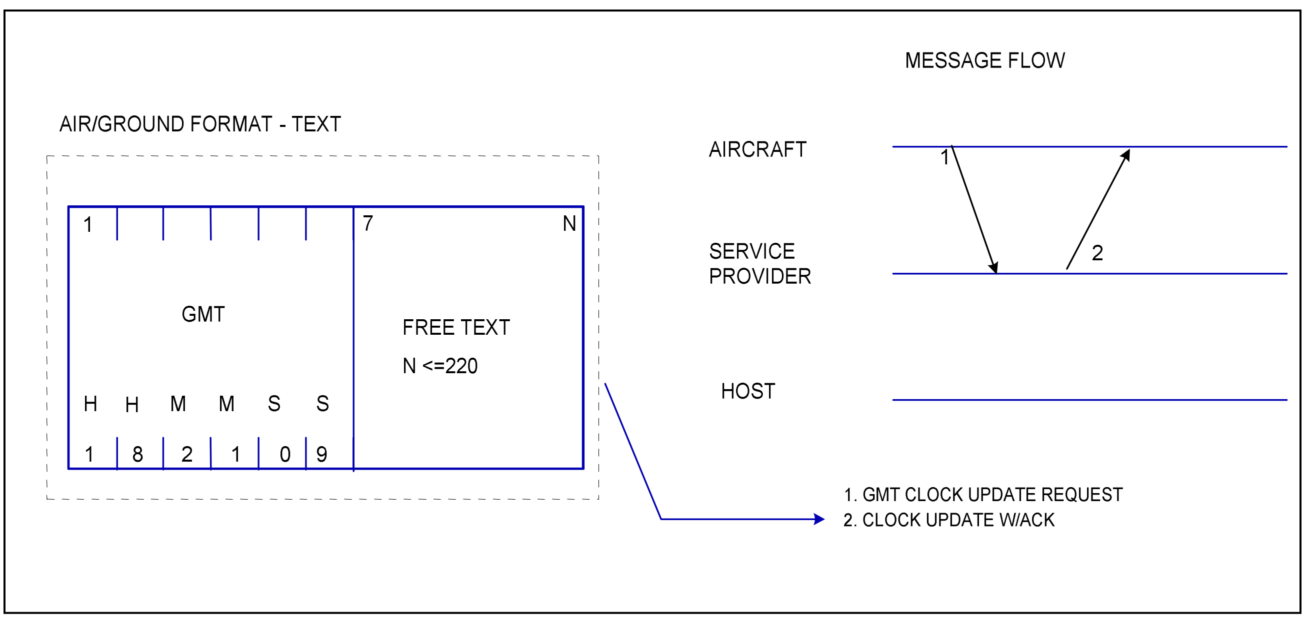


Figure 4.3.1-1 - GMT Report

4.3.2 Ground UTC Update - Label 52

Uplink Label 52 presents an alternative format for delivering UTC information. The new format includes the date and the day of the week as well as the information already present in Label 51. The format of the message is as follows:

Character No.	Character Content
1-6	Year (yy,mm,dd)
7	Day-of-Week (e.g. 1=MON, 7=SUN)
8-13	UTC (hh,mm,ss)

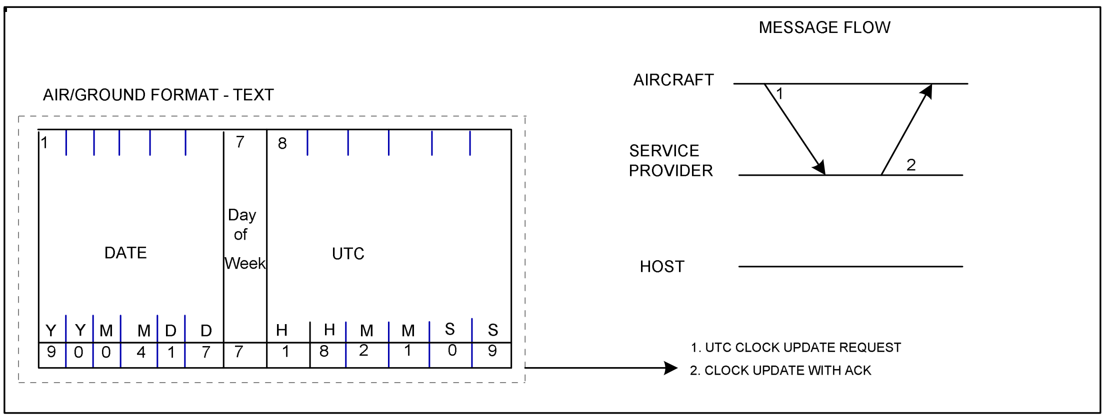


Figure 4.3.2-1 - Ground UTC Update

4.3.3 Reserved Spare - Label 53

Not assigned.

4.3.4 Cockpit/Cabin Printer Messages - Labels C0-C9

The Uplink Labels C0 through C9 are used to address different cockpit or cabin printers onboard the aircraft. Label C1 addresses Printer #1, C2 addresses Printer #2, etc. Label C0 is for an undesignated printer or an All Call printer as determined by the airborne system.

4.0 UPLINK MESSAGE TEXT FORMATS

Character No.	Character Content
1	Period Character <.>
2-8	ATA/IATA address of message originator
9	Space Character <$_{sp}$>
10-15	Date/Time group
16	Carriage Return Character <cr>
17	Line Feed Character <lf>
18-20	SMI from originator’s message
21	Carriage Return Character <cr>
22	Line Feed Character <lf>
23-24	TEI of AN or FI from originator’s message
25	Space Character <$_{sp}$>
26-32	Aircraft registration number or flight number
33	Slash Character </>
34-35	TEI of GL or AP from originator’s message
36	Space Character < >
37-39	Ground station identifier - 3 Alpha characters
40	Carriage Return Character <cr>
41	Line Feed Character <lf>
42	Hyphen Character <->
43	Space Character <$_{sp}$>
44-n	Free Text where n < 220

Only single-block uplinks and the first block of an ACARS multi-block uplink messages will contain the complete text field described above. The text fields of second and subsequent blocks of multi-block uplinks will only contain text.

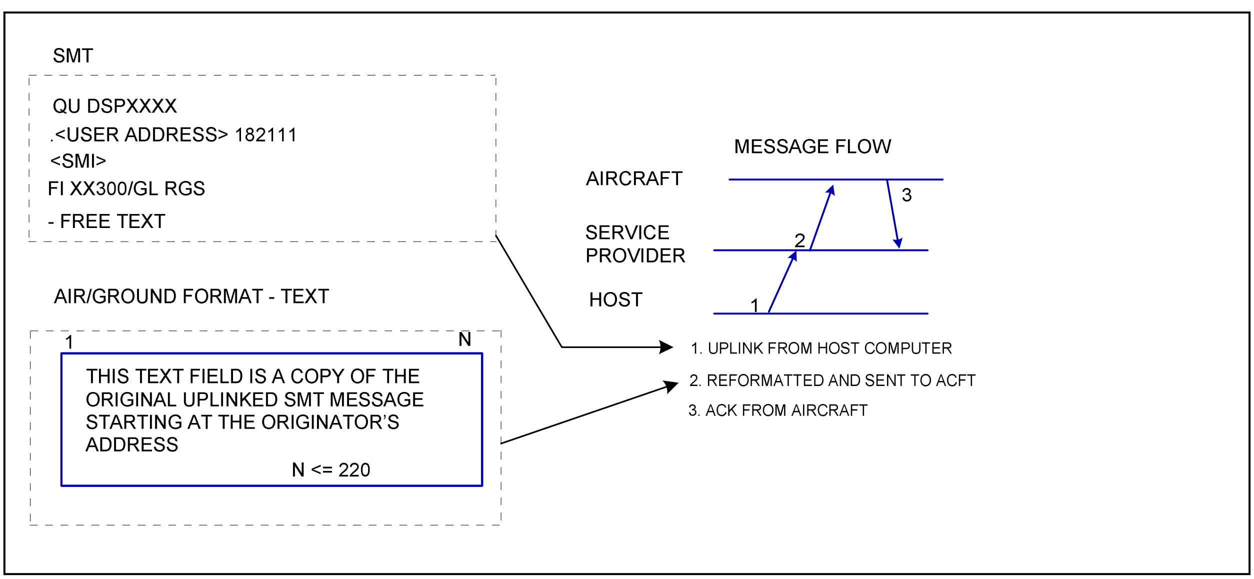


Figure 4.3.4-1 - Uplink Messages with SMT Header

4.3.5 Command/Response Uplink - Label RA

The Command/Response application is user-defined. The communications exchange is initiated by the ground host.

Character No.	Character Content	
1 – n	Free Text	(See Note 1)

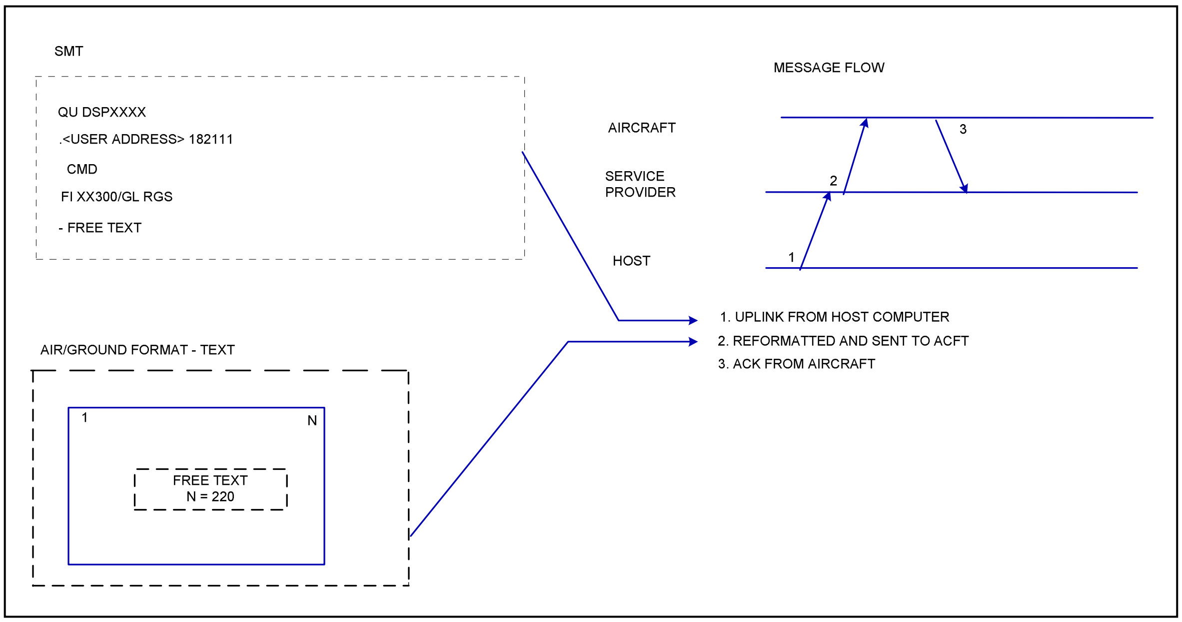


Figure 4.3.5-1 - Command/Response Uplink

While the free text of this message is user defined, many ACARS MUs have implemented a common format that is defined by:

Character No.	Character Content
1-2	Message Priority
3-9	Ground Address
10	Tilde <~> Character. See note below.
11	RA Function Indicator (1,2,3,4)
12	Free text where n < 220

Note: Since some user network interfaces with their service provider are limited to the baudot sub-set of ASCII, which excludes the tilda <~>, character 10 of incoming RA messages is frequently ignored by the avionics while others accept a range of characters. Consult your service provider. ACARS multi-block messages are permitted. When used, the fixed format shown above for Characters 1 thru 11 applies only to the first block.

4.3.6 Network Statistics Report Request - Label S1

The Network Statistics Report Request uplink message is used to request network statistics from the aircraft. Multiple reports (up to four possible report types) can be requested by including additional report type codes. The MU will retain only the most recent request if multiple requests are received. Uplink Network Statistics Report Request messages will be delivered to the DSP with the SMI of NSR.

The uplink Network Statistics Report Request (Label S1) uplink message provides the user with the option to request a report immediately or upon the occurrence of the IN event. Also, the user may arrange with the MU manufacturer to generate Label S1 downlinks at specific times or events. See Section 5.3.48 for the description of the Network Statistics downlink message.

Table 4.3.6-1 - Network Statistics Report Request Format

Size	Format	Description	Example	Notes
1	slash </>	Delimiter	/	
7-n	XXXXXXX	TTY Address	CIDRICR	2, 3
1	period <.>	Delimiter	.	
2	XX	Report Type Identifier	DA	1, 6
2	NN	Number of flight legs	02	5, 6
0-6	XX	Additional requests (0-3)		1, 4, 6

Notes:

1. Report Type — Description

Report Type	Description
SA	Enable generation of Summary Report to be downlinked subsequent to the IN event.
SC	Downlink the Summary Report with current data now.
DA	Downlink all accumulated Detailed Statistics records subsequent to the IN event.
DC	Downlink a Detailed Statistics Report with current data now.
SAnn	Downlink all accumulated Summary Statistics records subsequent to IN event for nn flight legs.
DAnn	Downlink all accumulated Detail Statistics records subsequent to the IN event for nn flight legs

2. This data is optional.

3. Multiple addresses can be specified: separated by spaces and terminated with a period <.>. See Section 3.2.3.3 for rules of encoding addresses.

4. Additional requests are included in the uplink request message, each additional request will follow the format defined in this table for the first request.

5. nn = number of flight legs to downlink statistics for. If 00, cancel transmission of statistics; if 99 send indefinitely.

6. If the format message is XXnn, only one request per message is allowed.

4.3.7 VHF Network Performance Report Request - Label S2

The VHF Network Performance Request is generated by an entity on the ground (user or DSP). The format enables the user to specify the reporting period or interval as described in Section 5.3.49.

Table 4.3.7-1 - Statistics Report Request Format - Label S2

Size	Format	Description	Range	Notes
1	/	Delimiter		1,2
7-n	XXXXXXX	TTY Address		1,2
1	.	Delimiter		1,2
1	A	Enable/Disable Data Collection and Reporting	0-1	0 = Disable 1 = Enable
4	NNNN	Duration of data collection (in minutes)	0001-1440	
4	NNNN	Period of reporting (in minutes)	0001-1440	$T2 \leq T1$

Notes:

1. This field is optional.

2. Multiple addresses can be specified. If included the first must be preceded by a slash </>. Addresses are separated by spaces and terminated with a period <.>. See Section 3.2.3.3 for rules of encoding addresses.

See Section 5.3.49 for an example of how this uplink affects the transmission of the S2 downlink message.

4.3.8 LRU Configuration Profile Report Request – MFI or Label S3

The LRU Configuration Profile Report Request is generated by an entity on the ground (user or DSP).

Size	Format	Description	Notes
1	slash </>	Delimiter	1,2
Var	XXXXXXX	TTY Address	1,2
1	period <.>	Delimiter	1,2

Notes:

1. This field is optional.
2. Multiple addresses can be specified. If included the first must be preceded by a slash </>. Addresses are separated by spaces and terminated with a period <.>. See Section 3.2.3.3 for rules of encoding addresses.

See Section 5.3.50 for the definition of the downlink Aircraft Profile Report message.

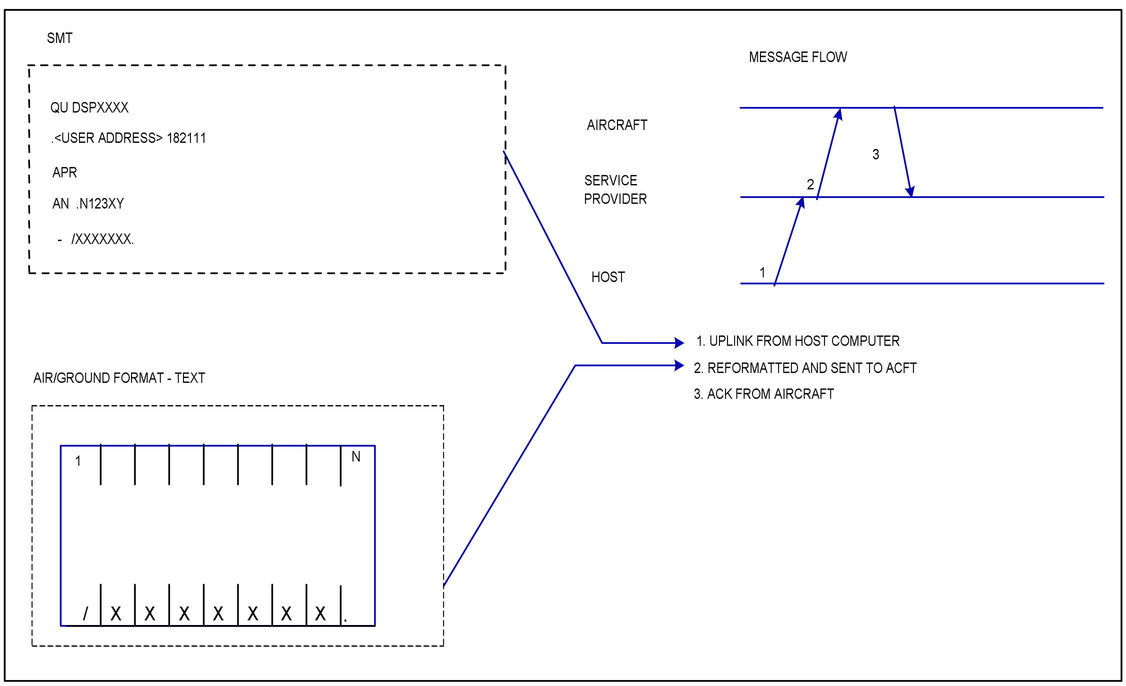


Figure 4.3.8-1 - LRU Configuration Report Request

4.3.9 Meteorological Report Command Uplink - MFI or Label H2

Automatic Weather Report (AWR) algorithm (see Section 5.2.13.2 and 5.2.13.3) limits can be changed via an ACARS uplink command using the following format:

Char	Data	Description	Units
1	A	IMI	
2	W	IMI	
3	R	IMI	
4-5	0-9	Ascent Series 1 intervals	Number of seconds, 03 to 20
6-8	0-9	Ascent Series 1 duration	Number of seconds, 030 to 200
9-10	0-9	Ascent Series 2 intervals	Number of seconds, 20 to 60
11-13	0-9	Top of Ascent	Hundreds of feet PALT, 180 to 300 or tens of seconds, 051 to 111
14-15	0-9	Enroute intervals	Number of minutes, 01 to 60
16-18	0-9	Top of a Descent	Hundreds of feet PALT, 180 to 300
19-21	0-9	Descent intervals	Number of seconds, 020 to 300
22	0-1	Ascent Enable(1) / Disable(0)	
23	0-1	Enroute Enable(1) / Disable(0)	
24	0-1	Descent Enable(1) / Disable(0)	

4.3.10 Meteorological Report Command Uplink - MFI or Label H4

Additional information in the form of programming notes is attached as Appendix G.

Automatic Weather Report (AWR) algorithm (see Section 5.3.13.4) limits can be changed via an ACARS uplink command using the following format:

4.3.10.1 Basic Configuration Data

Table 4.3.10.1-1 - Basic Configuration Data

Number of characters	Data	Description	Default value	Remarks
1	A	IMI		
1	W	IMI		
1	R	IMI		
2	04	Version number		
1	0, 1, 9	Enable AMDAR	1	0 = disable, 1 = enable, 9 = no change
1	0, 1, 9	Inhibit reporting in selected time interval See Note 2.	0	0 = disable (report through 24hrs every day), 1 = enable, 9 = no change. If enabled see Table 4.3.10-9.
1	0, 1, 9	Report in designated region See Note 3.	0	0 = disable, 1 = enable, 9 = no change, If enabled see Table 4.3.10-2.
1	0, 1, 9	Airport selection See Note 4.	0	0 = disable, 1 = enable, 9 = no change. If enabled see Table 4.3.10-3.
1	0, 1, 9	Ascent selection See Note 5.	1	0 = disable, 1 = enable. If enabled see Tables 4.3.10-5 and 4.3.10-3. If disabled and airport selection is disabled see Tables 4.3.10-6 and 4.3.10-4. 9 = no change
1	0-1 9	Enroute selection See Note 6.	1	0 = disable, 1 = enable, 9 = no change. If enabled see Tables 4-3.10- 4 and 4.3.10-3.
1	0, 1, 9	Descent selection See Note 7.	1	0 = disable, 1 = enable. If enabled see Tables 4.3.10-7 and 4.3.10-3. If disabled see Tables 4.3.10-8 and 4.3.10-4. 9 = no change
1	0-2	Downlink configuration tables See Note 8.	0	0 = do nothing, 1 = downlink Table1, 2 = downlink Tables 4.3.10-1, 4.3.10-2, 4.3.10-3, 4.3.10-4, 4.3.10-5, 4.3.10-6 4.3.10-7, 4.3.10-8 and 4.3.10-9 (see downlink report Label H4)
8	E_2 E_3 E_4 E_5 E_6 E_7 E_8 E_9	Extended message indicator See Note 9.	00000000	E_2= 2 means Table 4.3.10-2 follows, 0 means not included (and unchanged). Eg 03450700 means Tables 4.3.10-3, 4.3.10-4, 4.3.10-5 and 4.3.10-7 follow in that order.
1	/	Delimiter		End of Table 4.3.10-1 (this table) commands

Notes:

1. This table is the basic configuration table. It is the smallest message that can be uplinked and the information content is stored on board as Table 4.3.10-1. The information actually stored is determined by the commands contained in characters 6 – 12. Following a complete system reset and/or initialization, Table 4.3.10-1 contains the default characters (0 or 1) corresponding to characters 6 to 12. These can be changed by the uplinked message as necessary. Uplinked commands can be made to enable or disable the appropriate functions or leave the previous command unchanged. Each

character gives links to further on board data that affects the downlinked message required and, as necessary, updates to these data can be appended. Further explanation of each command follows.

2. Inhibit reporting in selected time interval, if enabled, points to Table 4.3.10-9. This command allows reporting to be inhibited for a selected period in any consecutive 24-hour period. When disabled, reporting is continuous unless inhibited by subsequent commands.

3. Report in designated region, if enabled, points to Table 4.3.10-2. Table 4.3.10-2 allows specific regions to be designated for enabling reporting or inhibiting reporting. When disabled, reports are to be made globally unless inhibited by subsequent commands.

4. Airport selection, if enabled, points to Table 4.3.10-3 which allows specific airfields to be selected for enabling ascent and/or descent reports or inhibiting ascent and/or descent reporting from specific airfields. If disabled, ascent and descent reports are required in all regions where AMDAR is enabled.

5. If Ascent selection is enabled, it points to Table 4.3.10-5 that specifies the ascent reporting scheme to be followed. If disabled, it overrides all previous commands and inhibits all ascent reporting. However, if Airport selection is disabled also, routine, timed reports can be enabled by reference to Table 4.3.10-6 using time intervals designated in Table 4.3.10-4. If Ascent selection is disabled and Airport selection is enabled it points to Table 4.3.10-3 to determine if routine reports are required during ascent from designated airfields.

6. Enroute selection, if disabled, overrides all previous commands and disables all enroute reporting. If enabled, enroute reporting is determined according to the commands linked to characters 6,7 and 8.

7. If Descent selection is enabled, it points to Table 4.3.10-7 that specifies the descent reporting scheme to be followed. If disabled, it overrides all previous commands and inhibits all descent reporting. However, if Airport selection is disabled also, routine, timed reports can be enabled by reference to Table 4.3.10-8 using time intervals designated in Table 4.3.10-4. If Descent selection is disabled and Airport selection is enabled it points to Table 4.3.10-3 to determine if routine reports are required during descent from designated airfields.

8. Downlink configuration tables, if set to 0 is ignored. If set to 1 the basic configuration (Table 4.3.10-1), as amended by the current message, is to be downlinked after the current uplink

message has been processed. If set to 2 all configuration tables are to be downlinked after the current uplink message has been processed.

9. The Extended message indicator indicates which updated configuration table data to be uplinked follows, as necessary.

4.3.10.2 Region Data

Table 4.3.10.2-1 - Region Data

Number of Characters	Data	Description	Remarks
2	N_RN_R	Number boxes following	NN= 0-16 Default = 00
14	$L_1L_1\ A_1L_2L_2A_2$ $L_3\ L_3L_3\ B_1L_4L_4\ L_4B_2$	Report in Lat/ Long box,	Lat in degrees north (A = N) or south (A = S) Lon in degrees east (B = E) or west (B = W) Convention is L_1L_1 to L_2L_2 (N -S) And $L_3L_3L_3$ to $L_4L_4L_4$ (W-E).
Variable, multiples of 14	As above	As above	As above, repeated (N_RN_R-1) times
1	:	Delimiter	End of report boxes, start of inhibit boxes
2	N_IN_I	Number boxes following	NN= 00-16 Default = 00
14	$L_1L_1\ A_1L_2L_2A_2$ $L_3\ L_3L_3\ B_1L_4L_4\ L_4B_2$	Inhibit reporting in Lat/ Long box	Inhibit has priority over enable
Variable, multiples of 14	As above	As above	As above, repeated (N_IN_I-1) times
1	/	Delimiter	End of Table 4.3.10-2 data.

Note: This Table is used if Report in designated region (Table 4.3.10-1, Character 8) is enabled. It allows up to 16 latitude/longitude boxes'that define regions in which profile and enroute observations should be taken (modified as appropriate by Table 4.3.10-3) and up to 16 regions in which observations are to be inhibited. Inhibited areas take precedence over reporting areas. Following a complete system reset and/or installation, the default number is 00 for both selection types. This is to be interpreted as the function is not enabled (i.e., report globally). When enabled, then no reporting is performed outside the designated regions unless specified in Table 4.3.10-3.

4.3.10.3 Airport Data (1)

Table 4.3.10.3-1 - Airport Data (1)

Number of Characters	Data	Description	Remarks
2	NANA	Number of airfields following	NANA = 00-20 default = 00
4	AAAA	Airfield selected for ascent	4 character airfield code
Variable multiples of 4	"	"	Repeated up to NANA -1 times
1	:	Delimiter	End of ascent list; start of descent list
2	NDND	Number of airfields following	NDND = 00-20 Default = 00
4	DDDD	Airfield selected for descent	4 character airfield code
Variable multiples of 4	"	"	Repeated up to NDND -1 times
1	:	Delimiter	End of descent list, start of (inhibit) ascent list
2	NANA	Number of airfields following	NANA = 00-20 default = 00
4	AAAA	Airfield inhibited for ascent	4 character airfield code
Variable multiples of 4	"	"	Repeated up to NANA -1 times
1	:	Delimiter	End of ascent list; start of descent list
2	NDND	Number of airfields following	NDND = 00-20 Default = 00
4	DDDD	Airfield inhibited for descent	4 character airfield code
Variable multiples of 4	"	"	Repeated up to NDND -1 times
1	0 - 1	Enable (1) or disable (0) routine observations during ascent and descent for the above selected inhibited airfields.	Default = 0 1 = enable routine observations. Routine observations are made at set intervals as defined in Table 4.3.10-4.
1	/	Delimiter	End of Table 4.3.10-3 data

Note: This table is used if Airport selection is enabled in Table 4.3.10-1. If also Report in designated region is set in Table 4.3.10-1 then the following rules apply to airfields within and external to the regions designated in Table 4.3.10-2. If airfields are specified outside a designated region then ascent and/or descent (but no enroute) reporting will apply to these airfields in addition to any requirements specified within the region. It is possible, therefore, to establish regions where only ascents and/or descents are made at specific airfields or all ascents/descents are made except those at designated airfields. The report list takes precedence over the inhibit list. For example if NANA (number of airfields following (for ascent reporting)) is set to 00 all ascents in an enabled region will be reported unless any are inhibited in the inhibit list following. If NANA (number of airfields following for ascent reporting) in an enabled region is non-zero, then only the listed airfields following, designated for ascent reporting, will be used. Ascent reporting at all other airfields in the same enabled region will be inhibited and the appropriate inhibit list will be ignored. The same logic applies to descent reporting. If in Table 4.3.10-1 Report in designated region is set to 0 then defaults in this table are to be interpreted as report ascents and/or descents (as appropriate) everywhere.

4.3.10.4 Interval and Wind Reporting Status

Table 4.3.10.4-1 Interval and Wind Reporting Status

Number of Characters	Data	Description	Remarks
2	mm	Routine-level flight observing interval (min)	Default = 07 Range = 01 – 60
1	w	Enable or disable maximum wind reporting	Default = 1 (enable) Disable = 0
1	/	Delimiter	End of Table 4.3.10-4 data

Note: This table sets the routine/enroute reporting interval. The third character (w), if set to the default value 1 enables maximum wind reporting during the enroute phase. If set to 0, this function is disabled.

4.3.10.5 Ascent Data

Table 4.3.10.5-1 - Ascent Data

Number of Characters	Data	Description	Remarks
1	0 or 1	Pressure level (0 or Time interval (1) selection	Ascent sampling mode Default = 1
2	ss	Series 1 intervals (seconds)	Default = 06 (seconds) Range = 03 - 20
3	sss	Series 1 duration (seconds)	Default = 090 Range = 030 – 200
2	ss	Series 2 intervals (seconds)	Default = 20 Range = 20 – 60
3	SSS	Total duration (secondsx10)	Default = 051 Range = 051 – 111
3	hhh	Top of climb (ftx100)	Default = 200 Range = 150 – 250
1	1 or 2	Pressure target list selection	1 = List 1, 2 = List 2 (Table 4.3.10-10) Default = 2
1	0 or 1	Additional level flight timer for pressure-based sampling: enabled = (1), disabled = (0)	Default = 1 (Routine timer interval as defined in Table 4.3.10-4)
1	/	Delimiter	End of Table 4.3.10-5 data

Note: This table is used when ascent reports are made. (This will be established by reference to Tables 4.3.10-1, 4.3.10-2 and 4.3.10-3). Following a complete system reset and/or initialization, the table holds the default values as given (all of which must be stored onboard). The first character indicates whether interval selection is by time or pressure intervals. The next 4 fields (Series 1 int. etc). give the required time interval parameters. If pressure is used, sampling commences using Series 2 format immediately. The next 3 characters set the top of climb defining the end of the ascent phase. This is followed by a single character that defines which of the two pre-stored lists of pressure altitude target heights are to be used (Table 4.3.1-0-10, List 1 or 2) when pressure level is selected by the first field. The next character selects whether a default timer is used in conjunction with pressure level selection to ensure that samples are still obtained if there is a pause during the ascent phase for periods of level flight. The additional interval timer resets and commences following each observation. If no pressure level is encountered during the pre-set time interval, a sample is taken and the timer is reset. The pre-set time interval is the same as selected in field 1 of Table 4.3.10-4 for routine/level flight. This technique also automatically commences the enroute phase of level flight if the top of climb is not reached. The function is disabled if Ascent selection is disabled in Table 4.3.10-1.

4.3.10.6 Airport Data (2)

Table 4.3.10.6-1 - Airport Data (2)

Number of Characters	Data	Description	Remarks
1	0 or 1	Routine observations enabled = (1), disabled = (0)	Enables or disables routine observations when both ascent and airport selection are disabled in Table 4.3.10-1. Default = 1
1	/	Delimiter	End of Table 4.3.10-6 data

Note: This table is used only if Ascent selection and Airport selection are disabled through Table 4.3.10-1 commands. If the first character is set to 1 (default) then routine observations at the time intervals given in Table 4.3.10-4 will be made whenever AMDAR reporting is enabled through previous Table 4.3.10-1 commands. If set to 0, no routine reports will be made anywhere during the ascent phase. If Ascent selection is disabled and Airport selection enabled this table is ignored and routine reporting requirements are determined from Table 4.3.10-3. Table 4.3.10-2 has no influence on this function.

4.3.10.7 Descent Data (1)

Table 4.3.10.7-1 - Descent Data (1)

Number of Characters	Data	Description	Remarks
1	0 or 1	Pressure interval (0) or Time interval (1) selection	Descent sampling mode selection Default = 1
3	sss	Descent interval (seconds)	Default = 040 Range = 020 – 300
3	hhh	Top of descent (PALT) (ft x 100)	Default = 200 Range = 150 - 250
1	1-2	Pressure target list selection	1 = list 1, 2 = list 2 (4.3.10 Table A) Default = 2
1	0 or 1	Additional level flight timer for pressure-based sampling: enabled = (1), disabled = (0)	Default = 1 (Routine timer interval as defined in Table 4.3.10-4)
1	/	Delimiter	End of Table 4.3.10-7 data

Note: This table is used if descent reports are made. (This will be established by reference to Tables 4.3.10-1, 4.3.10-2 and 4.3.10-3.) The first character indicates whether interval selection is by time or pressure intervals. The next 3 characters give the required time interval and must be included even if the pressure sampling mode is selected. The following 3 characters set the top of descent. The next character indicates which of two pre-stored pressure altitude target heights lists are to be used (Table 4.3.10-10, List 1 or List 2). The second last character determines whether a default timer is used in conjunction with pressure level selection to ensure that samples are still obtained if there is a pause during the descent phase for periods of level flight. The additional interval timer resets and commences following each observation. If no pressure level is encountered during the pre-set time interval, a sample is taken and the timer is reset.

The pre-set time interval is the same as selected in field 1 of Table 4.3.10-4 for routine/level flight. The function is disabled if Descent selection is disabled through Table 4.3.10-1 command.

4.3.10.8 Descent Data (2)

Table 4.3.10.8-1 - Descent Data (2)

Number of Characters	Data	Description	Remarks
1	0 or 1	Routine observations: enabled = (1) disabled = (0)	Enables or disables routine observations when both descent and airport selection are disabled in 4.3.10- 1. Default = 1
1	/	Delimiter	End of Table 4.3.10- 8 data

Note: This Table is used only if Descent selection and Airport selection are disabled through Table 4.3.10-1 command. If the first character is set to 1 (default) then routine observations at the time intervals given in Table 4.3.10-4 will be made during descent whenever AMDAR reporting is enabled through previous Table 4.3.10-1 commands. If set to 0 no reports will be made anywhere during the descent phase. If Descent selection is disabled and Airport selection enabled this table is ignored and routine reporting requirements are determined from Table 4.3.10-3. Table 4.3.10-2 has no influence on this function.

4.3.10.9 Reporting Disabled Status

Table 4.3.10.9-1 - Reporting Disabled Status

Number of Characters	Data	Description	Remarks
4	H1H1H2H2	Disable observations between selected hours (00-23) UTC, every day	H1H1 = start of inhibit period H2H2 = end of inhibit period Default = 0000
1	/	Delimiter	End of Table 4.3.10 - 9 data

Note: This table is used if Inhibit reporting in selected time interval (Table 4.3.10-1) is selected. It allows observations to be inhibited between selected hours UTC, each 24 hours it is enabled. The default value is interpreted as no interval selected. The inhibit period starts at the first designated hour in the day and ends when the next designated hour is reached the same or next day. Thus 2301 means inhibit between 2300 hours and 0100 hours the next day, every day. (two hours spanning midnight UTC). 0000 means report though all 24 hour periods.

Additional notes:

Default data for Tables 4.3.10-1 through to 4.3.10-9 are stored onboard as part of the basic software but can only be altered through software re-programming. Following a complete system reset and/or initialization, the default table variables from non-volatile memory are loaded and then retained in volatile memory until altered by uplink command. Default values can only be altered through software re-programming. Any subsequent uplinked changes are retained in volatile memory until the next system reset and/or initialization.

The uplink command can be used to change any of the system control parameters or simply to downlink an existing configuration for data management purposes.

4.3.10.10 Preset Target Heights Based on Pressure Level Selection

Note: This table is not uplinked but stored in the on-board AMDAR program]

Table 4.3.10.10-1 - Preset Target Heights based on Pressure Level Selection

Pressure (hPa)	Height (ft)	List 1	List 2	Height No (nn)
1050	-989	1	1	01
1045	-856	2		02
1040	-723	3	2	03
1035	-589	4		04
1030	-454	5	3	05
1025	-319	6		06
1020	-184	7	4	07
1015	-48	8		08
1010	89	9	5	09
1005	226	10		10
1000	364	11	6	11
995	502	12		12
990	641	13	7	13
985	780	14		14
980	920	15	8	15
975	1061	16		16
970	1202	17	9	17
965	1344	18		18
960	1486	19	10	19
955	1629	20		20
950	1773	21	11	21
945	1917	22		22
940	2062	23	12	23
935	2207	24		24
930	2353	25	13	25
925	2500	26		26
920	2647	27	14	27
915	2795	28		28
910	2944	29	15	29
905	3093	30		30
900	3243	31	16	31
895	3394	32		32
890	3545	33	17	33
885	3697	34		34
880	3850	35	18	35
875	4003	36		36
870	4157	37	19	37
865	4312	38		38
860	4468	39	20	39
855	4624	40		40
850	4781	41	21	41

Pressure (hPa)	Height (ft)	List 1	List 2	Height No (nn)
845	4939	42		42
840	5098	43	22	43
835	5257	44		44
830	5417	45	23	45
825	5578	46		46
820	5739	47	24	47
815	5902	48		48
810	6065	49	25	49
805	6229	50		50
800	6394	51	26	51
795	6560	52		52
790	6727	53	27	53
785	6894	54		54
780	7062	55	28	55
775	7232	56		56
770	7402	57	29	57
765	7573	58		58
760	7745	59	30	59
755	7917	60		60
750	8091	61	31	61
745	8266	62		62
740	8442	63	32	63
735	8618	64		64
730	8796	65	33	65
725	8974	66		66
720	9154	67	34	67
715	9334	68		68
710	9516	69	35	69
705	9699	70		70
700	9882	71	36	71
675	10817	72		72
650	11780	73	37	73
625	12774	74		74
600	13801	75	38	75
575	14862	76		76
550	15962	77	39	77
525	17103	78		78
500	18289	79	40	79
475	19524	80		80
450	20812	81	41	81
425	22160	82		82
400	23574	83	42	83
375	25061	84		84

Notes:

1, The contents of this table are the same as in Table 5.3.13.4-4 and Table 10 in Appendix G. If changes are necessary, please change all three tables.

2. The following two equations are used in the process to calculate pressure (P(hPa)) from pressure altitude (PALT) and pressure altitude from pressure if Table 4.3.10-10 is not used to determine pressure target heights.

   Computation of pressure, P(hPa) in ICAO Standard Atmosphere from pressure altitude, PALT:

   P(hPa) = 1013.25[1 – 10-6x6.8756(PALT)]5.2559 ------ ---(1)

   Computation of pressure altitude, PALT from pressure, P(hPa) in ICAO Standard Atmosphere:

   PALT = 1.4544x105[1 - (P(hPa)/1013.25)0.19026]------ ---(2)

   For pressure-based observations during ascent and descent phases of flight, all sampling takes place at multiples of 10 or 50 hPa if List 2 is selected (5 and 25 hPa if List 1 is selected) except for the initial observation following the Off event and predefined tops of ascent and descent both of which are defined in thousands of feet.

Example 1:

Interpretation of Observation Requirements

AMDAR data is required from this aircraft reporting according to the following requirements:

1. An exclusion time window is needed using the current pre-set time values i.e. no change to Table 4.3.10-9;
2. Data are to be collected in a single regional lat-long box (60N - 50N, 30W - 30E) but not in a small box within this area (52N - 50N, 001W - 001E) as defined in the update to Table 4.3.10-2;
3. There is no requirement for data to be collected or inhibited at any special airports;
4. Ascent data is required using the existing pre-set values in Table 4.3.10-5;
5. Enroute data is required using the existing pre-set reporting interval as defined in Table 4.3.10-4;
6. No high density data is required during descent, but sampling during descent is required as specified in the updated Table8 information below and at the existing pre-set routine reporting interval in Table 4.3.10-4.
7. At the end of saving all table updates, a downlinked configuration report for all tables is required.

Command String:

AWR041110110220000080/0160N50N030W030E:0152N50N001W001E/1/

Decode:

Character	Data	Meaning
1	A	
2	W	
3	R	
4	0	
5	4	Version no (04)
6	1	AMDAR enabled
7	1	Time interval in day selected, refer to Char 21 and Table 4.3.10-9
8	1	Reporting regions selected, refer to Char 14 and Table 4.3.10-2
9	0	Airport selection disabled
10	1	Ascents enabled, refer to Char 17 and Table 4.3.10-5
11	1	Enroute selected, refer to Char 16 and Table 4.3.10-4
12	0	Descent disabled, refer to Char 16, 20 and Tables 4.3.10-4 and 4.3.10-8
13	2	Downlink all tables (after command action)
14	2	Update for Table 4.3.10-2 follows
15	0	No change to Table 4.3.10-3
16	0	No change to Table 4.3.10-4
17	0	No change to Table 4.3.10-5
18	0	No change to Table 4.3.10-6
19	0	No change to Table 4.3.10-7
20	8	Update to Table 4.3.10-8 follows.
21	0	No change to Table 4.3.10-9
22	/	End of Basic Configuration (Table 1) Commands. Store Table 4.3.10-1 update (Chars 4-12)
23	0	}
24	1	} One designated reporting region follows
25	6	}
26	0	} 60N to
27	N	}
28	5	}
29	0	} 50N
30	N	}
31	0	}

Character	Data	Meaning
32	3	} 30W to
33	0	}
34	W	}
35	0	}
36	3	} 30 E
37	0	}
38	E	}
39	:	End of reporting region selection, start of inhibit region selection.
40	0	}
41	1	} One inhibit region selected (52N-50N), (01W-01E)
42	5	}
43	2	} 52N to
44	N	}
45	5	}
46	0	} 50N
47	N	}
48	0	}
49	0	}
50	1	} 001W
51	W	}
52	0	}
53	0	}
54	1	} 001E
55	E	}
56	/	End of Table 4.3.10-2 update data- update stored Table 4.3.10-2
57	1	Routine observations enabled (Table 4.3.10-8) during descent (intervals from Table 4.3.10-4)
58	/	End of Table 4.3.10-8 data- update stored Table 4.3.10-8

Example 2

Requirement:

Change only routine/enroute observation interval to 10 minutes with enroute enabled. Downlink all configuration tables.

Message:

AWR049999919200400000/100/

Note: Chars 6-10 are encoded 9 meaning no change to stored configuration. Char 11 is encoded 1 to ensure enroute reporting is enabled. Char 12 is encoded 9 indicating no change to descent selection. Char 13 is encoded 2 to request downlink of all configuration tables at termination of uplink message. Chars 14-15 are encoded 0 to indicate Tables 4.3.10-2 to 4.3.10-3 are not included in the message. Char 16 is coded 4 to indicate updated Table 4 follows. Chars 17-21 are coded 0 to indicate Tables 4.3.10-5 through 4.3.10-9 are not included in the message. Chars 23 and 24 give new value of 10 minutes in Table 4.3.10-4 for routine/enroute observing interval. Char 25 is set to 0 to indicate no max wind reporting.

Example 3

Observation requirements:

AMDAR data are required from this aircraft which is being returned to service following an extensive maintenance period. All settings have been set to the default values following power up but changes are now required to some settings according to the following requirements:

1. Data are to be reported during night hours only using the exclusion time window as defined in the updated Table 4.3.10-9 (0700 - 2100);
2. All profiles and enroute data are required in the southern hemisphere. Enroute data only is required in the northern hemisphere except over regions covering the US and Europe as defined in 2 regional exclusion lat.-long. boxes in the updated Table 4.3.10-2, i.e., (50N - 15N, 125W - 60W) and (90N - 40N, 15W - 40E);
3. Targeted profile observations are required for Singapore, Hong Kong and Bangkok (as defined in an updated Table 4.3.10-3) but no other northern hemisphere airport. By specifying these airports, profiles at all other airports in the northern hemisphere will be automatically inhibited.
4. Ascent data are required as shown in the updated Table 4.3.10 - 5 at the pre-set higher density pressure values contained in List 1 of pre-stored Table 10. The additional level flight timer is also required to produce data during pauses in the ascent.
5. Enroute data at the default interval of 7 minutes and maximum wind reports are required in the updated Table 4.3.10-4;
6. Descent data are required as shown in the updated Table 4.3.10-7 at the pre-set higher density pressure values contained in List 1 of the pre-stored Table A. The additional level flight timer is also required to produce data during pauses in the descent;
7. At the end of saving all table updates, a downlinked configuration report for all tables is required.

Command String:

**AWR0411111111223450709/0290N00N180W180E00S90S180W180E:0250N15N12
5W060W90N40N015W040E/03WSSSVHHHVTBD:03WSSSVHHHVTBD:00:000/07
1/0060902005120011/004020011/0721/**

Character Number	Data Value	Meaning/Action
1	A	IMI
2	W	IMI
3	R	IMI
4	0	Version no. (04)
5	4	
6	1	AMDAR is enabled
7	1	Use Exclusive time window to report overnight. Exclude observations between 7am and 9pm. Refer to Char. 21 and updated Table 4.3.10-9
8	1	Report globally except in regions over US and Europe. Refer to Char. 14 and updated Table 4.3.10-2
9	1	Use inclusive airport selection for ascents and descents. Refer to Chars. 14 & 15 and updated Tables 4.3.10-2 & 4.3.10-3.
10	1	High density pressure triggered Ascent is selected. Refer to Char. 17 & updated Table 4.3.10-5.
11	1	Enroute is selected at the default time interval. Refer to Char. 16 and Table 4.3.10-4 (default).
12	1	High density pressure triggered Descent is selected. Refer to Char. 19 & Table 4.3.10-7.
13	2	Transmit all tables in downlinked Status Report after saving of updated tables.
14	2	Update Table 4.3.10-2 - Define new regions.
15	3	Update Table 4.3.10-3 - Define new list of inclusive airports for ascent & descent.
16	4	Update Table 4.3.10-4 - Retain default 7 minute intervals; enable maximum wind.
17	5	Update Table 4.3.10-5 - Select pressure level trigger for ascent at high resolution.
18	0	No change to Table 4.3.10-6 - Retain default setting. Routine observations on ascent not required.
19	7	Update Table 4.3.10 - 7 - Select pressure level trigger for descent at high resolution
20	0	No change to Table 4.3.10-8. Retain default setting. Routine observations on descent not required.
21	9	Update Table 4.3.10- 9 - Set exclusion window to 0700-2100
22	/	End of basic configuration commands. Store Table 1 updates.
23	0	Commence Table 4.3.10-2 update. Define 2 inclusion boxes, southern hemisphere (profiles & enroute) and northern hemisphere (enroute only).
24	2	
25	9	
26	0	
27	N	
28	0	
29	0	
30	N	
31	1	
32	8	
33	0	
34	W	
35	1	
36	8	

Character Number	Data Value	Meaning/Action
37	0	
38	E	
39	0	
40	0	
41	S	
42	9	
43	0	
44	S	
45	1	
46	8	
47	0	
48	W	
49	1	
50	8	
51	0	
52	E	
53	:	End inclusive regional boxes
54	0	Commence Exclusion regional boxes. 2 are required
55	2	Report globally except in these 2 boxes
56	5	Commence defining first box (50N-15N; 125W-60W)
57	0	
58	N	
59	1	
60	5	
61	N	
62	1	
63	2	
64	5	
65	W	
66	0	
67	6	
68	0	
69	W	
70	9	Commence defining second box (90N-40N; 15W-40E)
71	0	
72	N	
73	4	
74	0	
75	N	
76	0	
77	1	
78	5	
79	W	
80	0	
81	4	
82	0	
83	E	
84	/	End of defining exclusion boxes.
85	0	Define 3 airports for ascent reporting in northern hemisphere box. All other NH ascents are inhibited
86	3	
87	W	

Character Number	Data Value	Meaning/Action
88	S	
89	S	
90	S	
91	V	
92	H	
93	H	
94	H	
95	V	
96	T	
97	B	
98	D	
99	:	
100	0	Define same 3 airports for descent reporting in NH. All other descents are NH inhibited
101	3	
102	W	
103	S	
104	S	
105	S	
106	V	
107	H	
108	H	
109	H	
110	V	
111	T	
112	B	
113	D	
114	:	
115	0	No airfields are selected for inhibiting ascents
116	0	
117	:	
118	0	No airfields are selected for inhibiting descents
119	0	
120	0	Disable routine sampling of profiles.
121	/	End of Table 4.3.10-3 update. Store new Table 4.3.10-3
122	0	Commence update to Table 4.3.10-4. Retain 7 min. intervals;
123	7	
124	1	Enable maximum wind reporting
125	/	
126	0	Commence update to Table 4.3.10-5. Enable Pressure level triggering during ascent phase
127	0	}
128	6	}
129	0	}
130	9	}
131	0	} No changes to default settings
132	2	}
133	0	}
134	0	
135	5	}
136	1	}
137	2	}

4.0 UPLINK MESSAGE TEXT FORMATS

Character Number	Data Value	Meaning/Action
138	0	}
139	0	}
140	1	Enable Table 4.3.10-10 List 1 high resolution pressure triggers
141	1	Enable additional level flight timer during ascent
142	/	End of Table 4.3.10-5 update
143	0	Commence update to Table 4.3.10-7. Enable Pressure level triggering during descent phase
144	0	}
145	4	}
146	0	}
147	2	} No changes to default settings
148	0	}
149	0	}
150	1	Enable Table 4.3.10-10 List 1 high resolution pressure triggers
151	1	Enable additional level flight timer during descent
152	/	End of update to Table 4.3.10-7
153	0	Commence update to Table 4.3.10-9. Set Exclusion time window 0700-2100
154	7	
155	2	
156	1	
157	/	End of update to Table 4.3.10-9. Save all Tables. Downlink status report

4.4 Uplink Message Formats, ACARS Peripherals - Label H1

Provisions have been made for avionic sub-systems (peripherals) to operate as End Systems and to accept messages from the AOC users' host systems or ATC facility on the ground. These messages will be routed through the ACARS Management Unit (MU) for delivery. Uplink messages to these avionics sub-systems will contain Label Characters H1.

Label H1 messages may contain additional addressing information to facilitate delivery of the message. Sub-labels are used to enable the MU to identify the specific avionics subsystem (e.g., FMC) to which uplink message is to be passed.

A general format example is shown below. The following sub-sections define, in greater detail, the format of messages exchanged across the air-ground medium that are to be delivered to an avionics sub-system by the ACARS Management Unit (MU).

A listing of sub-labels, their associated SMI and Section References are found in Table C2-A of Appendix C.

Table 4.4-1A - Ground-ground format of an Uplink Message for Delivery to an Avionics Subsystem

Standard Format:
QU DSPXXXX
.LAX05xx/ddhhmm
SMI
AN N1003x/GL or RGS FI xx1234/GL RGS
- /LAX05xx.Application text

The message will be delivered to the avionics system identified by the SMI. The actual SMI entry should be taken from Table C-2A of Appendix C, cross referenced to the avionics systems sub-label from Appendix D of ARINC Specification 622.

Message Text:
See the description provided in Section 4.3 under Table 4.3-1A, ground-ground format of Uplink Message sent to the MU.

Table 4.4-1B - General Air-Ground Format of Uplink Message to be delivered to an Avionics Sub-System.

		Aircraft Address		**Label**			**Sub-label**	**0ptional Supplementary Address**	**Message Text**
		.N1234x or .xx1234		H1			MD	/LAX05xx.	Application text

The specific messages supported by the ACARS network are defined in Sections 4.3.7 through 4.3.17.

Aircraft Address:
See ARINC Specification 618 for a description of the aircraft address.

Label:
Uplink messages to be delivered to a peripheral of the MU, such as the FMC, utilize the Label H1.

Sub-Label:
When uplink messages are to be delivered to avionics sub-systems by the ACARS MU for processing, these messages use Label H1 and a 2 character sub-label to identify the intended recipient avionics subsystem. Note that, as discussed in Section 4.3, the sub-label field is preceded by the POUNDSIGN <#> character to designate the presence of a sub-label field. The above example assumes that the message will be delivered to the active FMC; thus the Sub-Label MD is shown. See Table C-2A of Appendix C and ARINC Specification 622, Appendix D for a full listing of sub-label assignments for ACARS peripherals.

Table 4.4-1C - Example Sub-Labels

Destination	Sub-label
CMC	CF
Cabin Terminal	T1
DMU	DF
FMC selected	MD

Optional Supplementary Address:
For messages to a peripheral to the MU, the Supplementary Address is optional. The Supplementary Address field will contain the address of the End System to which the responding downlink should be sent. See Section 3.2.2.1.2.

Message Text:
See the description provided in Section 4.3 under Table 4.3-1A, Ground-ground format of Uplink Message sent to the MU.

4.4.1 OAT - Label H1

Character No.	Character Content
1	Period Character <.>
2-8	ATA/IATA address of message originator
9	Space Character <$_{sp}$>
10-15	Date/Time group
16	Carriage Return Character <cr>
17	Line Feed Character <lf>
18-20	SMI from originator's message
21	Carriage Return Character <cr>
22	Line Feed Character <lf>
23-24	TEI of AN or FI from originator's message
25	Space Character <$_{sp}$>
26-32	Aircraft registration number or flight number
33	Slash Character </>
34-35	TEI of GL or AP from originator's message
36	Space Character <$_{sp}$>
37-39	Ground station identifier - 3 Alpha characters
40	Carriage Return Character <cr>
41	Line Feed Character <lf>
42	Hyphen Character -
43	Space Character
44-n	Free Text where n < 220

Note: For ATS uplink messages to an OAT, the beginning of the Free text field is encoded with a SLASH </>, a two-character MFI, and a space, followed by one or more seven-character ATS return addresses, separated by spaces. This series is terminated with a period. (See Sections 4.4 and 4.5 for a definition of the MFI field.)

For OAT messages, SITA, as a DSP, examines the beginning of the text part of the Type B message to test whether the message contains a sub-label. If the text begins with the [DASH SPACE POUNDSIGN] <- #> character sequence, the two characters following the POUNDSIGN <#> are taken to be the sub-label. If the message is an ACARS multiblock, this sub-label will be placed at the beginning of any subsequent ACARS blocks. If the DSP finds any character other than POUNDSIGN <#> at the position described, the message is treated as containing no sub-label.

Only single-block uplinks and the first block of ACARS multi-block uplink messages will contain the complete text field described above. The Text fields of second and subsequent blocks of multi-block uplinks will only contain text. See Figure below.

4.4.2 OAX - Label H1

Character Number	Character Content
1	Dash Character <->
2	Space Character <$_{sp}$>
3-4	Free Text where n < 220

4.0 UPLINK MESSAGE TEXT FORMATS

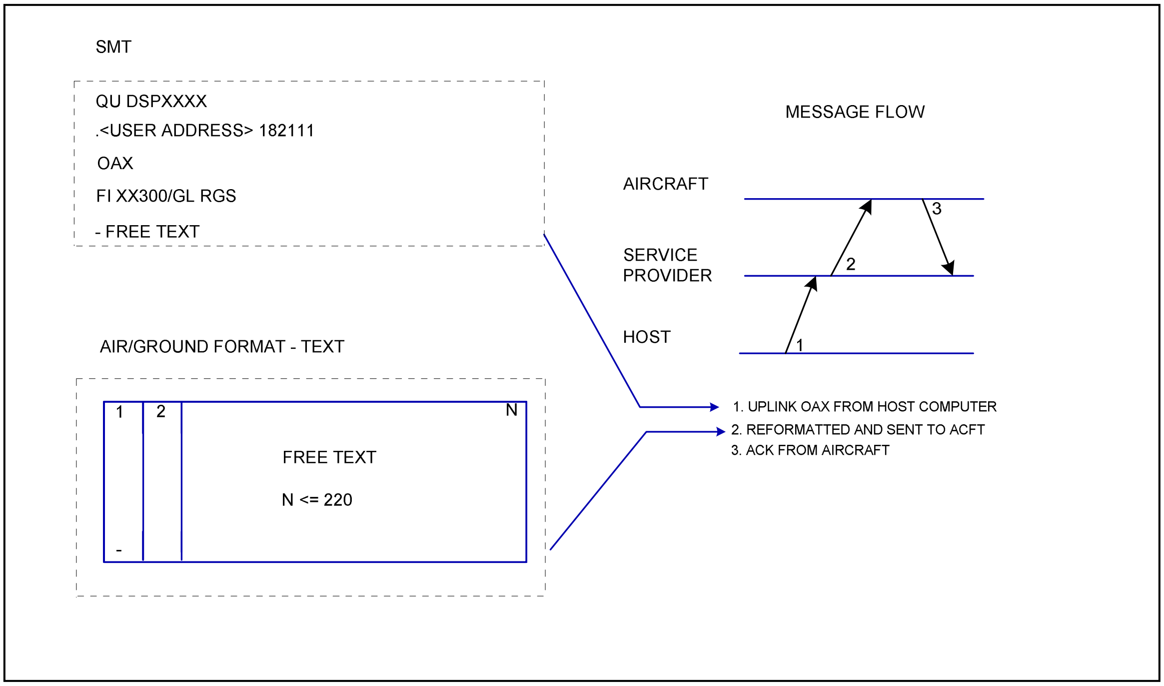


Figure 4.4.2-1 - OAX - Label H1

Note: For ATS uplink messages to an Optional Auxiliary Terminal (OAX), the beginning of the Free text field is encoded with a SLASH </>, a two-character MFI, and a space, followed by one or more seven-character ATS return addresses, separated by spaces. This series is terminated with a period. (See Sections 4.4 and 4.5 for a definition of the MFI field.)

For OAX messages, SITA, as the DSP, examines the beginning of the text part of the Type B message to test whether the message contains a sub-label. If the text begins with the [DASH SPACE POUNDSIGN] <- #> character sequence, the two characters following the POUNDSIGN <- #> are taken to be the sub-label. If the message is an ACARS multiblock, this sub-label will be placed at the beginning of any subsequent ACARS blocks. If the DSP finds any character other than POUNDSIGN <#> at the position described, the message is treated as containing no sub-label.

4.4.3 Uplinks (with Headers) to Peripherals - Label H1

This section describes the message format for uplink messages containing a sub-label and with SMT header information imbedded in the uplink Air-ground message block.

Peripherals may receive messages with the following SMIs:

CFD	DFD	FCD	TX1
		FCL	TX2
		FCR	TX3
		FC3	TX4

4.0 UPLINK MESSAGE TEXT FORMATS

Character Number	Character Content
1	Period Character <.>
2-8	ATA/IATA address of message originator
9	Space Character <sp>
10-15	Date/Time group
16	Carriage Return Character <cr>
17	Line Feed Character <lf>
18-20	SMI from originator's message
21	Carriage Return Character <cr>
22	Line Feed Character <lf>
23-24	TEI of AN or FI from originator's message
25	Space Character <sp>
26-32	Aircraft registration number or flight number
33	Slash Character </>
34-35	TEI of GL or AP from originator's message
36	Space Character <sp>
37-39	Ground station identifier (3 Alpha characters)
40	Carriage Return Character <cr>
41	Line Feed Character <lf>
42	Dash Character <->
43	Space Character <sp>
44	Poundsign Character <#>
45-46	Sub-label Characters (See Table C-2A of Appendix C.)
47-n	Free Text where n ≤ 220

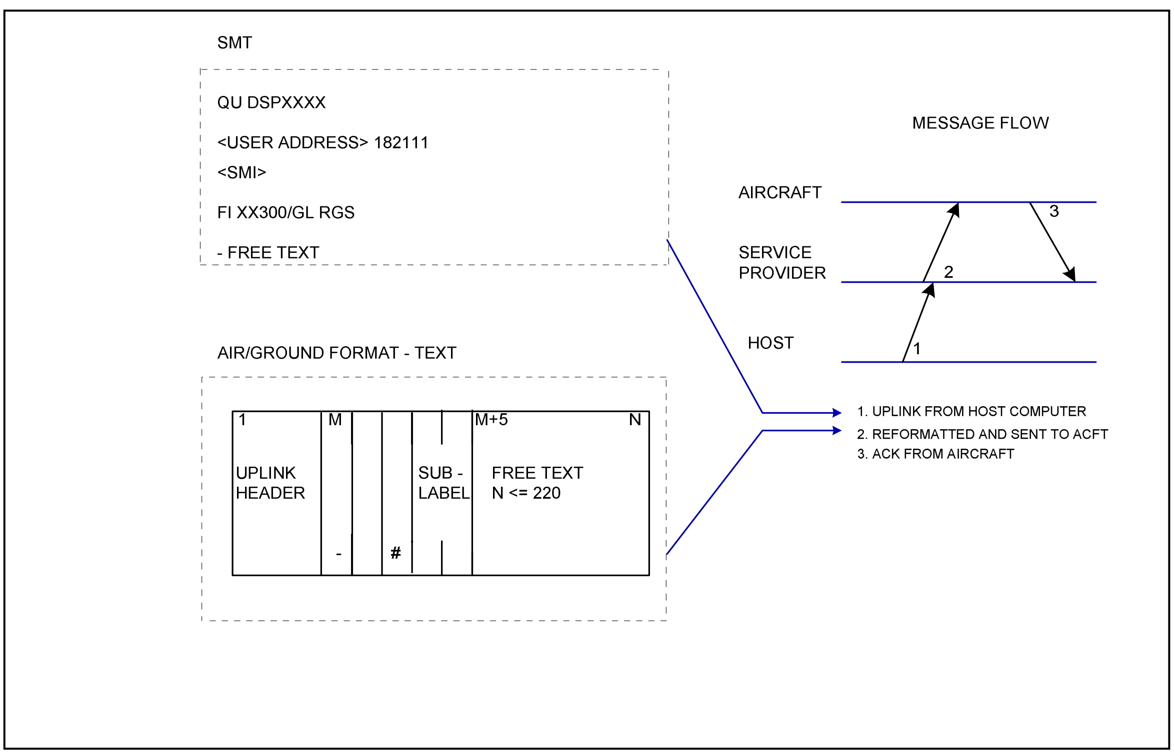


Figure 4.4.3-1 - Uplink Messages with SMT Header to Peripherals

4.4.4 Uplinks (With No Header) to Peripherals - Label H1

This section describes the message format for uplink messages with a sub-label, but without SMT Header information imbedded in the uplink Air-ground message block.

Peripherals may receive messages with the following SMIs:

AUD	CFX	DFX	FMD	Nxx	SDD	TT1-TT8	HDR
AUL			FML		SDL		HDL
AUR			FMR		SDR		HDD
			FM3				

Note: For ATS uplink messages to an ACARS peripheral, the beginning of the Free text field is encoded with a SLASH </>, a two-character MFI, and a space, followed by one or more seven-character ATS return addresses, separated by spaces. This series is terminated with a period. (See Sections 4.4 and 4.5 for a definition of the MFI field.)

Character Number	Character Content
1	Dash Character <->
2	Space Character <$_{sp}$>
3	Poundsign Character <#>
4-5	Sub-Label Characters (See Table C-2A of Appendix C)
6-n	Free Text where n < 220

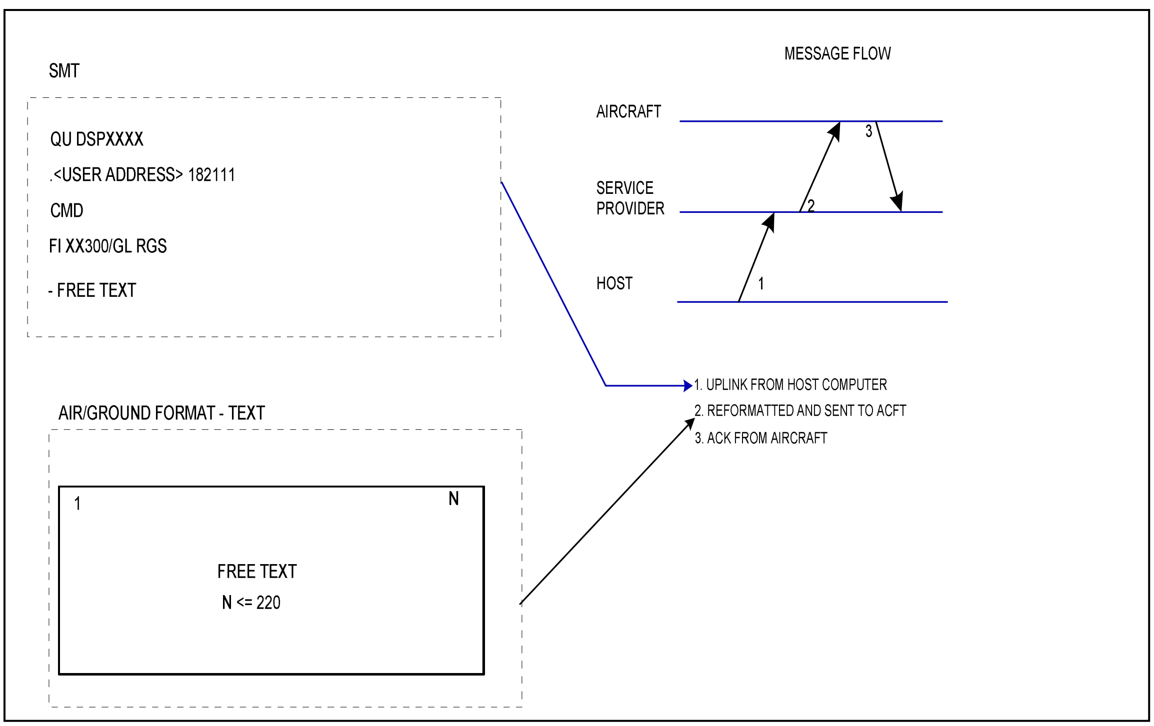


Figure 4.4.4-1 - Uplink Messages Without SMT Header to Peripherals

4.5 Uplink Message Formats, ATS Messages - MFI or Label Ax

The following sub-sections define the handling to be provided for Air Traffic Service (ATS) messages. For character-oriented messages, the format of these messages is found in Specification 623. For bit-oriented messages, the format is defined in RTCA and ICAO documentation.

COMMENTARY

The airlines have expressed a desire that both bit and character-oriented ATS messages be processed using the provisions of Specification 622. This will minimize the number of airborne software permutations. CAAs are encouraged to take note of the expected aircraft capability and plan their implementations accordingly.

ATS Uplinks	Label	SMI	MFI or Section
Oceanic Clearance	A1	CLX	4.5.1
Unassigned	A2	---	4.5.2
Departure Clearance	A3	CLD	4.5.3
Flight Systems Message	A4	FSM	4.5.4
Unassigned	A5	---	4.5.5
Request ADS Reports	A6	RAR	4.5.6
ATC Free Text	A7	FTU	4.5.7
Deliver Departure Slot	A8	DDS	4.5.8
ATIS Report	A9	DAI	4.5.9
ATS Facilities Notification (AFN)	A0	AFN	4.5.10
ATC Communications	AA	ATC	4.5.11
Terminal Weather Information	AB	TWI	4.5.12
Pushback Clearance	AC	PBC	4.5.13
Expected Taxi Clearance	AD	ETC	4.5.14
Unassigned	AE	---	4.5.15
CPC Command Response	AF	CPR	4.5.16
Unassigned	AG	---	4.5.17

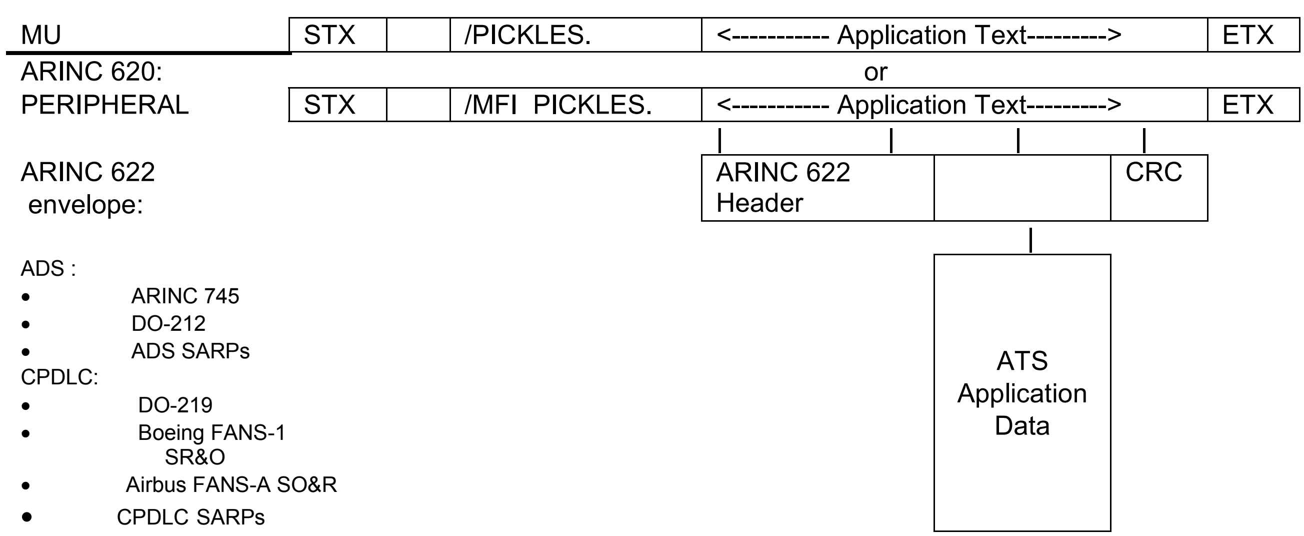


Figure 4.5-1 - ATS Message Encapsulation

4.0 UPLINK MESSAGE TEXT FORMATS

Note: Boeing and Airbus Industries have produced aircraft that were programmed to generate a subset of RTCA's DO-219 bit-oriented CPDLC message. These systems were designated FANS-1 by Boeing and FANS-A by Airbus. Subsequently, an expanded (and slightly different) set of controller/pilot phrases were developed by ICAO. Any of these bit-oriented applications [ADS: ARINC 745, DO-212 or ATN SARPs] and [CPDLC: DO-219, FANS-1/A or ATN SARPs] can constitute the ATS Application Data.

Table 4.5-1 - Ground-Ground Format of an Uplink ATS Message

ATS Format:
QU DSPXXX
.LAX05xx ddhhmm
SMI
AN N1003x/GL MAN or FI xx1234/GL MAN
- /PIKCLXS.Application text

Application Text:
See ARINC Specification 623 for definition of ATS Application Data. Messages that may have an impact on the movement of the aircraft, such as Air Traffic Service (ATS) messages, may have additional content in the Application text field to insure delivery and integrity. See ARINC Specification 622 for definition of ATS Application text (definition has precedence). In general, the format of the Message Text field of an ATS message is --------Application Text--------- with the expanded form being IMI/--------Application data------CRC for character-oriented messages and IMI/--------Application data------CRC for bit-oriented messages.

Imbedded Message Identifier:
The 3 character Imbedded Message Identifier (IMI) field is used to indicate the format of the generated message. Some uplink messages encode the IMI field with a variation that uses the third character to identify the version number of the format of the message.

Delimiter:
A slash </> character is used in character-oriented messages to separate the IMI from the Application Data. The characters AN are used in bit-oriented messages to separate the IMI from the Application Data per ARINC Specification 622.

Application Data:
In the case of ATS messages, the contents of the Application Data field are defined in ARINC Specification 623 or included by reference to ARINC Specification 622.

CRC:
Many ATS messages have been deemed to need additional assurance that the message is accurately reconstructed at the receiving equipment. This is achieved by including a cyclical redundancy check (CRC) value as the final element of the message content. The CRC is used by the receiving equipment to perform an end-to-end check on the message content. The CRC may be any binary number. Since the ACARS Air-ground network can only support the transfer of the character-based message set defined in ARINC Specification 618, the 16-bit CRC must be translated to pass reliably

across the ACARS network. The conversion process defined in Section 2.3.1.1 of ARINC Specification 622 should be used to process the CRC. The CRC consumes 4 characters in the message text.

Supplementary Address:
When the uplink message is sent to a peripheral to the MU, such as the FMC, the Label H1 will be used. For ATS uplink messages, the Optional Supplementary Address field will be expanded to include the 2 character Message Function Identifier (MFI) as the first entry followed by a space character <$_{sp}$> as a separator. The MFI serves the purpose that the Label would serve in a message delivered to the MU; i.e., identify the content and format of the uplink message.

The MFI is coded the same as the associated Label. For example, an ATIS message sent to the MU uses Label A9; the MFI of an ATIS uplink message sent to an avionics subsystem is also A9. The remainder of the Supplementary Address field will contain the address of the End System that is providing the uplink message. In most cases this will be the airline host. In the case of ATS messages, the Supplementary Address will be the address of the ATC facility that is responsible for the airspace in which the aircraft is located, or into which the aircraft will fly.

4.5.1 Oceanic Clearance - MFI or Label A1

The Oceanic Clearance uplink is a message prepared by the ATC facility and sent to the ground DSP who then forwards the message to the aircraft End System that issued the initial request. See Section 5.5.1 for the definition of the Oceanic Clearance Request downlink message.

Upon receipt of a ground-ground Oceanic Clearance uplink message destined for the ACARS MU, carrying an SMI of CLX, from the ATC facility, the DSP will uplink the Air-ground Oceanic Clearance message with the Label of A1 (See Section 4.3.) Alternatively, if the ground-ground message is an uplink to an ACARS peripheral, the SMI will be FMD, DFX, OAT, etc. Refer to Appendix D of Specification 622 for a listing of possible SMIs. In this case, the DSP will uplink the Air-ground Oceanic Clearance message with the Label H1, the appropriate sub-label for that peripheral and the MFI of A1 (See Section 4.3.5.) The MFI A1 is included at the beginning of the Supplementary Address field.

The expected Oceanic Clearance Readback downlink response by the aircraft is presented in Section 5.3.40 of this Specification.

The following examples show the treatment of SMIs, Labels/Sub-labels, MFIs and Supplementary Addresses, when the DSP converts ATS uplink messages from ground-ground to Air-ground format.

The Application Data and procedures for character-oriented ATS messages are given in ARINC Specification 623. ARINC Specification 622 provides additional processes to support both bit and character-oriented ATS applications.

For ATS uplink messages to an ACARS MU:

- The SMI is converted to a label, in this case, the SMI label combination identifies the ATS application.
- The Supplementary Address (if used) is copied directly from the ground-ground to the Air-ground message as shown.

4.0 UPLINK MESSAGE TEXT FORMATS

Although the following tables illustrate the content of the Oceanic Clearance uplink message, the structure applies to other ATS uplink messages. Therefore this one set of illustrations serve as representative of the other cases as well. Those Sections having similar uplinks contain a reference the tables below.

Table 4.5.1-1A - Oceanic Clearance Uplink to an MU - Ground-Ground Format

QU DSPxxxx
.PIKCLXS ddhhmm
CLX
AN N1003x/GL MAN or FI xx1234/GL MAN
- /LAX05xx. Application text

The Application text field is defined in Chapter 5 of ARINC Specification 622. The Application Data is given in ARINC Specification 623.

Table 4.5.1-1B - Oceanic Clearance Uplink to an MU - Air-Ground Format

		Aircraft Address		Label			Supplementary Address	Message Text
		.N1003x or .xx1234		A1			/LAX05xx.	Application text

For ATS uplink messages to an ACARS peripheral:

- The SMI is converted to a Label/Sub-Label combination; in this case the Label/Sub-label combination identifies the aircraft end-system.
- The MFI and Supplementary Address are copied directly from the ground-ground to Air-ground message as shown, in this case the MFI identifies the ATS application.

Table 4.5.1-2A - Oceanic Clearance Uplink to an Avionics Subsystem - Ground-Ground Format

QU DSPXXXX
.PIKCLXS ddhhmm DFX
AN N1003x/GL MAN or FI xx1234/GL MAN
- /A1 LAX05xx. Application text

Table 4.5.1-2B - Oceanic Clearance Uplink to an Avionics Subsystem - Air-Ground Format

		Aircraft Address		Label			Sub Label	Supplementary Address	Message text
		.N1003x or .xx1234		H1			DF	/A1 LAX05xx.	Application text

4.5.2 Unassigned - MFI or Label A2

4.5.3 Departure Clearance - MFI or Label A3

The Departure Clearance uplink message is generated as a character-oriented message. The Departure Clearance message can be received by the service provider from the airline or directly from the ATC agency depending on the arrangements that have been negotiated.

The format of the Departure Clearance uplink message is consistent with the general form described in Section 4.3.5 of this Specification. ARINC Specification 623 contains the application data of the Departure Clearance uplink message.

If the character-oriented Departure Clearance uplink message is destined for the ACARS MU, it is received by the service provider as a ground/ground message with the SMI of CLD. The DSP translates this SMI to Label A3 in the air/ground uplink.

If the Departure Clearance message is for a peripheral, the appropriate SMI, Label (H1) and Sublabel are used. The MFI A3 is included at the beginning of the Supplemental Address field. Refer to Appendix D of Specification 622 for a listing.

Refer to the tables in Section 4.5.1 for an illustration of the message structure.

4.5.4 Flight Systems Message - MFI or Label A4

By necessity, the list of responses available to controllers using the clearance message uplinks defined in Specification 623 are limited. The Flight Systems Message constitutes an expanded list of responses that can be used to augment the clearance messages in a codified manner. The format of the Flight Systems uplink message is consistent with the general form described in Section 4.3.5 of this Specification. See Chapter 5 of ARINC Specification 623 for the character-oriented Flight Systems uplink Application Data format. Generally, Flight System messages are expected to be sent by the ATS application after a request for clearance has been received or after a clearance readback has been received.

COMMENTARY

If the contents of Flight Systems uplink messages are not adequate, the controller may choose to use a ATC free text message (see Section 4.5.1).

To minimize complexity of the data link procedures, there is no equivalent to the Flight System message set in the aircraft. If the pilot needs to respond in a manner outside the defined downlink message set, s/he will revert to voice procedures.

If the message is to be delivered to the ACARS MU, the character-oriented Flight Systems message is received by the service provider with the SMI of FSM. The DSP translates the SMI to Label A4 in the air/ground uplink.

If the Flight Systems message is for a peripheral, the appropriate SMI, Label (H1) and Sublabel are used. The MFI A4 is included at the beginning of the Supplementary Address field. Refer to Appendix D of Specification 622 for a listing of SMIs, Sublabels and MFIs.

Refer to the tables in Section 4.5.1 for an illustration of the message structure.

4.5.5 Unassigned - MFI or Label A5

4.5.6 Request ADS Reports - MFI or Label A6

If the ground/ground Request for Automatic Dependent Surveillance (ADS) Reports uplink message is destined for the MU, it is received by the service provider with the SMI of RAR. The DSP translates this SMI to the Label A6 in the air/ground uplink if the message is for the MU.

If the message is for a peripheral, the appropriate SMI, Label and Sublabel are used. The MFI A6 is included at the beginning of the Supplementary Address field. Refer to Appendix D of Specification 622 for a listing of SMIs and Sublabels. See ARINC Characteristic 745 for the format of the ADS application text. See ARINC Specification 622 for information on processing of the bit-oriented Request ADS Reports message for transfer across the ACARS network.

Refer to the tables in Section 4.5.1 for an illustration of the message structure.

4.5.7 Free Text from ATC - MFI or Label A7

This message is meant to provide an ATC agency with the ability to communicate information that is not codified in any of the ATS uplink messages defined herein to an aircraft without the necessity of reverting to voice communications.

The ground/ground ATC free text message is received by the service provider with the SMI of FTU if it is destined for the ACARS MU. The DSP translates the SMI to Label A7 in the air/ground uplink.

If the message is for a peripheral, the appropriate SMI, Label (H1) and Sublabel are used. Refer to Appendix D of Specification 622 for a listing of SMIs and sublabels. The MFI A7 is included at the beginning of the Supplementary Address Field.

Refer to the tables in Section 4.5.1 for an illustration of the message structure.

4.5.8 Deliver Departure Slot - MFI or Label A8

This message is received by the service provider with the SMI of DDS and is translated to Label A8 when the message is to be delivered to the MU. If the message is for a peripheral, the appropriate SMI, label and sub-label are used and the MFI A8 is included at the beginning of the Supplementary Address Field.

COMMENTARY

It has been recognized that this could have been a simple message to the printer but it was felt that the functionality of the proposed scheme could be used in a negotiation exercise with the issuing authority.

Refer to the tables in Section 4.5.1 for an illustration of the message structure.

4.5.9 ATIS Report - MFI or Label A9

If the ATIS Report uplink is destined for the ACARS MU, the ground/ground ATIS Report message is received by the service provider with the SMI of DAI. The DSP translates the SMI to Label A9 in the air/ground uplink.

If the ATIS Report uplink message is for a peripheral, the appropriate SMI, Label (H1) and Sublabel are used. The MFI A9 is included at the beginning of the Supplementary Address Field. Refer to Appendix D of Specification 622 for a listing of SMIs and Sublabels.

In some cases, the service provider will be the originator of ATIS information and, although no SMI is involved, Label A9 should still be used in the air/ground uplink. See ARINC Specification 623 for the ATIS application text.

COMMENTARY

Lengthy ATIS uplinks have demonstrated an associated reduction in delivery success rate. The DLK Users Forum recommends that Notice to Airmen (NOTAM) information NOT be appended to digital ATIS uplink messages. Concise text and reasoned content is encouraged. Specifically, the message will be delivered most efficiently and effectively when its length is held to one block. In no case should the message exceed four blocks in length.

Refer to the tables in Section 4.5.1 for an illustration of the message structure.

4.5.10 ATS Facilities Notification (AFN) - MFI or Label A0

If the AFN uplink message is destined for the ACARS MU, the ground/ground AFN message is received by the service provider with the SMI of AFU. The DSP translates the SMI to the Label A0 in the air/ground uplink.

If the message is for a peripheral, the appropriate SMI, Label and Sublabel are used. The MFI A0 is included at the beginning of the Supplementary Address Field. Refer to Appendix D of Specification 622 for a listing of SMIs and sublabels. See Chapter 3 of ARINC Specification 622 for the format of the ATS Facilities Notification (AFN) application text.

AFN messages have three purposes: (1) they notify the ATC agency that the aircraft is ready to begin data communications (to support applications such as ADS), (2) they pass all relevant application information that is needed by the ATC agency to begin the data communications, and (3) they advise the aircraft to contact another ATC agency.

Refer to the tables in Section 4.5.1 for an illustration of the message structure.

4.5.11 ATCCommunications - MFI or Label AA

If the ATCComm uplink (formerly known as Two Way Data Link and now referred to as Controller Pilot Data Link Communications (CPDLC)) message is destined for the MU, the ground/ground ATCComm message is received by the service provider with the SMI of ATC. The DSP translates the SMI to the Label AA in the air/ground uplink.

If the message is for a peripheral, the appropriate SMI, Label and Sublabel are used. The MFI AA is included at the beginning of the Supplementary Address Field. Refer to Appendix D of Specification 622 for a listing of SMIs and sublabels. See Section 4.4 of ARINC Specification 622 for the format of the ATCComm application interface and for the definition of how to transfer the bit-oriented ATCComm application text onto the ACARS network. See RTCA DO-219 for the format of early ATCComm application text. Current text for FANS-1 is defined by Boeing. Future text for CPDLC is defined by ICAO**.**

4.5.12 Terminal Weather Information for Pilots - MFI or Label AB

The Terminal Weather Information for Pilots (TWIP) report is generated in response to a TWIP Request downlink (Label BB) from the aircraft. If the TWIP Report is destined for the ACARS MU, the ground/ground TWIP is received by the service provider with the SMI of TWI. The service provider translates the SMI to label AB in the air/ground uplink.

If the TWIP Report uplink message is destined for a peripheral, the appropriate SMI, label (H1) and Sublabel are used. The MFI AB is included at the beginning of the Supplementary Address field. Refer to Appendix D of Specification 622 for a listing of SMIs and Sublabels.

4.5.13 Pushback Clearance - MFI or Label AC

The Pushback Clearance is generated in response to a DDTC Pushback Clearance Request downlink (Label BC) from the aircraft. If the Pushback Clearance is destined for the ACARS MU, the ground/ground Pushback Clearance uplink message is received by the DSP with the SMI of PBC. The DSP translates the SMI to Label AC in the air/ground uplink.

If the Pushback Clearance uplink message is destined for a peripheral, the appropriate SMI, label (H1), and Sublabel are used. The MFI of AC is included in the beginning of the Supplemental Address field. Refer to Appendix D of Specification 622 for a listing of SMIs and Sublabels. See Specification 623 for the DDTC Pushback Clearance application and message text.

4.5.14 Expected Taxi Clearance - MFI or Label AD

The Expected Taxi Clearance is generated in response to a DDTC Expected Taxi Clearance Request downlink (Label BD) from the aircraft. If the Expected Taxi Clearance is destined for the ACARS MU, the ground/ground Expected Taxi Clearance uplink message is received by the DSP with the SMI of ETR. The DSP translates the SMI to Label AD in the air/ground uplink.

If the Expected Taxi Clearance uplink message is destined for a peripheral, the appropriate SMI, label (H1) and Sublabel are used. The MFI of AD is included in the beginning of the Supplemental Address field. Refer to Appendix D of Specification 622 for a listing of SMIs and Sublabels. See Specification 623 for the DDTC Expected Taxi Clearance message application text.

4.5.15 Unassigned - MFI or Label AE

4.5.16 CPC Command/Response - MFI or Label AF

Upon receipt of a CPC Command/Response, Label (or MFI) AF uplink, the avionics end system will deposit the uplink message into a buffer for subsequent processing, display of applications text, and aircrew assessment.

This CPC Command/Response message provides a CPC uplink command for display and acknowledgment (WILCO or UNABLE) by the crew and also other processing depending on the specific CPC application message type (Refer to AEEC Specification 623).

If the ground/ground CPC Command uplink message is destined for the MU, it is received by the DSP with the SMI of CPR (CPC Command/Response). The DSP translates the SMI to Label AF in the air/ground uplink.

If the message is destined for a peripheral, it is sent by the originator with the appropriate SMI for the intended peripheral. The DSP translates the SMI to the appropriate Label and Sublabel. The MFI of AF is included at the beginning of the Supplementary Address field. Refer to Appendix D of Specification 622 for a listing of SMIs and Sublabels. See ARINC Specification 623 for the CPC Command/Response applications and message text.

In all cases, the address of the originator is included in the uplink as defined in ARINC Specification 622. Refer to the tables in Section 4.5 for an illustration of the message structure.

4.5.17 Unassigned - MFI or Label AG

4.6 Uplink Message Formats, User Defined

User defined messages may be sent using the label characters <10> through <4~>. The Text field format should be as follows:

Character Number	Character Content
1-n	Free Text where n < 220

4.7 Uplink Message Formats, Vendor Defined

Vendor defined messages may be sent using labels V0 to V9 and VA to VZ. A series of three labels is defined for individual equipment vendors to provide a maximum amount of flexibility in implementation. These labels are intended to support unique vendor defined functionality while preventing interaction with AOC defined labels. An example of a vendor defined label would be to define an uplink message which can remotely manage a core function without impact to any unique AOC application.

The label assignments are:

Label	Vendor
VA, VB, VC	Rockwell Collins
VD, VE, VF	Honeywell
VG, VH, VI	Teledyne
VJ, VK, VL	Airbus
VM, VN, VO	Universal
VP to VZ andV0 to V9	and Other (Any vendor not explicitly defined)

The text field format should be as follows:

Character Number	Character Content
1-n	Free text, where n < 220

4.8 Uplink Message Formats, DSP Defined

DSP defined messages may be sent using labels X1 to X9.

5.0 DOWNLINK MESSAGE TEXT FIELD FORMATS

5.1 Introduction

This chapter contains a listing of the application text of downlink messages to be passed from an originating End System on an aircraft to the Data Link Service Provider (DSP) and then to the designated End System at an airline host or at an ATC agency. Sections 5.2 through 5.4 list the downlink texts: System Control, Service Related and User Defined.

Each application text definition contains a description of the message, a listing of the fields of the message and a graphic layout of the message construction. The figures in the following subsections illustrate the format of messages which are exchanged between an airborne end system and a ground based end system. The illustrations cover two legs of the total path: between the aircraft and the DSP on the ground and between the DSP and the ATC facility. Where appropriate, timing diagrams showing the sequence of message exchanges are also provided. The sequence and direction of message travel are illustrated in the figure at the right, depicting both direction (downlink and uplink) and source/sink (aircraft, DSP or user Host). As many as four separate messages may be needed to complete an exchange.

> Note: The form of the messages depicted in the examples do not necessarily typify the format in which these same messages will be presented in an actual implementation.

The whole message should be transmitted. Any of the fixed format fields for which no data has been entered should be filled with nulls <NUL>.

5.2 Downlink Message Formats, System Control

There are two groups of ACARS functions, the first of these, the System Control group, is associated with maintaining system operation, and the second, the Service-related group, with providing communications services. The MU should be capable of generating all downlinks identified as system-essential in the following table.

Refer to Table C1 and C2 of Appendix C for a listing of Messages, their associated label, SMI and section reference.

5.2.1 General Response - Label _DEL

When the only reason for the aircraft sub-system to downlink a response is the need for a technical acknowledgment to the previous uplink, this message should contain Label characters <_DEL>.

Character Number	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5	Airline Identifier - Alpha/Numeric Character #1	Flight Identifier See Section 2.3.3.2 of ARINC Specification 618
6	Airline Identifier - Alpha Character #2	
7	Flight Number - Alpha/Numeric Character #1 (MSC)	
8	Flight Number - Alpha/Numeric Character #2	
9	Flight Number - Alpha/Numeric Character #3	
10	Flight Number - Alpha/Numeric Character #4 (LSC)	

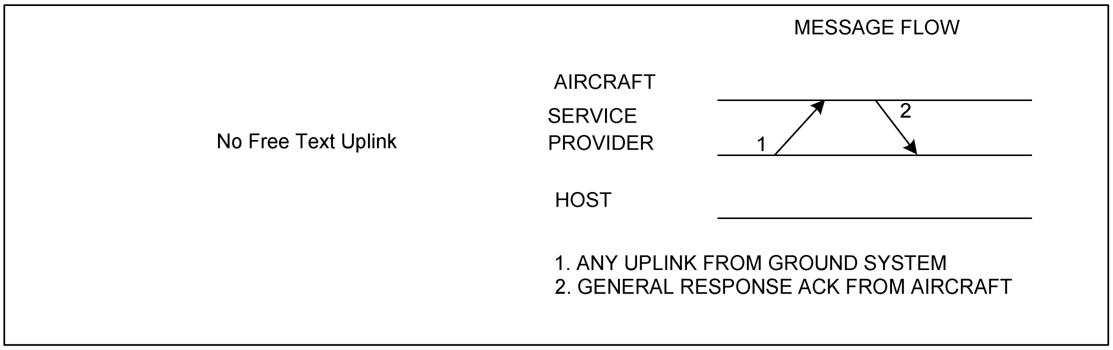


Figure 5.2.1-1 - General Response Downlinks

5.2.2 Voice Contact Request - Label 54

Aircrew requests for voice contact with a specified party on the ground should contain Label characters 54. The text should consist of the 22-character fixed format sequence shown below.

Character Number	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11	Communications Address of Ground Party		
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

The airborne equipment, i.e., the MU, should automatically fill character positions 14 and 18 of the 22-character message with NULs, leaving ten character positions of the communications address field to convey pilot-entered address information. Any dialing scheme involving one through ten characters may be implemented. When fewer than ten characters are employed, however, the airborne equipment should automatically fill the field with leading zeros in order to preserve the fixed format of the message.

COMMENTARY

The ten-character Ground Party Communications Address field permits a complete area code and telephone number to be downlinked if desired.

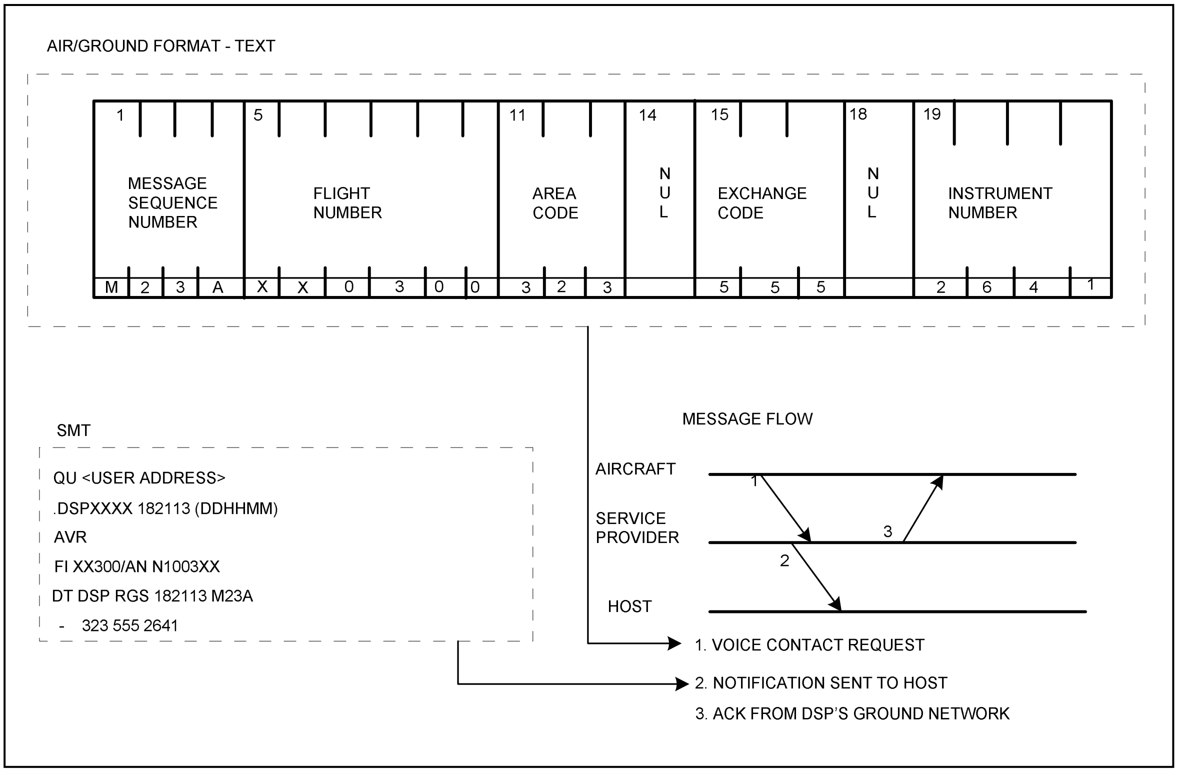


Figure 5.2.2-1 - Voice Contact Request

5.2.3 Reserved Characters

The Label character sequence _ j is reserved.

5.2.4 Temporary Suspension - Label 5P

A message containing Label characters 5P may be downlinked by the ACARS MU in accordance with ARINC Specification 618 to indicate the non-availability of the RF link because the VHF radio will be temporarily used for voice communications.

Character Number	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		

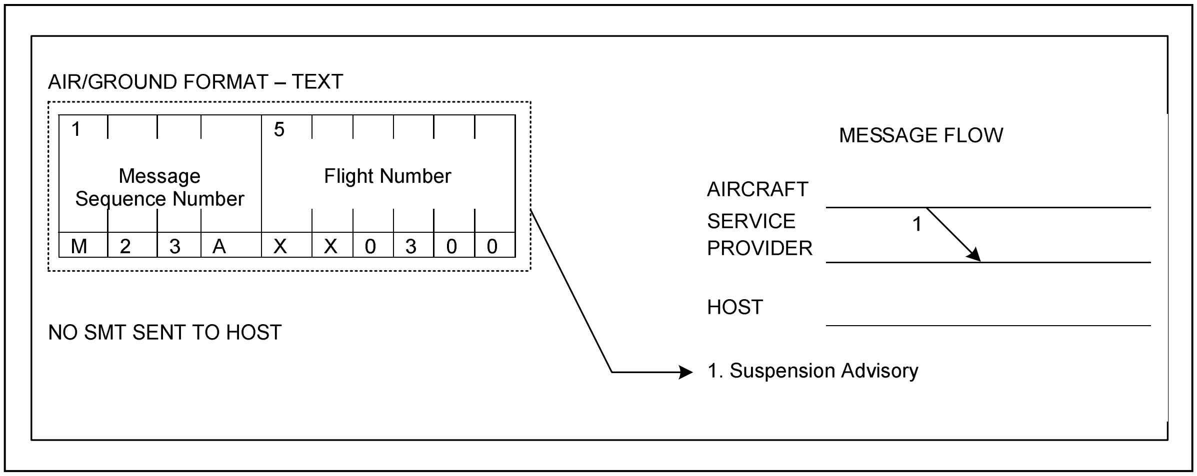


Figure 5.2.4-1 - Temporary Suspension

5.2.5 Unable to Deliver Uplinked Message - Label Q5

When the airborne sub-system cannot accept an uplinked message it should respond with a downlink containing Label character Q5. Such messages should be transmitted immediately, taking precedence over any other planned use of the downlink except Label 5P or Label F3 messages.

Character Number	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		

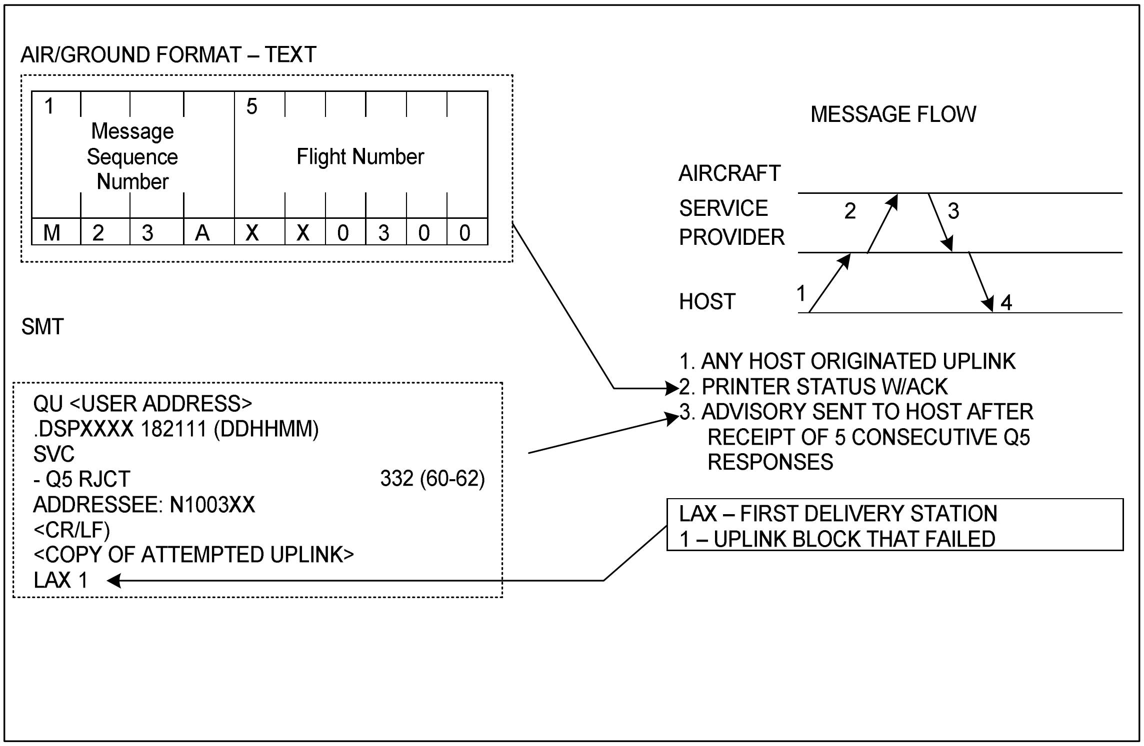


Figure 5.2.5-1 - Unable to Deliver Uplink Message

5.2.6 Voice to Data Channel Changeover Advisory - Label Q6

Label Q6 downlink messages will be transmitted in accordance with ARINC Specification 618 to indicate that the VHF radio associated with the ACARS MU has been returned from Voice to Data Service.

The format of the message should be as follows:

Character Number	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		

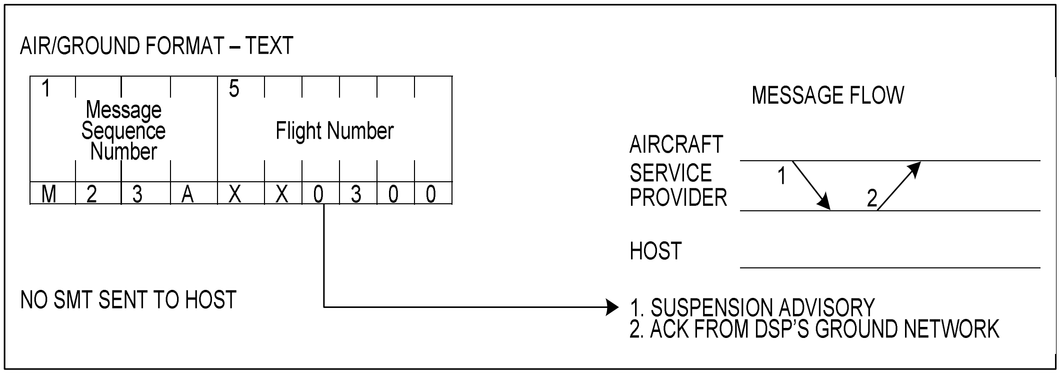


Figure 5.2.6-1 - Channel Changeover Advisory

5.2.7 Intercept/Unable to Process - Label QX

When the airborne sub-system wants to Intercept and terminate an uplink transmission (all blocks), it may respond with a downlink containing Label characters QX. Label QX may also be used to report that the MU is unable to process an uplink message. The message will be discarded by the MU.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11 thru n	Free Text where n $\leq$ 220		

The free text area may contain a user defined intercept message or error code. The received uplink is discarded by the MU. The service provider interprets this message as an air initiated INTERCEPT. The message is deemed undeliverable and no reattempts of the uplink or any subsequent blocks of that message will be transmitted from the ground. Such messages should be transmitted immediately, taking precedence over any other planned use of the downlink except label 5P messages. The Label QX is transmitted only once and never contains a NAK.

Example Message Triggers include Undefined Uplink Label Received, Undefined Sublabel Received (RA or H1 or user defined) and Destination (DFDAU, CFDIU, PRINTER, etc.) not available.

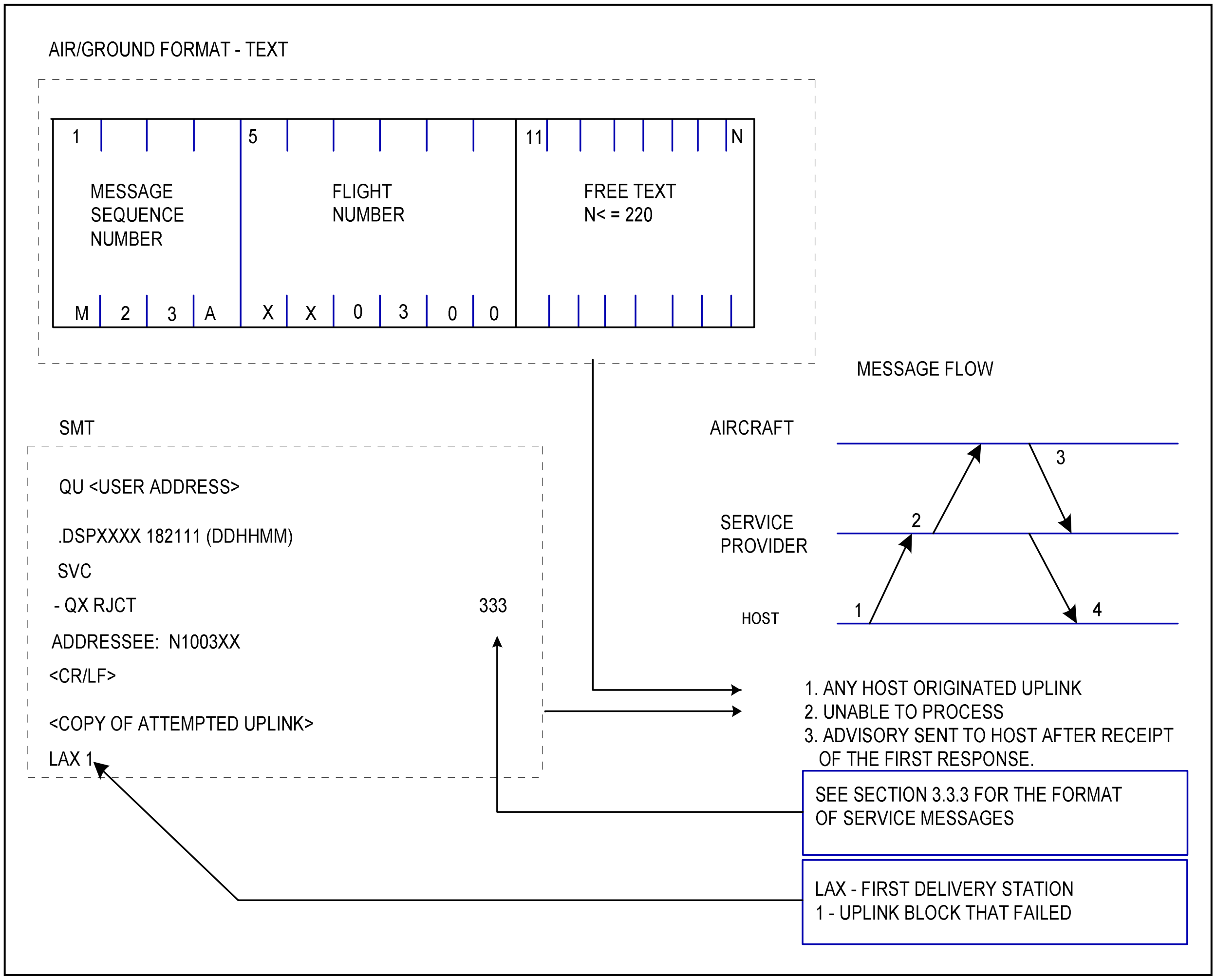


Figure 5.2.7-1 - Unable to Deliver Uplink Message

5.2.8 Dedicated Transceiver Advisory - Label F3

Label F3 messages may be downlinked by the airborne subsystem in response to Voice Go-Ahead (Label 54) uplinks. See ARINC Specification 618 for protocol details.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		

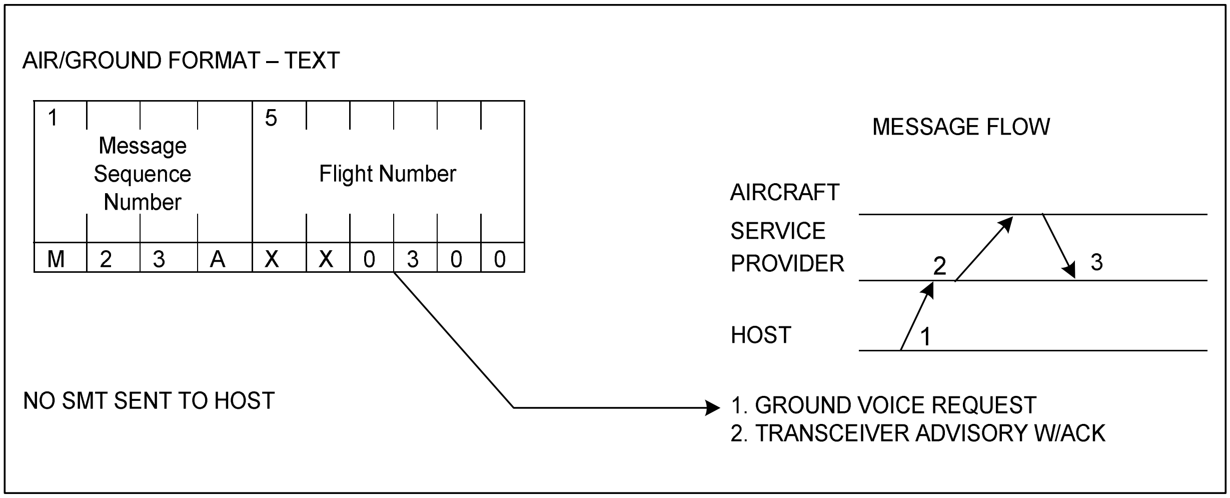


Figure 5.2.8-1 - Dedicated Transceiver Advisory

5.2.9 Cockpit Printer Status - Label CA-CF

On recognition of the status code signifying that the printer is not installed, not powered or inoperative, the MU should respond to uplinks directed to the printer with a downlink message having the label indicated in Section 3.3.3.

Note: Some users may desire to downlink additional text in some of these status messages. Also, they may elect to use one of the codes to indicate crew acknowledgment of the uplinked message. Because the time taken by the crew to take the acknowledgment action, push a button on the printer, for example, will exceed the ACARS turn-around time, it will not be possible for the acknowledgment message to be the response to the uplink requiring it. In this case, the response will be other traffic or a general response, and the acknowledgment message will be a separate, air-initiated downlink.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		

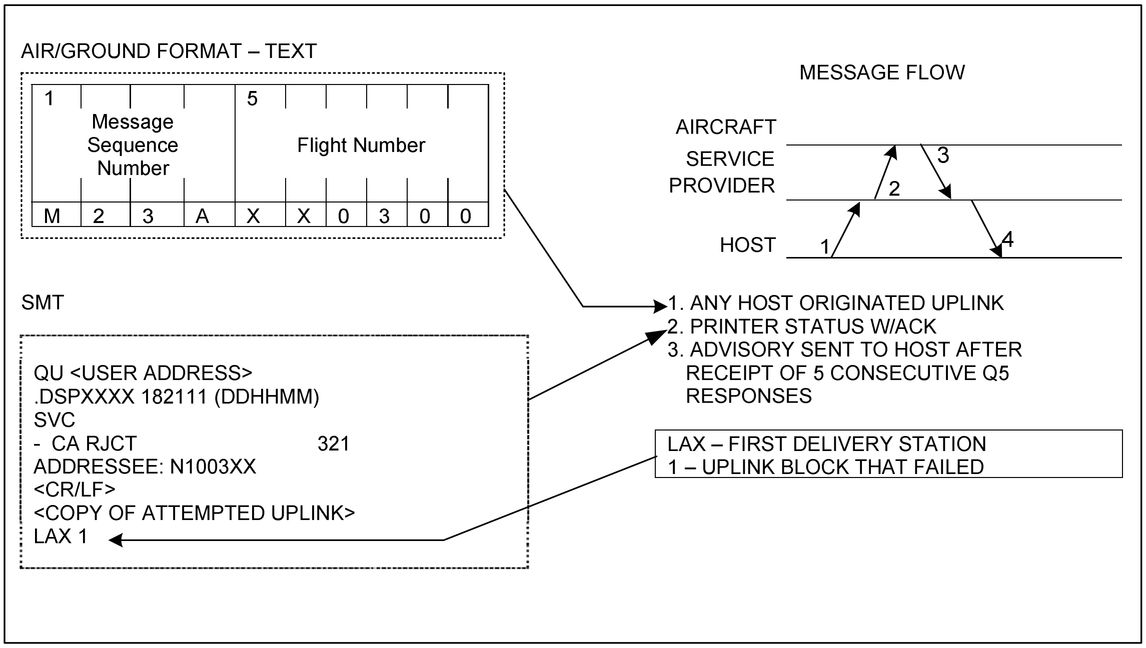


Figure 5.2.9-1 - Cockpit Printer Status

5.2.10 VDL Switch Advisory - Label 5V

A message containing Label characters 5V should be transmitted in accordance with ARINC Specification 618 to indicate that the VHF radio associated with the ACARS CMU will be tuned to a VDL frequency.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section AOA
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		

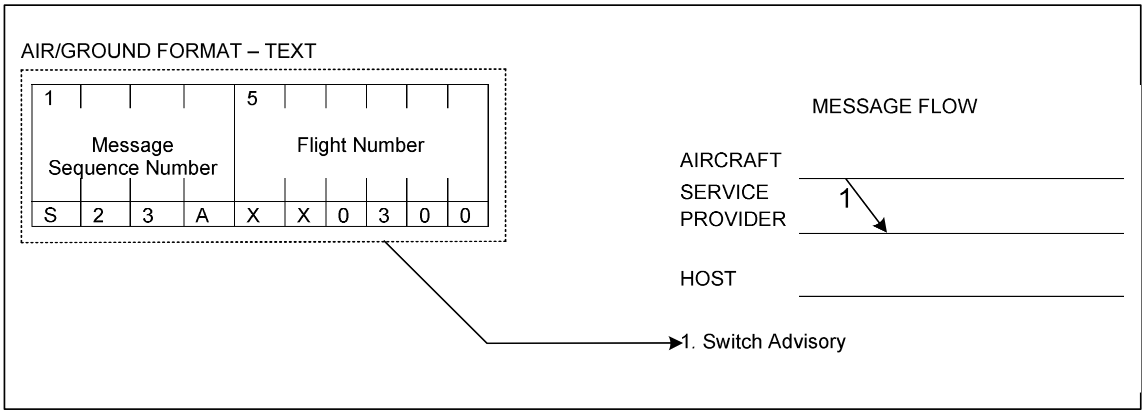


Figure 5.2.10-1 - VDL Switch Advisory

5.2.11 Autotune Reject – Label QV

If an aircraft receives an autotune command as described in Section 4.2.6, there are some circumstances in which the aircraft may reject the autotune command. The label QV is used for this purpose to indicate that the aircraft will remain on its current frequency and will not comply with the autotune command. The autotune command is sent when the aircraft is operating on AOA and is an AOA to POA autotune.

The following format is used for this message:

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
	Flight Identifier		
11	Reason Code		1
12 – n	Free Text where n ≤ 220		

Note :

1. Reject Reason Codes valid values are 1 – 9 defined as:

   1 – Contrary to airline preference

   2 – ATN session in progress

   3 – Autotune uplink format error

   4 – 9 – undefined

Downlink label QV should not be forwarded to the host, and should not be acknowledged by the DSP.

5.3 Downlink Message Formats, Service-Related Messages

The MU need only generate those service-related downlinks specified by the user to his supplier. While service-related downlink utilization is thus optional in terms of user deployment, procedures governing the ground handling of these messages necessitates adherence to the formats and other rules concerning them set forth in this document.

Note: Appendix C contains a complete listing of applications (messages) indexed by SMI and a second listing indexed by message label. These listings include a reference to the appropriate Section and may be used to locate a specific message more rapidly

5.3.1 Emergency Situation Report (Aircraft Hijack) Label 00

Emergency Situation Report should contain Label characters 00.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11 thru n	Free Text where n ≤ 220		

Characters 11 through 220 are available for free text in the form of a crew-entered security report. The format of the security report will be determined by the user.

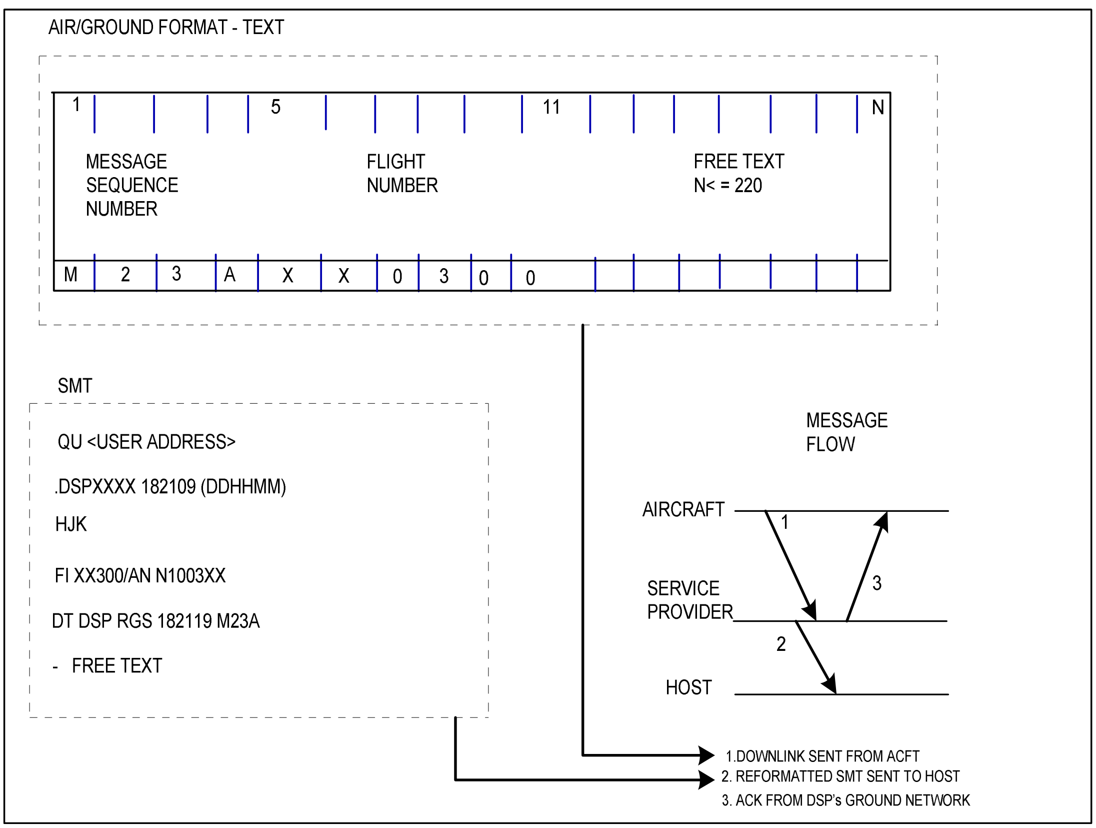


Figure 5.3.1-1 - Emergency Situation Report

5.3.2 Ground GMT Request - Label 51

This message is downlinked to request the GMT time only. See Section 5.3.1. Ground UTC (Label 52) is preferred. See Section 5.3.3.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	

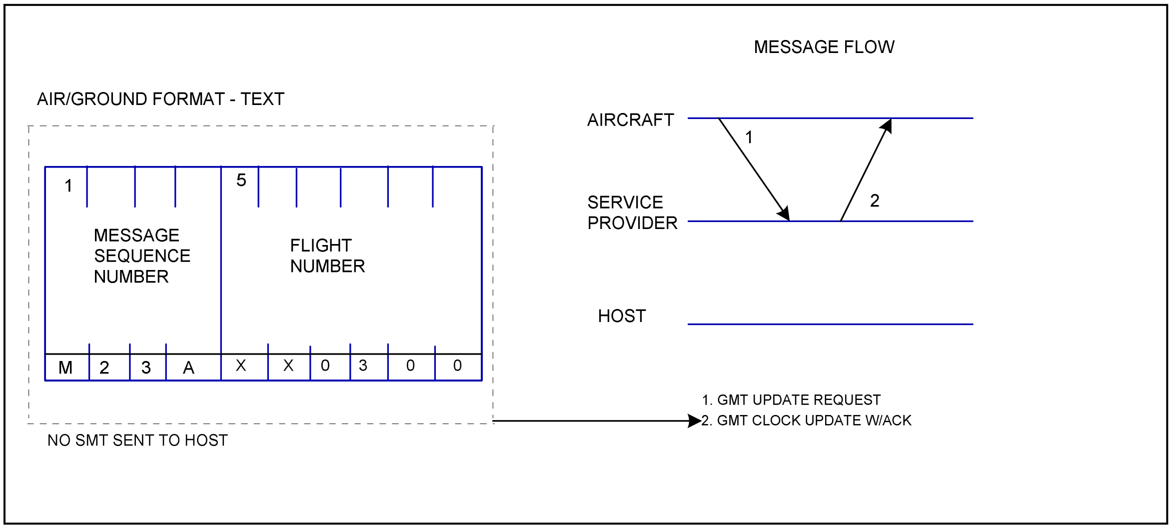
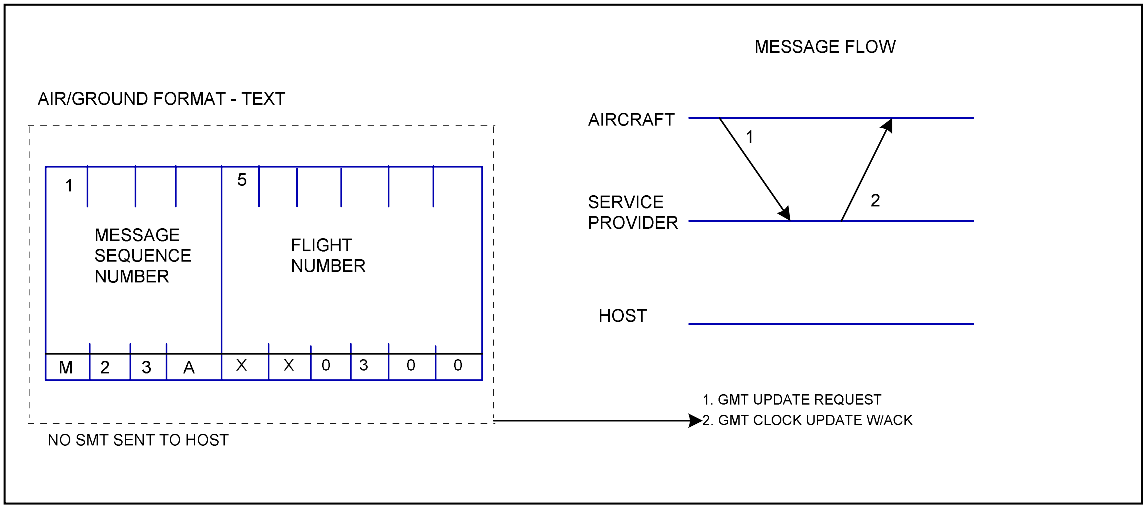


Figure 5.3.2-1 - Clock Update Request

5.3.3 Ground UTC Request - Label 52

This message is downlinked to request UTC time, date and an alternative ground UTC report. See Section 5.3.2.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	



Figgure 5.3.3 - Ground UTC Request – Label 52

5.3.4 ATIS Request - Label 5D

Automated Terminal Information Service (ATIS) request downlinks should contain Label characters 5D. The standardized ATIS information will be encoded into the free text.

COMMENTARY

Label B9 has been developed to provide ATIS information obtained directly from a CAA or from another party such as an airline or a service provider under an agreement with the CAA. The use of Label B9 is preferred. See Section 5.5.9 for a definition of B9.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11 thru n	Free Text where n < 220	

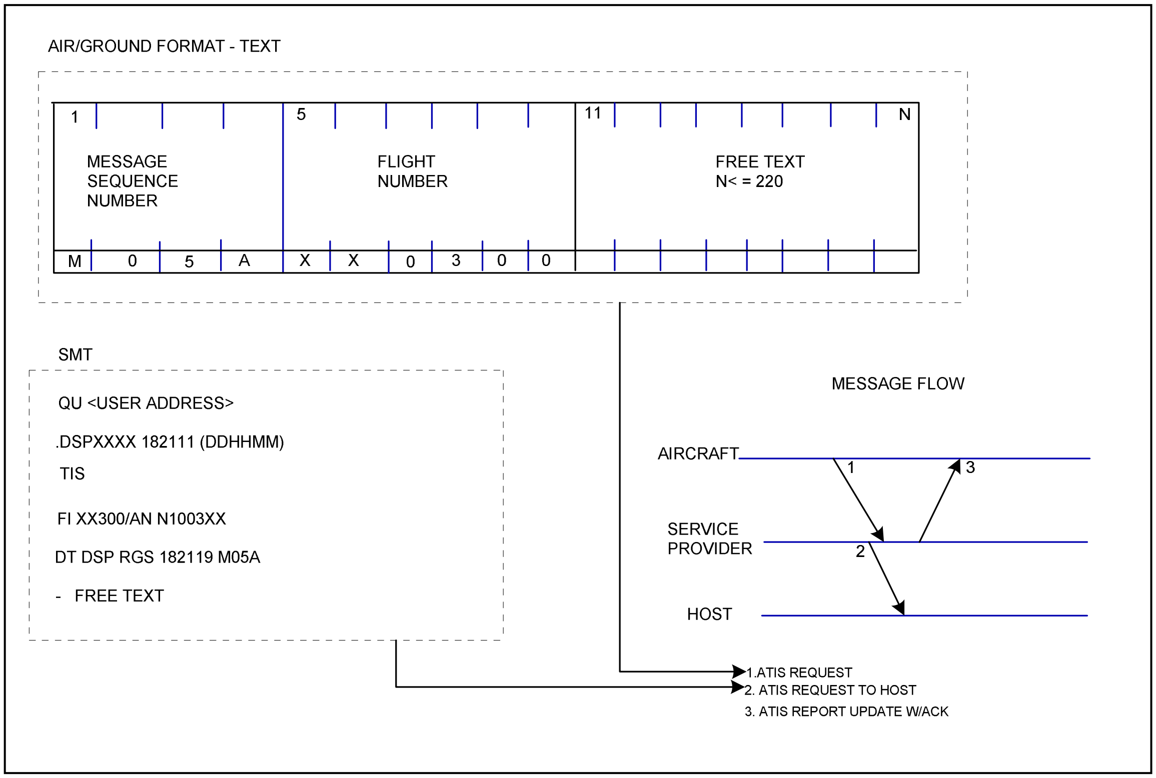


Figure 5.3.4-1 - ATIS Request

5.3.5 Aircrew Initiated Position Report - Label 5R

Aircraft Initiated Position Reports should contain Label characters 5R.

5.0 DOWNLINK MESSAGE TEXT FORMATS

The format should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number[Block Sequence Character]	
5-10	Flight Identifier	
11	Current Position Alpha Character	
12	Current Position Alpha Character	
13	Current Position Alpha Character	
14	Time Hours (Tens)	
15	Time Hours (Units)	
16	Time Minutes (Tens)	
17	Time Minutes (Units)	
18	Flight Level Numeric Character	
19	Flight Level Numeric Character	
20	Flight Level Numeric Character	
21	Next Report Point Alpha Character	
22	Next Report Point Alpha Character	
23	Next Report Point Alpha Character	
24	Time Over Hours (Tens)	
25	Time Over Hours (Units)	
26	Time Over Minutes (Tens)	
27	Time Over Minutes (Units)	
28	Fuel on Board Numeric Character	
29	Fuel on Board Numeric Character	
30	Fuel on Board Numeric Character	
31	Fuel on Board Numeric Character	
32	Static Air Temp Sign (see Note 2)	
33	Static Air Temp (Tens) degrees	
34	Static Air Temp (Units) degrees	
35	Wind Direction (Hundreds) degrees	
36	Wind Direction (Tens) degrees	
37	Wind Direction (Units) degrees	
38	Wind Speed (Hundreds) knots	
39	Wind Speed (Tens) knots	
40	Wind Speed (Units) knots	
41	Sky Condition - Alpha/Numeric Ch. #1/Space	
42	Sky Condition - Alpha/Numeric Ch. #2/Space	
43	Sky Condition - Alpha/Numeric Ch. #3/Space	
44	Sky Condition - Alpha/Numeric Ch. #4/Space	
45	Sky Condition - Alpha/Numeric Ch. #5/Space	
46	Sky Condition - Alpha/Numeric Ch. #6/Space	
47	Sky Condition - Alpha/Numeric Ch. #7/Space	
48	Sky Condition - Alpha/Numeric Ch. #8/Space	

Character No.	Character Content	Notes
49	Turbulence - Alpha/Numeric Ch. #1/Space	
50	Turbulence - Alpha/Numeric Ch. #2/Space	
51	Turbulence - Alpha/Numeric Ch. #3/Space	
52	Turbulence - Alpha/Numeric Ch. #4/Space	
53	Turbulence - Alpha/Numeric Ch. #5/Space	
54	Turbulence - Alpha/Numeric Ch. #6/Space	
55	Turbulence - Alpha/Numeric Ch. #7/Space	
56	Turbulence - Alpha/Numeric Ch. #8/Space	
57	Cruising Speed - Alpha Character M	
58	Cruising Speed - Numeric Character	
59	Cruising Speed - Decimal Point .	
60	Cruising Speed - Numeric Character	
61	Cruising Speed - Numeric Character	
62 thru n	Free Text where n $\leq$ 220	

Notes:

1. Fixed fields for which there is no data input should be filled with Null characters (0/0).

2. The characters used for indicating whether the sign of the static air temperature input is positive or negative should be selected from those characters which can transit ground communications systems and be handled by users' data processing systems. Users should advise their avionics suppliers what the crew inputs for sign will be and into what characters they should be translated for the downlink.

COMMENTARY

Users should consult with their service providers for information on the transmitting of their messages through the ground communications system in both normal and abnormal conditions. If, for example, fixed fields with no data input are filled with spaces, the message may be delivered to the proverbial bit bucket.

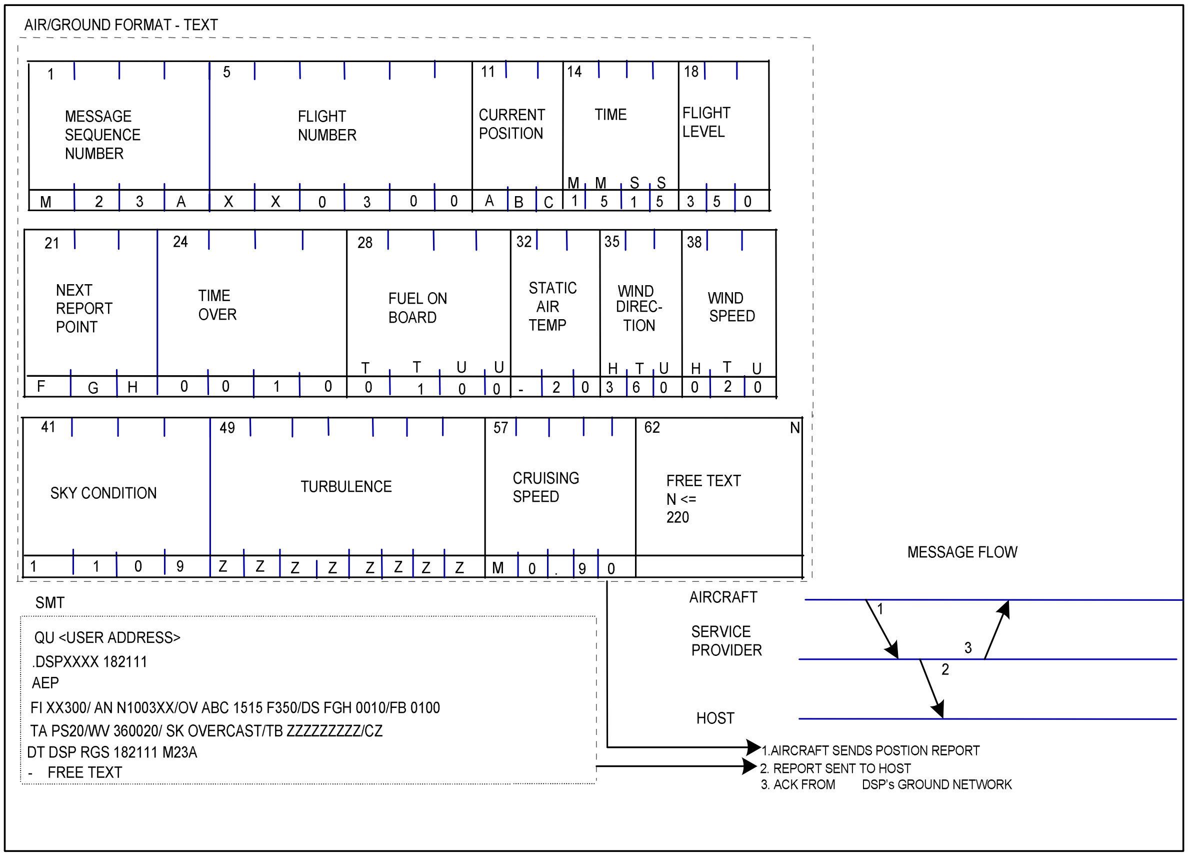


Figure 5.3.5-1 - Aircrew Initiated Position Report

5.3.6 Weather Request - Label 5U

Weather request downlinks should contain Label character 5U.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11 thru n	Free Text where n ≤ 220		

Free text will be comprised of information pertaining to the specifics of the request.

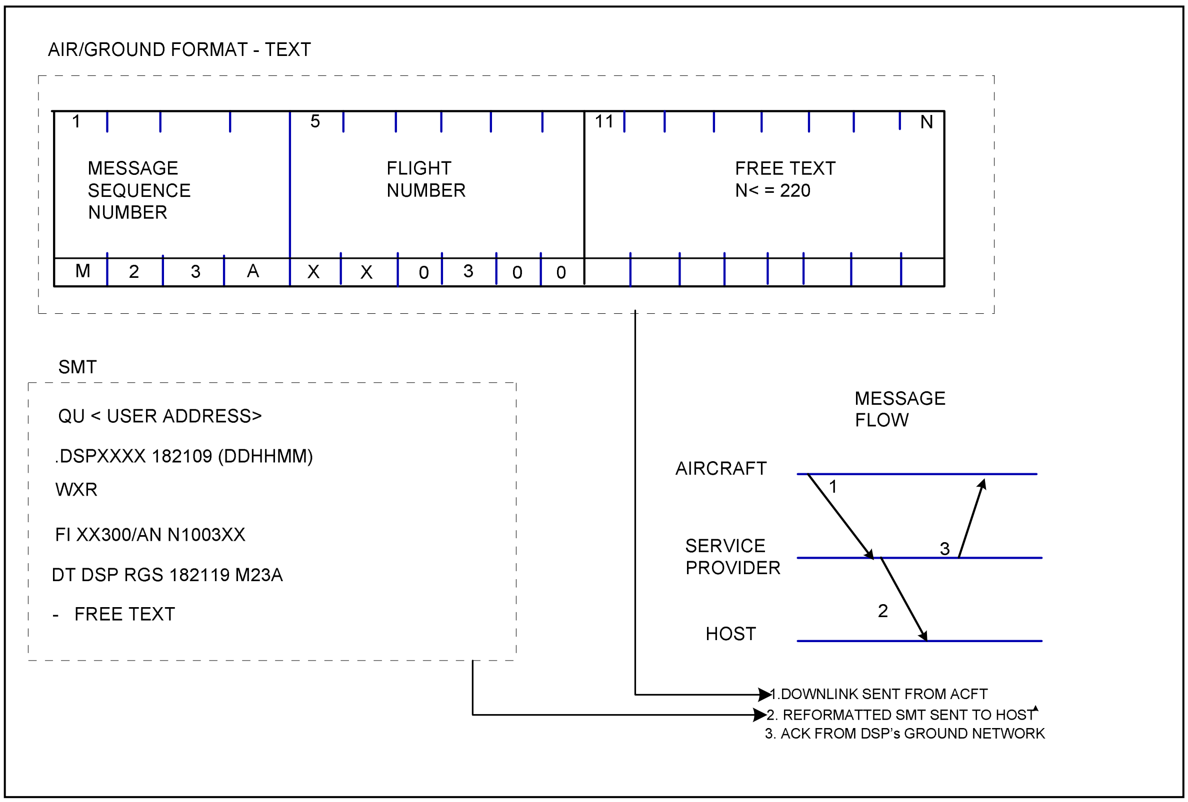


Figure 5.3.6-1 - Weather Request

5.3.7 Airline Designated Downlink - Label 5Z

The airline designated downlink should contain Label character 5Z. It should be transmitted when the entered text cannot be appended to a Departure/Arrival or ETA report, either because it is too long, or because no such reports are awaiting transmission.

Character No.	Character Content		Notes
1	Message	[Originator]	
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11 thru n	Free Text		

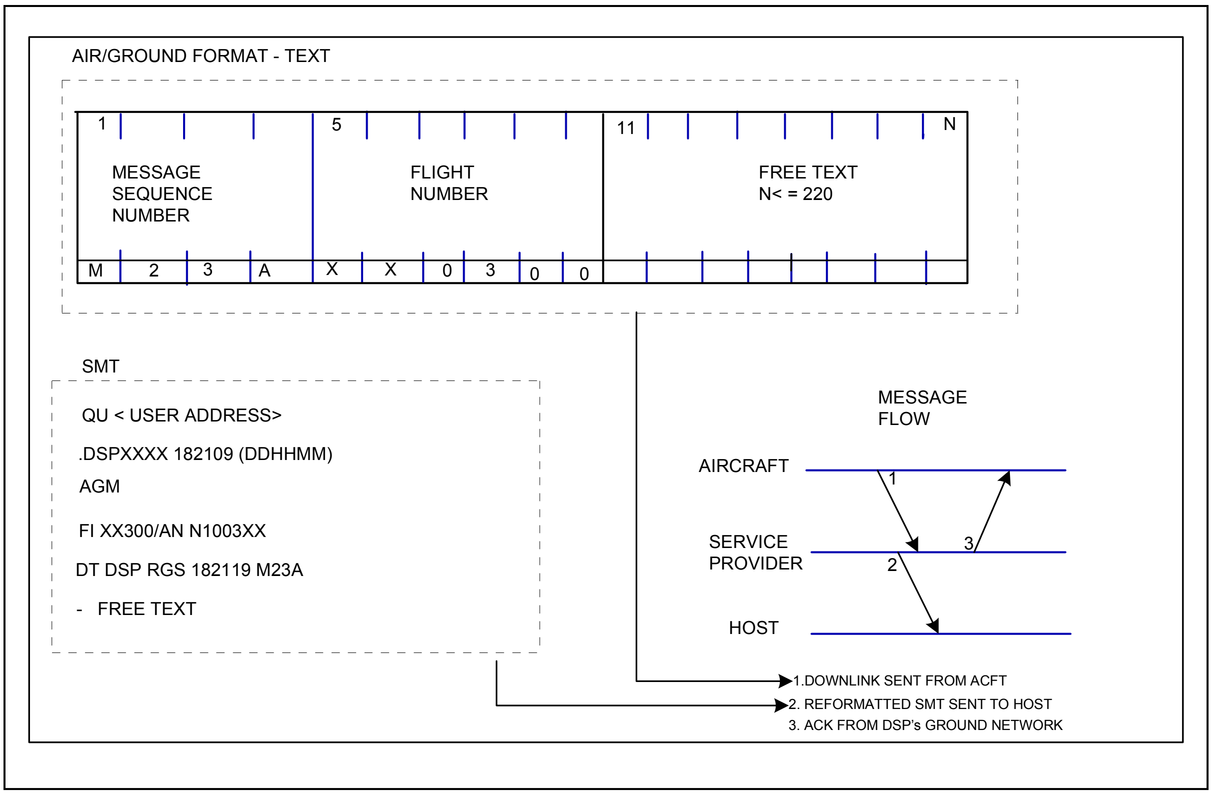


Figure 5.3.7-1- Airline Designated Downlink

5.3.8 Aircrew Revision to Previous ETA/Diversion - Label 5Y

Aircrew Revision to Previous ETA or Diversion Reports should contain Label characters 5Y.

The format should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number[Block Sequence Character]	
5-10	Flight Identifier	
11	New Destination Station Alpha Ch. #1	
12	New Destination Station Alpha Ch. #2	
13	New Destination Station Alpha Ch. #3	
14	ETA Hours (Tens)	
15	ETA Hours (Units)	
16	ETA Minutes (Tens)	
17	ETA Minutes (Units)	
18	Fuel on Board Numeric Ch. #1	
19	Fuel on Board Numeric Ch. #2	
20	Fuel on Board Numeric Ch. #3	
21	Fuel on Board Numeric Ch. #4	
22 thru n	Free Text where n $\leq$ 220	

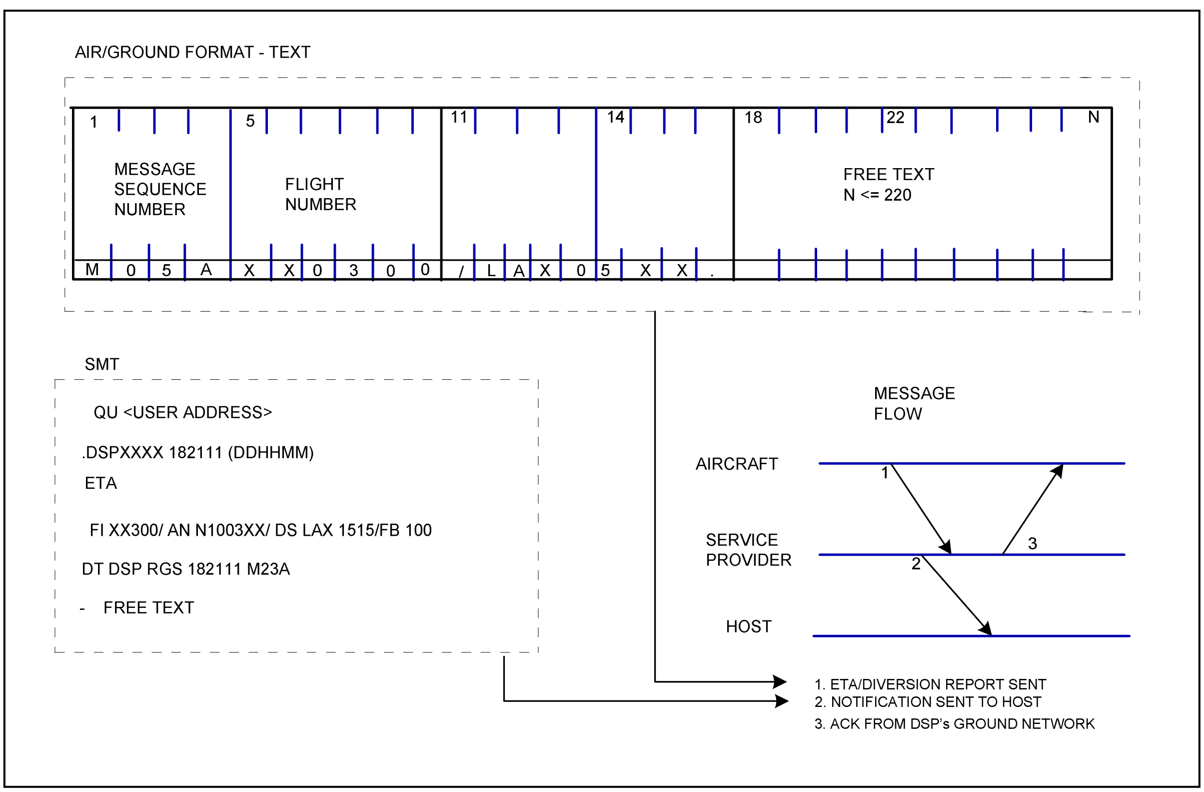


Figure 5.3.8 - ETA/Diversion Report

5.3.9 Aircrew Initiated Engine Data/Takeoff Thrust Report - Label 7A

Aircrew Initiated Engine Data or Takeoff Thrust Report should contain Label characters 7A.

Characters 11 through 220 are available for free text consisting of data manually entered by the crew. The format of the free text field will be determined by the user. The format should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11 thru n	Free Text where n ≤ 220	

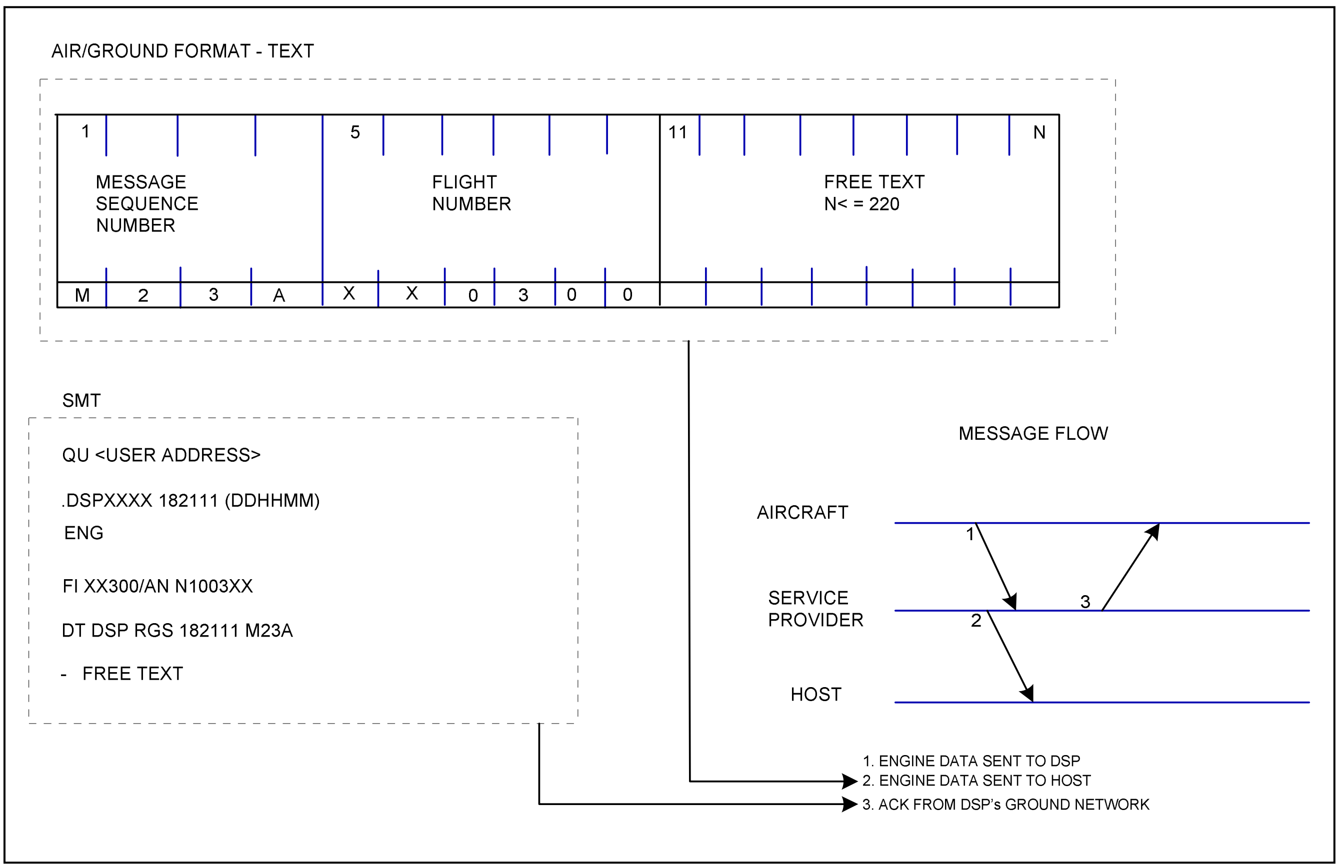


Figure 5.3.9 - Engine Data

5.3.10 Aircrew Entered Miscellaneous Message - Label 7B

In some avionics systems, provision has been made for the aircrew to enter Miscellaneous Messages from the Control/Display unit. Miscellaneous messages should be downlinked with the Label characters 7B.

The format of the message should be as follows:

Character No.	Character Content		Notes
1	Message	[Originator]	
2-3	Sequence	[Message Number]	
4	Numbe	[Block Sequence Character]	
5-10	Flight Identifier See Section 5.2.1		
11 thru n	Free Text where n ≤ 220		

The format of the free text field will be determined by the user.

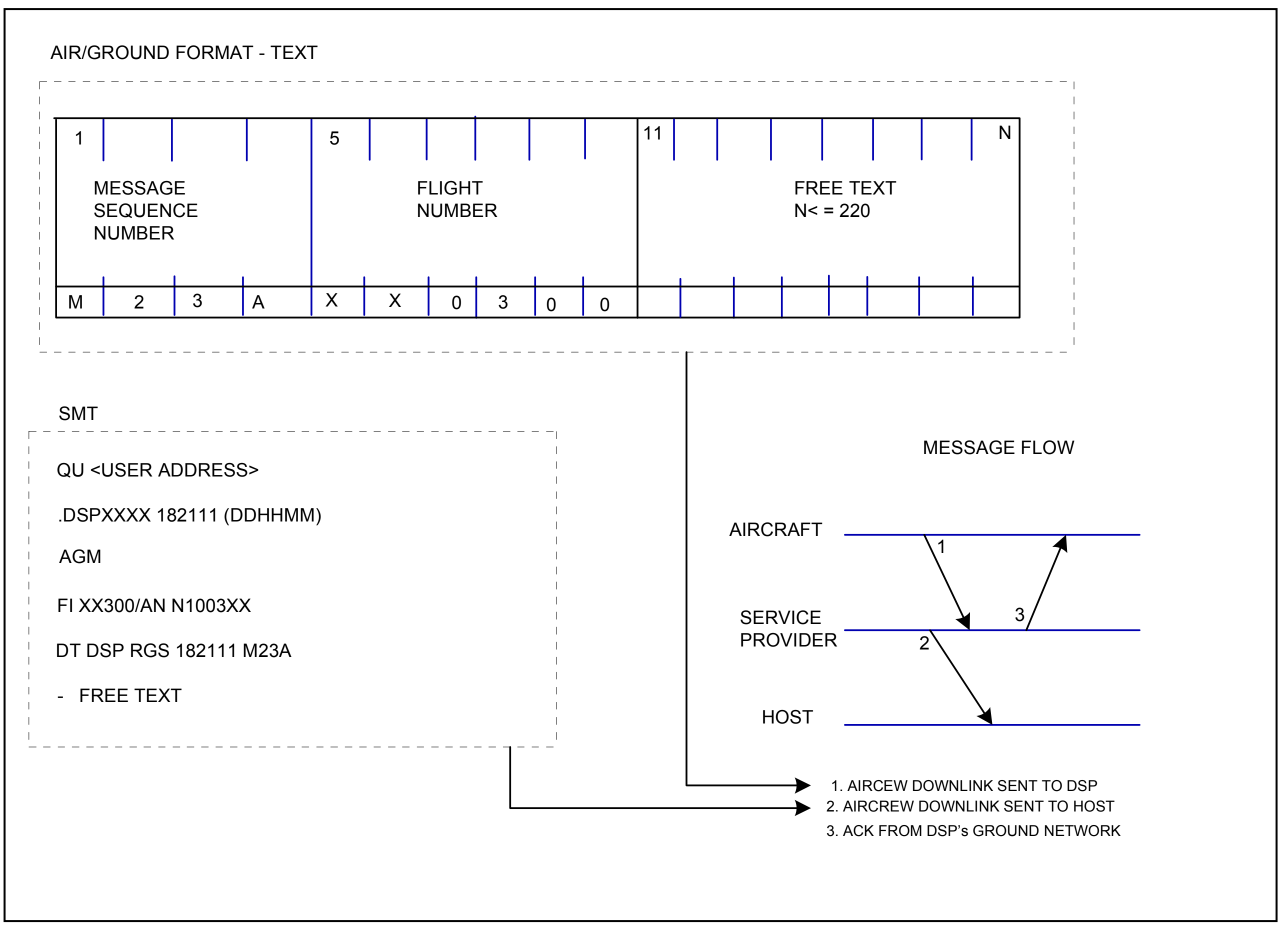


Figure 5.3.10 - Miscellaneous Message

5.3.11 Aircrew-Addressed Downlink - Labels 80 through 8~

Aircrew-addressed downlinks contain Labels selected from the range 80 through 8~. Aircrew -addressed downlinks are routed by the ACARS ground processor to (an) address(es) implied from the Label, to (an) address(es) entered by the flight crew or both, as negotiated between users and ground service providers. When multiple addresses are entered by the flight crew, they are separated by a space character (2/0). The address field is terminated by a period (2/14). The maximum number of addresses is 16.

Predefined addresses should be encoded in the following format:

Character No.	Character Content	Notes
1	Message [Originator]	
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	First text character	
2 thru n	Text	

If the aircrew entered addresses take the form of conventional seven-character teletype addresses, the following message format should be used:

Character No.	Character Content	Notes
1	Message [Originator]	
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Slash (2/15)	
12 thru 18	First aircrew entered address	
19	Space (2/0)	
20 thru 26	Second aircrew entered addresses (if used)	
27	Period (2/14)	
28 thru n	Text	

If the aircrew entered addresses take the form of three-character station identifiers, the following message format should be used:

Character No.	Character Content	Notes
1	Message [Originator]	
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Slash (2/15)	
12 thru 14	First aircrew entered address	
15	Space (2/0)	Only if 2nd address is present
16 thru 18	Second aircrew entered addresses (if used)	
19	Period (2/14)	
20 thru n	Text	

If the aircrew entered addresses take the form of four-character station identifiers, the following message format should be used:

Character No.	Character Content	Notes
1	Message [Originator]	
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Slash (2/15)	
12 thru 15	First aircrew entered address	
16	Space (2/0)	Only if 2nd address is present
17 thru 20	Second aircrew entered addresses (if used)	
21	Period (2/14)	
22 thru n	Text	

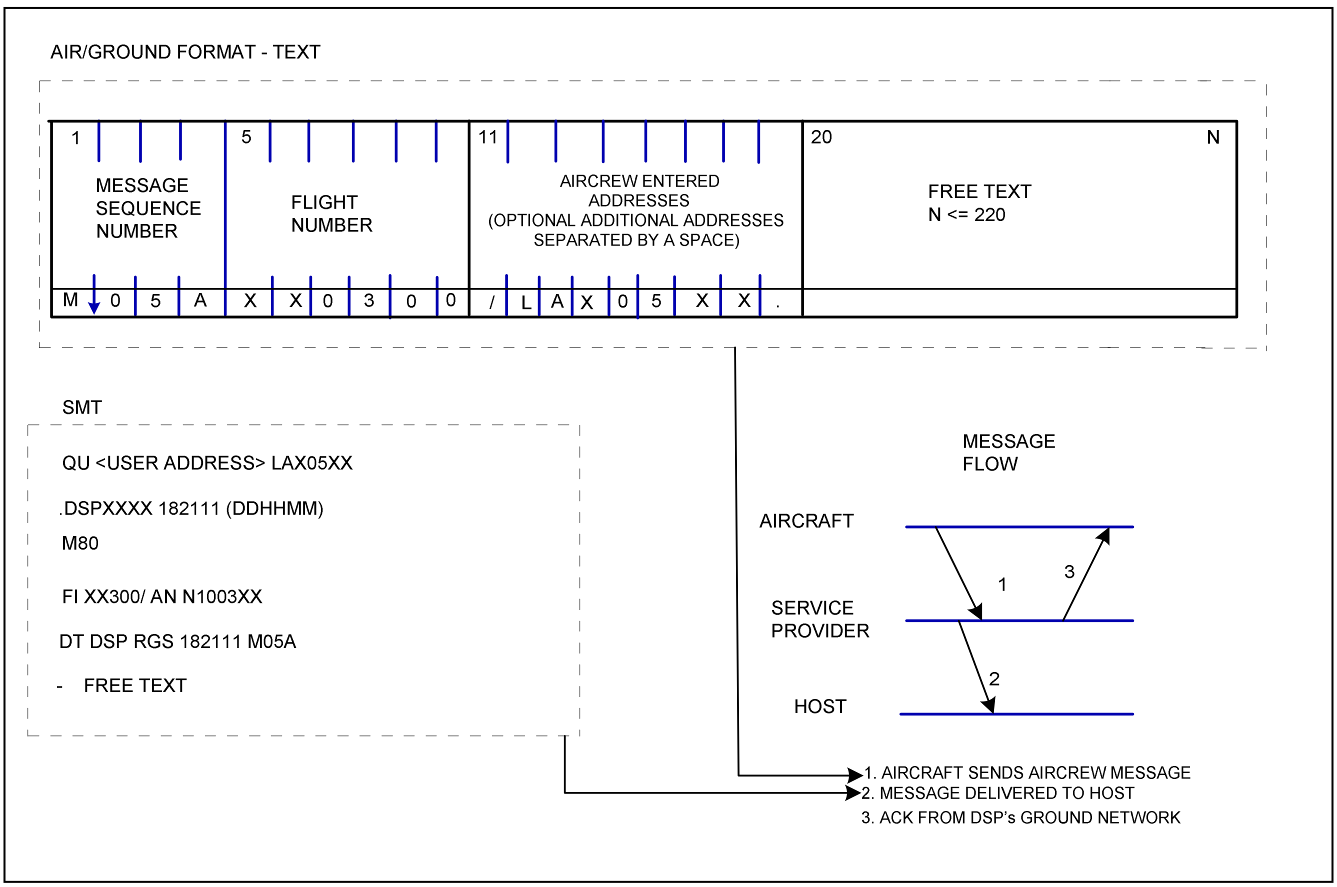


Figure 5.3.11-1 - Aircrew-Addressed Downlink

5.3.12 Unassigned

The description of Labels CA-CF were moved to Section 5.2.9.

5.3.13 Meteorological Report - Label or MFI H2

Sub-systems onboard the aircraft may be programmed to provide automatic downlinks of meteorological data at pre-determined altitudes, timed intervals, or pressure levels as specified by the user. These Meteorological Report downlink messages should contain the Label (or MFI) characters H2.

There are four versions of Meteorological Report defined. Version 1 provides a unified format for all flight phases. Version 2 divides the report data and associated data sampling times into three flight regimes. Version 2 divides the report data and associated data sampling times into three flight regimes. Version 3 is similar to Version 2 but provides timing interval information at the beginning of the message. Version 4 contains the ability to report at specified pressure intervals, controlling functions for system optimization and remote targeting of data, and a suggested algorithm for compressing the downlinked report. These should be used in conjunction with the appropriate Meteorological Report Command Uplink in Sections 4.3.9 and 4.3.10. Version 4 also is associated with the Meteorological Report Configuration Downlink in Section 5.3.54.

<u>Special Meteorological Note</u>

For data propriety and security reasons, the airline may require the receiving Met Office to ensure that all identification marks, such as carrier code/flight number and aircraft registration are removed from the AMDAR message before it is distributed for operational use and to the WMO. This can be done either by the airline host, the service provider or the receiving Met office.

5.3.13.1 Meteorological Report, Version 1 - MFI or Label H2

Table 5.3.13.1-1 - Meteorological Reports, Version 1

Number of Characters	Character Content	Notes
10	Standard Message Header	Refer to Section 3.4 of ARINC Specification 618
2	Version Number (01)	
7	Flight Identifier	See Note 1
7	Registration Number	
36	Data Sample 1	See Note 6
36	Data Sample 2	
.	.	
.	.	
36	Data Sample 5	

Notes:

1. The Flight Identifier is made up from the 3 letter ICAO Airline code and the 4 digit (or) alpha character Flight Number

2. The format of latitude and longitude are with North/South (abbreviated N/S) and East/West (abbreviated E/W) following the values of latitude and longitude and a resolution in degrees and minutes

   For example: **4811N12030W or 3530S14845E**.

Latitude	Longitude
DDMM (N/S)	DDDMM (E/W)
4811N	02030W
3530S	14845E

3. The character F followed by 3 numerals. For example: F350

4. The range of Static Air Temperature is from -99 to +99 Celsius. The format used is 4 characters. The characters MS are used to indicate a negative value and PS are used to indicate a positive value followed by temperature in degrees Celsius (2 numerals). For example: MS23 or PS24

5. If the roll angle exceeds 5 degrees, then the characters RA are used, otherwise the field is filled with 2 space characters

6. Up to 5 samples can be included in a report. Each data sample will contain the following data

Number of Chars	Data Sample	Notes
5	Latitude	See Note 2
6	Longitude	See Note 2
6	Date/Time (UTC) of Observation	Format: ddhhmm
4	Flight Level	See Note 3
4	Static Air Temperature (Celsius)	See Note 4
3	Wind Direction (degrees)	Range: 000-359
3	Wind Speed (knots)	Range: 000-999
2	Roll Angle Flag	See Note 5
3	Humidity	Range: 0 to 100 percent

5.3.13.2 Meteorological Report, Version 2 - MFI or Label H2

There are three flight phases with regard to meteorological data gathering and reporting. The expected sequence and timing of meteorological data acquisition the timing of meteorological reports are enumerated below.

ASCENT REPORTS

At the end of the sampling period a single Ascent report (message) is prepared and sent consisting of:

Initial Meteorological data measured at the time of the OFF event (take-off).

Series #1 Following the Initial sample, Series #1 data measurement samples are accumulated at intervals from 3 to 20 seconds (modifiable via uplink; default to 6 seconds) until the limit of 30 to 200 seconds (modifiable via uplink, default to 90 seconds) after OFF event. A delimiter (Slash </>) is used to designate the conclusion of Series #1 data.

Series #2 Series #2 data samples are accumulated from the expiration of the Series #1 data acquisition period. Series #2 data samples are taken at intervals from 20 to 60 seconds (modifiable via uplink; default to 20 seconds) until 510-1110 seconds (modifiable via uplink, default to 510 seconds).

ENROUTE REPORTS

Series #1 One Enroute report is sent consisting of six consecutive data measurement samples. The interval of data measurement is from 1 to 60 minutes; the default interval is 3 minutes. Enroute data measurements should begin at the conclusion of data sampling for the Ascent report and terminate when Descent report measurements commence.

Although discouraged, the Ascent and Descent reports may be inhibited and only the Enroute report generated. This option can be selected via data link uplink. In this case, the first Enroute data sample should be taken at the OFF event and data accumulation should continue at a uniform interval until the ON event unless the interval is modified by an uplink message.

DESCENT REPORTS

Series #1 Normally more than one Descent report will be sent consisting of ten data measurement samples taken over a period of approximately 10 minutes. Descent data measurements begin at 18,000 to 30,000 feet (top of descent). The point of initiation of Descent data measurement sampling is modifiable via uplink (default to 25,000 feet). The interval of Descent data measurement samples is 20 to 300 seconds, modifiable via uplink (default to 60 seconds). Descent reports for downlink will be assembled after every 10 samples and sent as one message. The final report is sent at the ON event (when the wheels touch down).

The format of the Meteorological Report Messages should be as follows:

Table 5.3.13.2-1 - Ascent Weather Report Format

Character Number	#of Char	Character Content	Format	Notes
1-10	10	Standard Message Header		
11-12	2	Version Number	02	
13	1	Type of Met Format	A, E, D	2
14-15	2	Date Message Assembled	dd	
16-19	4	Time Message Assembled	hhmm	
20-23	4	Departure Station	xxxx	
24-27	4	Destination Station	xxxx	
Initial report:				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	2	Date of Observation		dd
	4	Time of Observation	hhmm	5
	4	Pressure Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	4	WV Mixing Ratio	nnnQ	9
Series #1				
	4	Pressure Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind direction	nnn	Degrees true
	3	Wind Speed	nnn	Knots
	1	Roll Angle Flag	n	8
	4	WV Mixing Ratio	nnnQ	9
Delimiter	1	Slash </>	/	Indicates end of Series #1 data/ beginning of Series #2 data
Series #2				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	4	Pressure Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind Direction	nnn	Degrees true
	3	Wind Speed	nnn	Knots
	1	Roll Angle Flag	n	8
	4	WV Mixing Ratio	nnnQ	9
		End of Text	<ETX>	

Table 5.3.13.2-2 - Enroute Weather Report Format

Character Number	#of Char	Character Content	Format	Notes
1-10	10	Standard Header		1
11-12	2	Version Number	02	
13	1	Type of Met Format	A, E, D	2
14-15	2	Date of Message Assembly	dd	
16-19	4	Departure Station	xxxx	
20-23	4	Destination Station	xxxx	
Series #1				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	4	Time of Observation	hhmm	5
	4	Pressure Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind Direction	nnn	Degrees true
	3	Wind Speed	nnn	Knots
	1	Roll Angle Flag	n	8
	4	WV Mixing Ratio	nnnQ	9
	5	Turbulence	Cnnnn	10
		End of Text	<ETX>	

Table 5.3.13.2-3 - Descent Weather Report Format

Character Number	#of Char	Character Content	Format	Notes
1-10	10	Standard Header		1
11-12	2	Version Number	02	
13	1	Type of Met Format	A, E, D	2
14-15	2	Date of Message Assembly	dd	
16-19	4	Departure Station	xxxx	
20-23	4	Destination Station	xxxx	
Series #1				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	4	Time of Observation	hhmm	5
	4	Pressure Altitude	nnnn	4
	4	Static Air Temperature	annn	7
	3	Wind Direction	nnn	Degrees true
	3	Wind Speed	nnn	Knots
	1	Roll Angle Flag	n	8
	4	WV Mixing Ratio	nnnQ	9
	4	Turbulence	nnnn	11
		End of Text	<ETX>	

Notes:

1. See ARINC Specification 618.
2. (A = Ascent, E = Enroute, D = Descent). Each type has the same order of relevant meteorological information (latitude, longitude, time, pressure (or altitude), wind direction, wind speed, roll angle flag, water vapor, turbulence) but actual information and frequency of reporting levels varies with type.
3. A = N (North) or S (South), D = degrees, M = minutes, T = tenths of minutes.
4. A = E (East) or W (West), D = degrees, M = minutes, T = tenths of minutes.
5. h = hours, m = minutes
6. Resolution in tens of feet
7. The value of a is encoded either P (plus) or M (minus), units are tens, ones, tenths of a degree centigrade
8. If Roll angle exceeds 5 degrees set to [B], otherwise set to [G]
9. nnn = n_1 n_2 n_3 which implies $n_1 . n_2 \times 10^{-n_3}$; e.g., 123 = 1.2×10^{-3}. Q is a quality control character to be determined after contract award for WVSS.
10. C is a code where if C = Z then no turbulence above threshold and no data (characters) follow; if C = Q then some data problem exists and no data (characters) follow; if C = an integer n = 0 to 9, then 4n hexadecimal characters follow where the first two characters in a group of four are the average values of the turbulence metric and the last two characters are the peak values of the turbulence metric over a one-minute period.
11. nnnn: First two hexadecimal characters represent the average turbulence metric. The last two hexadecimal characters represent the peak turbulence metric.

5.3.13.3 Meteorological Report, Version 3 – MFI or Label H2

Ascent data measurements continue until top of climb, 18,000 to 30,000 feet. The point of institution of Enroute data measurement samples is modifiable via uplink (default to 25,000 feet).

The format of the Meteorological Report Messages should be as follows:

Table 5.3.13.3-1 - Ascent Weather Report Format

Character Number	#of Char	Character Content	Format	Notes
1-10	10	Standard Message Header		1
11-12	2	Version Number	03	
13	1	Type of Met Format	A, E, D	2
14-15	2	Date of Message Assembly	dd	
16-19	4	Time of Message Assembly	hhmm	
20-23	4	Departure Station	xxxx	
24-27	4	Destination Station	xxxx	
28-29	2	Series #1 time interval	ss	seconds
30-31	2	Series #2 time interval	ss	seconds
Initial report:				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	2	Date of Observation	dd	
	4	Time of Observation	hhmm	5
	4	Pressure Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	4	WV Mixing Ratio	nnnQ	9
Series #1				
	4	Pressure Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind direction	nnn	Degrees true
	3	Wind Speed	nnn	Knots
	1	Roll Angle Flag	n	8
	4	WV Mixing Ratio	nnnQ	9
Delimiter	1	Slash </>	/	Indicates end of Series #1 data/ beginning of Series #2 data
Series #2				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	4	Pressure Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind Direction	nnn	Degrees true
	3	Wind Speed	nnn	Knots
	1	Roll Angle Flag	n	8
	4	WV Mixing Ratio	nnnQ	9
		End of Text	<ETX>	

Note: The Version 3 Ascent Report will be followed by Version 2 Enroute and Descent Reports. Refer to Tables 5.3.13.2-2 and Table 5.3.13.2-3. Refer to Section 5.3.13.2 for Notes to this Table.

5.3.13.4 Meteorological Report, Version 4 - MFI or Label H2

There are three flight phases with regard to meteorological data gathering and reporting. The expected sequence and timing of meteorological data acquisition and the timing of meteorological reports are enumerated below. A suggested algorithm to minimize the number of transmitted characters by compressing the downlink report is given in Appendix H.

5.3.13.4.1 Ascent Reports

At the end of the sampling period, a single Ascent report (message) is prepared and sent consisting of:

5.3.13.4.1.1 Initial

Meteorological data measured at the time of the OFF event (take-off).

5.3.13.4.1.2 Series #1

Following the Initial sample, Series #1 data measurement samples are accumulated at intervals from 3 to 20 seconds (modifiable via uplink; default to 6 seconds) until the duration limit of 30 to 200 seconds (modifiable via uplink, default to 90 seconds) after OFF event.

Alternatively measurement samples can be accumulated at target heights according to pre-set, tabulated values corresponding to target pressure levels. If this pressure-based method of sampling is employed, ascent sampling commences with the Series #2 format (i.e., Series #1 is skipped). A delimiter (Slash </>) is used to designate the conclusion of Series #1 data.

5.3.13.4.1.3 Series #2

Series #2 data samples are accumulated from the expiration of the Series #1 data acquisition period. Series #2 data samples are taken at intervals from 20 to 60 seconds (modifiable via uplink; default to 20 seconds) until 510-1110 seconds from the OFF event (modifiable via uplink, default to 510 seconds).

Alternatively, if a pressure-based ascent sampling scheme with additional default time interval option (selectable by uplink) is employed, sampling commences using the Series #2 format immediately after the initial report. Sampling commences at 10hPa intervals (modifiable to 5hPa by uplink; Table 5.3.13.4-4 reference). The first sample is the first target height above the pressure altitude taken for the initial sample. 10 samples are taken if 10hPa intervals are selected. If 5hPa intervals are selected (by uplink command), 20 samples are taken. Thereafter, samples are taken at target altitudes corresponding to 50hPa intervals (modifiable to 25hPa by uplink). The first sample is taken at the target height corresponding to the 50hPa (or 25hPa if selected) level above the final 10hPa (or 5hPa if selected) sample. The final sample is taken at the pre-set top of ascent (modifiable via uplink between 15,000 ft and 25,000 ft; default 20,000 ft.). An additional mode is included (de-selectable through uplink command) that enables default timed samples to be taken if a sample has not been taken for a pre-defined time period. The default time interval is the same as the enroute time interval (modifiable by uplink command). This scheme ensures data are still produced if there is a pause during the ascent phase for a short period of level flight. Samples continue to be treated as ascent data and are included in the ascent report. Pressure-based ascent sampling resumes once the next target altitude is reached.

5.3.13.4.2 Enroute Reports

5.3.13.4.2.1 Series #1

Only time-based sampling is used. One Enroute report is sent consisting of six consecutive data measurement samples. The interval of data measurement is from 1 to 60 minutes; the default interval is 7 minutes. Enroute data measurements should begin at the conclusion of data sampling for the Ascent report and terminate when Descent report measurements commence. If pressure-based sampling is used during ascent but the pre-set top of ascent is not reached, the default timing mode (if selected) will automatically become the enroute sampling mode. The Maximum Wind option (de-selectable via uplink command), provides an additional data measurement sample that is taken at the time of occurrence of the peak wind measurement. The sample is included in the enroute report using the maximum wind indicator.

Although discouraged, the Ascent and Descent reports may be inhibited and only the Enroute report generated. This option can be selected via data link uplink. In this case, the first Enroute data sample should be taken at the OFF event and data accumulation should continue at a uniform interval until the ON event unless the interval is modified by an uplink message.

Default settings for the upper limit of Ascent Series 2 (time or height) data and the commencement of Descent data must be chosen to match operational profiles of the aircraft, i.e., they must be set lower than the expected cruise altitude.

5.3.13.4.2.2 Maximum Wind Report

This facility is required to aid in locating jet stream cores and is applied in level flight phase only. The highest wind speed measured between a sequential pair of routine observations is labelled maximum wind. Maximum wind is derived according to these criteria:

- Aircraft is in level flight, above 600hPa (13,800 ft.
- Maximum wind exceeds 60k.
- Maximum wind exceeds by at least 10kt the value of wind speed measured at the previous routine observation.
- Maximum wind exceeds by at least 10kt the value of wind speed measured at the subsequent routine observation.

5.3.13.4.3 Descent Reports

5.3.13.4.3.1 Series #1

Normally more than one descent report will be sent consisting of ten data measurement samples taken over a period of approximately 6 minutes. Sampling may be triggered either by time or pressure based schemes. Descent data measurements begin at 15,000 to 25,000 feet (top of descent). The point of initiation of descent data measurement sampling is modifiable via uplink (default to 20,000 feet). The interval of descent data measurement samples is 20 to 300 seconds, modifiable via uplink (default to 40 seconds). A descent report for downlink will be assembled after every 10 samples and sent as one message. For time-based sampling, Series #1 reporting continues from top of descent to the ON event (at wheels touch down) when the final report is sent. Series #2 reporting is not used.

Whichever interval (pressure or time) is designated for descent profiling, the descent flight phase will start on passing through the pre-set value for the top of descent except in the event that the enroute altitude is already lower than top of descent. In this case, 5.3.13.4.3.1 the descent phase shall commence on descending through two consecutive 25hPa target altitudes taken from Table 5.3.13.4-4 reference, List 1. For example, if cruise level is 24,000 ft and top of descent is set to 25,000 ft, descent sampling shall commence at target level 82 (22,160 ft).

Alternatively, a pressure-based descent sampling scheme with additional time interval option (selectable through uplink) may be employed. The ascent and descent phase profiles are designed to be similar with higher density sampling during the lowest 100hPa layer and lesser density sampling above this layer.

Once the descent phase has been detected, Series #1 reporting commences initially at intervals corresponding to 50hPa levels (modifiable to 25hPa by uplink) and continues until the 700hPa (target height 71, 9882 ft) level is reached. All Series #1 samples from top of descent to 700hPa including the 700hPa sample are transmitted in one report. If the pre-set top of descent is lower than the cruise (enroute reporting phase) altitude, descent phase sampling shall commence when the aircraft descends through the first 50hPa or 25hPa (as appropriate) target height encountered below top of descent. For example if top of descent is set to 20,000 ft, and the selected pressure target list points to Table 5.3.13.4-4 reference, List 2, descent sampling starts at height 79 (18,289 ft). Thereafter sampling continues at 50hPa target intervals until level 71 is reached.

An additional mode is included (de-selectable through uplink command) that enables default timed samples to be taken if a sample has not been taken for a pre-defined time period. The default time interval is the same as the enroute time interval (modifiable by uplink command). This scheme ensures sampling continues if there is a pause during the descent phase for a period of level flight. Samples continue to be treated as descent data and are included in the descent report. Pressure-based descent sampling resumes once the next target altitude is reached.

In the event that the enroute altitude is already lower than top of descent and the descent phase has been detected, the first sample shall be taken at the first target height encountered i.e., the second of the two trigger levels if List 1 is used and the first available trigger at or immediately following the second 25hPa value if List 2 is used. For example, if cruise level is 24,000 ft and top of descent is set to 25,000 ft, and List 2 is selected, descent sampling shall commence at target level 41 (20,812) and continue at 50hPa intervals. In this case the sample levels are 23,574 ft and 22,160 ft. and 20,812 is the first available List 2 sample altitude following the decision that descent is under way. If the selected pressure target list had pointed to List 1, descent sampling would have started at target height 82 and continued at 25hPa intervals. Sampling then continues as described above until Level 71 (700hPa) is reached.

5.3.13.4.3.2 Series #2

On passing through 700hPa (target level 71 at 9882 ft), data sampling is increased to 10hPa intervals and stored until touchdown. On touchdown, the most recent (lowest) 10 samples at 10hPa intervals above touchdown altitude are used together with integer multiples of 50hPa above this 100hPa layer to Level 61. The remaining 10hPa samples are discarded. All Series #2 samples are sent in one report (in more than one message if necessary) containing samples at 50hPa intervals down to 100hPa above touchdown altitude followed by 10, 10hPa samples for the lowest portion of the profile. The format of the Series #1 and Series #2 reports is the same and no delimiter is required to separate them because the samples are transmitted in separate messages. If the selected pressure target list had pointed to List 1, on passing through 700hPa (target height 71) descent sampling would be increased to 5hPa intervals (target heights 70, 69, 68, 67…) until touchdown. On touchdown, the most recent (lowest) 20 samples at 5hPa intervals above touchdown altitude are used together with integer multiples of 25hPa above this 100hPa layer to Level 66. The remaining 5hPa samples are discarded. The same additional default time triggering process is included (de-selectable via uplink command) as in the Series #1 part of the profile, i.e., if a sample has not been taken for a pre-defined time period, a reduced rate of sampling continues during pauses in the descent phase.

5.3.13.4.4 Data Smoothing

It is desirable to smooth individual sensor data samples to standardise measurements, improve representativeness of data according to sampling interval, and reduce quantising errors and random noise. Ideally such filtering would be varied with all changes in sampling interval which itself varies with application. In practice two smoothing rates are recommended, one for profile use (ascent/descent) and one for cruise (enroute or level flight).

For profile measurement, 10 second averaging is recommended. This equates roughly to 50m in the vertical plane and 1km in the horizontal plane. For cruise level sampling, 30 second averaging is recommended equating roughly to 8km in the horizontal plane.

The suggested smoothing times are given as the arithmetic averages of raw data measurements (for example the average of 10 one-second interval temperature measurements from the air data computer). An efficient, simple to code, alternative is a continuous exponential smoothing function as given below:

If y_n is the nth raw data sample, t the raw data update interval, T the averaging time and Y_n the corresponding smoothed value, then:

$$Y_n = 3t(y_n - Y_{n-1})/ T + Y_{n-1}$$

5.3.13.4.5 Optimization

Additional automated functionality is included to provide a highly flexible optimized data collection system. Software variables, selectable through uplink command, control the time and location where data sampling is required. The system operates globally. Details are provided in Sections 4.3.9 and 4.3.10 - Meteorological Report Command Uplink.

The format of the Meteorological Report Messages should be as follows:

Table 5.3.13.4-1 - Ascent Weather Report Format

Character Number	# of Char	Character Content	Format	Notes
1-10	10	Standard Message Header		1
11-12	2	Version Number	04	
13	1	Type of Met Format	A or C or Q or R	2
14	1	Altitude Pressure Reference	P or B	12
15-16	2	Date Message Assembled	dd	
17-20	4	Time Message Assembled	hhmm	
21-24	4	Departure Station	xxxx	
25-28	4	Destination Station	xxxx	
Initial report:				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	2	Date of Observation	dd	
	4	Time of Observation	hhmm	5
	2	Series #1 time interval (seconds)	ss	11
	2	Series #2 time interval (seconds)	ss	11
	4	Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	4	WV/Humidity	nnnQ	9
Series #1				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	4	Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind direction (Degrees true)	nnn	
	3	Wind Speed (Knots)	nnn	
	1	Roll Angle Flag	n	8
	4	WV/Humidity	nnnQ	9
Delimiter	1	Slash </>	/ Indicates end of Series #1 data/ beginning of Series #2 data	
Series #2				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	4	Time of Observation	hhmm	5
	4	Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind Direction (Degrees true)	nnn	
	3	Wind Speed (Knots)	nnn	
	1	Roll Angle Flag	n	8
	4	WV/Humidity	nnnQ	9
		End of Text	<ETX>	

Table 5.3.13.4-2 - Enroute Weather Report Format

Character Number	# of Char	Character Content	Format	Notes
1-10	10	Standard Header		1
11-12	2	Version Number	04	
13	1	Type of Met Format	E or S	2
14	1	Altitude Pressure Reference	P or B	12
15-16	2	Date of Message Assembly	dd	
17-20	4	Departure Station	xxxx	
21-24	4	Destination Station	xxxx	
Sample Format (up to 6 samples)				
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	4	Time of Observation	hhmm	5
	4	Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind Direction (Degrees true)	nnn	
	3	Wind Speed (Knots)	nnn	
	1	Roll Angle Flag/Max Wind	n	8
	4	WV/Humidity	nnnQ	9
	2+	variable blocks of 4		
		Turbulence	CCnnnn…nnnn	10
		End of Text	<ETX>	

Table 5.3.13.4-3 - Descent Weather Report Format

Series #1 and Series #2				
Character Number	**# of Char**	**Character Content**	**Format**	**Notes**
1-10	10	Standard Header		1
11-12	2	Version Number	04	
13	1	Type of Met Format	D or P or U or V	2
14	1	Altitude Pressure Reference	P or B	12
15-16	2	Date of Message Assembly	dd	
17-20	4	Departure Station	xxxx	
21-24	4	Destination Station	xxxx	
	6	Latitude	ADDMMT	3
	7	Longitude	ADDDMMT	4
	4	Time of Observation	hhmm	5
	4	Altitude	nnnn	6
	4	Static Air Temperature	annn	7
	3	Wind Direction (Degrees true)	nnn	
	3	Wind Speed (Knots)	nnn	
	1	Roll Angle Flag	n	8
	4	WV/Humidity	nnnQ	9
	2+	variable blocks of 4		
		Turbulence	CCnnnn…nnnn	10
		End of Text	<ETX>	

Notes:

1. See ARINC Specification 618.

2. A/C = Ascent, E = Enroute, D/P = Descent). Each type has the same order of relevant meteorological information (latitude, longitude, time, pressure (or altitude), wind direction, wind speed, roll angle flag, water vapour, turbulence) but actual information and frequency of reporting levels varies with type. Codes A and D indicate samples are selected by time intervals only. Codes C and P indicate samples are selected by target pressure levels in Ascent (C) and Descent (P). See also Notes 6 and 8. Enroute is coded E. If required by uplink command, maximum wind can be reported during Enroute (E) phase (see Note 8 for max. wind flag). If downlink data compression is used, characters A, C, E, D, P are replaced respectively by Q, R, S, U, V.

Level	**Ascent**		**Enroute**		**Descent**	
Selection	Normal	Compressed	Normal	Compressed	Normal	Compressed
Time	A	Q	E	S	D	U
Pressure	C	R			P	V

3. A N (North) or S (South), D = degrees, M = minutes, T = tenths of minutes

4. A = E (East) or W (West), D = degrees, M = minutes, T = tenths of minutes

5. h hours, m = minutes

6. Resolution in tens of feet. If negative, first character is M. If positive, first character is part of altitude value.

7. The value of a is encoded either P (plus) or M (minus), units are tens, ones, tenths of a degree celcius.

8. Steady flight means roll angle less than or equal to 5^o, or both roll and pitch angles less than or equal to 3^o.

   Unsteady flight means roll angle greater than 5^o, or both roll and pitch angles greater than 3^o.

   For all phases of flight (Format A, Q, C, R, E, S, D, U, P and V) except maximum wind reports, set steady flight to G; otherwise set Unsteady to B. For maximum wind event, set Steady to W; otherwise set unsteady to U.

9. Water Vapour/Humidity is measured and reported either as mixing ratio or relative humidity, depending on the type of sensor employed. Mixing Ratio is reported as nnn = n_1 n_2 n_3 which implies n_1 . n_2 x 10^{-n3} ; e.g., 123 = $1.2x10^{-3}$.

   Q is a quality control character to be determined after contract award for WVSS.

Relative Humidity is reported as nnn where the range of nnn is between 000 and 100 per cent.

In this case, Q is the Humidity indicator U.

10. CC is a code where if CC = ZZ then no turbulence above threshold and no data (characters) follow;

    if CC = QQ then some data problem exists and no data (characters) follow;

    if CC= two integers nn where nn = 00 to 99, then nn multiples of 4 hexadecimal characters follow where the first two characters in a group of four are the average values of the turbulence metric and the last two characters are the peak values of the turbulence metric over a one-minute period. nn is the reporting interval in minutes between samples during enroute and descent phases of flight. If pressure-based sampling is invoked, nn can vary substantially during the descent phase. Note that the case where nn=00 occurs during descent and indicates a reporting interval of less than one minute where insufficient turbulence data samples have been taken since the previous sample and no data (characters) follow.

11. Each of the two character pairs 00 to FF are the hexadecimal representation of decimal values 0-255 of the turbulence metric eddy dissipation rate (m^(2/4)s^(-1)) scaled by a factor of 100, i.e., edr values of 0.00 to 2.55.

12. For pressure-based observations, insert spaces for ss.

    P = PALT (Pressure Altitude in ICAO Standard Atmosphere)

    B = BALT (Barometric Altitude in QNH adjusted atmosphere)

    If BALT is reported, conversion to the Pressure Altitude (PALT) scale will be necessary in ground processing using runway or area QNH at the time of the observation. This is essential before data can be used or exchanged. If both PALT and BALT are available, PALT is preferred.

Pressure (hPa)	Height (ft)	List 1	List 2	Height No (nn)
1050	-989	1	1	01
1045	-856	2		02
1040	-723	3	2	03
1035	-589	4		04
1030	-454	5	3	05
1025	-319	6		06
1020	-184	7	4	07
1015	-48	8		08
1010	89	9	5	09
1005	226	10		10
1000	364	11	6	11
995	502	12		12
990	641	13	7	13
985	780	14		14
980	920	15	8	15
975	1061	16		16
970	1202	17	9	17
965	1344	18		18
960	1486	19	10	19
955	1629	20		20
950	1773	21	11	21
945	1917	22		22
940	2062	23	12	23
935	2207	24		24
930	2353	25	13	25
925	2500	26		26
920	2647	27	14	27
915	2795	28		28
910	2944	29	15	29
905	3093	30		30
900	3243	31	16	31
895	3394	32		32
890	3545	33	17	33
885	3697	34		34
880	3850	35	18	35
875	4003	36		36
870	4157	37	19	37
865	4312	38		38
860	4468	39	20	39
855	4624	40		40
850	4781	41	21	41
845	4939	42		42
840	5098	43	22	43
835	5257	44		44
830	5417	45	23	45
825	5578	46		46
820	5739	47	24	47
815	5902	48		48
810	6065	49	25	49

Pressure (hPa)	Height (ft)	List 1	List 2	Height No (nn)
805	6229	50		50
800	6394	51	26	51
795	6560	52		52
790	6727	53	27	53
785	6894	54		54
780	7062	55	28	55
775	7232	56		56
770	7402	57	29	57
765	7573	58		58
760	7745	59	30	59
755	7917	60		60
750	8091	61	31	61
745	8266	62		62
740	8442	63	32	63
735	8618	64		64
730	8796	65	33	65
725	8974	66		66
720	9154	67	34	67
715	9334	68		68
710	9516	69	35	69
705	9699	70		70
700	9882	71	36	71
675	10817	72		72
650	11780	73	37	73
625	12774	74		74
600	13801	75	38	75
575	14862	76		76
550	15962	77	39	77
525	17103	78		78
500	18289	79	40	79
475	19524	80		80
450	20812	81	41	81
425	22160	82		82
400	23574	83	42	83
375	25061	84		84

Notes:

1. The contents of this table are the same as in Table 4.3.10-10 and Table 10 in Appendix G. If changes are necessary, please change all three tables.

2. The following two equations are used in the process to calculate pressure (P(hPa)) from pressure altitude (PALT) and pressure altitude from pressure if Table 4.3.10-10 is not used to determine pressure target heights.

   Computation of pressure, P(hPa) in ICAO Standard Atmosphere from pressure altitude, PALT:

   $P(hPa) = 1013.25[1 - 10^{-6}x6.8756(PALT)]^{5.2559}$ -------(1)

   Computation of pressure altitude, PALT from pressure, P(hPa) in ICAO Standard Atmosphere:

   $PALT = 1.4544x10^{5}[1 - (P(hPa)/1013.25)^{0.19026}]$--------2)

5.3.14 Command/Response Downlink - Label RB

Command/Response downlinks should contain Label characters RB. The applications for such downlinks are user-defined and they should be generated as needed in response to Command/Response uplinks.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11 thru 19	Defined per one of the two tables below.		
20 thru n	Free Text where n < 220		

The address can be encoded in one of two forms, Address only and Priority plus Address.

ADDRESS ONLY	
Character	**Content**
11	Space
12 - 18	7-Letter IATA address
19	Space

PRIORITY + ADDRESS [1]	
Character	**Content**
11 - 12	QU Priority
13 - 19	7-Letter IATA address

Note:

1. Currently supported by SITA. This technique may not be supported by other DSPs.

5.0 DOWNLINK MESSAGE TEXT FORMATS

While the free text of this message is user defined, many ACARS MUs have implemented a common format that is defined by:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11-12	Message Priority	
13-19		
20	Space	
21	Tilde <~> Character. See note below	
22	RB Function Indicator (2,3,4)	
23-n	Free Text where n $\leq$ 220	

Note: Since some user network interfaces with their service provider are limited to the baudot subset of ASCII, which excludes the tilde <~>, character 21 of the downlink RB message is frequently replaced by the avionics with character number 10 of the corresponding uplink RA message. Consult your avionics supplier.

ACARS multi-block messages are permitted. When used, the fixed format show above for characters 11 through 22 applies only to the first block.

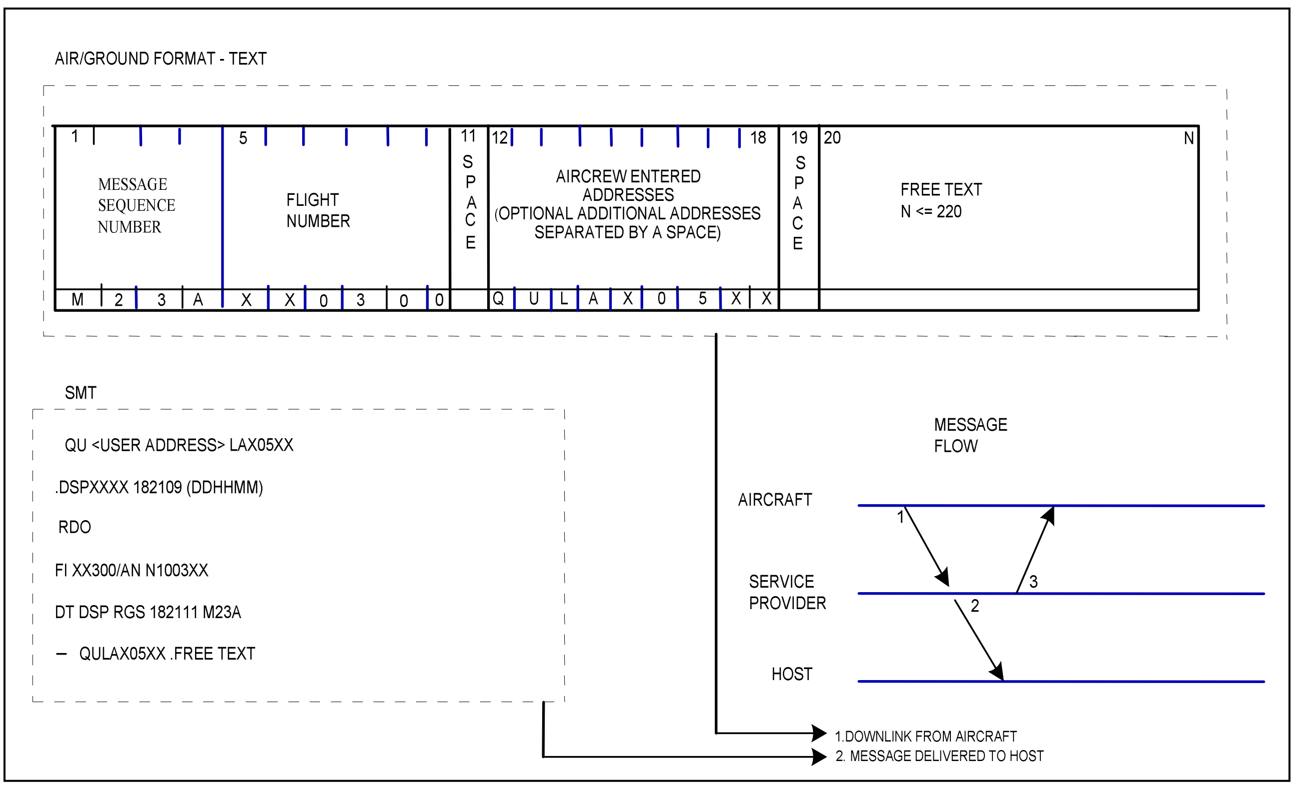


Figure 5.3.14-1 - Command/Response Downlink

5.3.15 Link Test - Label Q0

A message containing Label characters Q0 should be downlinked when the pilot presses the TEST key on his/her control unit followed by the SEND key.

The Link Test message format should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	See Section 5.2.1

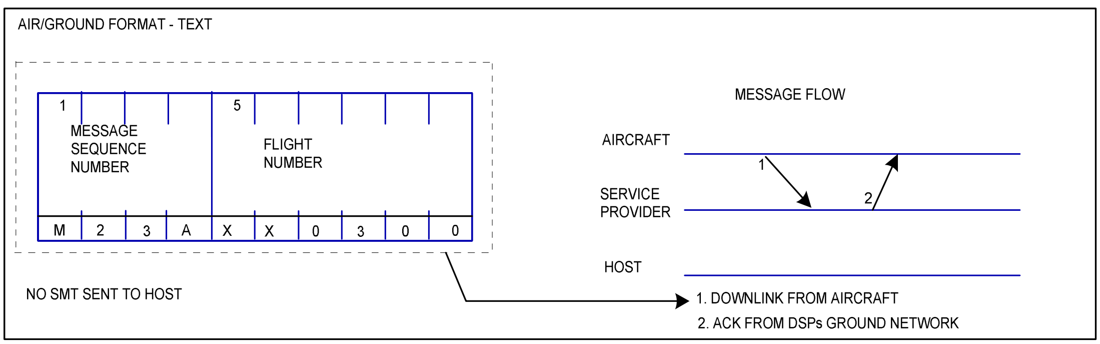


Figure 5.3.15-1 - Link Test

5.3.16 Departure/Arrival Reports (IATA Airport Code) - Label Q1

Each ACARS user should advise his avionics vendor of the Departure and Arrival Report message type option he wishes to see implemented in his hardware. The same label and format is used for both messages.

Departure Report should be transmitted automatically following the occurrence of the OFF event and an Arrival Report following the occurrence of the IN event.

Some users may desire automatic transmission of such a report between these events. The pilot should also be able to command the transmission of an Arrival report at any time between the ON and the IN events. Whether or not the pilot commands either of these transmissions, a Departure Report should always be transmitted automatically following the OFF event and an Arrival Report sent following the IN event, or at such other times defined by the user.

The Text field should consist of the 36-character fixed format section defined below, followed, when airline needs dictate, by Free text out to the maximum system handling capability of 220 characters.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier;	See Section 5.2.1
11	Departure Station - Alpha/Numeric Character #1	
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	OUT Time Hours (Tens)	
15	OUT Time Hours (Units)	
16	OUT Time Minutes (Tens)	
17	OUT Time Minutes (Units)	
18	OFF Time Hours (Tens)	
19	OFF Time Hours (Units)	
20	OFF Time Minutes (Tens)	
21	OFF Time Minutes (Units)	
22	ON Time Hours (Tens)	
23	ON Time Hours (Units)	
24	ON Time Minutes (Tens)	
25	ON Time Minutes (Units)	
26	IN Time Hours (Tens)	
27	IN Time Hours (Units)	
28	IN Time Minutes (Tens)	
29	IN Time Minutes (Units)	
30	Fuel Quantity (Thousands)	
31	Fuel Quantity (Hundreds)	
32	Fuel Quantity (Tens)	
33	Fuel Quantity (Units)	
34	Destination Station - Alpha/Numeric Character #1	
35	Destination Station - Alpha/Numeric Character #2	
36	Destination Station - Alpha/Numeric Character #3	
37 thru n	Free Text where $n \leq 220$	

It should also be possible for the pilot to command the transmission of a Departure Report at any time between the OUT and the OFF events. Refer to Section 3.2.1 for the rules for encoding the SMI of the Type B version of the Q1 message. Refer to Section 3.2.1 for coding Rules for the free text field.

The free text will usually consist of Captain/First Officer identification information.

5.0 DOWNLINK MESSAGE TEXT FORMATS

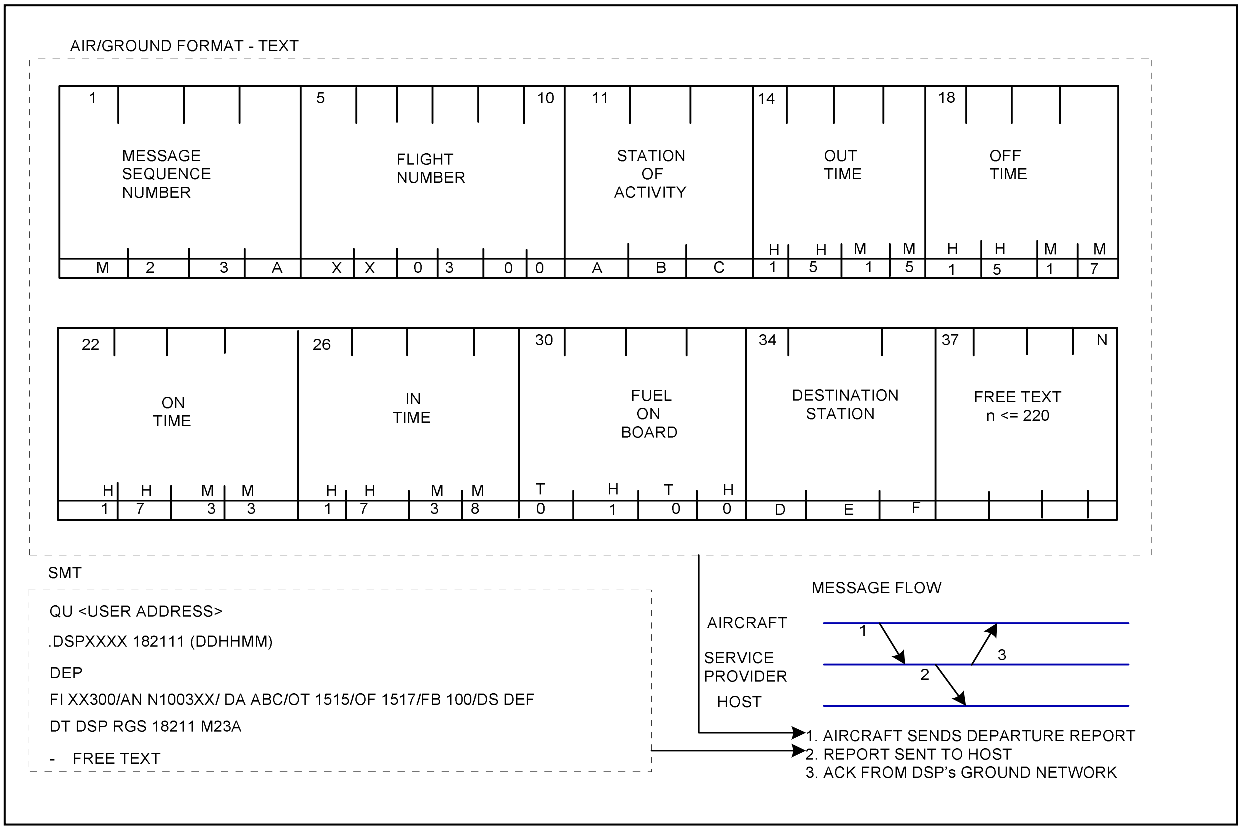


Figure 5.3.16-1 - Departure Report (Q1)

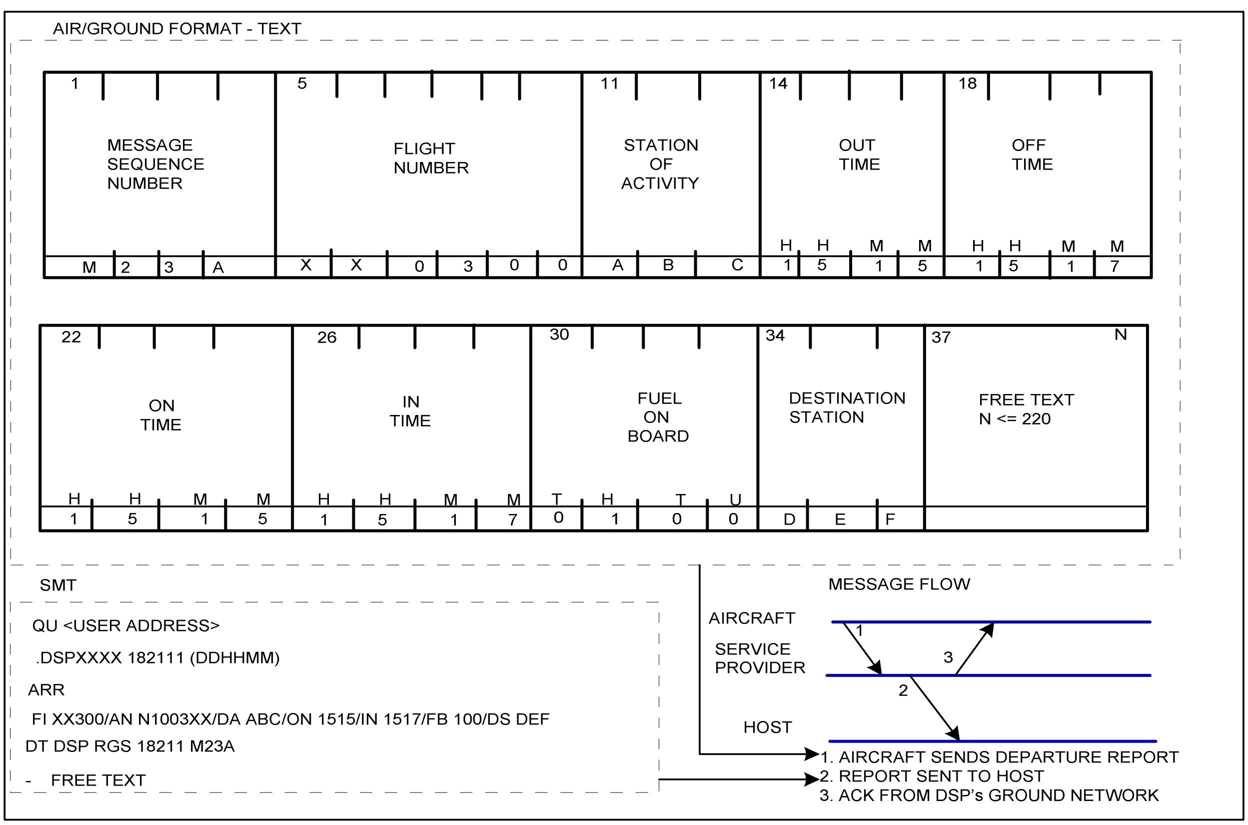


Figure 5.3.16-2 - Arrival Reports (Q1)

5.3.17 ETA Report - Label Q2

The Text field should consist of the 21-character fixed format section defined below, followed when airline needs dictate, by free text out to the maximum system handling capability of 220 characters. The free text will consist of information derived from manual inputs.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Destination Station - Alpha/Numeric Character #1	
12	Destination Station - Alpha/Numeric Character #2	
13	Destination Station - Alpha/Numeric Character #3	
14	ETA Hours (Tens)	
15	ETA Hours (Units)	
16	ETA Minutes (Tens)	
17	ETA Minutes (Units)	
18	Fuel Quantity (Thousands)	
19	Fuel Quantity (Hundreds)	
20	Fuel Quantity (Tens)	
21	Fuel Quantity (Units)	
22 thru n	Free Text where $n \leq 220$	

Note: The data in the Fuel Quantity field may be downlinked in either a Departure report or an ETA report. Which downlink is used will depend on which report is transmitted first and when the data is entered.

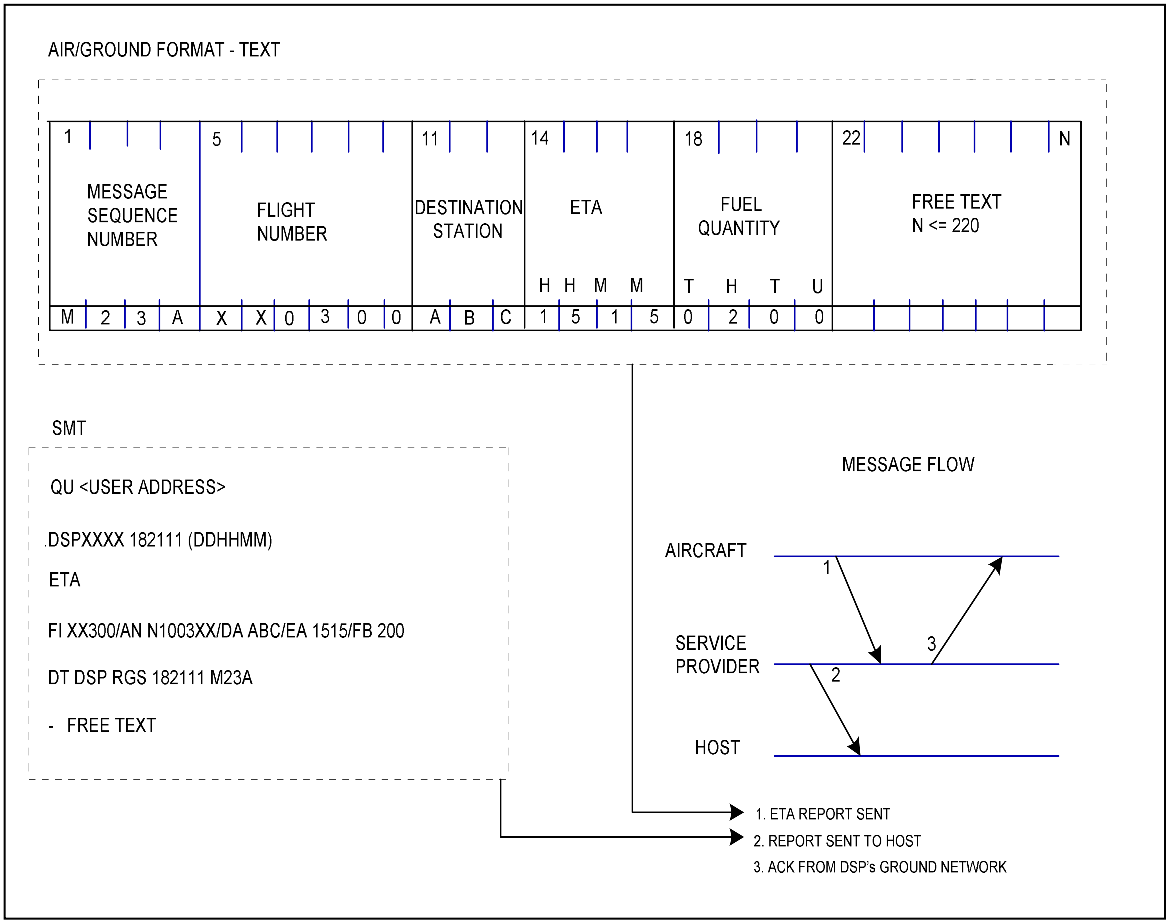


Figure 5.3.17-1 - ETA Report

5.3.18 Clock Update Advisory - Label Q3

The clock update advisory message may, at airline option, be transmitted automatically whenever the clock is updated by the pilot.

It may also be transmitted whenever the clock is updated automatically upon receipt of a Ground UTC Delivery Uplink.

The Text field should consist of the 19-character fixed format sequence shown below.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier;		
11	Hours (Tens)		Clock time before reset
12	Hours (Units)		
13	Minutes (Tens)		
14	Minutes (Units)		
15	Space		
16	Hours (Tens)		} Clock time } after reset
17	Hours (Units)		
18	Minutes (Tens)		
19	Minutes (Units)		

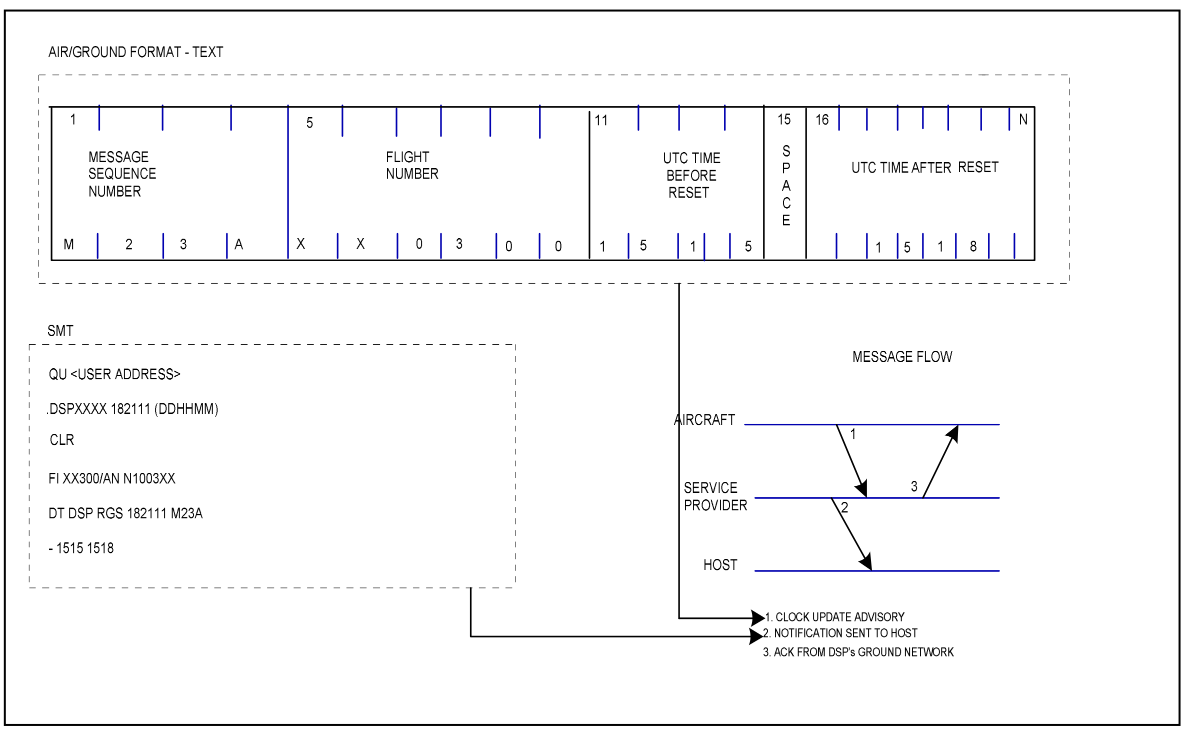


Figure 5.3.18-1 - Clock Update Advisory

5.3.19 Unassigned

This is a placeholder for future assignment.

5.3.20 Unassigned

This is a placeholder for future assignment.

5.3.21 Delay Message - Label Q7

Messages containing information on operational delays should contain Label characters Q7.

The format of the message should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11 thru n	Free Text where n ≤ 220	

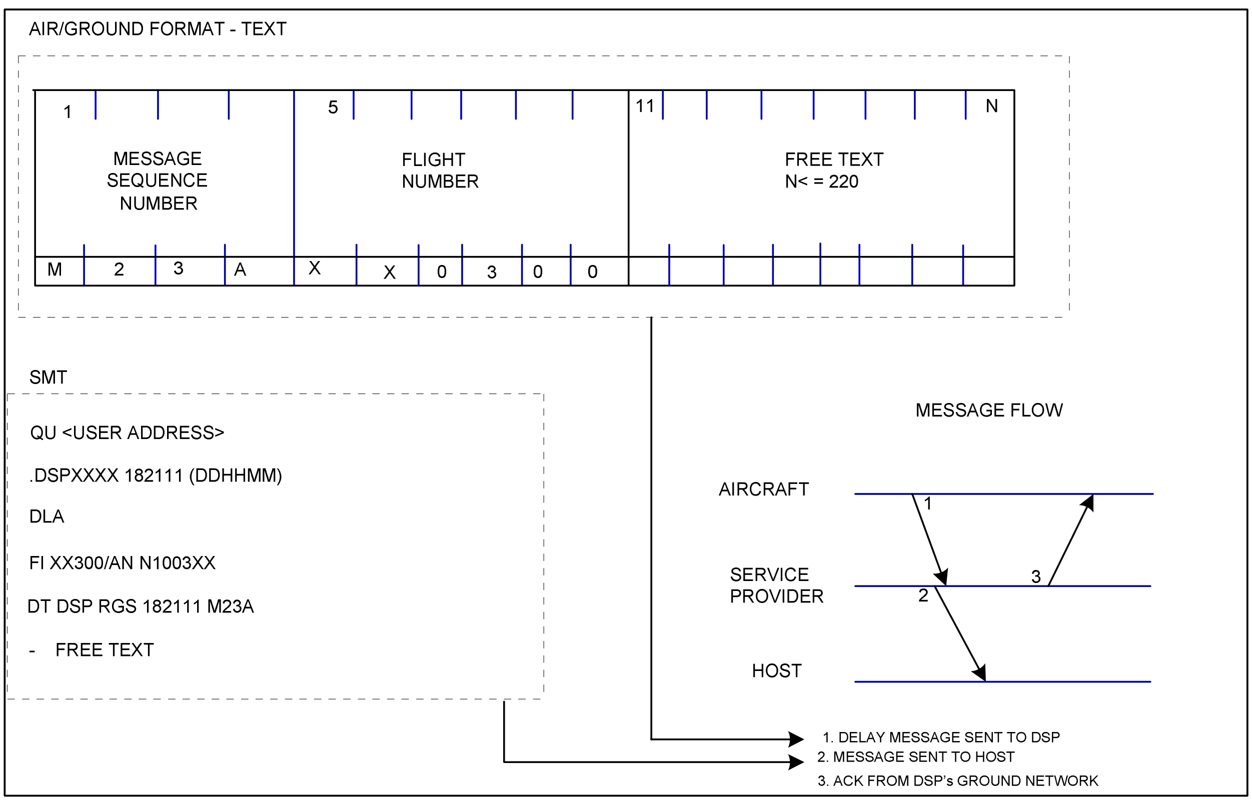


Figure 5.3.21-1 - Delay Message – Label Q7

5.3.22 Reserved - Label Q8

Not used in downlink messages.

5.3.23 Reserved - Label Q9

Not used in downlink messages.

5.3.24 OUT/Fuel Report (IATA Airport Code) - Label QA

The OUT/Fuel report should be transmitted automatically following the declaration of the OUT event.

The Text field should consist of the 26-character fixed format section defined below, followed, when airline needs dictate, by Free text out to the maximum system handling capacity of 220 characters. The Free text will consist of information defined by the airline.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Departure Station - Alpha/Numeric Character #1	
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	OUT time hours (Tens)	
15	OUT time hours (Units)	
16	OUT time minutes (Tens)	
17	OUT time minutes (Units)	
18	Boarded Fuel Character #1 (MSC)	
19	Boarded Fuel Character #2	
20	Boarded Fuel Character #3	
21	Boarded Fuel Character #4	
22	Boarded Fuel Character #5 (LSC)	
23	Fuel Quantity (Thousands)	
24	Fuel Quantity (Hundred)	
25	Fuel Quantity (Tens)	
26	Fuel Quantity (Units)	
27 thru n	Free Text where n $\leq$ 220	

The complete text of the OUT/Fuel Report should be transmitted, with those fixed format fields for which information is not required or not available filled with NULs (0/0) or spaces. See Section 3.2.1 for the effect of these options. If the free text portion of the text field is not used, the control character <ETX> should terminate the field at position number 27. In all other cases, the ETX character should terminate the field following the last free text character.

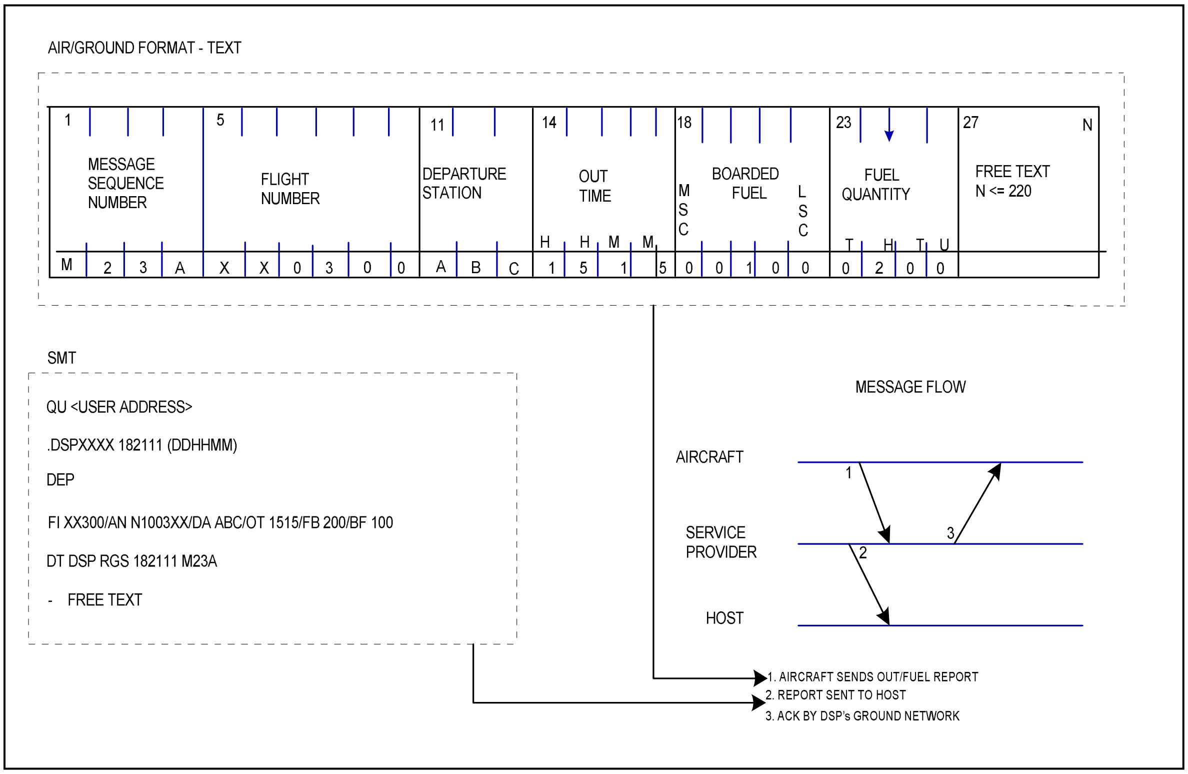


Figure 5.3.24-1 - OUT/Fuel Report (IATA Airport Code)

5.3.25 OFF Report (IATA Airport Code) - Label QB

This report format was defined to deliver the airport identification using the 3-character IATA designator.

The OFF report should be transmitted automatically following the declaration of the OFF event.

COMMENTARY

> DSPs use both the aircraft Departure and Destination information to manage its air/ground frequencies for the flight. For this reason, the Label QF message format is preferable to the Label QB format.

The OFF Report should be transmitted automatically following the declaration of the OFF event. Note the possible need to delay the transmission of this message until the aircraft is within radio coverage of the ACARS.

5.0 DOWNLINK MESSAGE TEXT FORMATS

The Text field should consist of the 17-character fixed format section defined below, followed, as necessary, by Free text as already described

.Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11	Departure Station - Alpha/Numeric Character #1		
12	Departure Station - Alpha/Numeric Character #2		
13	Departure Station - Alpha/Numeric Character #3		
14	OFF Time Hours (Tens)		
15	OFF Time Hours (Units)		
16	OFF Time Minutes (Tens)		
17	OFF Time Minutes (Units)		
18 thru n	Free Text where n ≤ 220		

The complete text of the OFF Report should be transmitted, with those fixed format fields for which information is not required or not available filled with NULs (0/0) or spaces. See Section 3.2.1 for the effect of these options.

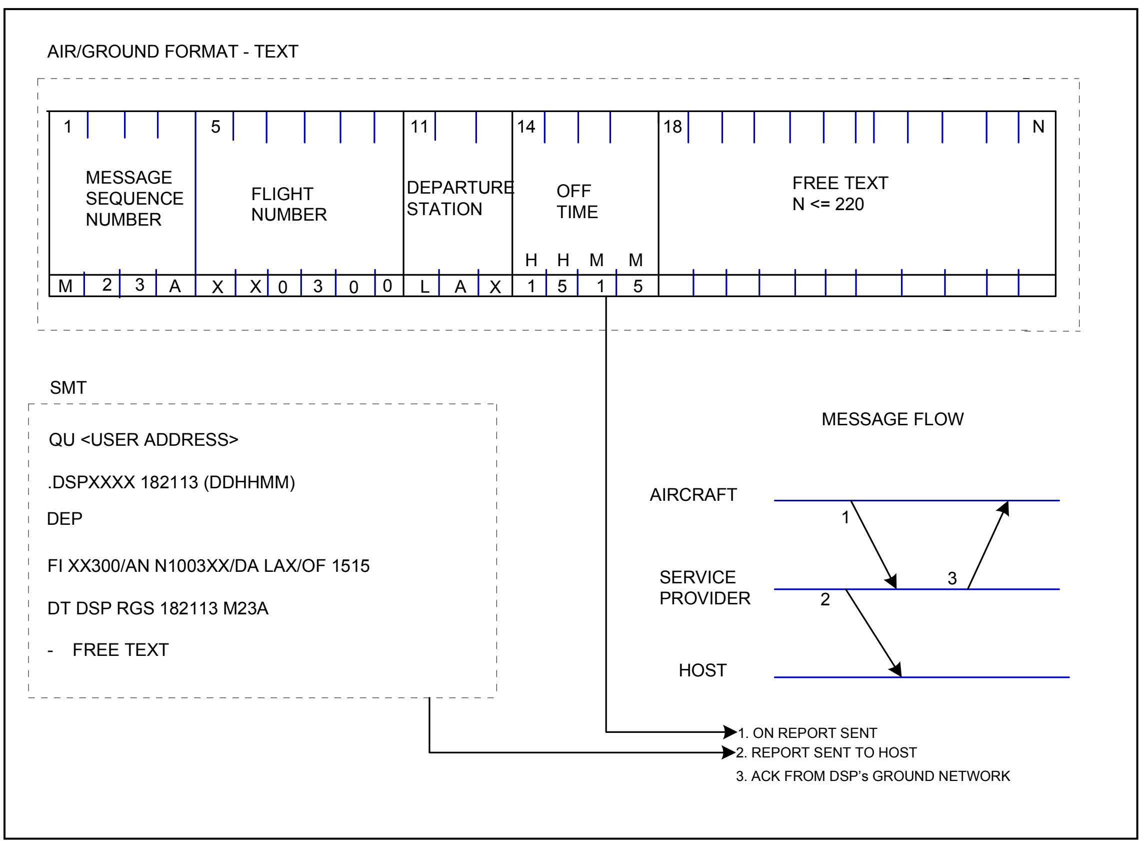


Figure 5.3.25-1 - OFF Report (IATA Airport Code)

5.3.26 ON Report (IATA Airport Code) - Label QC

The Text field should consist of the 17-character fixed format section defined below, followed, as necessary, by Free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3 .4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Destination Station - Alpha/Numeric Character #1	
12	Destination Station - Alpha/Numeric Character #2	
13	Destination Station - Alpha/Numeric Character #3	
14	ON Time Hours (Tens)	
15	ON Time Hours (Units)	
16	ON Time Minutes (Tens)	
17	ON Time Minutes (Units)	
18 thru n	Free Text where n $\leq$ 220	

The complete block of the ON Report should be transmitted, with those fixed format fields for which information is not required or not available filled with NULs (0/0) or spaces. See Section 3.2.1 for the effect of these options.

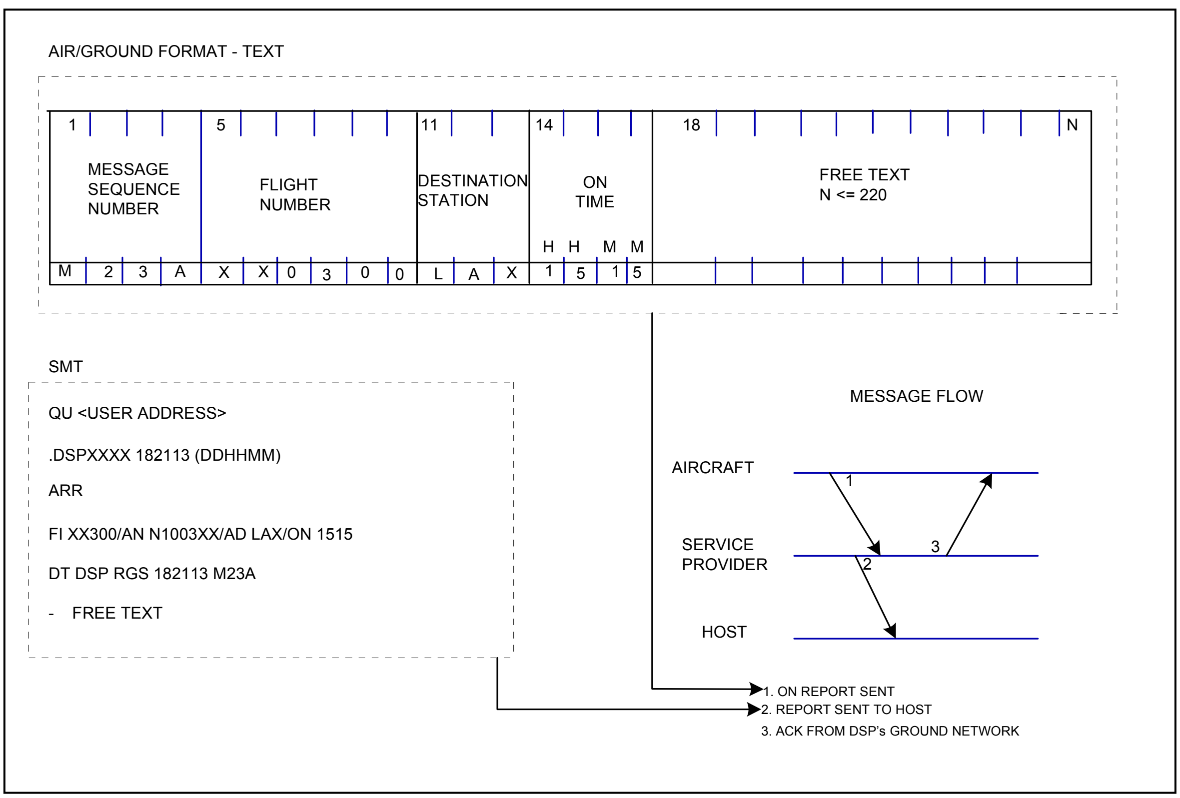


Figure 5.3.26-1 - ON Report (IATA Airport Code)

5.3.27 IN/Fuel Report (IATA Airport Code) - Label QD

The Text field should consist of the 22-character fixed format section followed, as necessary, by Free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	See Section 5.2.1
11	Destination Station Alpha/Numeric Character #1	
12	Destination Station Alpha/Numeric Character #2	
13	Destination Station Alpha/Numeric Character #3	
14	IN Time Hours (Tens)	
15	IN Time Hours (Units)	
16	IN Time Minutes (Tens)	
17	IN Time Minutes (Units)	
18	Fuel Quantity (Thousands)	
19	Fuel Quantity (Hundreds)	
20	Fuel Quantity (Tens)	
21	Fuel Quantity (Units)	
22	Captain/First Officer Identifier	
23 thru n	Free Text where n $\leq$ 220	

The message should be transmitted automatically following the declaration of the IN event. The Captain/First Officer Identifier character position should contain the numeric character 1 or 2 depending on the state of the Captain/First Officer Identification input (Captain causing 1 to be transmitted and First Officer causing 2 to be transmitted). If, in an airborne sub-system in which Captain/First Officer information is to be manually entered, no entry is made, the control character NUL (0/0) or spaces should be transmitted in this position. See Section 3.2.1 for the effect of these options.

5.0 DOWNLINK MESSAGE TEXT FORMATS

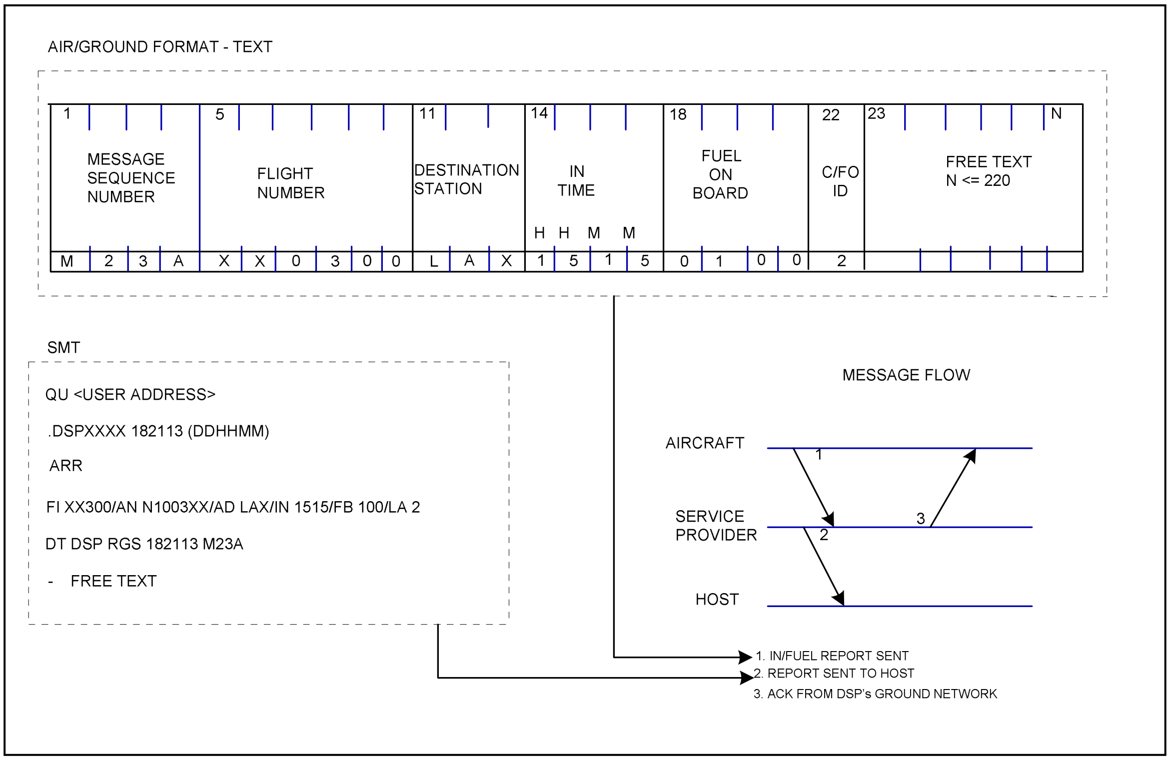


Figure 5.3.27-1 - IN/Fuel Report (IATA Airport Code)

5.3.28 OUT/Fuel/Destination Report (IATA Airport Code) - Label QE

The Text field should consist of the 29-character fixed format section defined below followed, as necessary, by free text, as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier;	
11	Departure Station - Alpha/Numeric Character #1	
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	OUT Time Hours (Tens)	
15	OUT Time Hours (Units)	
16	OUT Time Minutes (Tens)	
17	OUT Time Minutes (Units)	
18	Boarded Fuel Character #1 (MSC)	
19	Boarded Fuel Character #2	
20	Boarded Fuel Character #3	
21	Boarded Fuel Character #4	
22	Boarded Fuel Character #5 (LSC)	
23	Fuel Quantity (Thousands)	
24	Fuel Quantity (Hundreds)	
25	Fuel Quantity (Tens)	
26	Fuel Quantity (Units)	
27	Destination Station - Alpha/Numeric Character #1	
28	Destination Station - Alpha/Numeric Character #2	
29	Destination Station - Alpha/Numeric Character #3	
30 thru n	Free Text where $n \leq 220$	

The complete text of the OUT/Fuel Destination Report should be transmitted, with those fixed format fields for which information is not required or not available filled with ‘NUL’s (0/0) or spaces. See Section 3.2.1 for the effect of these options.

5.0 DOWNLINK MESSAGE TEXT FORMATS

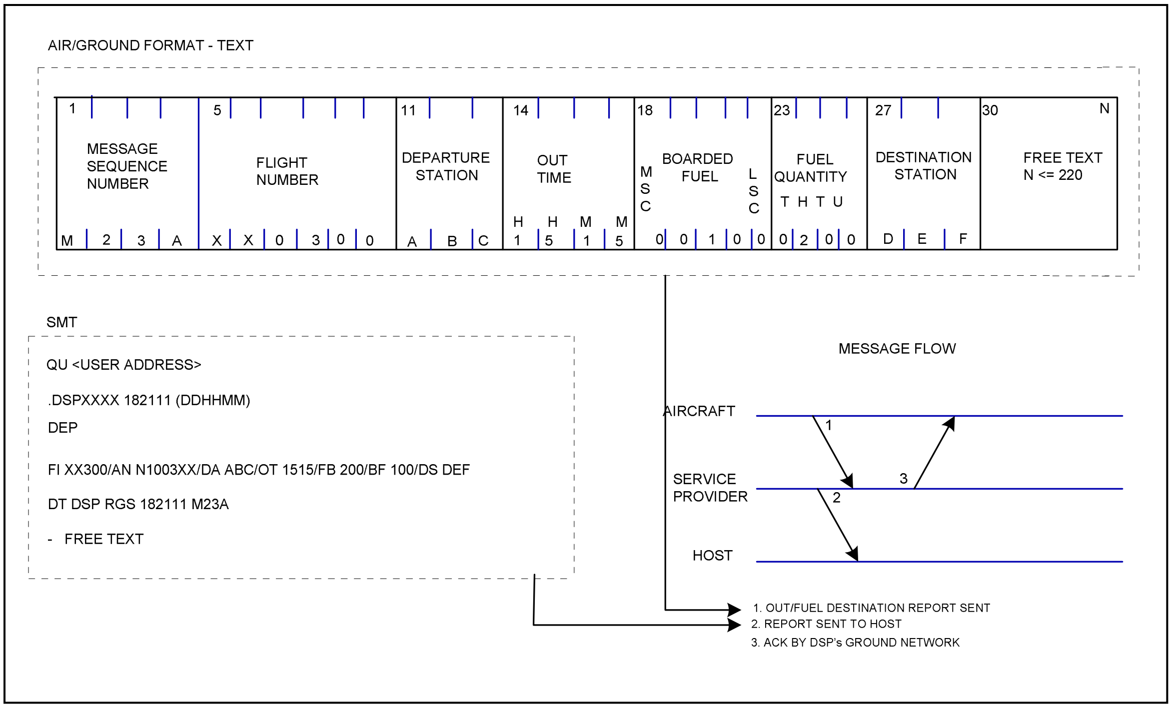


Figure 5.3.28-1 - OUT/Fuel/Destination Report (IATA Airport Code)

5.3.29 OFF/Destination Report (IATA Airport Code) - Label QF

The Text field should consist of the 20-character fixed format section defined below followed, as necessary, by free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	See Section 5.2.1
11	Departure Station - Alpha/Numeric Character #1	
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	OFF Time Hours (Tens)	
15	OFF Time Hours (Units)	
16	OFF Time Minutes (Tens)	
17	OFF Time Minutes (Units)	
18	Destination Station - Alpha/Numeric Character #1	
19	Destination Station - Alpha/Numeric Character #2	
20	Destination Station - Alpha/Numeric Character #3	
21 thru n	Free Text where n ≤ 220	

The complete text of the OFF/Destination Report should be transmitted, with those fixed format fields for which information is not required or not available filled with 'NUL's (0/0) or spaces. See Section 3.2.1 for the effect of these options.

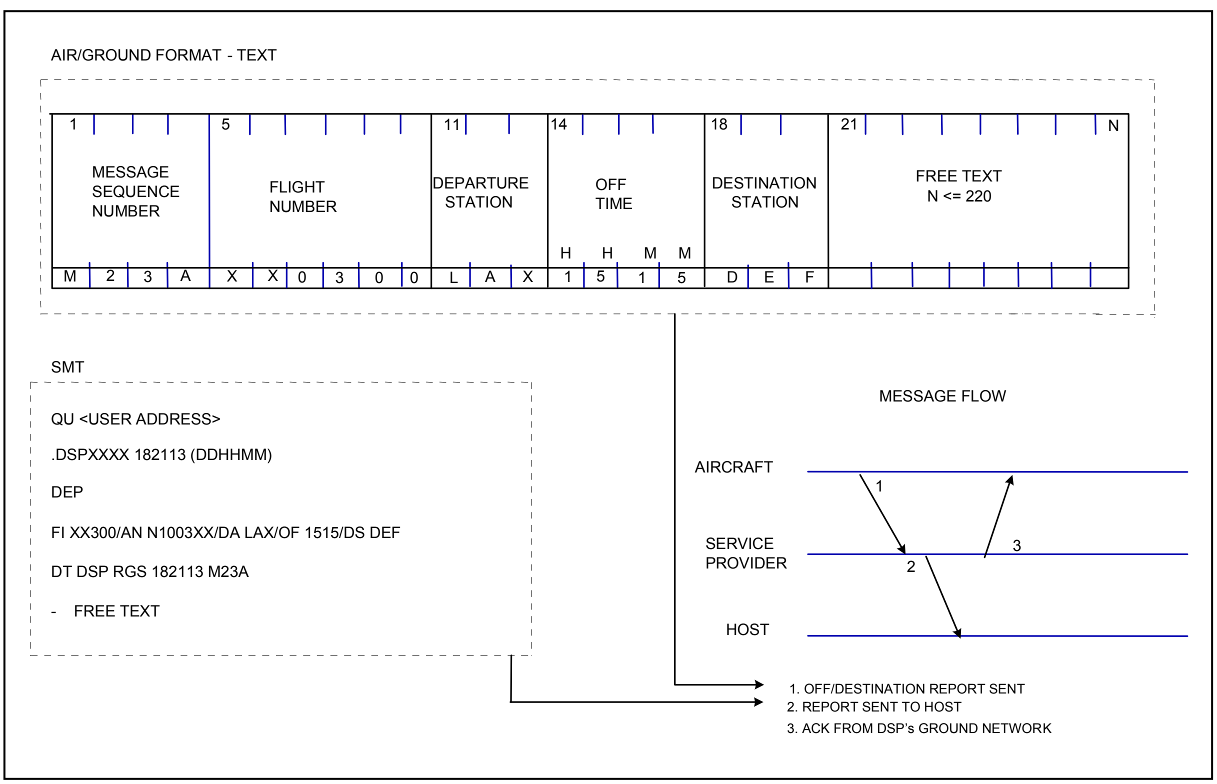


Figure 5.3.29-1 - OFF/Destination Report (IATA Airport Code)

5.3.30 OUT/Return IN Report (IATA Airport Code) - Label QG

OUT/Return IN reports may be transmitted as the result of aircraft returning to the gate after an OUT report.

The format should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	See Section 5.2.1
11	Departure Station - Alpha/Numeric Character #1	
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	OUT Time Hours (Tens)	
15	OUT Time Hours (Units)	
16	OUT Time Minutes (Tens)	
17	OUT Time Minutes (Units)	
18	Return IN Time Hours (Tens)	
19	Return IN Time Hours (Units)	
20	Return IN Time Minutes (Tens)	
21	Return IN Time Minutes (Units)	
22 thru n	Free Text where n ≤ 220	

The complete text of the OUT/Return IN Report should be transmitted, with those fixed format fields for which information is not required or not available filled with 'NUL's (0/0) or spaces. See Section 3.2.1 for the effect of these options.

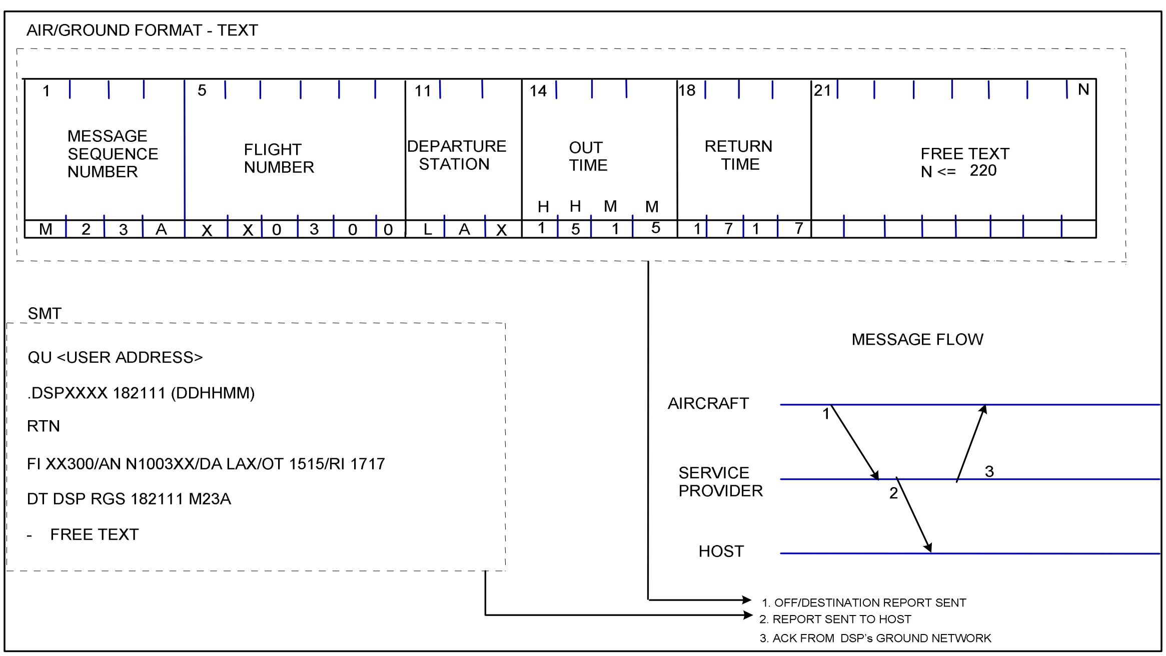


Figure 5.3.30-1 - OUT/Return IN Report (IATA Airport Code)

5.3.31 OUT Report (IATA Airport Code) - Label QH

The format should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	See Section 5.2.1
11	Departure Station - Alpha/Numeric Character #1	
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	OUT Time Hours (Tens)	
15	OUT Time Hours (Units)	
16	OUT Time Minutes (Tens)	
17	OUT Time Minutes (Units)	
18 thru n	Free Text where n $\leq$ 220	

The complete text of the OUT Report should be transmitted, with those fixed format fields for which information is not required or not available filled with 'NUL's (0/0) or spaces. See Section 3.2.1 for the effect of these options.

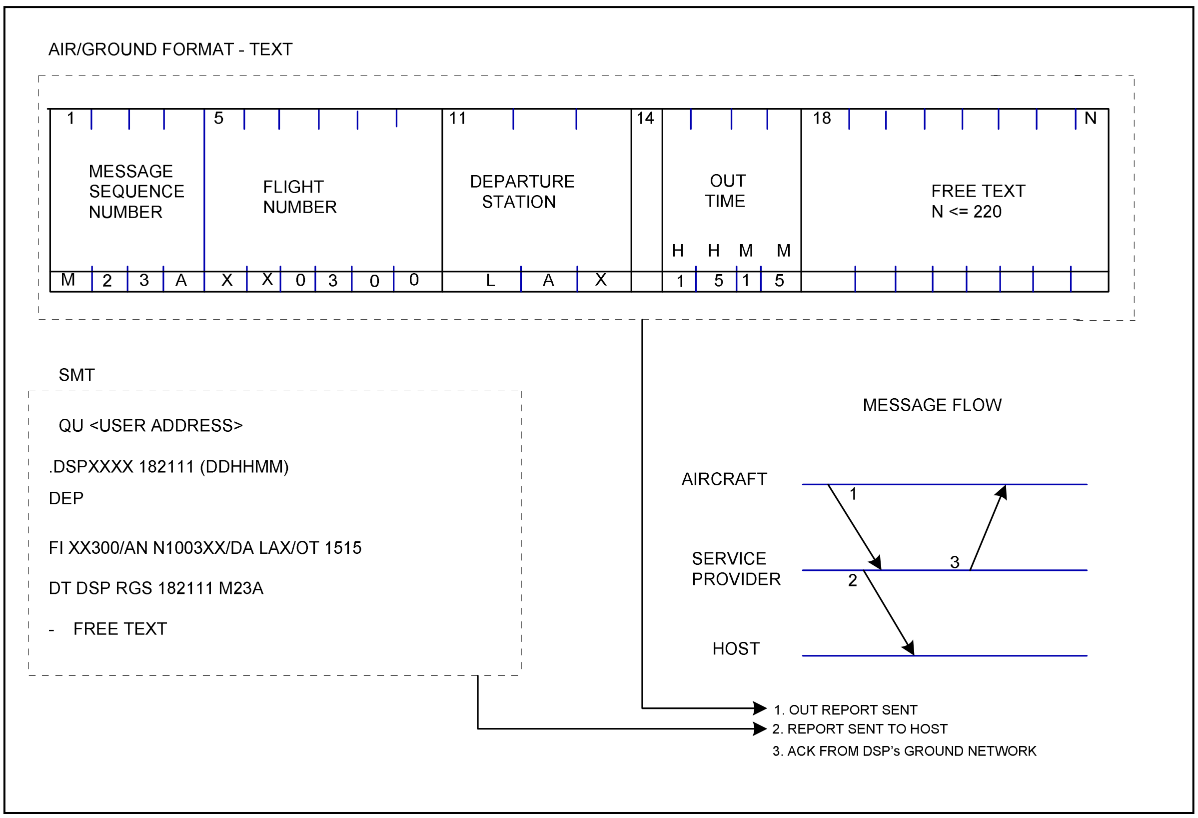


Figure 5.3.31-1 - OUT Report (IATA Airport Code)

5.3.32 Landing Report (IATA Airport Code) - Label QK

The Landing report should be transmitted automatically following the declaration of the ON event.

The Text field should consist of the 20-character fixed format section defined below followed, as necessary, by free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier;	See Section 5.2.1
11	Destination Station - Alpha/Numeric Character #1	
12	Destination Station - Alpha/Numeric Character #2	
13	Destination Station - Alpha/Numeric Character #3	
14	ON Time Hours (Tens)	
15	ON Time Hours (Units)	
16	ON Time Minutes (Tens)	
17	ON Time Minutes (Units)	
18	Departure Station - Alpha/Numeric Character #1	
19	Departure Station - Alpha/Numeric Character #2	
20	Departure Station - Alpha/Numeric Character #3	
21 thru n	Free Text where n ≤ 220	

The complete block of the Landing Report should be transmitted, with those fixed format fields for which information is not required or not available filled with 'NUL's (0/0) or spaces. See Section 3.2.1 for the effect of these options.

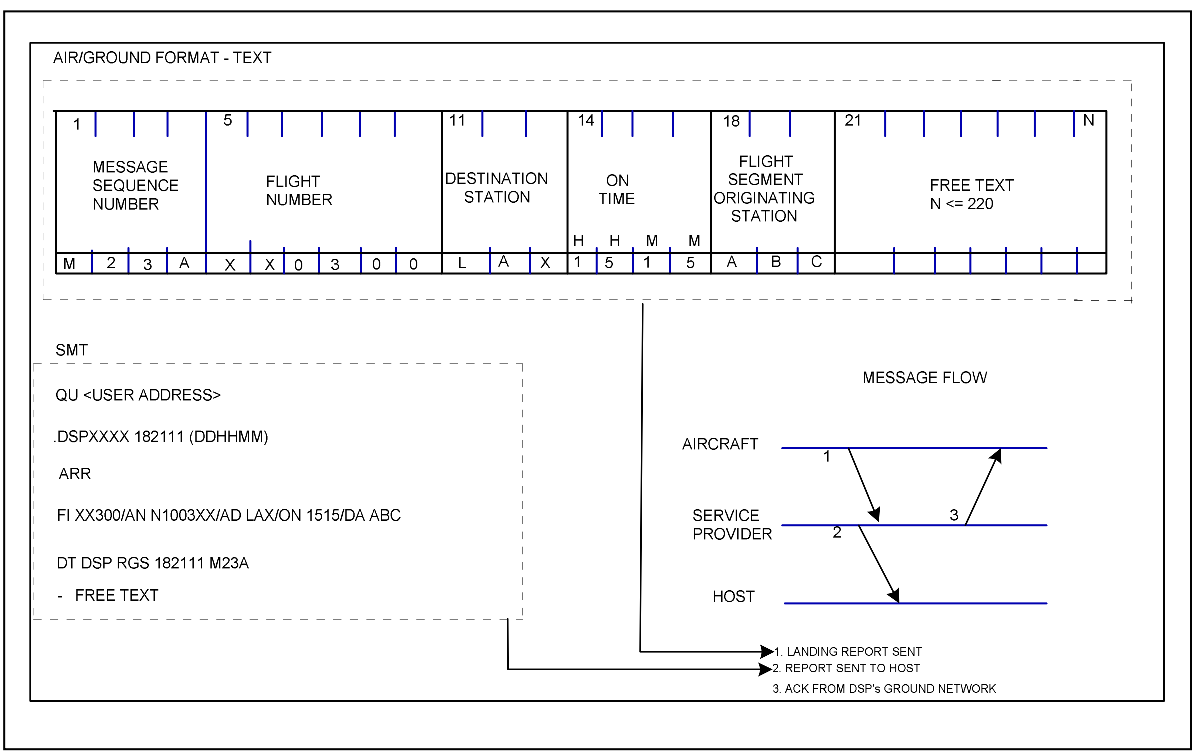


Figure 5.3.32-1 - Landing Report (IATA Airport Code)

5.3.33 Arrival Report (IATA Airport Code) - Label QL

The message should be transmitted automatically following the declaration of the IN event. The fuel quantity field should contain the fuel on-board at the time of landing. If this field is not loaded prior to the IN event, the MU should fill it, the Captain/First Officer Identifier field and the Category of Landing fields with NUL (0/0) characters.

The Text field should consist of the 26-character fixed format section defined below, followed, as necessary, by free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	See Section 5.2.1
11	Destination Station - Alpha/Numeric Character #1	
12	Destination Station - Alpha/Numeric Character #2	
13	Destination Station - Alpha/Numeric Character #3	
14	IN Time Hours (Tens)	
15	IN Time Hours (Units)	
16	IN Time Minutes (Tens)	
17	IN Time Minutes (Units)	
18	Fuel Quantity (Thousands)	
19	Fuel Quantity (Hundreds)	
20	Fuel Quantity (Tens)	
21	Fuel Quantity (Units)	
22	Captain/First Officer Identifier	
23	Departure Station - Alpha/Numeric Character #1	
24	Departure Station - Alpha/Numeric Character #2	
25	Departure Station - Alpha/Numeric Character #3	
26	Category of Landing	
27 thru n	Free Text where n $\leq$ 220	

5.0 DOWNLINK MESSAGE TEXT FORMATS

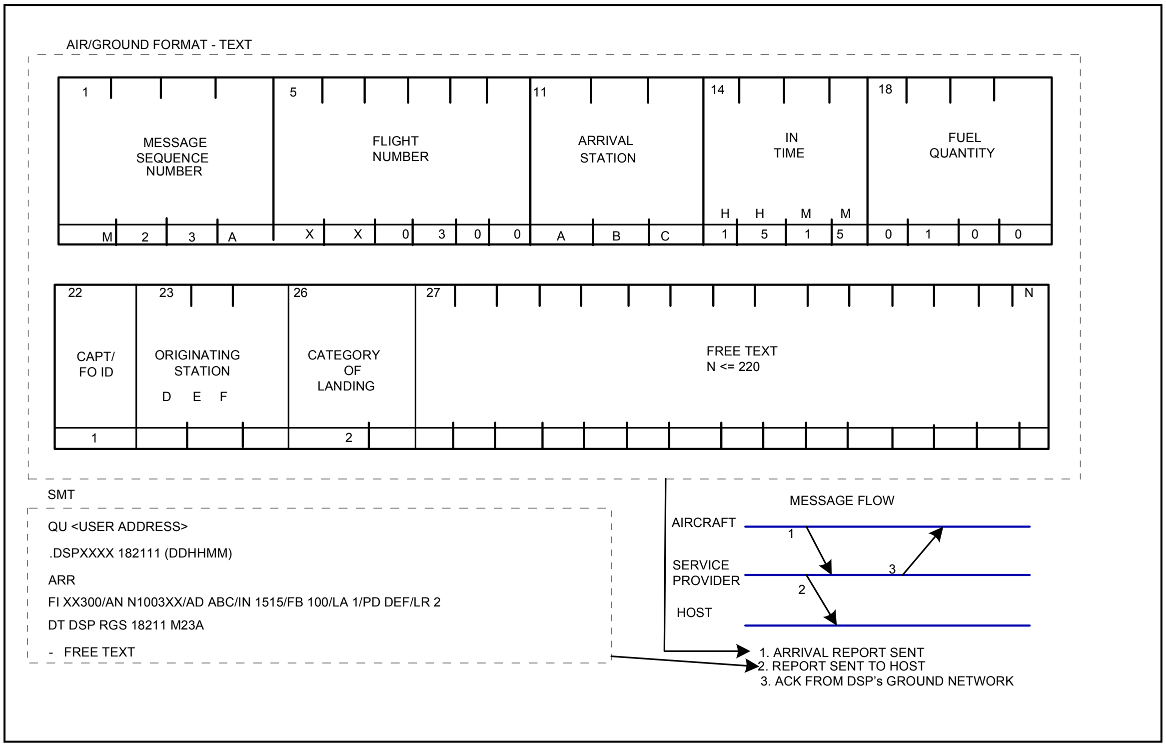


Figure 5.3.33-1 - Arrival Reports (IATA Airport Code)

5.3.34 Arrival Information Report (IATA Airport Code) - Label QM

Arrival Information Reports should contain Label character QM.

The Text field should consist of the 22-character fixed format section defined below, followed, as necessary, by free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier;	See Section 5.2.1
11	Destination Station - Alpha/Numeric Character #1	
12	Destination Station - Alpha/Numeric Character #2	
13	Destination Station - Alpha/Numeric Character #3	
14	Fuel Quantity (Thousands)	
15	Fuel Quantity (Hundreds)	
16	Fuel Quantity (Tens)	
17	Fuel Quantity (Units)	
18	Departure Station - Alpha/Numeric Character #1	
19	Departure Station - Alpha/Numeric Character #2	
20	Departure Station - Alpha/Numeric Character #3	
21	Category of Landing	
22 thru n	Free Text where n $\leq$ 220	

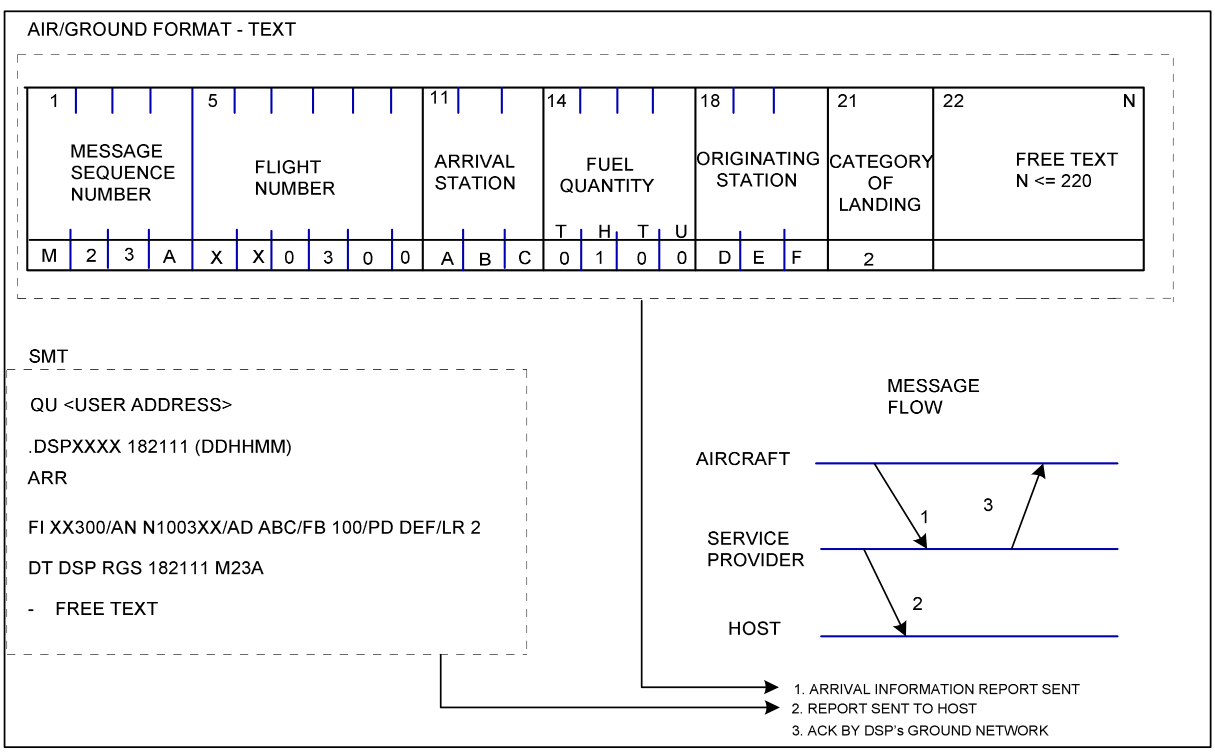


Figure 5.3.34-1 - Arrival Information Report (IATA Airport Code)

5.3.35 Diversion Report (IATA Airport Code) - Label QN

The Text field should consist of the 28-character fixed format section defied below followed, as necessary, by free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	See Section 5.2.1
11	Previous Destination Station - Alpha/Numeric Character #1	
12	Previous Destination Station - Alpha/Numeric Character #2	
13	Previous Destination Station - Alpha/Numeric Character #3	
14	New Destination Station - Alpha/Numeric Character #1	
15	New Destination Station - Alpha/Numeric Character #2	
16	New Destination Station - Alpha/Numeric Character #3	
17	Space (2/O)	
18	ETA at Diversion Station Hours (Tens)	
19	ETA at Diversion Station Hours (Units)	
20	ETA at Diversion Station Minutes (Tens)	
21	ETA at Diversion Station Minutes (Units)	
22	Fuel Quantity (Thousands)	
23	Fuel Quantity (Hundreds)	
24	Fuel Quantity (Tens)	
25	Fuel Quantity (Units)	
26	Flight Segment Originating Station - Alpha/Numeric Character #1	
27	Flight Segment Originating Station - Alpha/Numeric Character #2	
28	Flight Segment Originating Station - Alpha/Numeric Character #3	
29 thru n	Free Text where n $\leq$ 220	

5.0 DOWNLINK MESSAGE TEXT FORMATS

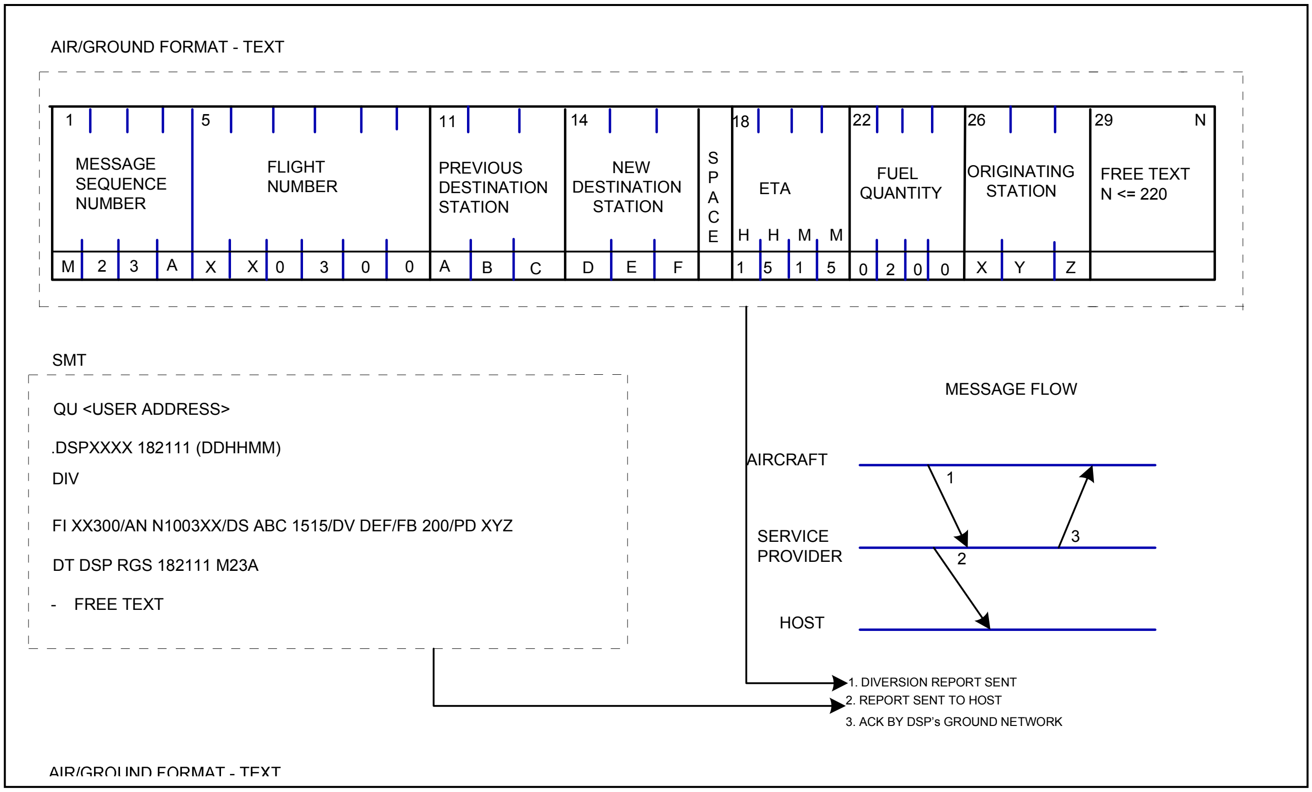


Figure 5.3.35-1 - Diversion Report (IATA Airport Code)

5.3.36 Out Report (ICAO Airport Code) - Label QP

The Out report should be transmitted automatically following the declaration of the OUT event.

The Text field should consist of the 31-character fixed format section defined below, followed, when airline needs dictate, by free text out to the maximum system handling capacity of 220 characters. The free fext will consist of information derived from manual inputs.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC | Specification 618
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	See Section 5.2.1
11	Departure Station - Alpha/Numeric Character #1	IATA 3-character codes may be used with a trailing space to form 4-characters.
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	IATA 3-character codes may be used with a trailing space to form 4-characters.
14	Departure Station - Alpha/Numeric Character #4	
15	Destination Station Alpha/Numeric Character #1	
16	Destination Station Alpha/Numeric Character #2	
17	Destination Station Alpha/Numeric Character #3	
18	Destination Station Alpha/Numeric Character #4	
19	OUT time hours (Tens)	
20	OUT time hours (Units)	
21	OUT time minutes (Tens)	
22	OUT time minutes (Units)	
23	Fuel Onboard Quantity (Thousands)	
24	Fuel Onboard Quantity (Hundred)	
25	Fuel Onboard Quantity (Tens)	
26	Fuel Onboard Quantity (Units)	
27	Boarded Fuel Character #1 (MSC)	
28	Boarded Fuel Character #2	
29	Boarded Fuel Character #3	
30	Boarded Fuel Character #4	
31	Boarded Fuel Character #5 (LSC)	
32 thru n	Free Text where n < 220	

The complete text of the OUT Report should be transmitted, with those fixed format fields for which information is not required or not available filled with 'NUL's (0/0) or spaces. See Section 3.2.1 for the effect of these options. If the free text portion of the text field is not used, the control character <ETX> should terminate the field at position number 32. In all other cases, the ETX character should terminate the field following the last free text character.

Note: When IATA 3-character codes are used, the TEI line in the SMT format should omit the trailing space included in the downlink. This is done in order to adhere to the rules for TEI applications (defined in Appendix B).

5.0 DOWNLINK MESSAGE TEXT FORMATS

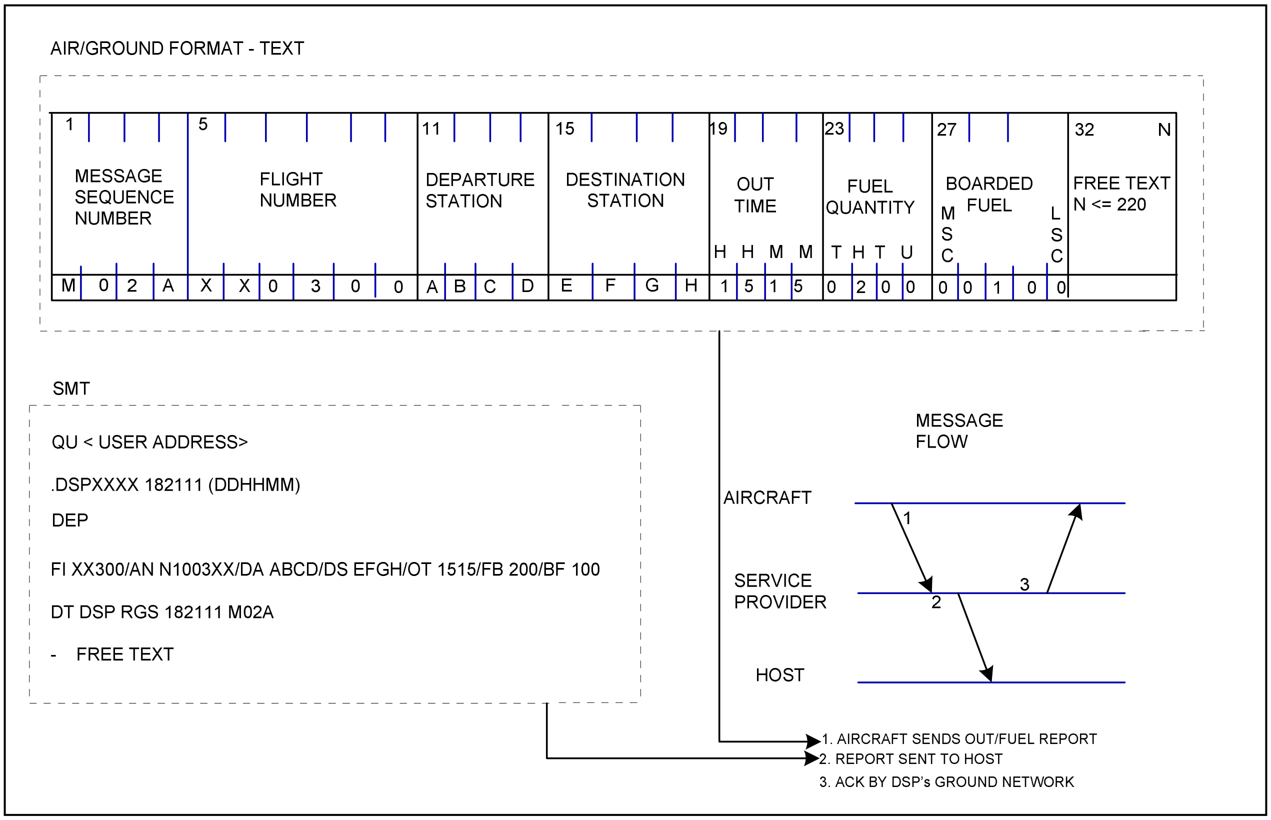


Figure 5.3.36-1 - OUT Report (ICAO Airport Code)

5.3.37 OFF Report (ICAO Airport Code) - Label QQ

The OFF Report should be transmitted automatically following the declaration of the OFF event.

The Text field should consist of the 22-character fixed format section defined below, followed, as necessary, by free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1.
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Departure Station - Alpha/Numeric Character #1	IATA 3-character codes may be used with a trailing space to form 4-characters.
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	Departure Station - Alpha/Numeric Character #4	
15	Destination Station - Alpha/Numeric Character #1	IATA 3-character codes may be used with a trailing space to form 4-characters.
16	Destination Station - Alpha/Numeric Character #2	
17	Destination Station - Alpha/Numeric Character #3	
18	Destination Station - Alpha/Numeric Character #4	
19	OFF Time Hours (Tens	
20	OFF Time Hours (Units)	
21	OFF Time Minutes (Tens)	
22	OFF Time Minutes (Units)	
23 thru n	Free Text where n $\leq$ 220	

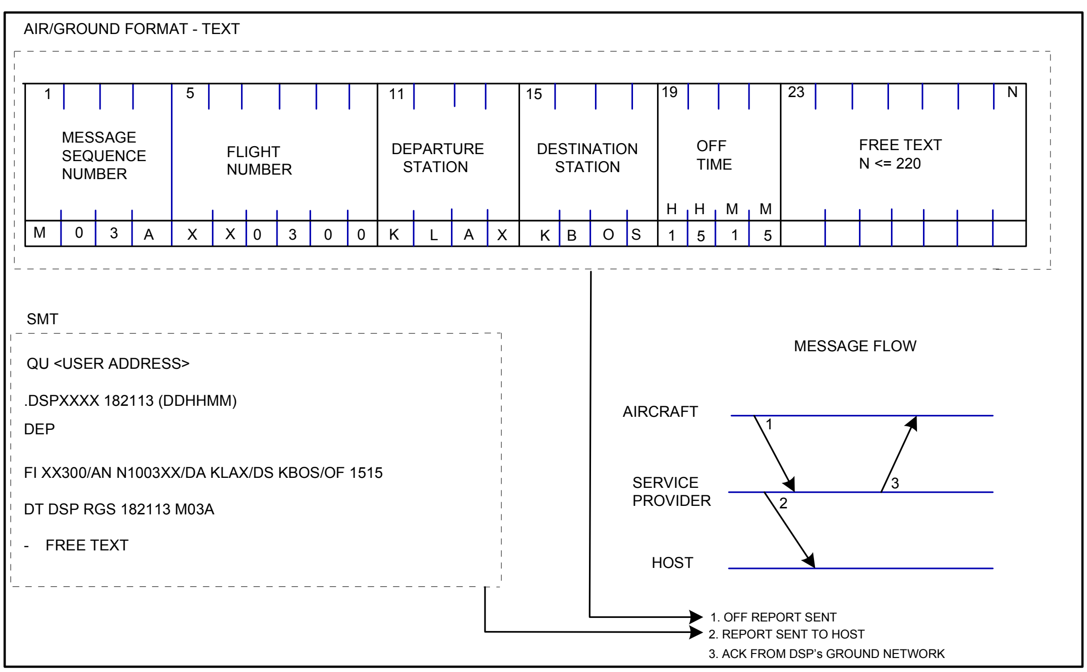


Figure 5.3.37-1 - OFF Report (ICAO Airport Code)

5.3.38 ON Report (ICAO Airport Code) - Label QR

The Text field should consist of the 22-character fixed format section defined below, followed, as necessary, by free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1.
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Departure Station - Alpha/Numeric Character #1	IATA 3-charactetr codes may be used with a trailing space to form 4-characters.
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	Departure Station - Alpha/Numeric Character #4	
15	Destination Station Alpha/Numeric Character #1	IATA 3-character codes may be used with a trailing space to form 4-characters.
16	Destination Station Alpha/Numeric Character #2	
17	Destination Station Alpha/Numeric Character #3	
18	Destination Station Alpha/Numeric Character #4	
19	ON Time Hours (Tens)	
20	ON Time Hours (Units)	
21	ON Time Minutes (Tens)	
22	ON Time Minutes (Units)	
23 thru n	Free Text where n < 220	

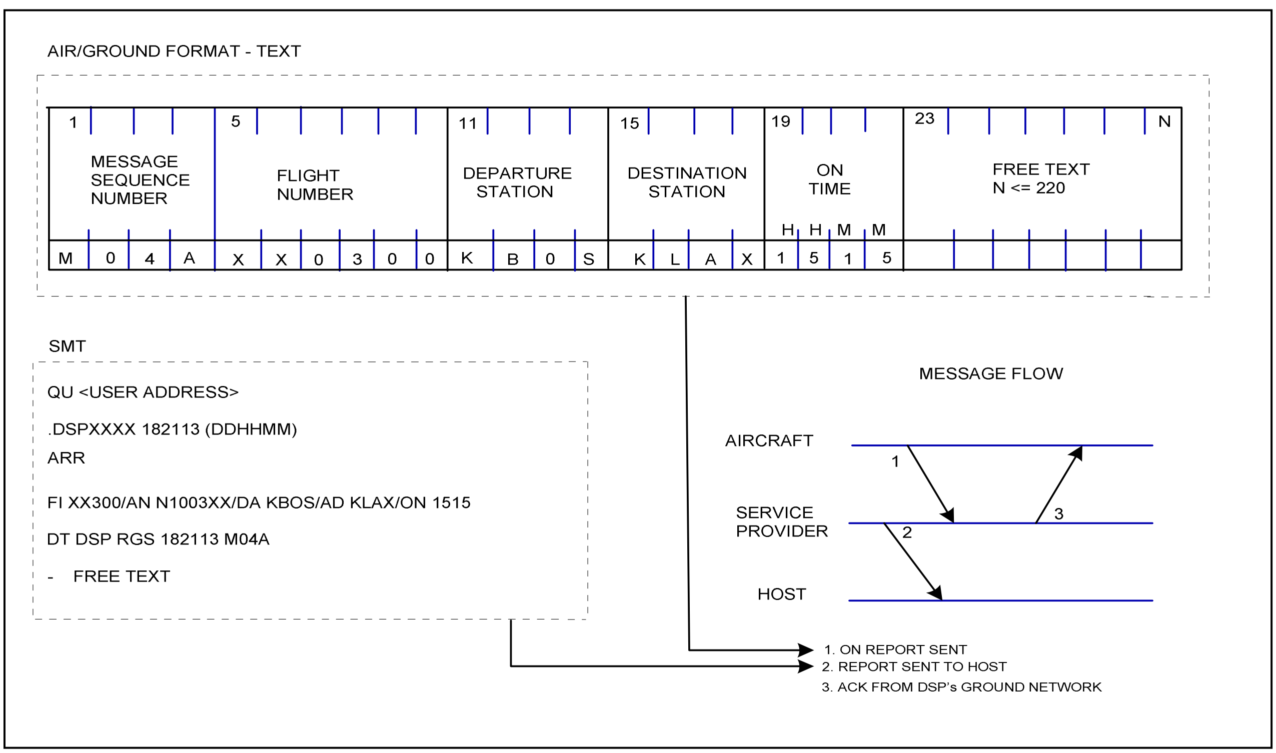


Figure 5.3.38-1 - ON Report (ICAO Airport Code)

5.3.39 IN Report (ICAO Airport Code) - Label QS

The Text field should consist of the 28-character fixed format section followed, as necessary, by free text as already described.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Departure Station - Alpha/Numeric Character #1	IATA 3-character codes may be used with a trailing space to form 4-characters.
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	Departure Station - Alpha/Numeric Character #4	
15	Destination Station Alpha/Numeric Character #1	IATA 3-character codes may be used with a trrailing space to form 4-characters.
16	Destination Station Alpha/Numeric Character #2	
17	Destination Station Alpha/Numeric Character #3	
18	Destination Station Alpha/Numeric Character #4	
19	IN Time Hours (Tens)	
20	IN Time Hours (Units)	
21	IN Time Minutes (Tens)	
22	IN Time Minutes (Units)	
23	Fuel Onboard Quantity (Thousands)	
24	Fuel Onboard Quantity (Hundreds)	
25	Fuel Onboard Quantity (Tens)	
26	Fuel Onboard Quantity (Units)	
27	Captain/First Officer Identifier	
28	Landing Category	
29 thru n	Free Text where $n \leq 220$	

The message should be transmitted automatically following the declaration of the IN event. The Captain/First Officer Identifier character position should contain the numeric character 1 or 2 depending on the state of the Captain/First Officer Identification input (Captain causing 1 to be transmitted and First Officer causing 2 to be transmitted.) If, in an airborne sub-system in which Captain/First Officer information is to be manually entered, no entry is made, the control character ‘NUL’ (0/0) or spaces should be transmitted in this position. See Section 3.2.1 for the effect of these options.

5.0 DOWNLINK MESSAGE TEXT FORMATS

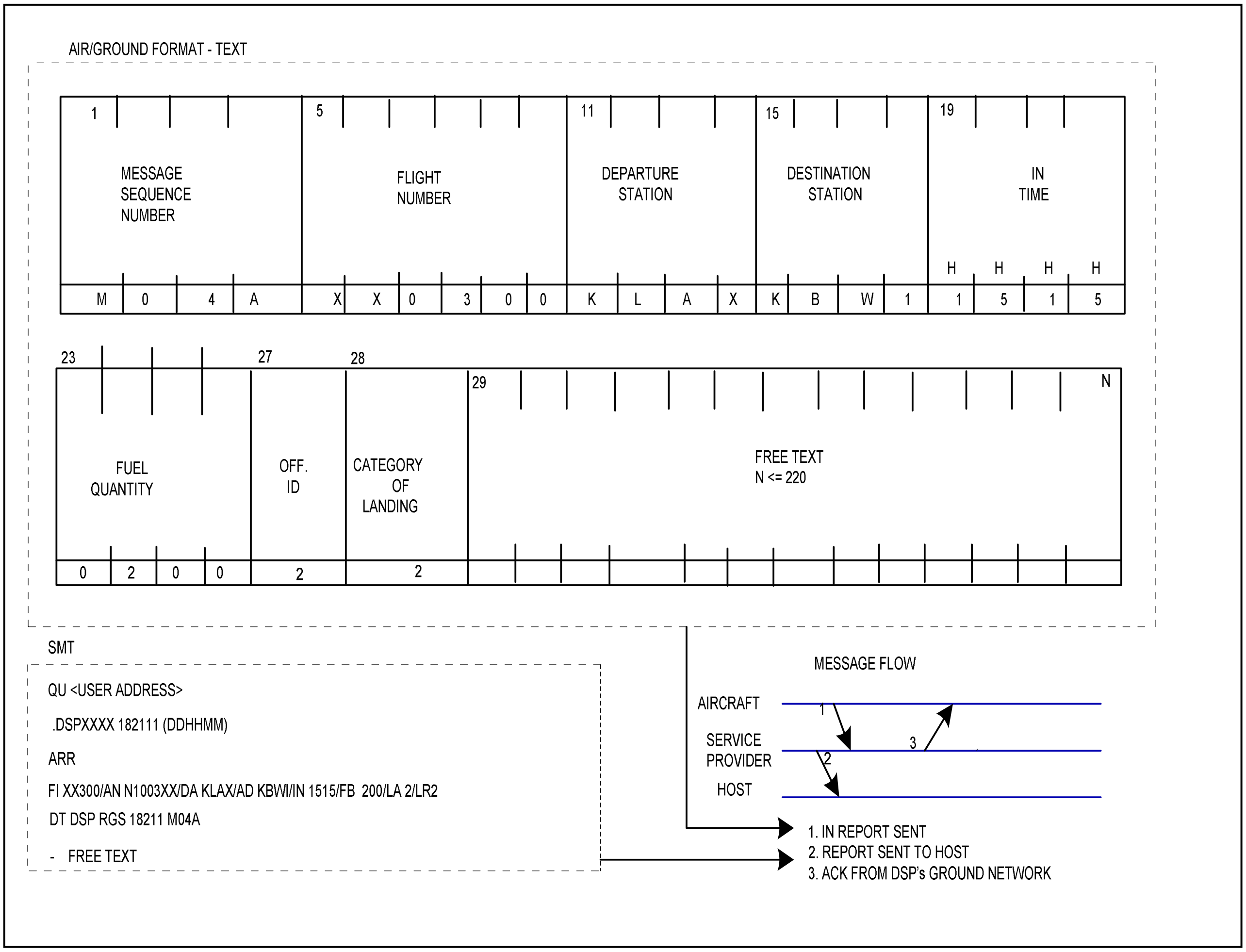


Figure 5.3.39-1 - IN Report (ICAO Airport Code)

5.3.40 OUT/Return IN Report (ICAO Airport Code) - Label QT

OUT/Return IN reports may be transmitted as the result of aircraft returning to the gate after an OUT report. OUT/Return IN reports should contain the Label Characters QT. The Text field should consist of the 30-character fixed format section defined below, followed, as necessary, by free text as already described.

The format should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section3,4 of ARINC Specification 618. See Section 5.2.1.
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Departure Station - Alpha/Numeric Character #1	IATA 3-character codes may be used with a trailing space to form 4-characters.
12	Departure Station - Alpha/Numeric Character #2	
13	Departure Station - Alpha/Numeric Character #3	
14	Departure Station - Alpha/Numeric Character #4	
15	Destination Station Alpha/Numeric Character #1	IATA 3-character codes may be used with a trailing space to form 4-characters.
16	Destination Station Alpha/Numeric Character #2	
17	Destination Station Alpha/Numeric Character #3	
18	Destination Station Alpha/Numeric Character #4	
19	Out Time Hours (Tens)	
20	Out Time Hours (Units)	
21	Out Time Minutes (Tens)	
22	Out Time Minutes (Units)	
23	Return IN Time Hours (Tens)	
24	Return IN Time Hours (Units)	
25	Return IN Time Minutes (Tens)	
26	Return IN Time Minutes (Units)	
27	Fuel Onboard Quantity (Thousands)	
28	Fuel Onboard Quantity (Hundreds)	
29	Fuel Onboard Quantity (Tens)	
30	Fuel Onboard Quantity (Units)	
31 thru n	Free Text where $n \leq 220$	

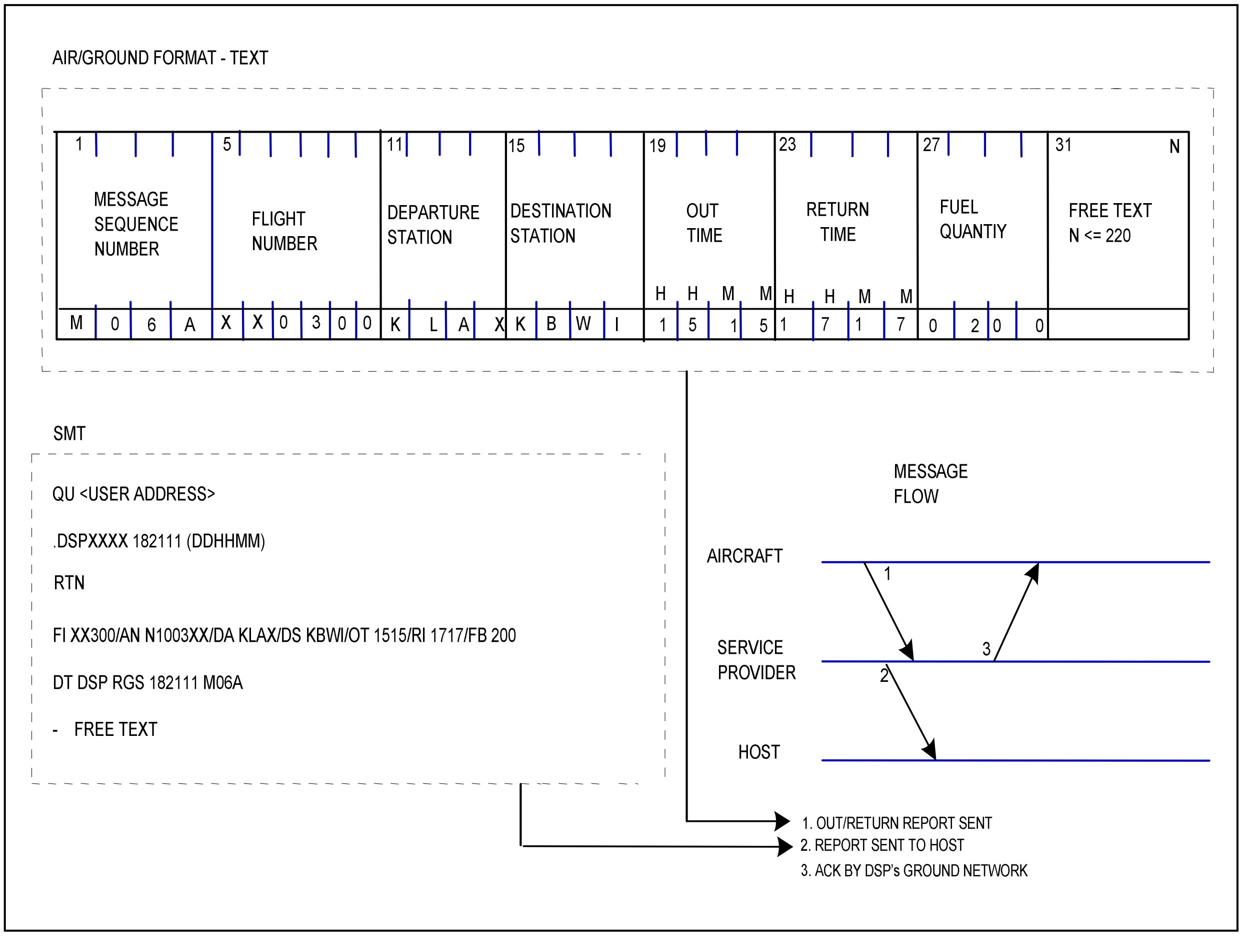


Figure 5.3.40-1 - OUT/Return IN Report (ICAO Airport Code)

5.3.41 Unassigned - Label QU

This is a placeholder for a potential new section.

5.3.42 Reserved

5.3.43 Unassigned - Label QW

This is a placeholder for a potential new section.

5.3.44 Unassigned - Label QY

This is a placeholder for a potential new section.

5.3.45 Unassigned - Label QZ

This is a placeholder for a potential new section.

5.3.46 Undelivered Uplink Report- Label HX

When the airborne system has acknowledged all the block(s) of an uplink message, and is subsequently unsuccessful in its attempts to deliver that message to an airborne subsystem, it may initiate an Undelivered Uplink Report message containing the Label characters HX, indicating that the acknowledged message was not delivered.

Note that the Label HX message is not a response to the DSP for the undelivered uplinked message, as are the Q5 and QX messages. It is queued and downlinked after the DSP has already assumed that the uplinked message was successfully delivered.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618. See Section 5.2.1.
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Char]	
5-10	Flight Identifier		
11	Slash Character </>		If additional (three, four or seven characters) addresses are entered, each address is separated by a Space <$_{sp}$> character.
12-m	Additional addresses (optional)		
m+1	Period character <.>		
(m+2) thru n	Free Text where n<220;		If optional additional addressing is not utilized, the free text portion begins with character 11 thru n
Or 1			

The free text area may contain a user defined Reject message or Error code, and may contain any part or all of the text of the undelivered uplink message.

5.0 DOWNLINK MESSAGE TEXT FORMATS

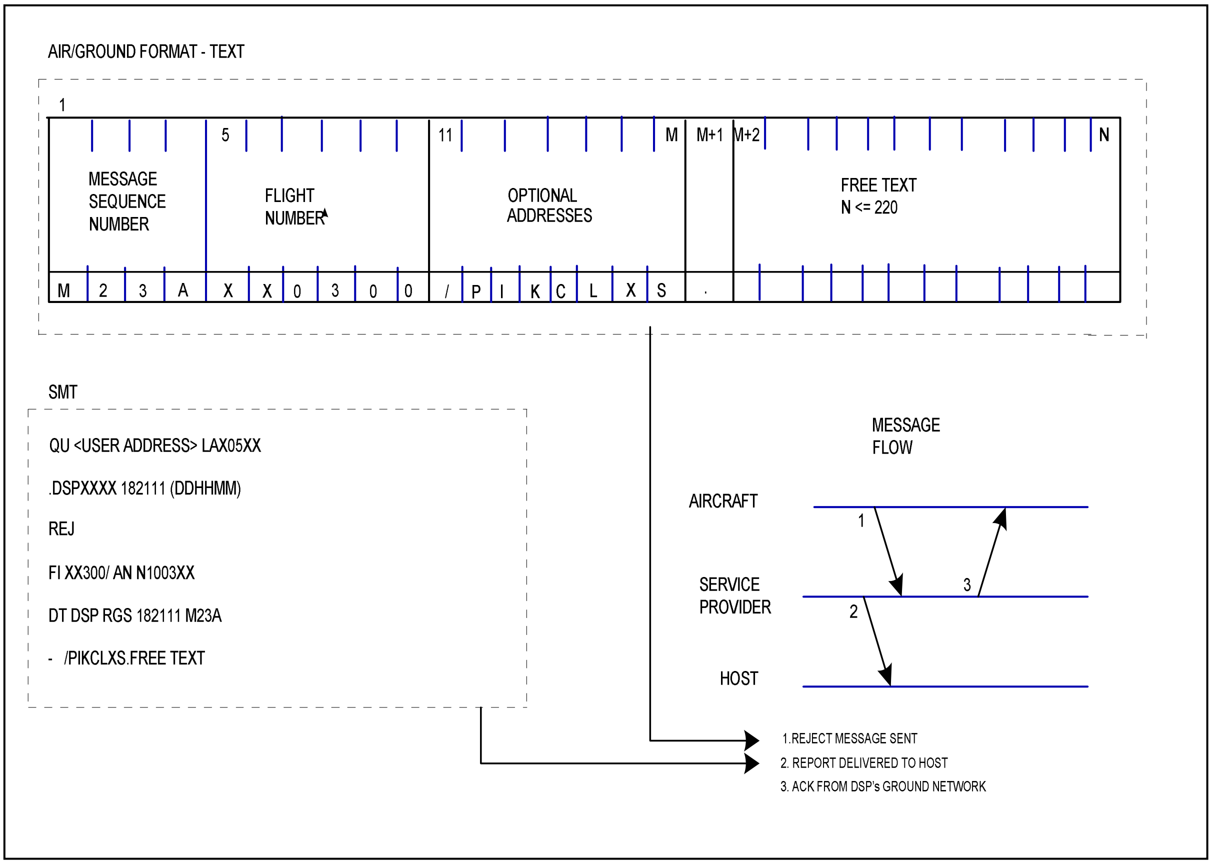


Figure 5.3.46-1 - Undelivered Uplink Report – ARNC Implementation

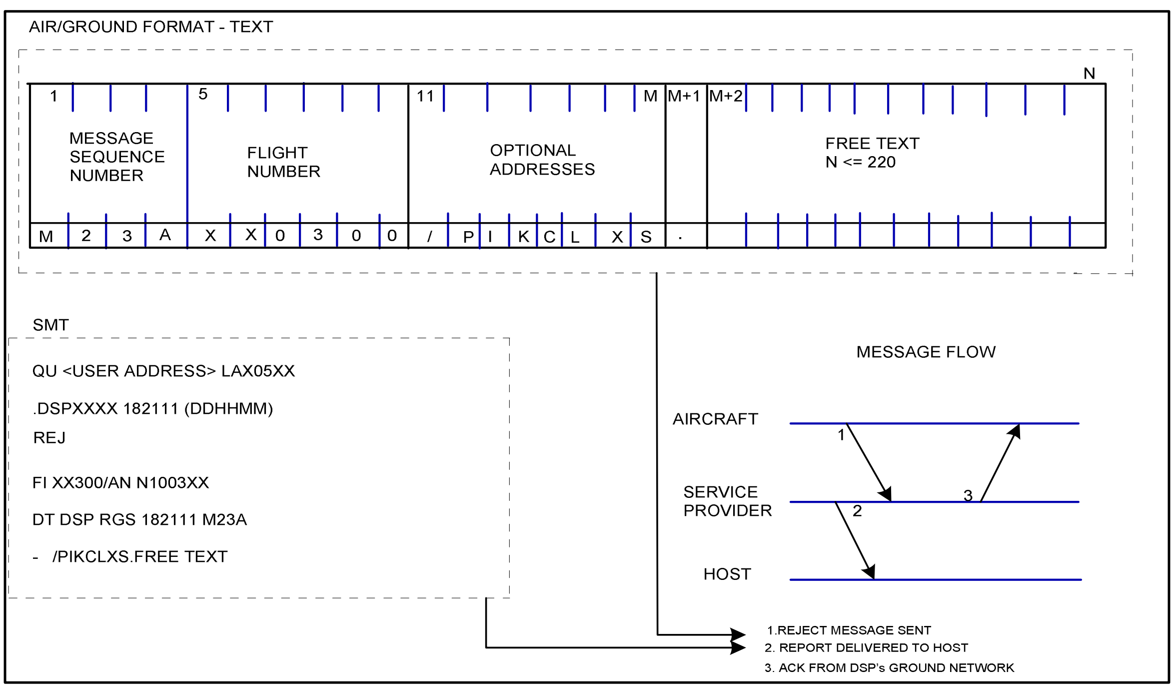


Figure 5.3.46-2 - Undelivered Uplink Report – SITA Implementation

5.3.47 Aircrew Initiated Position Report, Alternate Format - Label 57

Alternate Aircrew Initiated Position Reports should contain Label characters 57. These reports may include weather information.

These reports may include weather information. The format should be as follows:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618. See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Char]	
5-10	Flight Identifier	
11	Current Position - Alpha Character #1	
12	Current Position - Alpha Character #2	
13	Current Position - Alpha Character #3	
14	Current Position - Alpha Character #4	
15	Current Position - Alpha Character #5	
16	Time Hours (Tens)	
17	Time Hours (Units)	
18	Time Minutes (Tens)	
19	Time Minutes (Units)	
20	Flight Level - Numeric Character #1	
21	Flight Level - Numeric Character #2	
22	Flight Level - Numeric Character #3	
23	Next Report Point - Alpha Character #1	
24	Next Report Point - Alpha Character #2	
25	Next Report Point - Alpha Character #3	
26	Next Report Point - Alpha Character #4	
27	Next Report Point - Alpha Character #5	
28	Time Over Hours (Tens)	
29	Time Over Hours (Units)	
30	Time Over Minutes (Tens)	
31	Time Over Minutes (Units)	
32	Fuel on Board - Numeric Character #1	
33	Fuel on Board - Numeric Character #2	
34	Fuel on Board - Numeric Character #3	
35	Fuel on Board - Numeric Character #4	
36	Static Air Temp Sign (see Note 2)	
37	Static Air Temp (Units) degrees	
38	Static Air Temp (Units) degrees	
39	Wind Direction (Hundreds) degrees	
40	Wind Direction (Tens) degrees	
41	Wind Direction (Units) degrees	
42	Wind Speed (Hundreds) knots	
43	Wind Speed (Tens) knots	
44	Wind Speed (Units) knots	
45	Sky Condition - Alpha/Numeric Character #1/Space	
46	Sky Condition - Alpha/Numeric Character #2/Space	
47	Sky Condition - Alpha/Numeric Character #3/Space	
48	Sky Condition - Alpha/Numeric Character #4/Space	
49	Sky Condition - Alpha/Numeric Character #5/Space	
50	Sky Condition - Alpha/Numeric Character #6/Space	

5.0 DOWNLINK MESSAGE TEXT FORMATS

Character No.	Character Content	Notes
51	Sky Condition - Alpha/Numeric Character #7/Space	
52	Sky Condition - Alpha/Numeric Character #8/Space	
53	Turbulence - Alpha/Numeric Character #1/Space	
54	Turbulence - Alpha/Numeric Character #2/Space	
55	Turbulence - Alpha/Numeric Character #3/Space	
56	Turbulence - Alpha/Numeric Character #4/Space	
57	Turbulence - Alpha/Numeric Character #5/Space	
58	Turbulence - Alpha/Numeric Character #6/Space	
59	Turbulence - Alpha/Numeric Character #7/Space	
60	Turbulence - Alpha/Numeric Character #8/Space	
61	Cruising Speed - Alpha Character M	
62	Cruising Speed - Numeric Character (MSC)	
63	Cruising Speed - Decimal Point <.>	
64	Cruising Speed - Numeric Character	
65	Cruising Speed - Numeric Character (LSC)	
66 thru n	Free Text where n < 220	

Notes:

1. Fixed fields for which there is no data input should be filled with Null characters <0/0>.

2. The characters used for indicating whether the sign of the static air temperature input is positive or negative should be selected from those characters which can transit ground communications systems and be handled by users' data processing systems. Users should advise their avionics suppliers what the crew input for sign will be and into what characters they should be translated for the downlink.

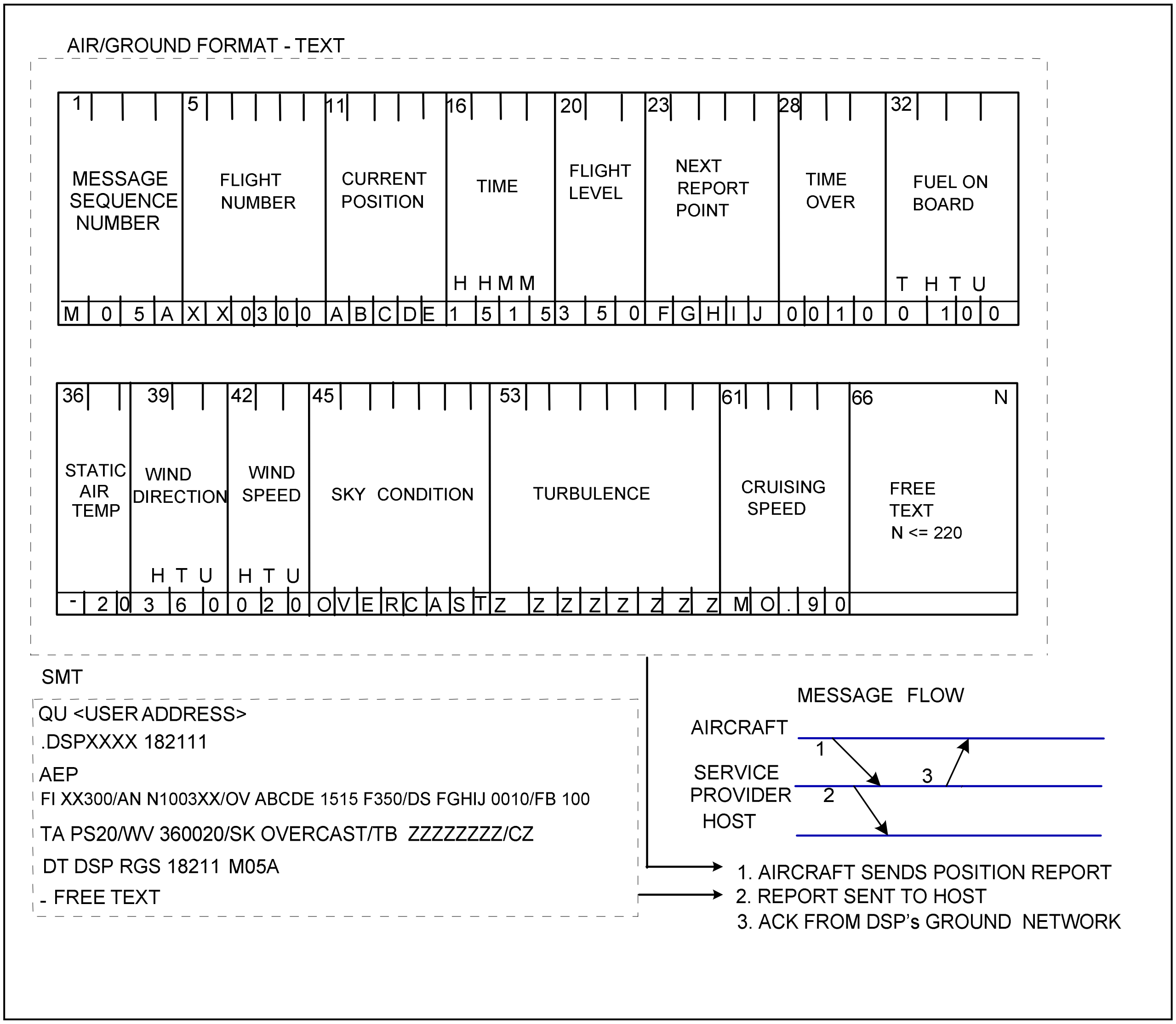


Figure 5.3.47-1 - Alternate Aircrew Initiated Position Report

5.3.48 VHF Network Statistics Report - Label S1

When so equipped, the aircraft should accumulate data concerning the performance of the ACARS VHF network. A Network Statistics Report containing this data should be sent via a Label S1 downlink message. Network Statistics Report downlink messages will be delivered to the user with the SMI of NSR.

The Network Statistics Report downlink message can be generated immediately upon request (via uplink) or at the occurrence of the IN event. See Section 4.3.23 for the definition of the uplink request message.

There are two types of Network Statistics Reports defined in this specification: Summary and Detailed.

The Summary Report message should be sent per user requirements or in response to a Label S1 uplink request for report SA or SC. Any data that is unavailable will be blank filled. The Summary Report should be assembled according to the formats defined in Table 5.3.48-3.

The Detailed Report message should be sent per user requirements or in response to a Label S1 uplink request for report DA or DC. Any data that is unavailable will be blank filled. The Detailed Report should be assembled according to the format defined in Table 5.3.48-4.

Table 5.3.48-3 - Version 2 – VHF Network Statistics Report, Summary

Size	Format	Description	Example	Notes
10		Standard Message Header		
Variable	XXXXXXX	TTY address from uplink	/CIDRICR.	optional, 4,5
1	2	Version identifier	2	
2	XX	summary report identifier	SA	3
6	AAXNNN	Flight identifier	AC9999	
4	XXXX	Departure station	YYZ <sp>	1
4	XXXX	Destination station	LAX <sp>	1
4	<hhmm>	OUT time	1220	
4	<hhmm>	OFF time	1240	
4	<hhmm>	ON time	1840	
4	<hhmm>	IN time	1855	
4	<hhmm>	Start of statistics capture	1150	
4	<hhmm>	End of statistics capture	1900	
1	/	slash (Delimiter)	/	
3	NNN	Downlink messages during OUT	033	2
3	NNN	Downlink blocks during OUT	041	2
3	NNN	Uplink messages during OUT	009	2
3	NNN	Uplink blocks during OUT	038	2
3	NNN	Blocks ACKed on 1st transmission	037	2
2	NN	Blocks ACKed on 2nd transmission	03	2
2	NN	Blocks ACKed on 3rd transmission	01	2
2	NN	Blocks ACKed on 4th or later transmission	00	2
1	N	NAKs received to downlink blocks while OUT	0	2
2	NN	Times retransmit counter (VAC1) limit reached due to no response while OUT	00	2
1	N	Times downlink ACARS multi-block message timer (VAT10) expired while OUT	0	2
2	NN	Duplicate uplink blocks received while OUT	00	2
2	NN	NAKs transmitted in response to uplink blocks containing errors while OUT	01	2
1	N	Times uplink Message Assembly Timer (VAT4) expired while OUT	0	2
1	/	slash (Delimiter)	/	
3	NNN	Downlink messages during OFF	033	2
3	NNN	Downlink blocks during OFF	041	2
3	NNN	Uplink messages during OFF	009	2
3	NNN	Uplink blocks during OFF	038	2
3	NNN	Blocks ACKed on 1st transmission	037	2
2	NN	Blocks ACKed on 2nd transmission	03	2
2	NN	Blocks ACKed on 3rd transmission	01	2
2	NN	Blocks ACKed on 4th or later transmission	00	2
1	N	NAKs received to downlink blocks while OFF	0	2
2	NN	Times retransmit counter (VAC1) limit reached due to no response while OFF	00	2

5.0 DOWNLINK MESSAGE TEXT FORMATS

Size	Format	Description	Example	Notes
1	N	Times downlink ACARS multi-block message timer (VAT10) expired while OFF	0	2
2	NN	Duplicate uplink blocks received while OFF	00	2
2	NN	NAKs transmitted in response to uplink blocks containing errors while OFF	01	2
1	N	Times uplink message assembly timer (VAT4) expired while OFF	0	2
1	/	slash (Delimiter)	/	
3	NNN	Downlink messages during ON	033	2
3	NNN	Downlink blocks during ON	041	2
3	NNN	Uplink messages during ON	009	2
3	NNN	Uplink blocks during ON	038	2
3	NNN	Blocks ACKed on 1st transmission	037	2
2	NN	Blocks ACKed on 2nd transmission	03	2
2	NN	Blocks ACKed on 3rd transmission	01	2
2	NN	Blocks ACKed on 4th or later transmission	00	2
1	N	NAKs received to downlink blocks while ON	0	2
2	NN	Times retransmit counter (VAC1) limit reached due to no response while ON	00	2
1	N	Times downlink ACARS multi-block message timer (VAT10) expired while ON	0	2
2	NN	Duplicate uplink blocks received while on	00	2
2	NN	NAKs transmitted in response to uplink blocks containing errors while ON	01	2
1	N	Times uplink message assembly timer (VAT4) expired while ON	0	2
1	/	slash (Delimiter)	/	
3	NNN	Downlink messages during IN	033	2
3	NNN	Downlink blocks during IN	041	2
	NNN	Uplink messages during IN	009	2
3	NNN	Uplink blocks during IN	038	2
3	NNN	Blocks ACKed on 1st transmission	037	2
2	NN	Blocks ACKed on 2nd transmission	03	2
2	NN	Blocks ACKed on 3rd transmission	01	2
2	NN	Blocks ACKed on 4th or later transmission	00	2
1	N	NAKs received to downlink blocks while IN	0	2
2	NN	Times retransmit counter (VAC1) limit reached due to no response while IN	00	2
1	N	Times downlink multi-block message timer (VAT10) expired while IN	0	2
2	NN	Duplicate uplink blocks received while IN	00	2
2	NN	NAKs transmitted in response to uplink blocks containing errors while IN	01	2
1	N	Times uplink message assembly timer (VAT4) expired while IN	0	2

Notes:

1. If IATA (3 character) station IDs are used, provide a blank in the trailing character.

2. If any count exceeds the maximum display value, hold the maximum value.

3. Report types:

   SA - Enable generation of summary report to be downlinked subsequent to the IN event.

   SC - Downlink the summary statistics report with current data.

4. If multiple addresses are specified (to a maximum of 7), they will be separated by a space and terminated by a period.

5. See Section 3.2.2.1.2.

The format of the VHF Network Statistics Report is:

Table 5.3.48-4 - Version 2 VHF Network Statistics Report, Detailed

Size	Format	Description	Example	Notes
10		Standard Header		
Variable	/XXXXXXX.	TTY address from uplink	/CIDRICR.	optional 5,6
1	2	Version identifier	2	
2	XX	Detail report identifier	DA	3
6	AAXNNN	Flight identifier	AC9999	
4	XXXX	Departure station	YYZ<sp>	1
4	XXXX	Destination station	LAX<sp>	1
4	<hhmm>	OUT time	1220	
4	<hhmm>	OFF time	1240	
4	<hhmm>	ON time	1848	
4	<hhmm>	IN time	1855	
2	NN	Total number of reports available	04	
1	/	slash (Delimiter)		4
2	NN	Report number	01	4
4	NNNN	Frequency	3147	4
1	X	Logical channel ID (or 2)	A	4
1	N	OOOI state	1	4, 8
4	<hhmm>	UTC contact established	1544	4
4	<hhmm>	UTC contact lost	1622	4
1	A	Channel change reason	S	4, 7
2	NN	Number of downlink messages transmitted	21	2, 4
3	NNN	Number of downlink blocks transmitted	041	2, 4
2	NN	Number of uplink messages received	11	2, 4
3	NNN	Number of uplink blocks received	057	2, 4
3	NNN	Blocks ACKed on 1st transmission	037	2, 4
2	NN	Blocks ACKed on 2nd transmission	03	2, 4
2	NN	Blocks ACKed on 3rd transmission	01	2, 4
2	NN	Blocks ACKed on 4th or later transmission	00	2, 4
1	N	Number of NAKs received to downlink blocks	0	2, 4
2	NN	Times retransmit counter (VAC1) limit reached due to no response	00	2, 4
1	N	Times downlink multi-block message timer (VAT10) expired	0	2, 4
2	NN	Duplicate uplink blocks received	00	2, 4
2	NN	Number of NAKs transmitted in response to uplink blocks containing errors	01	2, 4
1	N	Times uplink message assembly timer (VAT4) expired	0	2, 4
1	/	slash (Delimiter)	/	

Note: Multiple detailed reports are prepared and concatenated as required to fully document the flight leg. Each report is formatted identically with the example above, beginning with the Report Number field and terminating with the slash </> delimiter. No delimiter is used in the final report.

Notes:

1. If IATA (3-character) station IDs are used, provide a blank in the trailing character.

2. If any count exceeds the maximum display value, hold the maximum value.

3. Report types:

   SA - Enable generation of Summary Report to be downlinked subsequent to the IN event

   SC - Downlink the Summary Report with current data now

   DA - Downlink all accumulated Detailed Statistics Records subsequent to the IN event

   DC - Downlink a Detailed Statistics Report with current data now

4. These fields will be repeated as needed to fill downlink message.

5. If multiple addresses are specified (to a maximum of 7), they will be separated by a space and terminated by a period.

6. See Section 3.2.2.1.2

7. Coding:

   A = Timer expiration

   B = Misc./Channel Change Not Applicable

   C = Signal quality below threshold

   D = Category A to Category B preference

   E = Return to Data mode

   F = Number of retries exceeded

   G = OOOI state change (no change in channel or frequency

   H = Frequency change by Autotune

   I = Frequency change by manual command

8. OOOI State:

Coding of the OOOI state should be:

Out	1
Off	2
On	3
In	4

5.3.49 VHF Network Performance Report - Label S2

The ACARS MU will collect data relative to RF activity and associated attributes, particularly BCS failures. The philosophy and collection mechanisms are described in Appendix F to this Specification. The state diagram for collecting data is illustrated in Figure 3-1 of Attachment 3. ARINC Specification 618 specifies details of data to be collected.

VHF Network Performance messages may be sent automatically or upon request. Refer to Section 4.3.7 for the definition of the Request message. Automatic message generation can be based on a label S2 request message from the ground. The duration of time (number of minutes) for which data should be gathered and sent is specified by the value of T1 in the uplink request. The period of time (number of minutes) between the sending of individual reports is specified by the value of T2. If T2 = T1 then only one report will be sent at the end of T1 minutes. Downlink reporting should be suspended during periods when there are no subnetworks available (No Comm).

Should any of the parameters of the VHF Network Performance Report reach their maximum values during the time the CMU is gathering the data, then the CMU should send the report at that time and resume normal data gathering and reporting.

This approach implies that a common implementation of Channel Utilization is to be adopted.

Table 5.3.49 - VHF Network Performance Report - Label S2

Data Field	Variable	Size	Range	Note
Standard Header		10		
Optional slash		1	/	4
Optional Supplemental Addresses		N	XXXXXXX	4
Optional period		1	.	4
Frequency	F	4	18.00 to 3697	118.00 - 136.97 MHz
Latitude	I	5	DDMM (N/S)	1
Longitude	L	6	DDDMM (E/W)	1
Altitude	H	4	FXXX	Flight Level 2
Comm Conditions	CC	1	1 - Normal 2 - Voice 3 - No Comm 4 - Autotune 5 - Others	The CC field is set to 1 whenever the S2 label transmission is triggered by T1 or T2.
Service Provider Identification	DSP	2	XS, XA, XC etc.	3
UTC start time of data collection	Ts	6	HHMMSS	
UTC stop time of data collection	Tf	6	HHMMSS	
Cumulative amount of time the MU detects the channel is busy (in percent)	Tcu	2	00-99	See ARINC Spec 618
Cumulative block delivery delay	Tbdd (ms)	6	000000-999999	See of ARINC Spec 618
Cumulative MAC delay per block sent.	Tmac (ms)	5	00000-99999	See of ARINC Spec 618 100 seconds max recording
Number of block buffered at Tf	B1	2	00-99	Number of block enqueued in the MU to be transmitted over the RF.
Number of first downlink block transmissions that require an ACK	D1	2	00-99	
Number of re-transmitted downlink blocks that require an ACK	D2	3	000-999	
Number of downlink blocks received from surrounding aircraft	D3	3	000-999	
Number of incomplete downlink blocks received from surrounding aircraft	ID3	3	000-999	
Number of downlink blocks received with bad BCS from surrounding aircraft	BD3	3	000-999	
Number of acknowledgments received (General Response or imbedded ACK)	U1	2	00-99	
Number of first uplink transmission addressed to the aircraft that require an ACK	U2	2	00-99	

Data Field	Variable	Size	Range	Note
Number of uplink re-transmissions addressed to the aircraft that require an ACK	U3	3	000-999	
Number of uplinks with bad BCS addressed to the aircraft	BU3	2	00-99	
Number of incomplete uplinks addressed to the aircraft.	IU3	2	00-99	
Number of uplinks addressed to other aircraft	U4	3	000-999	
Number of uplinks with bad BCS addressed to other aircraft	BU4	3	000-999	
Number of incomplete uplinks addressed to other aircraft	IU4	3	000-999	
Number of distinct Squitters received (unique RGSs)	SQ1	2	00-99	
Total number of Squitters received	SQ2	2	00-99	
Number of Squitters received with bad BCS	BSQ2	2	00-99	
Number of incomplete Squitters received	ISQ2	2	00-99	
Number of Hand-offs in Category-B	CTB1	2	00-99	
Number of distinct logical channels active in the SAA table	CTB2	2	00-30	

Notes:

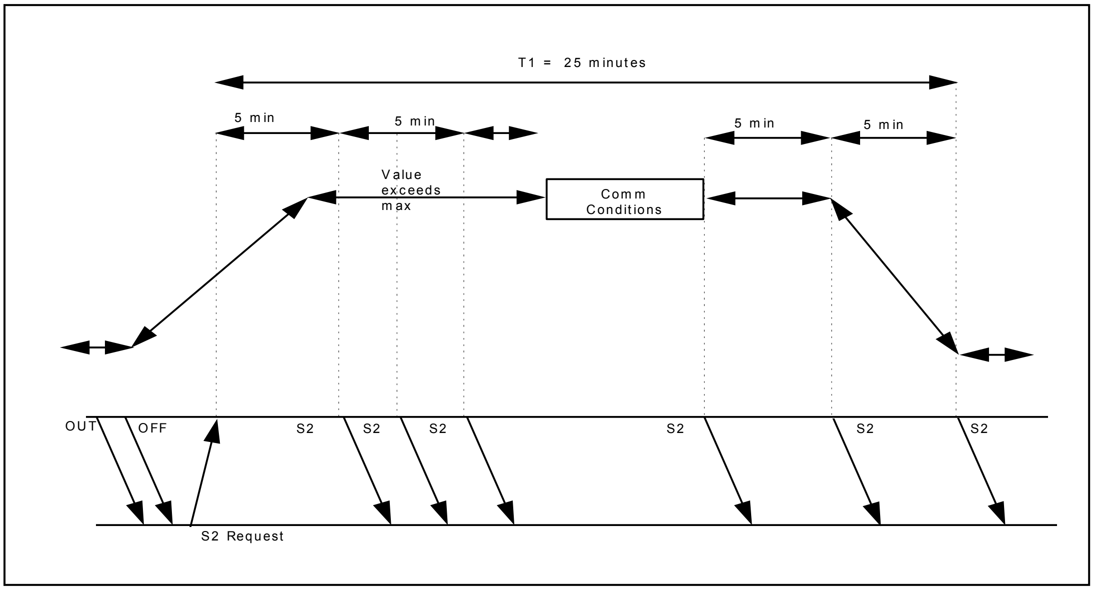
1. Lat/Long position at the end of the sample

2. Altitude is the pressure altitude at the end of the sample.

3 Refer to Section 3.2.2-3 for DSP assignments. Fill with spaces if DSP is not known. Characters are derived from the most recent uplink Squitter.

Example:

A VHF Network Performance Report Request message is sent after the OFF downlink message is received by the DSP or user. In the example diagram below, the S2 Request fields are set as follows: E/D = 1, T1 = 25, T2 = 5.



5.3.50 LRU Configuration Report – Label S3

This report may be automatically sent when any of the following events occur:

- In response to an S3 request.
- Software or database loaded.
- MU is installed in a different aircraft.

An ACARS peripheral such as an FMC or SDU can use the LRU Configuration Report. In this case the MFI S3 is used to allow the service provider to recognize the LRU Configuration Report. The Sub-Label/SMI of the downlink identifies which LRU created the report.

The LRU Configuration Report can hold up to 11 part numbers. The part numbers are divided into two categories: hardware part numbers and software parts. The 11 part number fields can be distributed between the two categories however best suits the vendor. A colon <:> separates the hardware part number fields from the software part number fields. Each part number field may hold up to 15 characters. Part numbers should not contain commas or colon <:> characters. In the following example three part number fields are allocated for hardware and the remainder for software. Unused part number fields are not included in the report, see second example.

Example 1:

M01ARI9999/PAESSCR.01.N123GS963-0758-001,722-1234-501A,723-5678-501X:998-2141-511A,998-2142-511A,998-2145-509,998-3102-503,998-2141-511A,998-2145-509,998-3102 03,998-3102-503

Example 2:

M01ARI999901.N123GS963-0758-001:998-2141-511A,998-2142-511A,998-2145-509,998-3102-503

If the Label S3, LRU Configuration Report request uplink contains an address then the address is copied to the optional address field of the Downlink Report. When there is no address in the report then the address field along with the slash </> and period <.> delimiters are omitted.

Table 5.3.50-1 - Example LRU Configuration Report

Character Number	Max Field Size	Content	Example
1-10	10	Standard message header (see ARINC 618)	
	9	optional address field (Note 5)	/PAESSCR.
	2	Version number	01
	7	Aircraft registration number	.N123GS
	Up to 15	Hardware part number (Note 1)	963-0758-001
	1	Comma (note 3)	,
	Up to 15	Optional second hardware part number (Note 2)	722-1234-501A
	1	Comma (Note 3)	,
	Up to 15	Optional third hardware part number (Note 2)	722-5678-501X
	1	colon (Note 4)	<:>
	Up to 15	software part number	998-2141-511A
	1	Comma (Note 3)	,
	Up to 15	Optional second software part number (Note 2)	998-2142-511A
	1	Comma (Note 3)	,
	Up to 15	Optional third software part number (Note 2)	998-2145-509
	1	Comma (Note 3)	,
	Up to 15	Optional forth software part number (Note 2)	998-3102-503
	1	Comma (Note 3)	,
	Up to 15	Optional fifth software part number (Note 2)	998-2141-511A
	1	Comma (Note 3)	,
	Up to 15	Optional sixth software part number (Note 2)	998-2145-509
	1	Comma (Note 3)	,
	Up to 15	Optional seventh software part number (Note 2)	998-3102-503
	1	Comma (Note 3)	,
	Up to 15	Optional eighth software part number (Note 2)	998-3102-503

Notes:

1. Included when possible. Some avionics software is not cognizant of the hardware part number.

2. Optional field, zero length when not used.

3. Comma delimiter only included when following field contains data.

4. Colon (:) separates hardware and software part number fields

5. Multiple addresses may be provided, separated by blanks

5.3.51 Media Advisory - Label SA

The Media Advisory message is to be sent when link status changes as described in Section 9.1.2 of ARINC Specification 618. The Media Advisory message is not a queued message.

COMMENTARY

The Media Advisory (Label SA) message is to be sent immediately following the loss of a link when an alternate link is available. For example, downlink an SA Media Advisory message (using the designators LV) via SATCOM to report the loss of the VHF link. As an alternative, a high priority ATC message in queue may be sent preceding the Media Advisory (Label SA) message. Use of traffic specific to the link or a Link Test (Label Q0) message is to be used to prevent a high priority message from being delayed during the establishment process while another link is available.

Upon request by the user airline, the DSP should forward the Media Advisory (Label SA) message to other networked DSPs to advise them of a change in link status.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier	
11	Version Number	1
12	Establishment/Loss Flag	2
13	Media Identification	3
14-19	UTC Time Stamp	4
20-n	Current Media Status	5
n+1	Delimiter (slash </>)	
n+2 to m	Free Text where m < 220	6

Notes:

1. This format represents Version 0 (zero)
2. Coding: E = Media Established L = Media Lost
3. Coding: V = VHF-ACARS

   S = Inmarsat Aero H/H+/I/L Satcom

   H = HF

   G = Global Star Satcom

   C = ICO Satcom

   2 = VDL Mode 2
4. Time stamp data is captured at transition

5. This is a variable length field listing all links currently in the Maintenance state (as defined in ARINC Specification 618). Refer to Section 5.9.4 of ARINC 618 for assignments

6. Additional Vendor-defined parameters may be placed here.

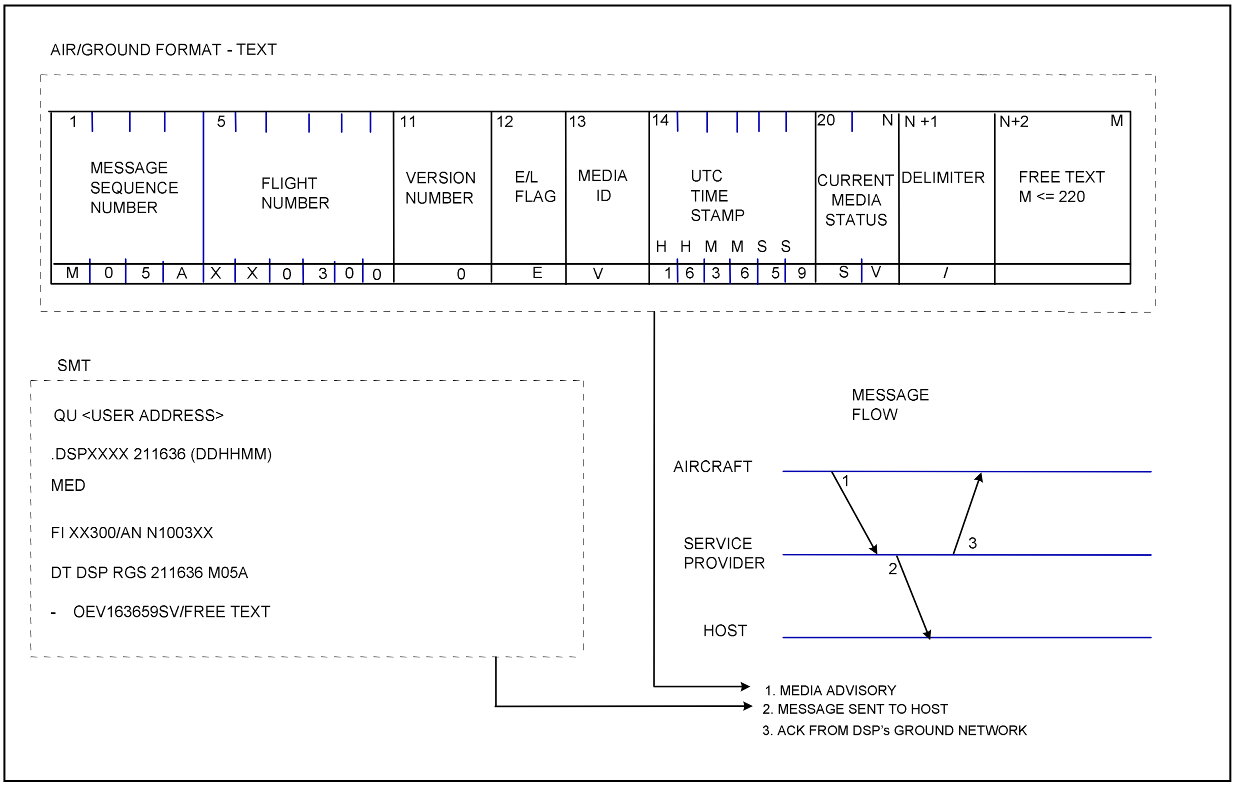


Figure 5.3.51-1 - Media Advisory

5.3.52 Icing Report - MFI or Label H3

Subsystems onboard the aircraft may be programmed to provide automatic downlinks of icing data. These Icing Report downlink messages should contain the Label (or MFI) characters H3. During an icing event, the following icing report will be transmitted every 5 minutes for the duration of icing conditions.

Table 5.3.52-1 - Icing Reports

Number of Chars	Character Content	Notes
10	Standard Message Header	Refer to Section 3.4 of ARINC Specification 618 See Note 1
2	Version Number (01)	
7	Flight Identifier	
7	Aircraft Registration Number	
31	Data Sample 1	See Note 2
31	Data Sample 2	
.	.	
.	.	
31	Data Sample 5	

Notes:

1. The Flight Identifier is made up from the 3 letter ICAO Airline code and the 4 digit (or) alpha character Flight Number.

2. Five samples (taken once each minute) will be included in a report. Each data sample will contain the following data:

Number of Chars	Data Sample	Notes
5	Latitude	See Note 3
6	Longitude	See Note 3
6	Date/Time (UTC) of Observation	Format: ddhhmm
4	Flight Level See Note 4	
4	Static Air Temperature (Celsius)	See Note 5
1	Ice/no-ice signal	See Note 6
2	Peak liquid water content (grams/m3)	See Note 7
2	Average liquid water content (grams/m3)	See Note 7
1	SLD/no-SLD signal	See Note 8

3. The format of latitude and longitude are with North/South (abbreviated N/S) and East/West (abbreviated E/W) following the values of latitude and longitude and a resolution in degrees and minutes.

For example: 4811N12030W or 3530S14845E

LATITUDE ddmm (N/S)	LONGITUDE dddmm (E/W)
4811N	02030W
3530S	14845E

4. The character F followed by 3 numerals. For example: F350

5. The range of Static Air Temperature is from -99 to +99 degrees Celsius. The format used is 4 characters. The characters MS are used to indicate a negative value and PS are used to indicate a positive value followed by temperature in degrees Celsius (2 numerals). For example: MS23 or PS24

6. A value of 0 indicates no icing conditions. A value of 1 indicates icing conditions are present

7. Values will range from 0 - 9.9 grams/m^3 with a resolution of 0.1 grams/m^3. The format of the data is 00 to 99 where 99 represents 9.9 grams/m^3.

8. A value of 0 indicates no Supercooled Large Droplets (SLD) conditions. A value of 1 indicates SLD conditions are present.

5.3.53 Internet E-Mail Message – MFI or Label E1

An aircraft can generate an Internet email message for downlink. This message should be sent via a Label E1 downlink message. Note downlink message label E2 is used if the DSP is providing this email service.

E-Mail messages carry the following format:

Character Number	Character Content	Example	Notes
1-10	Standard Header		
11 to m	Internet E-Mail box name	JOHN.SMITH	
m+1	Delimiter [/]	/	Slash
(m+2) to k	Internet E-Mail domain	ABCD.COM	
k +1	Delimiter </>	/	
(k+2) to n	Body of E-Mail message		$n \leq 220$

SMI = EML

Free Text = DASH followed by

Space followed by

Space followed by

Internet email mailbox name (could include period (s)) followed by

SLASH followed by

Internet email DOMAIN name (will include at least one period) followed by

SLASH followed by

Body of email message (maximum ACARS message length including free text addressing)

5.0 DOWNLINK MESSAGE TEXT FORMATS

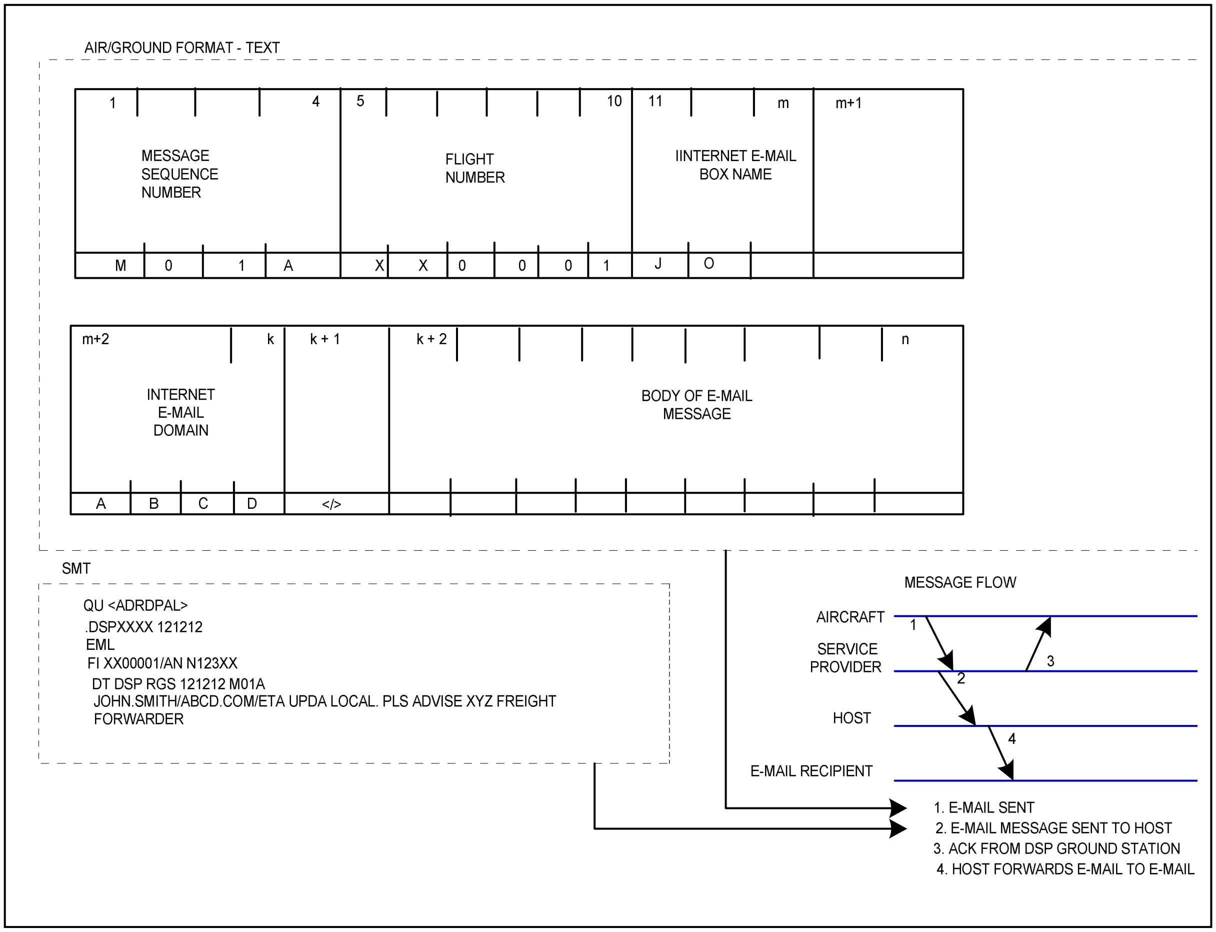


Figure 5.3.53-1 - Internet E-Mail Message

5.3.54 Meteorological Report Configuration Downlink – MFI or Label H4

Automatic Weather Report (AWR) configuration can be downlinked in response to an ACARS uplink command using the following format:

Table 5.3.54-1 - Configuration

Character Number	Number Of Characters	Character Content	Format	Notes
1-10	10	Standard message header		1
11-12	2	Version number	04	
13	1	Type of format	1,2	2
14-15	2	Date message assembled	dd	
16-19	4	Time message assembled	hhmm	
20-23	4	Departure station	xxxx	
24-27	4	Destination station	xxxx	
28	1	Enable or disable AMDAR	n	3
29	1	Inhibit reporting in selected time interval	n	3
30	1	Designated region reporting	n	3
31	1	Airport Selection	n	3
32	1	Ascent enable or disable	n	3
33	1	Enroute enable or disable	n	3
34	1	Descent enable or disable	n	3
35	1	Delimiter	/	
As required	Variable	8 additional tables when Format = 2	nnn…..n	4

Table 5.3.54-2 - Designated Region

Number of Characters	Data	Description	Remarks
2	N_RN_R	Number boxes following	NN= 00-16
14	$L_1L_1\ A_1L_2L_2A_2$ $L_3\ L_3L_3\ B_1L_4L_4\ L_4B_2$	Report in Lat/ Long box	Lat in degrees north (A = N) or south (A = S) Lon in degrees east (B = E) or west (B = W) Convention is L_1L_1 to L_2L_2 (N -S) And $L_3L_3L_3$ to $L_4L_4L_4$ (W-E).
Variable multiples of 14	As above	As above	As above, repeated (N_RN_R-1) times
1	:	Delimiter	End of report boxes, start of inhibit boxes
2	N_IN_I	Number boxes following	NN= 00-16
14	$L_1L_1\ A_1L_2L_2A_2$ $L_3\ L_3L_3\ B_1L_4L_4\ L_4B_2$	Inhibit reporting in Lat/ Long box	
Variable multiples of 14	As above	As above	As above, repeated (N_IN_I-1) times
1	/	Delimiter	End of Table 2 data.

Table 5.3.54-3 - Airport Selection

Number of Characters	Data	Description	Remarks
2	N_AN_A	Number of airfields following	N_AN_A = 01-20
4	AAAA	Airfield selected for ascent	4 character airfield code
Variable multiples of 4	"	"	Repeated up to N_AN_A -1 times
1	':'	Delimiter	End of ascent list; start of descent list
2	N_DN_D	Number of airfields following	N_DN_D = 01-20
4	DDDD	Airfield selected for descent	4 character airfield code
Variable multiples of 4	"	"	Repeated up to N_DN_D -1 times
1	‘:’	Delimiter	End of descent list, start of (inhibit) ascent list.
2	N_AN_A	Number of airfields following	N_AN_A = 01-20
4	AAAA	Airfield inhibited for ascent	4 character airfield code
Variable multiples of 4	"	"	Repeated up to N_AN_A -1 times
1	':'	Delimiter	End of ascent list; start of descent list
2	N_DN_D	Number of airfields following	N_DN_D = 01-20
4	DDDD	Airfield inhibited for descent	4 character airfield code
Variable multiples of 4	"	"	Repeated up to N_DN_D -1 times
1	'0' - '1'	Routine observations: enabled=(1), disabled=(0)	
1	'/'	Delimiter	End of Table 3 data

Table 5.3.54-4 - Enroute Reports and Maximum Wind

Number of Characters	Data	Description	Remarks
2	mm	Routine-level flight observing interval	Range = 01 - 60
1	w	Maximum wind reporting : enabled=(1), disabled=(0)	
1	'/'	Delimiter	End of Table 4 data

Table 5.3.54-5 - Ascent Reports

Number of Characters	Data	Description	Remarks
1	'0' or 1'	Pressure level (0) or Time interval (1) sampling selection	
2	ss	Series 1 intervals(s)	Range = 03 - 20'
3	sss	Series 1 duration(s)	Range = 030'- 200
2	ss	Series 2 intervals(s)	Range = 20 – 60
3	SSS	Total duration (sx10)	Range = 051 – 111
3	hhh	Top of climb (ftx100)	Range = 150 – 250
1	'1' or '2'	Pressure target list selected	1 = List 1, 2 = List 2 in 4.3.10 Table 10
1	'0' or '1'	Additional level flight timer for pressure-based observations enabled = (1), disabled = (0)	Range = 0 – 1
1	'/'	Delimiter	End of Table 5 data

Table 5.3.54-6 - Routine Reports for Disabled Ascent

Number of Characters	Data	Description	Remarks
1	'0' or '1'	Routine observations: Enabled = (1), disabled = (0)	
1	/	Delimiter	End of Table 6 data

Table 5.3.54-7 - Descent Reports

Number of Characters	Data	Description	Remarks
1	'0' or '1'	Pressure interval (0) or time interval (1) selection	
3	sss	Descent interval (s)	Range = 020 – 300
3	hhh	Top of descent(PALT) (ft x 100)	Range = 150 – 250
1	'1'-'2'	Pressure target list selected	1 = List 1, 2 = List 2 (4.3.10, Table 10)
1	'0' or '1'	Additional level flight timer for pressure-based observations: enabled = ('1'), disabled = ('0')	Range = '0' - '1'
1	'/'	Delimiter	End of Table 7 data

Table 5.3.54-8 - Routine Reports for Disabled Descent

Number of Characters	Data	Descriptions	Remarks
1	'0' or '1'	Routine observations: enabled = (1), disabled = (0)	
1	/	Delimiter	End of Table 8 data

Table 5.3.54-9 - Inhibiting Time Interval

Number of Characters	Data	Description	Remarks
4	H1H1H2H2	Observations disabled between selected hours (00-23) UTC, every day	H1H1 = start of inhibit period H2H2 = end of inhibit period
1	'/'	Delimiter	End of Table 9 data

Notes:

1. See ARINC Specification 618.
2. 1 = basic table (Table 5.3.54-1) only downlinked. 2 = Extended message containing all tables downlinked.
3. 0 = disabled, 1 = enabled
4. Included if Type of Format = 2 (extended configuration report)

5.3.55 Internet E-Mail Message – DSP Service – MFI or Label E2

An aircraft can generate an Internet email message for downlinking. This message should be sent via a label E2 downlink message if it is desired to use an email service that may be provided by the DSP. Note downlink message label E1 is used if the host is providing this email service.

Email messages use the following message format:

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2 – 3	Sequence [Message Number]	
4	Number[Block Sequence Character]	
5 – 10	Flight Identifier	
11 – m	Internet Email box name	
m+1	Delimiter [/]	Slash
(m+2) – k	Internet Email domain	
k+1	Delimiter [/]	Slash
(k+2) – n	Text of Email message	n $\leq$ 220

The SMI code for this downlink is EMS.

Air/Ground Format – Text

1	2	3	4	5	6	7	8	9	10	11	12	m	m+1
Message Sequence Number				Flight Number						Internet Email Box Name			Delimiter
M	0	1	A	X	X	0	0	0	1	J	O	H	/

m+2			k	k+1	k+2								n
Internet Email Domain				Delimiter	Text of Email Message								
A	B	C	M	/	E	T							R

SMT
QU ADRDPAL
.DSPXXXX 121212
EMS
FI XX0001/AN N123XX
DT DSP RGS 121212 M01A
- JOHN.SMITH/ABCD.COM/ ETA UPDATE LOCAL. PLZ ADVISE XYZ FREIGHT FORWARDER

Message Flow
Aircraft sends email message
Message delivered to Email Recipient
ACK from DSP's ground network

Figure 5.3.55 -1 - Internet Email Message - DSP Service

5.4 Downlink Message Formats, Messages from Avionics Subsystem - Label H1

Provisions have been made for avionic subsystems, acting as a peripheral to the ACARS MU, to prepare messages for the AOC users host systems or ATC facilities on the ground. These messages will be routed through the ACARS Management Unit (MU) for delivery. Typically, these subsystems include the Optional Auxiliary Terminal (OAT), the Flight Management Computer (FMC), the Aircraft Condition Monitoring System (ACMS). Downlink Messages from these designated on-board devices will contain Label characters H1 and text assembled at the source.

A listing of sublabels, their associated SMI and Section References can be found in Table C2-A of Appendix C.

In aircraft equipped with an ACARS MU designed to ARINC Characteristic 597, the interfaces between the MU and the Aircraft Integrated Data System (AIDS) and the Flight Management Computer (FMC) are provided by the Optional Auxiliary Terminal (OAT). All messages from these airborne systems (peripherals to the MU) originate either in the OAT or in devices attached to an OAT interface. MUs designed to ARINC Characteristic 597 are no longer recommended for new aircraft installations.

In aircraft equipped with an ACARS MU designed to either ARINC Characteristic 724 or 724B, the interfaces between the MU and the airborne subsystems (peripherals to the MU), such as the AIDS and FMC, are connected directly.

The differences in the two datalink subsystem configurations necessitate variations in the Text field format of some downlink messages. The Application text field format used to downlink messages from airborne systems connected to an ARINC 597 ACARS MU is described in Section 5.4. The Application text field format used to downlink messages from subsystems connected to an ARINC 724 ACARS MU is described in Section 5.3.38.2.

Each H1-labeled message may be designated as either a Conversational (Type A) message or a Conventional (Type B) message. Currently, ACARS ground systems support only Type B messages.

Each data link user employing an OAT in their aircraft configuration defines a standard ground address for H1-labeled downlink messages. If desired, messages may be routed to additional destinations by entering the addresses of the additional destinations in the Application text field.

Table 5.4-1A - General Format of Downlink Message Originating from an Avionic Subsystem

		AIRCRAFT ADDRESS		LABEL			FLIGHT NUMBER		SUB LABEL		OPTIONAL USER ADDRESS	MESSAGE TEXT
		.N1234X		HI			XX1234		M1 [1]		/PIKCLXS.	<u>APPLICATION TEXT</u>

Note: Some OATs may not use the Sublabel.

The format of the fields in downlink messages generated by an avionics subsystem are the same as those used in downlinks generated by the MU (See Section 5.3) with the following exceptions. The label is H1 and a sublabel field is included. In the above example, the message was generated by the Left FMC, designated by M1 in the Sublabel field.

Table 5.4-1B - Format for ATS Downlink Message Originating from an Avionic Subsystem

		AIRCRAFT ADDRESS		LABEL			FLIGHT NUMBER		SUB LABEL		USER ADDRESS	MESSAGE TEXT
		.N1234x		H1			xx1234		M1		/MFI LAX05xx.	Application text

The format of the User Address field of ATS downlink messages generated by an avionics subsystem is expanded to include a 2 character Message Function Identifier (MFI) as its first element. The MFI, will be identical to the associated Label, assigned from the block of labels B0 through BZ, that would be used if the message were generated by the MU.

ATS downlink messages are assigned the block of labels (and MFIs) B0 through BX. See Section 5.5 for the format of ATS downlink messages.

5.4.1 Messages from Airborne Subsystems: ARINC 597 ACARS - Label H1

The following Application text field format should be used for downlink messages when the originating system is a peripheral to the ACARS MU and the aircraft is equipped with an ACARS MU designed to ARINC Characteristic 597. ACARS MUs designed to ARINC Characteristic 597 are no longer recommended for new aircraft installations.

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618.
2-3	Sequence [Message Number]	
4	Number[Block Sequence Character]	
5-10	Flight Identifier;	See Section 5.2.1. If additional addresses are entered the addresses are separated
11 by spaces.	Slash Character </>	
12-m	Additional addresses; (3,4 or 7 characters)	If optional addressing is not utilized, the Free text portion begins with character 11.
m + 1	Period character <.>	
(M+2)-n	Free Text where n≤ 220	

5.0 DOWNLINK MESSAGE TEXT FORMATS

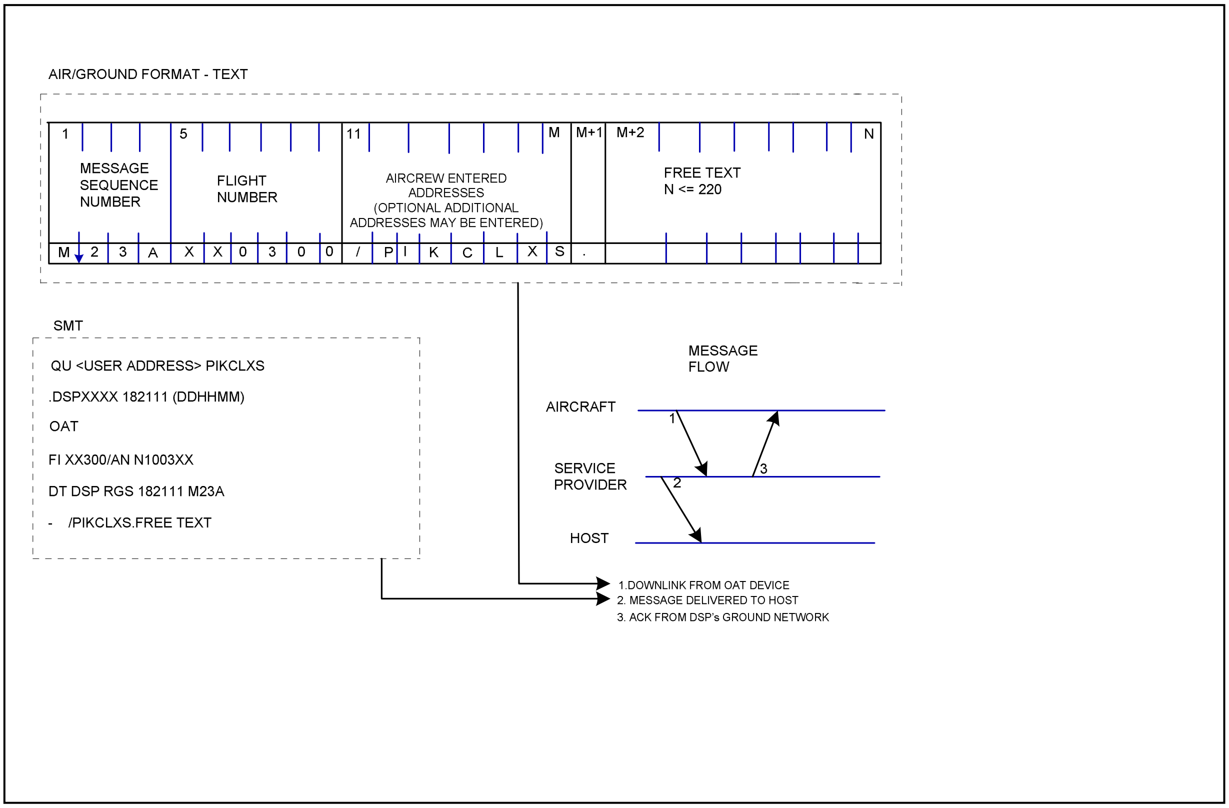


Figure 5.4.1-1 - Downlink by Peripheral to ARINC 597 – ARNC Implementation

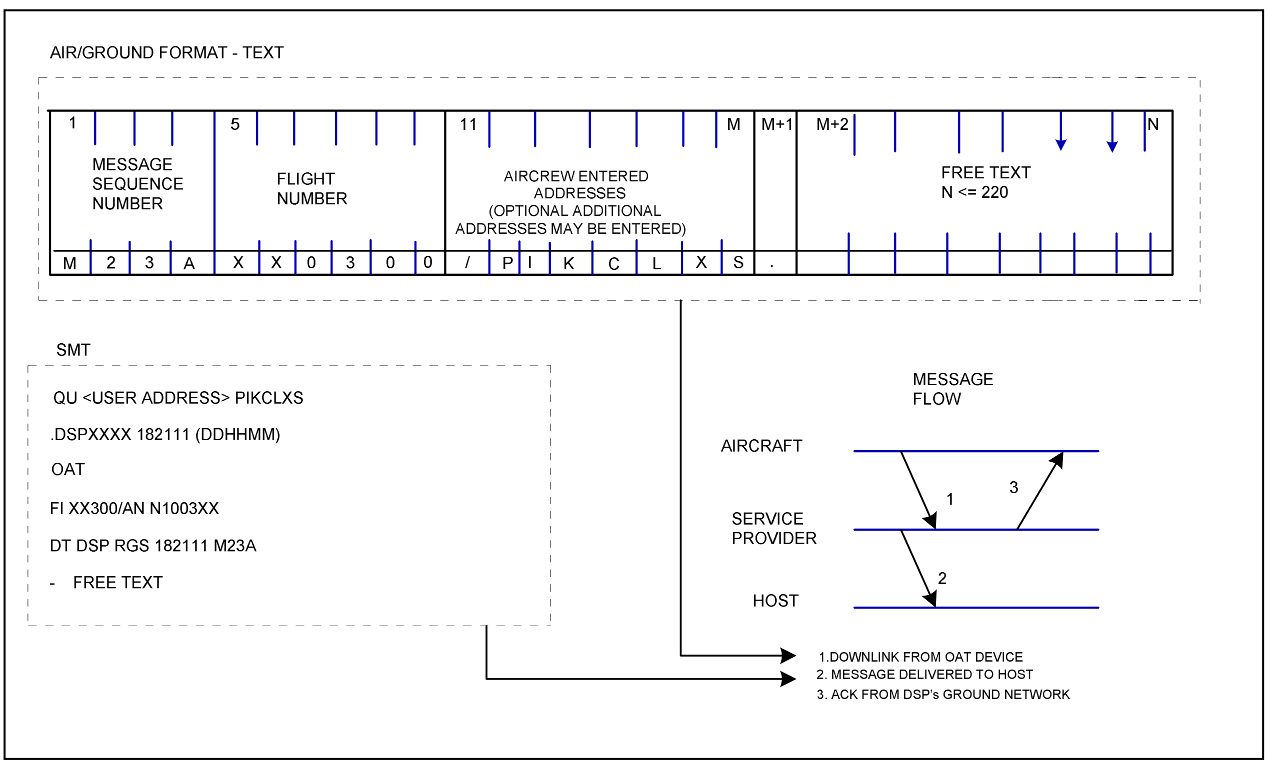


Figure 5.4.1-2 - Downlink by Peripheral to ARINC 597 – SITA Implementation

5.4.2 Messages from Airborne Subsystems: ARINC 724 or 724B ACARS MU - Label H1

The application text fields of second and subsequent blocks of ACARS multi-block CFDIU, DFDAU, FMC and Cabin Terminal downlink messages will contain only the text portion of the message. The application text fields of second and subsequent blocks of multiblock CFDIU, DFDAU, and FMC, and Cabin Terminal downlinks with additional addresses will start with the POUNDSIGN character <#> and the two sublabel characters followed by the character B. These will be followed by the next text character in sequence after that with which the previous block ended. All blocks except the final block of an ACARS multiblock downlink will be terminated by the control character ETB. The final block will be terminated with the control character ETX.

The variations of the possible formats of downlink messages generated by avionics subsystems are provided in the following subsections.

5.4.2.1 OAT - Simple H1 Message

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Numbe r	[Block Sequence Character]	
5-10	Flight Identifier		
11-n	Free Text where n represents the maximum data characters over the air-ground link used to deliver the message.		

5.4.2.2 OAT - H1 Message With Additional Addresses

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1
2-3	Sequence	[Message Number]	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11	Slash Character </>		
12-m	Two character MFI and/or additional addresses.		The space character is used as a delimiter between the MFI and the addresses. The MFI applies to ATS only. See Section 3.8.1.
m+1	Period character <.>		
M+2-n maximum data delivery	Free Text where n represents the characters over the air-ground link used to the message.		

5.4.2.3 CFDIU, DFDAU, FMC or Cabin Terminal Messages Without Additional Addresses

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618 See Section 5.2.1.
2-3	Sequence [Message Number]	
4	Number [Block Sequence Character]	
5-10	Flight Identifier;	
11	Pound sign <#> character	
12-13	Two Character Sublabel	See Table C-2A of Appendix C for assignments.
14	Reserved: Code with the character B	
15-n	Free Text where n represents the maximum data characters over the air-ground link used to deliver the message	

5.4.2.4 CFDIU, DFDAU, FMC or Cabin Terminal Messages With Additional Addresses

Character No.	Character Content	Notes
1	Message [Originator]	Refer to Section 3.4 of ARINC Specification 618. See Section 5.2.1
2-3	Sequence [Message Number]	
4	Number [Block Sequence Char]	
5-10	Flight Identifier	
11	Poundsign <#> character	
12-13	Two Character Sublabel	See Table C-2A of Appendix C for assignments.
14	Reserved: Code with the character B	
15	Slash Character </>	
16-m	Two-character MFI and/or additional seven-character addresses	The space character is used as a delimiter between the MFI and the addresses. The MFI applies to ATS only. See Section 3.8.1.
m+1	Period character <.>	
(m+2)-n	Free Text where n represents the maximum data characters over the air-ground link used to deliver the message.	

5.0 DOWNLINK MESSAGE TEXT FORMATS

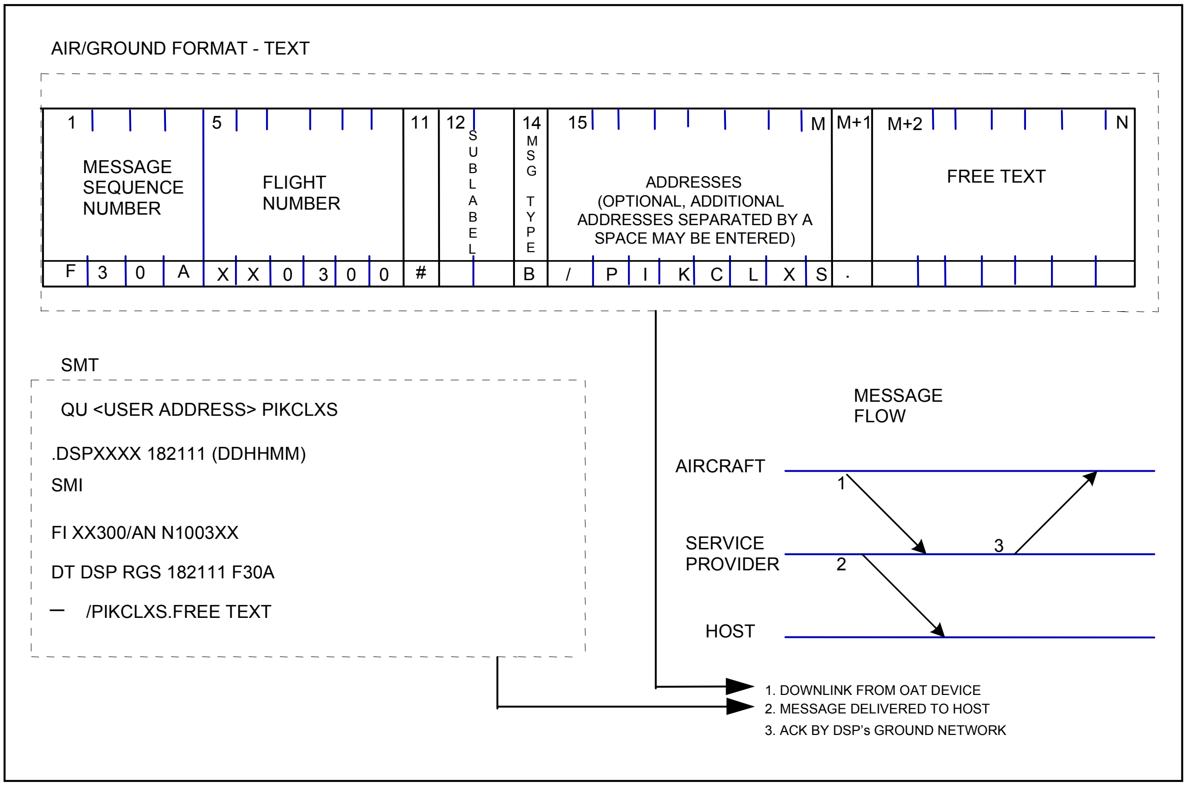


Figure 5.4.2.4-1 - Messages from Avionics Subsystem – ARNC Implementation

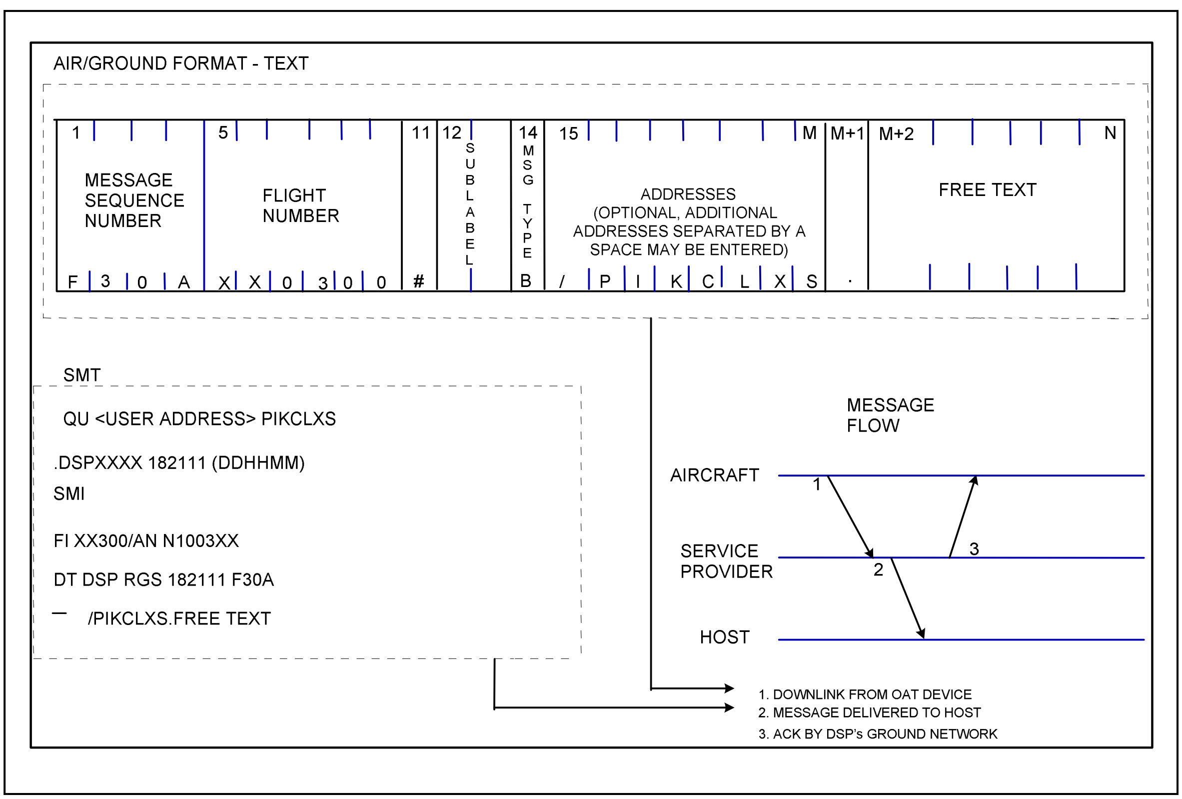


Figure 5.4.2.4-2 - Messages from Avionics Subsystem – Implementation By Others

5.5 Downlink Message Formats, ATS Messages - MFI or Label Bx

The following subsections define the handling to be provided for Air Traffic Service (ATS) messages. For character-oriented messages, the format of these messages is found in Specification 623. For bit-oriented messages, the format is defined in RTCA and ICAO documentation. Currently the bit-oriented messages are limited to Automatic Dependent Surveillance (ADS) and Controller/Pilot Data Link Communications (CPDLC).

COMMENTARY

The airlines have expressed a desire that both bit and character-oriented ATS messages be processed using the provisions of Specification 622. This will minimize the number of airborne software permutations. Furthermore, the airlines have stated a need that service providers be capable of discretely addressing every application (Label) within an ATS site.

Before the application currently referred to as Controller/Pilot Data Link Communications (CPDLC) was defined by ICAO, it was defined by RTCA as Two Way Data Link (TWDL). The function to support CPDLC/TWDL has been defined in AEEC Specifications as ATCComm.

The MU need only generate those service-related downlinks specified by the user to his supplier. While service-related downlink utilization is thus optional in terms of user deployment, procedures governing the ground handling of these messages necessitates adherence to the formats and other rules concerning them set forth in this document. For the reader's convenience, a listing of ATC messages is provided below. See Section 5.3 for a listing of AOC messages.

Table 5-5 - Format for Air-Ground Downlink ATS Messages Generated by an MU

		AIRCRAFT ADDRESS		LABEL		MSN	FLIGHT NUMBER	SUPPLEMENTARY ADDRESS	MESSAGE TEXT
		.N1003x		Bx		M01A	xx5678	/LAX05xx.	Application
									text

Label:
For downlink messages, the Label will be assigned from the block of labels B0 through BZ.

Application Text:
See ARINC Specification 623 for definition of ATS Application Data . Messages that may have an impact on the movement of the aircraft, such as Air Traffic Service (ATS) messages, may have additional content in the a application text field to insure delivery and integrity. See ARINC Specification 622 for definition of ATS

Application Text (definition has precedence). In general, the format of the Message Text field of an ATS message is --------Application Text--------- with the expanded form being IMI/--------Application data------CRC for character-oriented messages and IMI/--------Application data------CRC for bit-oriented messages.

Imbedded Message Identifier:
The 3 character Imbedded Message Identifier (IMI) field indicates the format and Version Number of the generated message.

Delimiter:
A slash </> character is used in character-oriented messages to separate the IMI from the Application Data. The characters AN are used in bit-oriented messages to separate the IMI from the Application Data per ARINC Specification 622.

Application Data:
The contents of the Application data for ATS downlink messages are defined in ARINC Specification 623.

CRC:
Messages which may have an impact on the movement of the aircraft, such as Air Traffic Services (ATS) messages, have been deemed to need additional assurance that an end-to-end check is performed on the message content to validate its accurate reconstruction at the receiving equipment. This is done by including a cyclical redundancy check (CRC) as the final element of the message content.

The CRC may be any binary number of 16 bits. Since the ACARS air-ground network can only support the transfer of the character-based message set defined in ARINC Specification 618, the 16-bit CRC must be translated to pass reliably across the ACARS network. The conversion process defined in Specification 622 should be used to process the CRC. In its expanded form, the CRC consumes 4 characters in the message text.

If the free text portion of a message is greater than that which can be accommodated in the Text field of a single block, multiple blocks will be transmitted. In this case, each intermediate block will be terminated with the control character <ETB>. The final block (and only the final block) of each ACARS multi-block message will contain the control character <ETX>.

Refer to Tables C1 and C2 of Appendix C for a listing of messages, their associated labels, SMIs and Section references.

5.5.1 Request Oceanic Clearance - MFI or Label B1

The Request for Oceanic Clearance is a message prepared by an End System on an aircraft and sent to the ground DSP who then forwards the message to the ATC facility designated within the message. The message may be initiated by aircrew action or initiated automatically.

The Label of B1 is used in the air-ground message. The format of the Request for Oceanic Clearance definition provides specific parameters to clearly indicate what information is being requested.

Upon receipt of the air-ground downlink message from the aircraft, if the message is from the MU, the DSP generates a ground-ground message to the ATC facility with the SMI of RCL. If the air-ground downlink message is from a peripheral to the MU, such as the FMC, the DSP generates a ground-ground message to the ATC facility with the SMI of FML or FMR. See Appendix D of Specification 622 for a listing of SMIs and subLabels.

Refer to ARINC Specification 623 for the format of the Application data and Specification 622 for the description of the process needed to transfer this message across the ACARS network. Both the air-ground and ground-ground form of the message are illustrated in the examples below. The first set illustrates the structure of a downlink message generated by the MU. The second set illustrates the structure of a message generated by an avionics subsystem.

Table 5.5.1-1A - Request Oceanic Clearance Downlink From an MU - Air-Ground Format

		AIRCRAFT ADDRESS		LABEL			MSN	FLIGHT NUMBER	SUPPLEMENTARY ADDRESS	MESSAGE TEXT
		.N1234x		B1			M01A	xx5678	/LAX05xx.	Application text

Table 5.5.1-1B - Request Oceanic Clearance Downlink From an MU - Ground-Ground Format

QU <USER ADDRESS> LAX05xx
.DSPxxxx ddhhmm
RCL
FI xx5678/AN N1234x
DT DSP RGS 182111 M01A
- Application text

Table 5.5.1-2A - Request Oceanic Clearance Downlink From an Avionics Subsystem - Air-Ground Format

		AIRCRAFT ADDRESS		LABEL			MSN	FLIGHT NUMBER		SUB LABEL		SUPPLEMENTARY ADDRESS	MESSAGE TEXT
		.N1234x		H1			F10A	xx5678		M1		/B1 LAX05xx.	Application text

Table 5.5.1-2B - Request Oceanic Clearance Downlink From an Avionics Subsystem - Ground-Ground Format

QU <USER ADDRESS> LAX05xx
.DSPXXXX ddhhmm
FML
FI xx5678/AN N1234x
DT DSP RGS 182111 F10A
- Application text CRC

5.5.2 Oceanic Clearance Readback - MFI or Label B2

Upon receipt of an Oceanic Clearance uplink message, identified by Label (or MFI) A1, the avionic end system should deposit the application text (information content) in a dedicated ATC buffer. The avionic end system should then automatically send a command to print or display the message, as stored in the ATC buffer, for the aircrew's assessment.

Following manual aircrew confirmation of an Oceanic Clearance uplink message, the Oceanic Clearance Readback message is prepared by an End System on the aircraft at the direction of the pilot and sent to the ground DSP who then forwards it to the ATC facility designated within the message.

Upon receipt of the Acknowledge Oceanic Clearance message generated by an MU (containing Label of B2), the DSP forwards the ground-ground message to the ATC facility with the SMI of CLA. Upon receipt of the Oceanic Clearance Readback message generated by a peripheral to the MU (containing MFI of B2), the DSP forwards the ground-ground message to the ATC facility with the SMI of the appropriate peripheral. See Appendix D of Specification 622 for a listing of SMIs and sublabels.

Refer to ARINC Specification 623 for the format of the application text and Specification 622 for the description of the process needed to transfer this message across the ACARS network. Both the air-ground and ground-ground form of the message are illustrated in the examples in Section 5.5.1. The first set illustrates the structure of a downlink message generated by the MU. The second set illustrates the structure of a message generated by an avionics subsystem.

5.5.3 Request Departure Clearance - MFI or Label B3

The Request for Departure Clearance is a message prepared by an End System on the aircraft and sent to the ground DSP who then forwards the message to the ATC facility designated within the message. The format of the Request for Departure Clearance provides specific parameters to clearly indicate what information is being requested.

Upon receipt of the air-ground downlink message generated by the MU containing the Label of B3 (or, if generated by a peripheral, the Label H1 and the MFI B3), the DSP sends the complementary ground-ground message to the ATC facility with the SMI of RCD for an MU message, or the appropriate SMI for a message from an ACARS peripheral. See Appendix D of Specification 622 for a listing of SMIs and sublabels.

Refer to ARINC Specification 623 for the format of the application text and Specification 622 for the description of the process needed to transfer this message across the ACARS network. Both the air-ground and ground-ground form of the message are illustrated in the examples in Section 5.5.1. The first set illustrates the structure of a downlink message generated by the MU. The second set illustrates the structure of a message generated by an avionics subsystem.

5.5.4 Departure Clearance Readback Downlink - MFI or Label B4

The Departure Clearance Acknowledgement message is prepared by an End System on the aircraft at the direction of the pilot and sent to the ground DSP who then forwards it to the ATC facility designated within the message.

Upon receipt of the Departure Clearance Acknowledgement downlink message containing Label of B4 (or the Label H1 with the MFI B4), the DSP forwards the ground-ground message to the ATC facility with the SMI of CDA for an MU message or the appropriate SMI for a message from an ACARS peripheral. See Appendix D of Specification 622 for a listing of SMIs and sublabels.

Refer to ARINC Specification 623 for the format of the application text and Specification 622 for the description of the process needed to transfer this message across the ACARS network. Both the air-ground and ground-ground form of the message are illustrated in the examples in Section 5.5.1. The first set illustrates the structure of a downlink message generated by the MU. The second set illustrates the structure of a message generated by an avionics subsystem.

5.5.5 Waypoint Position Report - MFI or Label B5

The WPR message may be generated automatically by the avionics (typically the FMC) or may be generated by the FMC or MU through manual pilot entry. The message is intended to be used by an aircraft operating in a non-radar environment. The Waypoint Position Report (WPR) downlink is prepared by an End System on the aircraft at the direction of the pilot and sent to the ground DSP who then forwards it to the ATC facility designated within the message.

If the WPR is created by a peripheral, such as the FMC, the message will be downlinked as Label H1 with the MFI of B5.

When it is received by the DSP, it is translated to SMI POS if generated by an MU or, alternatively, to the appropriate SMI if generated by a peripheral. Refer to ARINC Specification 623 for the format of the Application Data and for message generation logic.

5.5.6 Provide ADS Report - MFI or Label B6

This message may be generated by the MU or by an avionics subsystem onboard the aircraft. When it is received by the DSP, it is translated to SMI PAR if generated by an MU, or the appropriate SMI if generated by a peripheral. The message is meant to be used by an aircraft operating in a non-radar environment.

Refer to ARINC Specification 622 for the definition of ADS and the process needed to transfer this message across the ACARS network. Refer to ARINC Characteristic 745 for the format of the application data. Both the air-ground and ground-ground formats of the message are illustrated in the examples in Section 5.5.1.

5.5.7 Free Text to ATC - MFI or Label B7

The Free Text message is meant to provide the ability for the pilot to communicate directly with an ATC agency. It provides a way to augment the exchanges provided by ATCComm messages (See Section 5.5.11). This message, generated by the pilot, is translated to SMI FTD by the service provider if from an MU, or the appropriate SMI if from a peripheral. See Appendix D of Specification 622 for a listing of SMIs and sublabels.

5.5.8 Request Departure Slot - MFI or Label B8

This message, generated by the pilot, is translated to SMI RDS by the service provider if the message is from an MU, or the appropriate SMI, if from a peripheral. The processing is similar to the label (or MFI) B1. This message is meant to be a standard text message forwarded to a specific ATC unit in charge of slotting departure time for a given airspace.

5.5.9 Request ATIS Report - MFI or Label B9

This message, generated by the aircraft, is translated to SMI RAI by the service provider if the messge is from an MU, or the appropriate SMI if from a peripheral. See Appendix D of Specification 622 for a listing of SMIs and sublabels. Refer to ARINC Specification 623 for the format of the Application data and Specification 622 for the description of the process needed to transfer the message across the ACARS network. Both the air-ground and ground-ground form of the message are illustrated by the examples in Section 5.5. The first set illustrate an ATIS Request generated by the MU. The second set illustrate an ATIS Request generated by an avionics subsystem.

COMMENTARY

It has been recognized that the label 5D already exists with SMI TIS but the 5D message is intended to access only one address while the B9 has the capability of forwarding the message to a different addresses based on the code contained in the downlink. Both are expected to be supported for the interim period.

5.5.10 ATS Facilities Notification (AFN) - MFI or Label B0

This message, generated by the pilot or the avionics, is translated to SMI AFD by the service provider if from an MU, or the appropriate SMI if from a peripheral. See Appendix D of Specification 622 for a listing of SMIs and sublabels. Refer to ARINC Specification 623 for the format of the AFN Application Data. AFN messages are used:

1. to notify the ATC agency that the aircraft is ready to begin data communications (to support applications such as ADS)

2. to pass down relevant ATS application information needed by the ATC agency, and

3. for the current ATC agency to advise the aircraft to contact another ATC agency

5.5.11 ATCCommunications - MFI or Label BA

This message, generated by the pilot, is translated to SMI ATC by the service provider if from an MU, or the appropriate SMI if from a peripheral. See Appendix D of Specification 622 for a listing of SMIs and sublabels. This message type covers a list of at least 100 possible interactions between the controller and the pilot. Refer to RTCA DO-219 for the format of the ATCComm Application Data. Refer to ARINC Specification 622 for information on processing of the bit-oriented ATCComm message for transfer across the ACARS network.

Both the air-ground and ground-ground forms of the message are illustrated by the examples in Section 5.5.1. The first set illustrates the structure of the message downlink generated by the MU. The second set illustrates the structure of the message generated by an avionics subsystem.

5.5.12 Terminal Weather Information for Pilots - MFI or Label BB

This message, generated by the aircraft, is translated to SMI TWR by the service provider if the downlink was composed by an MU, or the appropriate SMI if from a peripheral. See Appendix D of Specification 622 for a listing of SMIs and subLabels. Refer to ARINC Specification 623 for the format of the Application Data and Specification 622 for the description of the process needed to transfer the message across the ACARS network.

5.5.13 Pushback Clearance Request - MFI or Label BC

This message is generated by the aircraft, translated to SMI PBR by the service provider if from an MU, or the appropriate SMI if from a peripheral. Reference Appendix D of ARINC Specification 622 for a listing of SMIs and sublabels. Refer to ARINC Specification 623 for the format of the Application data and ARINC Specification 622 for the detailed description of the process needed to transfer the message across the ACARS network.

5.5.14 Expected Taxi Clearance Request - MFI or Label BD

This message is generated by the aircraft, translated to SMI ETR by the service provider if from an MU, or the appropriate SMI if from a peripheral. Reference Appendix D of ARINC Specification 622 for a listing of SMIs and sublabels. Refer to ARINC Specification 623 for the format of the Application Data and ARINC Specification 622 for the detailed description of the process needed to transfer the Message across the ACARS network.

5.5.15 CPC Aircraft Log-On/Log-Off Request - MFI or Label BE

To initiate CPC service, the CPC Aircraft Log-On/Log-Off Request downlink is generated by the MU or other avionics peripheral. The CPC Aircraft Log-On/Log-Off Request downlink indicates a CPC Log-On request or Log-Off request from the aircraft.

In all cases, the CPC Aircraft Log-On/Log-Off Request is routed to the CPC provider to indicate that an aircraft/flight capable of supporting CPC is ready to begin or end the CPC Service (Refer to ARINC Specification 623 for a complete description of the use and format of this message.)

Upon receipt of the CPC Aircraft Log-On/Log-Off Request downlink message containing Label BE (or the Label H1 with the MFI of BE), the DSP forwards the ground-ground message to the CPC Application using a SMI of CPL (CPC Log On/Off) for an MU message or the appropriate SMI for a message from an ACARS peripheral. The CPC Application address for this message is determined by the Supplementary Address field or, based on DSP-to-airline coordination, another address configured within the DSP's front-end processor. See Appendix D of Specification 622 for a listing of SMIs and Sublabels.

Refer to Specification 623 for the format of the Application data and Specification 622 for the description of the process needed to transfer this message across the ACARS network. Both the air-ground and ground-ground form of the message are illustrated in the examples in Section 5.5.1.

5.5.16 CPC WILCO/UNABLE Response - MFI or Label BF

The crew will use the CPC WILCO/UNABLE Response downlink to respond, positively or negatively, to CPC Command/Response uplinks. Depending on the specific type of CPC uplink (See ARINC Specification 623), the crew may also be required to enter and confirm supplementary data. This downlink serves as an end-to-end acknowledgment or response for the CPC Command/Response uplink.

Upon receipt of the CPC WILCO/UNABLE Response message generated by an MU (Label BF), the DSP forwards the ground-ground message to the addressed ATC facility with the SMI of CWR. Upon receipt of the CPC WILCO/UNABLE Response message generated by a peripheral to the MU (containing MFI of BF), the DSP forwards the ground-ground message to the ATC facility with the SMI of the appropriate peripheral. See Appendix D of Specification 622 for a listing of SMIs and Labels.

Refer to ARINC Specification 623 for the formats of the Application data and Specification 622 for the description of the process needed to transfer this message across the ACARS network. Both the air-ground and ground-ground forms of this message are illustrated in the examples in Section 5.5.1. The first set illustrates a downlink message generated by the MU. The second set illustrates a downlink message generated by a peripheral to the ACARS MU.

5.5.17 Unassigned - MFI or Label BG

This Section is a placeholder for a future assignment.

5.6 Downlink Message Format, User-Defined

A label in the group from 10 to 4~ denotes the address of a ground destination. The use of each label is negotiated between the data link service user and the DSP.

Character No.	Character Content		Notes
1	Message	[Originator]	Refer to Section 3.4 of ARINC Specification 618. See Section 5.2.1
2-3	Sequence	[Message Number	
4	Number	[Block Sequence Character]	
5-10	Flight Identifier		
11 thru n	Free Text where <220		

5.7 Downlink Message Formats, Vendor Defined

Vendor defined messages may be sent using labels VA to VZ and V0 to V9. A series of three labels is defined for individual equipment vendors to provide a maximum amount of flexibility in implementation. These labels are intended to support unique vendor defined functionality while preventing interaction with AOC defined labels. An example of a vendor defined label would be to define an uplink message which can remotely manage a core function without impact to any unique AOC application.

The label assignments are:

LABEL	VENDOR
VA, VB, VC	Rockwell Collins
VD, VE, VF	Honeywell
VG, VH, VI	Teledyne
VJ, VK, VL	Airbus
VM, VN, VO	Universal
VP to VZ and V0 to V9	Other (Any vendor not explicitly defined)

The text field format should be as follows:

Character Number	Character Content
1-n	Free text where n < 220

5.8 Downlink Message Formats, DSP Defined

DSP defined messages may be sent using labels X1 to X9.

6.0 SERVICE LEVEL STANDARDS

6.1 Introduction

The intent of this section is to describe some methods that data link service providers may use to judge the performance of their data link service. It should be well understood that the level and quality of service that are provided will vary from service provider to service provider and will be treated on an individual contractual basis between the data link user and the data link service provider.

6.2 Transit Times

The time it takes for a message to traverse a node, a system of nodes, or a network is defined as the message transit time. The timely arrival of messages in the data link environment is critical to the daily operations of data link service users. Therefore it is imperative to ensure that messages reach their ultimate destination in a timely fashion.

Note: The data link ground system is currently defined without a priority scheme (although ARINC and SITA treat voice/data switchover messages with a higher priority than normal traffic).

Since data link service providers may have varying network designs (ground networks size, multiple data link processors, centralized versus distributed networks), data link service users can only be concerned with, and can only measure, end-to-end message transit times.

COMMENTARY

Each service provider may use its own unique method of determining the beginning and end points of the time measurement. This selection will be based on the type of network system used.

The end-to-end uplink transit delay can be defined from the time the ground user submit the uplink Ground/Ground message to the DSP for delivery to the target aircraft, to the time the last bit of information is received by the intended Airborne User.

The end-to-end downlink transit delay can be defined from the time the Airborne User submit the dowlink Air/Ground message to the DSP to the time the last bit of information is received by the intended ground user.

6.3 Availability

Availability is a measure of the degree that a system or part of a system is in an operational state.

Availability is calculated by the expression

A = (1 - (total time of outage)/(total operating time)) times 100 percent.

Network availability is the most critical form of measurement a service provider will provide to its data link users. These measurements can include ground network impairments, ground station outages, and critical airport outages as described below.

6.3.1 System

System non-availability results in the complete loss of end to end user communications. Availability at the system level is addressed in terms of the two primary areas of the communications system, the central data link processor(s) and the ground communications network.

The central data link processor(s) is responsible for the management of all data link system transactions. As a result, the availability requirement for the central data link processor(s) is 100 percent.

The availability of the ground communications network is based on the interface with the central data link processor(s) and the data link ground users. The DSP is responsible for ensuring constant communications between the ground communications network and the central data link processor(s). However, it is the ground user's responsibility to supply redundant ground communications network connections.

6.3.2 Ground Stations

In terms of availability, a ground station is considered a controller which manages a single channel.

Each ground station is, in turn, responsible for communicating with the ground communications network.

Though the ground station is a critical part of the ground network, non-availability of a single ground station may not result in a loss of end to end user communications since multiple ground stations can operate on the same channel.

Additional availability enhancements may include Uninterruptable Power Supplies (UPS), a dial back-up for alternate telephone communications, or satellite communications in order to provide improved reliability.

The service provider requirement for availability at the non-critical ground station is a system wide average of 99.50 percent.

6.3.3 Critical Airports

Some airports are of a nature that no failures can be allowed for any reason. For these critical airports, aconfiguration should be designed by the DSP to ensure maximum availability.

The configuration of the critical airport is based on the following principles:

- Redundancy - In order to ensure maximum reliability, the critical airport consists of more that one cluster (multiple channels) of ground stations. In addition, the clusters are physically separated from each other.
    - Additional redundancy is established by having each station connected to different nodal elements of the ground network.
- Power - In order to ensure continuous power, a system of uninterruptable power supplies can be installed.

- Communications - In order to ensure continuous communications, additional communication features may be installed. Satellite communications may be used to improve the reliability of the link from one ground network node to another. Alternatively, each ground station cluster could make use of dial back-up telephone connections in the event of a dedicated line failure.
- Channel Utilization - In order to ensure maximum transmission and receipt of uplink and downlink messages, a system of multiple channels (clusters) for improved channel utilization is required. In addition, channels should be assigned in a configuration which supports large volumes of enroute and on-ground aircraft.

The service provider requirement for availability at the critical airports is a system wide average of 99.99 percent.

6.4 Clock Accuracy

All messages delivered to airborne users or ground users by the DSP which contain clock or timing information (aircraft internal clock updates, or message time stamps) should be time stamped by the data link central processor with an accuracy within 1 second of the Coordinated Universal Time (UTC).

7.0 REFERENCE DOCUMENTS

1. Federal Register, Volume 55, Number 30, Tuesday, February 13, 1990

2. Federal Register, Volume 55, Number 97, Friday, May 18, 1990

3a. **ARINC Specification 429 P1:** *Mark 33 Digital Information Transfer System (DITS) - Part 1 Functional Description and Word Formats*

3b. **ARINC Specification 429 P2:** *Mark 33 Digital Information Transfer System (DITS) - Part 2 Discrete Data Words*

3c. **ARINC Specification 429 P3:** *Mark 33 Digital Information Transfer System (DITS) - Part 3 - File Data Transfer Techniques*

4. **ARINC Specification 618:** *Air-Ground Character-Oriented Protocol Specification*

5. **ARINC Specification 619:** *ACARS Protocols for Avionic End Systems*

6. **ARINC Specification 622:** *Processes for ATS Data Link Applications Over ACARS Air-Ground Network*

7. **ARINC Specification 623:** *Character-Oriented Air Traffice Service (ATS) Applications*

8. **ARINC Characteristic 724:** *Mark 2 Aircraft Communications Addressing and Reporting System*

9. **ARINC Characteristic 724B:** Aircraft Communications Addressing and Reporting System (ACARS)

10. **ARINC Characteristic 741P1:** *Aviation Satellite Communications System*

11. **ARINC Characteristic 741P2:** *Satellite Communications System*

12. **ARINC Characteristic 750:** *VHF Data Radio (VDR)*

13. **ARINC Characteristic 758:** *Communications Management Unit (CMU) Mark 2*

14. ICAO Document 4444

15. **ATA/IATA Interline Communications Manual:** *Doc/Gen/1840 Rev 8, October 1, 1987*

Note: AEEC Characteristics and Specifications published by ARINC are normally written using generic references, i.e., the document is referenced without naming any Supplements that may have been added to update the standard. It is prudent practice to contact ARINC to determine the most current status of each relevant ARINC document before proceeding with any design.

ATTACHMENT 1
GROUND SYSTEMS STANDARDS RELATIONSHIPS

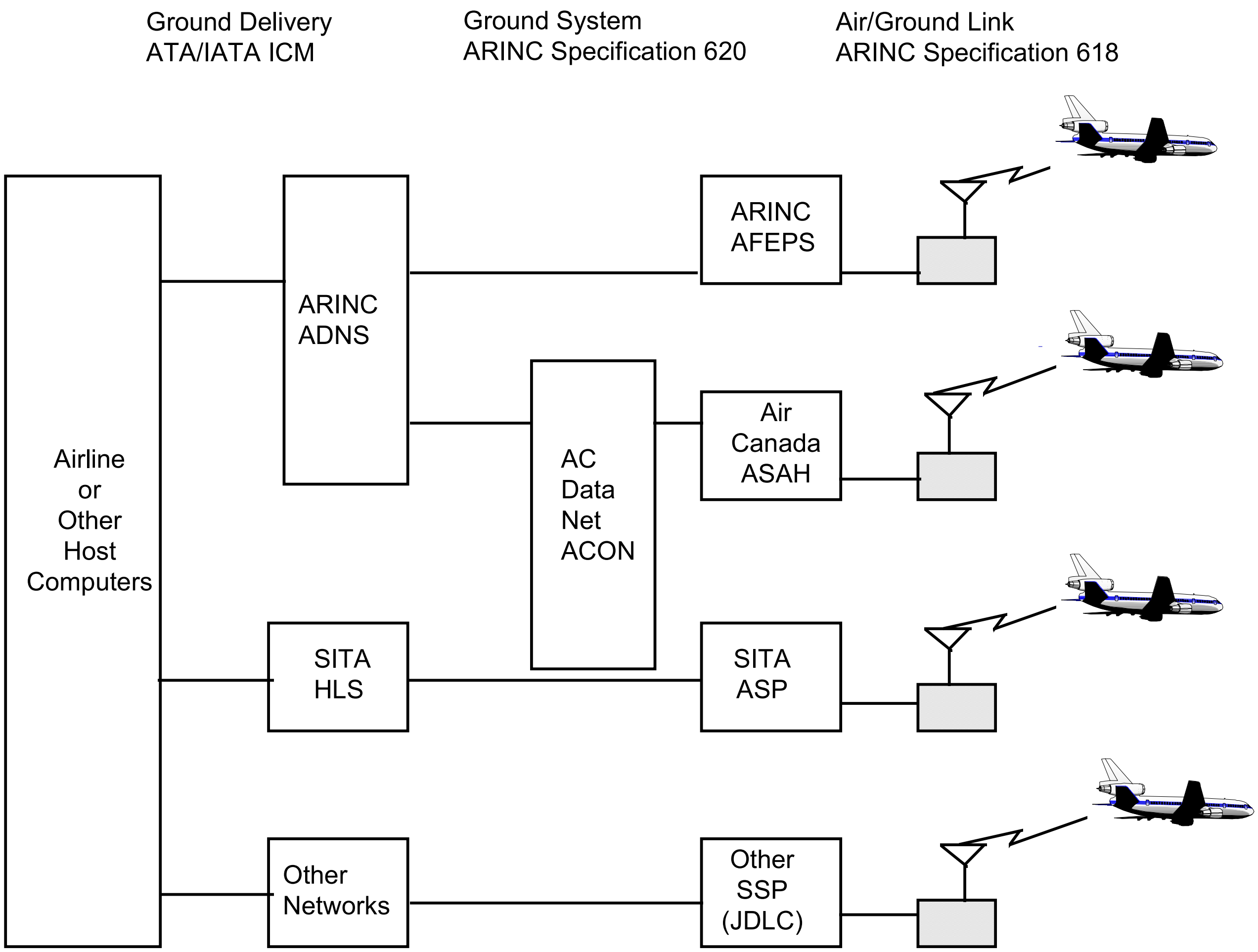


Figure 1-1 - Functional Depiction of Internetworking

ATTACHMENT 2
SERVICE MESSAGES - REASON CODES

Table 2-1 - Reason Codes for Unformattable Downlink Service Messages

Messages that are declared undeliverable by the service provider are returned to the originator using the SMI of SVC.

Code	Reason for Rejection	Explanation	Note
111	Inconsistent Message Length	Wrong text length for label	
112	Unknown Label	The label is not known	1
113	Unknown Sublabel	The sublabel is not known	1
114	Unknown Aircraft	Aircraft registration is not known	2, 3
115	Unknown Agency	The agency is unknown to the DSP	4
121	Inconsistent H1 Message Format	The defined part of the free text of an OAT message is incorrect.	
122	Inconsistent 8x Message Format	The Supplementary Address field in an aircrew address message is incorrect.	
123	Inconsistent Mx Message Format	The Supplementary Address field in an Arrival/Departure (IATA) message is incorrect.	
124	Unknown Format	Unknown message format	
131	Too many Type B Addresses	Too many addresses in the Supplementary Address field	
132	Unknown 3 or 4 Letter Code	Unconfigured code in the Supplementary Address field	
133	Missing Address for H1	No supplementary address in OAT message	
134	Unknown Address	Supplementary address is unknown to the DSP	
141	Unknown Reason	Reason not identified	
142	Invalid MFI	This is an invalid MFI	

Notes:

1. Although all service providers will support each of the defined labels, the user may need to specify the subset of defined labels used.
2. The service provider cannot identify specific aircraft. Typically, the service provider will maintain a list of aircraft for each user.
3. SITA supports this code, other service providers may not.
4. Supported only by ARINC.

ATTACHMENT 2
SERVICE MESSAGES - REASON CODES

Table 2-2 - Reason Codes for Untransmittable Uplink Services Messages

Messages that are declared undeliverable by the service provider are returned to the originator using the SMI of SVC.

Code	Reason for Rejection	Explanation
211	Invalid Aircraft Number	The Aircraft Registration is improperly formatted
212	Unknown Aircraft Number	The Aircraft Registration has not been identified to DSP
213	Invalid Flight Number	The Flight Number is improperly formatted
214	Unknown Station in GL or AP	The city code is unknown to the DSP or is non-alphabetic
215	Invalid Station Type	The code is not valid ground station
216	No Addressee	The Text Elements include neither a Flight Number nor a Aircraft Registration
217	No End of Address	The address of the message ends incorrectly
221	Invalid Uplink Format	The format of the message cannot be decoded
222	Unknown SMI	The SMI is not supported
223	Unknown TEI	An unsupported TEI appears
224	Duplicate TEI	A TEI appears more than once
225	Multiple AP TEI(S)	More than one AP TEI appear
226	Multiple GL TEI(S)	More than one GL TEI appear
227	Multiple Stations to: GL and AP	Both GL and AP TEIs appear
228	Invalid Originator Line	Improperly formatted origin
231	No Station To	No tracking available and neither GL nor AP appear
232	No known aircraft on this flight	Flight Number not currently registered
234	Aircraft not logged on	Unable to transmit message via SATCOM when aircraft is not logged on.
240	AN/FI mismatch	Message was received with invalid pairing of Aircraft Number (AN) and Flight Identifier (FI).
241	Unable to process - Message too old	Message delayed in Ground Network
242	Unauthorized Originator	Message received for ATS routing from unauthorized ATS facility
243	Invalid SMI	This is an invalid SMI
244	Invalid MFI	This is an invalid MFI
245	TP/GL mismatch	Inconsistent TP and GL identified
246	Missing Message Assurance Value	Message sent by CAA User doesn't contain a MA TEI
247	Invalid Message Assurance Value	Message sent by CAA User contains a MA TEI with no value or with an invalid MA Value. (ex: MA 11Z, MA 11A, MAS,...)
248	Expiry of Message Assurance Timer (SITA only)	Timer has expired for a particular message while waiting for MAS confirmation from SITA or ARINC.
249	Unknown Reason	CAA Server Internal Operations is not allowing transmission of this message. Internal Error.

ATTACHMENT 2
SERVICE MESSAGES - REASON CODES

Table 2-3 - Reason Code for Undeliverable Uplink Service Messages

Messages that are declared undeliverable by the service provider are returned to the originator using the SMI of SVC.

Code	Reason for Rejection	Explanation
311	No ACK	No response from aircraft
312	Aircraft In Voice	Aircraft is in voice mode
313	Aircraft in VDL Scan Mode	Aircraft is in VDL scan mode
321	CA RJCT - Printer Busy	Aircraft printer error occurred
322	CB RJCT - Printer Busy	Aircraft printer busy
323	CC RJCT - Printer Busy	Aircraft printer in local test mode
324	CD RJCT - Printer Busy	Aircraft printer out of paper
325	CE RJCT - Printer Busy	Aircraft printer buffer full
326	CF RJCT - Printer Busy	Aircraft printer has unknown error
331	NK RJCT - Aircraft NAK	Aircraft decoded its address in uplink block but Block Check Sum (BCS) incorrect
332	Q5 RJCT	ACARS MU unable to deliver message to final airborne destination
333	QX RJCT	ACARS MU unable to handle message; do not re-send

ATTACHMENT 3
PERFORMANCE REPORT GENERATION STATE DIAGRAM

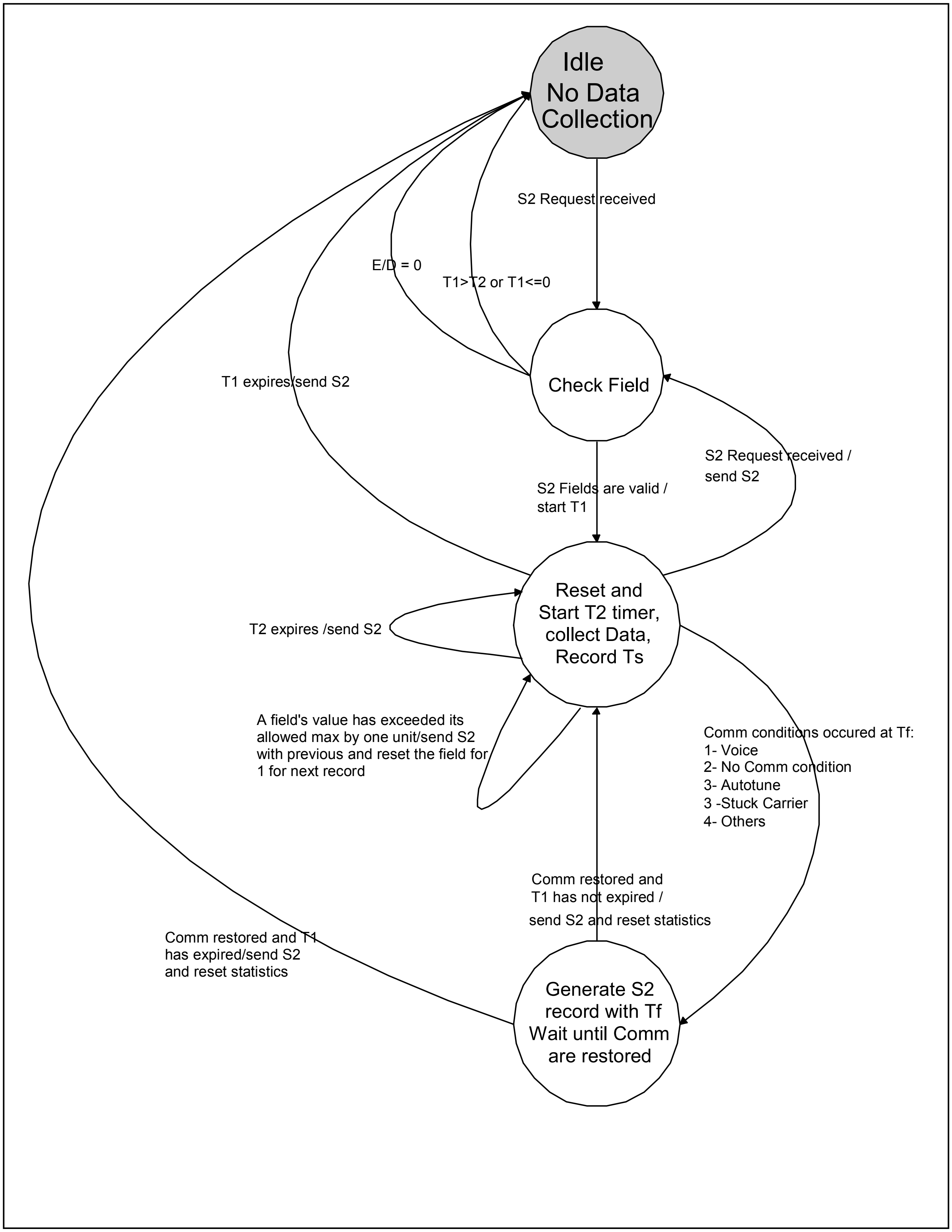


Figure 3-1 - Data Gathering and Report Generation

APPENDIX A
GLOSSARY & ACRONYMS

ACARS	Aircraft Communication Addressing and Reporting System
ACDN	Air Canada Data Network
ACK	Acknowledge
ACMS	Aircraft Condition Monitoring System
ADNS	ARINC Data Network Service
ADSU	ADS Unit
AEEC	Airline Electronic Engineering Committee
AFEPS	ACARS Front End Processor System (ARINC)
AIDS	Aircraft Integrated Data System
ADS	Automatic Dependent Surveillance
AOS	ACARS Outage Status
ARA	ACARS Restoral Advisory
ARINC	Aeronautical Radio, Incorporated
ASA	ACARS Station Addition
ASD	ACARS Station Deletion
ASP	AIRCOM Service Processor
ATA	Air Transport Association
ATC	Air Traffic Control
ATN	Aeronautical TELECOMM Network
CAA	Civil Aviation Authority
CFDIU	Central Fault Display Indicator Unit
CMC	Centralized Maintenance Computer
CMU	Communicating Management Unit
CSMA	Carrier Sense/Multiple Access Protocol
DBI	Downlink Block Identifier
DDTC	Digital Delivery of Taxi Clearance
DFDAU	Digital Flight Data Acquisition Unit
DMU	Data Management Unit
DSP	Data Link Service Provider
DSU	Data Link Service User
ETB	End of Transmission Block (ISO 5 character)
ETX	End of Transmission (ISO 5 character)
FMC	Flight Management Computer
FMS	Flight Management System
FWC	Flight Warning Computer
GSN	Ground Station Network

APPENDIX A
GLOSSARY & ACRONYMS

HLS	High Level System
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICM	Interline Communications Manual
IMI	Imbedded Message Identifier
MCDU	Multi-Function-Control Display Unit
MFI	Message Function Identifier
MTD	Message Text Delimiter
MTI	Message Text Identifier
MU	Management Unit
NAK	Non Acknowledgment
OAT	Optional Auxiliary Terminal
OSI	Open Systems Interface
RF	Radio Frequency
RGS	Remote Ground Station
RTCA	RTCA Corporation
SATCOM	Satellite Communications
SEM	System Essential Message
SITA	Societe Internationale de Telecommunications Aeronautiques
SMI	Standard Message Identifier
SMT	Standard Message Text
SPGNF	Service Provider Global Network Facilities
SPGS	Service Provider Ground Station
SP	Service Provider
SPP	Service Provider Processor
SRM	Service Related Message
STX	Start-of-Text Control Character
TAK	Technical Acknowledgment
TCAS	Traffic Alert/Collision Avoidance System
TEI	Text Element Identifier
TET	Text Element Terminator
TWI	Terminal Weather Information
TWIP	Terminal Weather Information for Pilots
UBI	Uplink Block Identifier
UDM	User Defined Message
UTC	Universal Coordinated Time

APPENDIX A
GLOSSARY & ACRONYMS

WVSS	Water Vapor Sensor System

APPENDIX B
SECTION B.1 TEI CODES

A TEI is a two-character code that uniquely identifies a text element type contained in SMT. TEIs have been assigned for those text elements most commonly used in the air-ground operations environment. An effort has been made to assign codes that conform to existing international and U.S. domestic standards and to use mnemonic values that are of maximum use when human interpretation and manual processing are required by the recipient.

The following TEIs have been assigned:

Code	**Title (Text Element Form)**
<-$_{sp}$>	Start of free text indicator. The TEI consists of a dash and a space character. (Refer to the end of this list of TEIs for a discussion about the incorporation of free text in SMT.)
AC	Estimated time approach clearance (four numeric characters--GMT hhmm)
AD	Aerodome of concern or arrival (three or four alpha characters) • ATA/IATA = three alpha characters • ICAO = four alpha characters
AL	Altitude or flight level (four, five, or six alphanumeric characters) • Character A plus three numeric characters = altitude to nearest 100 feet • Character F plus three numeric characters = flight level to nearest 100 feet • Character M plus four numeric characters = altitude to nearest 10 meters • The character C, D, or L prefixed to the character A, F, or M indicates that the aircraft is climbing, descending, or leaving (i.e., passing through the indicated altitude or flight level)
AN	Aircraft number (up to seven alphanumeric characters)
AP	Aircraft located at an airport (three/four alpha characters corresponding to airport designator codes)
AR	Arrival runway (variable alphanumeric characters)
AU	Auxiliary power unit (APU) (variable alphanumeric characters)
BF	Boarded fuel (up to six numeric characters; fuel to be expressed in hundreds of pounds, other units to be identified)
CL	Cruising level (four or five alphanumeric characters) • Character A plus three numeric characters = altitude to nearest 100 feet • Character F plus three numeric characters = flight level to nearest 100 feet • Character M plus four numeric characters = altitude to nearest 10 meters
CP	Cargo and Payload Information (Variable length, alpha-numeric sequence)
CZ	Cruising speed (six alphanumeric characters--speed in knots; five alphanumeric characters-

APPENDIX B
SECTION B.1 TEI CODES

Code	Title (Text Element Form)
	speed stated in a MACH number) • KTxxxx = knots • Mx.xx = MACH number • Where x is a numeric character
DA	Aerodrome of departure (three or four alpha characters) • ATA/IATA = three alpha characters • ICAO = four alpha characters
DP	Dew point (two numeric characters--degrees Celsius)(Downlink only)
DS	Destination station (three or four alpha characters and, optionally, a space character and four numeric characters—Destination aerodrome and, optionally, UTC hhmm) • ATA/IATA = three alpha characters • ICAO = Four alpha characters
DT	Communication service information (variable alphanumeric characters) ACARS message received and processed: DSP sit ddhhmm xxxx Where: DSP indicates DSP processed the message • site, airport or city designator of the ACARS site from which the message was received (three or four alpha characters) • ddhhmm date/time: the message was received (six numeric characters where dd = day of the month and hhmm = time UTC) • xxxx message sequence number: as received from the aircraft; the sequence number as defined in ARINC Specification 618
DV	Identification of aircraft being diverted from landing at original destination to another location (variable alphanumeric characters)
ED	Estimated time of departure (three or four alpha characters, space character, and four numeric characters--aerodrome of departure and UTC hhmm) • ATA/IATA = three alpha characters • ICAO = four alpha characters
EN	Endurance (four numeric characters--fuel endurance in hours and minutes, hhmm)
EO	Estimated time over (variable number of alphanumeric characters, space character, and four numeric characters--location and UTC hhmm)
FB	Fuel on board (up to six numeric characters, fuel to be expressedd in hundreds of pounds; other units to be identified)
FC	Estimated further clearance (four numeric characters--UTC hhmm)
FD	Fuel over destination (up to six numeric characters; fuel to be expressed in hundreds of pounds, other units to be identified)

APPENDIX B
SECTION B.1 TEI CODES

Code	Title (Text Element Form)
FI	Flight identification (up to seven alphanumeric characters)
GL	Approximate geographic location of aircraft (three/four alpha characters--airport or city designator code)
HD	Aircraft heading (three numeric characters--aircraft heading to the closest ten degrees, true)
IC	Aircraft icing (variable alphanumeric characters)
IN	IN Time (four numeric characters--UTC hhmm)
LA	Identification of officer landing aircraft (one numeric character)
LP	Log Page. Field length: 10 alpha and/or numeric characters
LR	Identification landing category (one numeric character)
MA	Message assurance (three numeric characters and one alpha character--sequence number and function, nnn) Where nnn is a sequence number, 000-999, and a is an alpha character indicating the function of the text element: • A = User Request for delivery indication • I = User Request for delivery indication and link acknowledgement • L = DSP identification of link acknowledgement • S = DSP identification of message receipt • X = DSP response for unsupported MA function • F = DSP identification for untransmittable message
MN	Maintenance (variable alphanumeric characters)
NL	Number of landings (up to two numeric characters followed by the alpha character F or T. The numeric characters indicate the number of landings, and the alpha character indicates the type of landing. F = full stops and T = touch and goes. Two sets of character sequences may be used, one indicating the number of full stops and one indicating the number of touch and goes)
NP	Next report point (variable number of alphanumeric characters)
OF	OFF Time (four numeric characters--UTC hhmm
ON	ON Time (four numeric characters--UTC hhmm)
OS	Other supplementary information (variable alphanumeric characters)
OT	OUT Time (four numeric characters--UTC hhmm)
OV	Present location (variable number of alpha numeric characters, space character, four numeric characters, space character, and an alpha character with three numeric characters--location, UTC hhmm, and altitude or flight level)

APPENDIX B
SECTION B.1 TEI CODES

Code	Title (Text Element Form)
	• Character A plus three numeric characters = altitude to nearest 100 feet • Character F plus three numeric characters = flight level to nearest 100 feet • Character M plus four numeric characters = altitude to nearest 10 meters
PB	Number of persons on board (variable alphanumeric characters--ATA/IATA
PD	Point of departure (three alpha characters--station of origin for this flight segment)
QN	Altimeter setting (two numeric characters, period character, and two numeric characters--value to set altimeter in inches xx.xx; if millibars are used as the reference, the character M is suffixed to the value)
RD	Departure runway (variable alphanumeric characters)
RF	Request flight level (variable alphanumeric characters)
RI	Return in time (four numeric characters--UTC hhmm)
RM	Remarks (variable alphanumeric characters)
RO	Return on time (four numeric characters--UTC hhmm)
RT	Route information (variable alphanumeric characters)
SA	Alternative aerodrome (three character sequence(s)-- ATA/IATA (Where more than one alternative is given, character sequences are separated by single space characters)
SI	Special communication addressing instruction (variable alphanumeric characters)
SK	Sky conditions (variable alphanumeric characters)
SL	SELCAL code (four alpha characters)
SP	Significant point (variable alphanumeric characters)
TA	Static air temperature (two alpha characters and two numeric characters) • MSxx = temperature in degrees below zero, Celsius (-xx C) • PSxx = temperature in degrees above zero, Celsius (xx C) Where xx is two numeric characters.
TB	Turbulence (variable alphanumeric characters)
TM	Surface air temperature (two alpha characters and two numeric characters) • MSxx = temperature in degrees below zero, Celsius (-xx C) • PSxx = temperature in degrees above zero, Celsius (xx C)

APPENDIX B
SECTION B.1 TEI CODES

Code	Title (Text Element Form)
	Where xx is two numeric characters.
TO	Time over (variable number of alphanumeric characters, space character, and four numeric characters--location and UTC hhmm)
TP	Transmission Path – Only one value should be used. *It* indicates to the DSP the medium to use for message delivery. VHF indicates the preference for the VHF media. Likewise, SAT and HFD indicate a preference for SATCOM and HFDL respectively**.**
VR	Runway visual range (up to three numeric characters--visual range in 30- to 60-meter increments for ranges to 800 meters
WV	Wind information (six numeric characters with the first three characters indicating wind direction to the nearest 10 degrees, true, and the second three characters indicating wind speed to the nearest knot)
WX	This text element may contain a weather-related position report if the weather, observation was taken at a position other than the aircraft's present position. If a weather-related position report is included, the six numeric characters are followed by a space character and a variable number of alphanumeric characters at describe the position of observation. (The present position of the aircraft is reported by using the TEI OV.)
WI	Weather (variable alphanumeric characters providing weather information or processing information for which there is no assigned TEI)
ZW	Zero fuel weight (variable numeric characters)

TEIs and the text elements identified by the TEIs are referred to as structured text. A text element follows its TEI and is separated from the TEI by a single space character as shown in the following example:

TA MS29

Where TA identifies the text element as the static air temperature, and the text element indicates that the static air temperature is 29 below zero, Celsius.

APPENDIX B
SECTION B.2 RULES FOR SMI/TEI APPLICATION

Text that is not part of a message's structured text is free text and immediately follows the last line of the structured text portion of the text field. The start of the free text portion of SMT is indicated by a dash character (-)-space character sequence that is used as a free text identifier. This identifier appears at the start of the first line of free text. That is, it immediately follows the Carriage Return-Line Feed sequence that ends the last line of structured text. The free text identifier is, in turn, followed by a space character that separates the free text identifier from the first character of free text. The free text identifier appears only at the start of the first line of free text. When the free text occupies more than one line, the free text identifier should not appear at the start of the second and subsequent lines of text.

The rules listed in this section apply to the use of standard message identifiers and text element identifiers in standard message text.

Notes:

1. The ATA/IATA Five-bit Coded Character Set (Alphabet No. 2) uses CARRET and LINE FEED to refer to the Carriage Return and Line Feed control characters. The ATA/IATA Seven-bit Code for Information Interchange (Alphabet No. 5) uses CR and LF to refer to these characters. In this manual, CR and LF are used to refer to the Carriage Return and Line Feed control characters in both alphabets. The dash character is the FIGS A character in Alphabet No. 2.
2. Each message must contain an SMI. A message may not contain more than one SMI unless it is a Possible Duplicate Message (PDM) being (delivered) retransmitted by the service provider's ground/ground network. In this case, the SMI code PDM is inserted in line 3 of the message by the delivering service provider. The original SMI code would follow on line 4 and all other lines would be shifted down by one after this.
3. An SMI must be an approved three-character code and must be on a line by itself at the first part of the message text. All SMI codes presently approved for use with datalink are listed in Appendix C.
4. SMT text received by the datalink service provider from a ground user for transmission to an aircraft must include either an AN (aircraft registration mark) text element or an FI (flight identification) text element.
5. Structured text begins on the line immediately after the SMI line, and each line of structured text must be ended with a <cr/lf> sequence.
6. A TEI and its text element must be separated from each other by a single space; thus, the TEI and its text element must be on the same line. That is, they cannot be separated by a <cr/lf> sequence. This requirement also means that each line of structured text must begin with a TEI. (See, however, item 11 below.)
7. A line of text may contain several structured text elements; i.e., TEIs and their accompanying text elements. Structured text elements must be separated from each other by the slash character </> without any intervening spaces as shown in the following example:

   (1) FI XX110/AN N69740/DA IAH/OT 1936/FB 752/BF 268<cr/lf>
8. In the forming of messages, TEIs need not appear in any fixed order with the following exceptions:

COMMENTARY

The order of TEIs, as they appear in ground/ground message, is not necessarily consistent with the order of these fields in the air/ground message.

- In messages that have the flight identification or the aircraft number or both as mandatory text elements, the TEIs for these elements must appear immediately after the <cf/lf> sequence that ends the line containing the SMI.
  - When present, TA static air temperature, should appear at the beginning of a line of structured text. That is, these TEIs must immediately follow a <cr/lf> sequence.
  - When present, MA Message Assurance, should appear at the end of structured text; i.e., the TEI must follow the AN/FI sequence.

9. The start of Free Text is indicated by the dash character (-) followed by a space character. The dash character must be at the beginning of the first line of text and free text should start two spaces after the dash character. The dash character is not repeated at the beginning of subsequent lines of text.
10. When present, the free text portion of a message follows the <cr/lf> sequence that ends the last line of structured text. The free text portion must be located immediately before and be terminated by the end-of-text character.
11. Structured data elements identified by TEIs may be mandatory or optional for an SMI as defined for an SMT; however, the order and composition of data items within a data element should be standardized for each SMT
12. If the number of characters in a text element for a TEI causes the standard line length allowed by the communications environment to be exceeded and the text element to be broken by a <cr/lf> sequence, the TEI must be repeated after the <cr/lf> sequence. The repeated TEI is followed by a space character and the remainder of the text element.
13. The use of the TP TEI is optional; however, when used in conjunction with the GL TEI, the ground station's media must match that specified by the TP TEI.

While it is implied that message texts identified by certain SMIs will always contain specific TEIs, no fixed SMTs have been agreed to at present.

In general, it is intended that data processing be accomplished at the TEI level, not the SMI level.

APPENDIX C
MESSAGE INFORMATION

Table C-1 Message List by SMI

SMI	LABEL/ SUB-LABEL	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
A80 to A8`	80 to 8`	DN	Aircrew-Addressed Downlink Message	5.3.11	AIR-6
AAM	N/A	DN	Network Advisory Message	3.4	
AEP	57	DN	Alternate Aircrew Initiated Position Report	5.3.47	AIR-6
AEP	5R	DN	Aircrew Initiated Position Report	5.3.5	AIR-6
AFD	B0	DN	ATS Facility Notification (AFN)	5.5.10	DSP-3
AFU	A0	UP	ATS Facility Notification (AFN)	4.5.10	DSP-3
AGM	5Z	DN	Airline Designated Downlink	5.3.7	AIR-6
AGM	7B	DN	Aircrew Entered Miscellaneous Message	5.3.10	AIR-6
AGM	C1	UP	Designated Cockpit/Cabin Printer Message	4.3.4	AIR-6
AGM	Q1	DN	Departure/Arrival Report	5.3.15	AIR-6
AOA	N/A	G/G	ACARS Station(s) Outage Advisory		
AOS	N/G	G/G	ACARS Station(s) Outage Status Advisory	2.4.1	
APR	S3	UP	LRU Configuration Report Request	4.3.8	AIR-6
APR	S3	DN	LRU Configuration Report	5.3.50	AIR-6
ARA	N/A	G/G	ACARS Station(s) Restoral Advisory	2.4.2	
ARI	N/A	G/G	Fuel/Close-out Report		
ARR	Q1	DN	Arrival Report	5.3.16	AIR-6
ARR	QC	DN	ON report (IATA Airport Code)	5.3.26	AIR-6
ARR	QD	DN	IN/Fuel Report (IATA Airport Code)	5.3.27	AIR-6
ARR	QK	DN	Landing Report (IATA Airport Code)	5.3.32	AIR-6
ARR	QL	DN	Arrival Report (IATA Airport Code)	5.3.33	AIR-6
ARR	QM	DN	Arrival Information Report (IATA Airport Code)	5.3.34	AIR-6
ARR	QR	DN	ON Report (ICAO Airport Code)	5.3.38	AIR-6
ARR	QS	DN	IN Report (ICAO Airport Code)	5.3.39	AIR-6
ASA	N/A	G/G	ACARS Station(s) Addition	2.4.3	
ASD	N/A	G/G	ACARS Station(s) Deletion	2.4.4	
ATC	AA	UP	ATC Communications	4.5.11	DSP-3
ATC	BA	DN	ATC Communications	5.5.11	DSP-3
CDA	B4	DN	Departure Clearance Readback Downlink	5.5.4	DSP-3
CFD	H1/CF	UP/DN	Central Fault Display (Header)	4.4.3, 5.4.2	AIR-6
CFX	H1/CF	UP	Central Fault Display (No Header)	4.4.4	AIR-6
CLA	B2	DN	Oceanic Clearance Readback	5.5.2	DSP-3
CLD	A3	UP	Departure Clearance	4.5.3	DSP-3
CLK	Q3	DN	Clock Update Advisory	5.3.18	DSP-4
CLX	A1	UP	Oceanic Clearance	4.5.1	DSP-3
CMD	RA	UP	Command/Response Uplink	4.3.5	AIR-6
CP0	C0	UP	Undesignated Cockpit/Cabin Printer Messages, All Call	4.3.4	AIR-6

Legend:	N/A = Not Applicable	GG=Ground to Ground UP=Uplink DN=Downlink	AIR = Label Optionally Addressed to Airline Host or DSP DEL = Label Not Supported under ATN DSP = Label Always Addressed to Data Link Service Provider	Priority 1=high Priority 16=low

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MESSAGE INFORMATION

Table C-1 Message List by SMI

SMI	LABEL/ SUB-LABEL	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
CP1	C1	UP	Designated Cockpit/Cabin Printer Messages	4.3.4	AIR-6
CP2 to CP9	CP2 to CP9	UP	Designated Cockpit/Cabin Printer Messages	4.3.4	AIR-6
CPL	BE	DN	CPC Aircraft Log-On/Log-Off Request	5.5.15	DSP-3
CPR	AF	UP	CPC Command/Response	4.5.16	DSP-3
CWR	BF	DN	CPC WILCO/UNABLE RESPONSE	5.5.16	DSP-3
DAI	A9	UP	ATIS Report	4.5.9	DSP-3
DDS	A8	UP	Deliver Departure Slot	4.5.8	DSP-3
EP	Q1	DN	Departure Report	5.3.16	AIR-6
DEP	QA	DN	OUT/Fuel Report (IATA Airport Code)	5.3.24	AIR-6
DEP	QB	DN	OFF Report (IATA Airport Code)	5.3.25	AIR-6
DEP	QE	DN	OUT/Fuel/Destination Report (IATA Airport Code)	5.3.28	AIR-6
DEP	QF	DN	OFF/Destination Report (IATA Airport Code)	5.3.29	AIR-6
DEP	QH	DN	OUT Report (IATA Airport Code)	5.3.31	AIR-6
DEP	QP	DN	OUT Report (ICAO Airport Code)	5.3.36	AIR-6
DEP	QQ	DN	OFF Report (ICAO Airport Code)	5.3.37	AIR-6
DFD	H1/DF	UP/DN	Digital Flight Data Acquisition Unit (Header)	4.4.3, 5.4.2	AIR-6
DFX	H1/DF	UP	Digital Flight Data Acquisition Unit (No Header)	4.3.5.4	AIR-6
DIV	QN	DN	Diversion Report (IATA Airport Code)	5.3.35	AIR-6
DLA	Q7	DN	Delay Message	5.3.21	AIR-6
ECS	H1/EC	DN	Engine Display System	5.4	AIR-6
EML	E1	DN	Internet E-Mail Message	5.3.53	AIR-6
EMS	E2	DN	Internet E-mail Message/DSP Service	5.3.55	AIR-6
ENG	7A	DN	Aircrew Initiated Engine Data/Takeoff Thrust Report	5.3.9	AIR-6
ENG	H1/EI	DN	Engine Report	5.4	AIR-6
ETA	5Y	DN	Aircrew Revision to Previous ETA/Diversion Report	5.3.8	AIR-6
ETA	Q2	DN	Estimated Time of Arrival Report	5.3.17	AIR-6
ETC	AD	UP	Expect Taxi Clearance	4.5.14	DSP-3
ETR	BD	DN	Pushback Clearance Request	5.5.14	DSP-3
FC3	H1/M3	UP Only	Flight Management Computer, Center (Header)	4.4.3	AIR-3

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APPENDIX C
MESSAGE INFORMATION

Table C-1 Message List by SMI

SMI	LABEL/ SUB-LABEL	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
FCD	H1/MD	UP	Flight Management Computer, Selected (Header)	4.4.3	AIR-3
FCL	H1/M1	UP	Flight Management Computer, Left (Header)	4.4.3	AIR-3
FCR	H1/M2	UP	Flight Management Computer, Right (Header)	4.4.3	AIR-3
FM3	H1/M3	UP/DN	Flight Management Computer, Center (No Header)	4.4.4, 5.4.2	AIR-3
FMD	H1/MD	UP/DN	Flight Management Computer, Selected (No Header)	4.4.4	AIR-3
FML	H1/M1	UP/DN	Flight Management Computer, Left (No Header)	4.4.4, 5.4.2	AIR-3
FMR	H1/M2	UP/DN	Flight Management Computer, Right (No Header)	4.4.4, 5.4.2	AIR-3
FSM	A4	UP	Flight Systems Message	4.5.4	DSP-3
FTD	B7	DN	“Free Text” to ATC	5.5.7	DSP-3
FTU	A7	UP	“Free Text” from ATC	4.5.7	DSP-3
GVR	54	UP	Voice Go-ahead (or ACARS Frequency Uplink)	4.2.3	DEL
HDD	H1/HD	UP	HF Data Radio, Selected (No Header)	4.4.4	AIR-6
HDL	H1/H1	UP/DN	HF Data Radio, Left (No Header)	4.4.4, 5.4	AIR-6
HDR	H1/H2	UP/DN	HF Data Radio, Right (No Header)	4.4.4, 5.4	AIR-6
HJK	00	DN	Emergency Situation Report (Aircraft Hijack)	5.3.1	AIR-1
ICE	3	DN	Icing Report	5.3.52	AIR-5
M10 to M4~	10 to 4~	UP/DN	User Defined Messages (No Header)	4.6, 5.6	AIR-6
MAS	N/A	G/G	Message Assurance		
MED	SA	DN	Media Advisory	5.3.51	DEL
MVA	M2	DN	User Defined Message	5.6	AIR-6
MX1 to MX9	X1to X9 MX9	UP	Service Provider Defined	4.8., 5.8,	DSP-6
MX1 to MX9	X1to X- X4, X9	UP/DN	Service Provider Defined	4.8., 5.8,	DSP-6
N10 to N4~	H1/10 to H1/4~	DN	User Defined Messages (No Header)	5.4.2, 4.0	AIR-6
NPR	S2	UP	Network Performance Report Request	4.3.7	DEL
NPR	S2	DN	Network Performance Report	5.3.49	DEL

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MESSAGE INFORMATION

Table C-1 Message List by SMI					
SMI	LABEL/ SUB-LABEL	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
NSR	S1	UP	VHF Network Statistics Report Request	5.3.48	DEL
NSR	S1	DN	VHF Network Statistics Report	5.3.48	DEL
OAT	H1/None	UP/DN	Optional Auxiliary Terminal (Header)	4.4.1, 5.4	AIR-6
OAT	H1/PS	DN	Keyboard/Display Unit	5.4	AIR-6
OAX	H1/None	UP	Optional Auxiliary Terminal (No Header)	4.4.2	AIR-6
PAR	B6	DN	Provide ADS Report	5.5.6	DSP-3
PBC	AC	UP	Pushback Clearance	4.5.13	DSP-3
PBR	BC	DN	Pushback Clearance Request	5.5.13	DSP-3
PDM	N/A	G/G	Possible Duplicate Message		
POS	B5	DN	Waypoint Position Report	5.5.5	DSP-3
QTB	N/A	G/G	Incomplete Message		
RAI	B9	DN	Request ATIS Report	5.5.9	DSP-3
RAR	A6	UP	Request ADS Report	4.5.6	DSP-3
RCD	B3	DN	Request Departure Clearance	5.5.3	DSP-3
RCL	B1	DN	Request Oceanic Clearance	5.5.1	DSP-3
RDO	RB	DN	Command/Response Downlink	5.3.14	AIR-6
RDS	B8	DN	Request Departure Slot	5.5.8	DSP-3
REJ	HX	DN	Undelivered Uplink Report	5.3.46	AIR-6
RTN	QG	DN	OUT/Return IN Report (IATA Airport Code)	5.3.30	AIR-6
RTN	QT	DN	OUT/Return IN Report (ICAO Airport Code)	5.3.40	AIR-6
SDD	H1/SD	UP	SDU, Selected (No Header)	4.4.4	AIR-6
SDL	H1/S1	UP/DN	SDU, Left (No Header)	4.4.4, 5.4	AIR-6
SDR	H1/S2	UP/DN	SDU, Right (No Header)	4.4.4, 5.4	AIR-6
SVC	CA	DN	Communication Service Message, Printer Status Annunciation - Error in Printer	3.3.4	AIR-6
SVC	CB	DN	Printer Busy	5.2.9	AIR-6
SVC	CC	DN	Printer in Local or Test Mode	5.2.9	AIR-6
SVC	CD	DN	Printer Out of Paper	5.2.9	AIR-6
SVC	CE	DN	Printer Buffer Overrun	5.2.9	AIR-6
SVC	CF	DN	Printer Initialized Before Completion Printer Status Communication - Error in Printer	5.2.9	AIR-6
SVC	N/A	G/G	Communication Service Message		
SVC	Q5	DN	Unable to Deliver Uplink Messages	5.2.5	AIR-6
SVC	QX	DN	Intercept/Unable to Process	5.2.7	AIR-6
TIS	5D	DN	ATIS Request	5.3.4	DSP-7

Legend: N/A = Not Applicable; GG=Ground to Ground; UP=Uplink; DN=Downlink; AIR = Label Optionally Addressed to Airline Host or DSP; DEL = Label Not Supported under ATN; DSP = Label Always Addressed to Data Link Service Provider; Priority 1=high; Priority 16=low

APPENDIX C
MESSAGE INFORMATION

Table C-1 Message List by SMI

SMI	LABEL/ SUB-LABEL	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
TT0	H1/T0	UP	Cabin Terminal Message All Call (No Header)	4.4.4	AIR-7
TT1 to TT8	H1/T1 to H1/T8	UP/DN	Cabin Terminal Message (No Header)	4.4.4, 5.4	AIR-7
TWI	AB	UP	Terminal Weather Information for Pilots	4.5.12	DSP-3
TWR	BB	DN	Terminal Weather Information for Pilots	5.5.12	DSP-3
TX1 to TX8	H1/T1 to H1/T8	UP	Cabin Terminal Messages (Header)	4.4.3	AIR-7
VMA to VMZ and VM0 to VM9	VA to VZ and V0 to V9	UP/DN	Vendor defined message	4.7, 5.7	AIR-6
WXC	H4	UP/DN	Meteorological Configuration Report and Command	5.3.54, 4.3.10	AIR-5
WXM	H2	UP	Meteorological Report Command	4.3.9	AIR-5
WXM	H2	DN	Meteorological Report	5.3.13	AIR-5
WXO	H1/WO	DN	Weather Observation Report	5.4	AIR-6
WXR	5U	DN	Weather Request	5.3.6	AIR-5

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MESSAGE INFORMATION

Table C-2 Message List by Label

LABEL	SMI	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
:;	N/A	UP	Data Transceiver Auto-Tune	4.2.6	DEL
_j	N/A	N/A	Reserved	4.2.2	DEL
:}	N/A	UP	OA to AOA Autotune	4.2.8	DEL
_DEL	N/A	UP/DN	General Response (Demand Mode)	4.2.1, 5.2.1	DEL
00	HJK	DN	Emergency Situation Report (Aircraft Hijack)	5.3.1	AIR - 1
10 to 4~	M10 to M4~	UP/DN	User Defined Messages (No Header)	4.6, 5.6	AIR - 6
51	N/A	DN	Ground GMT Request	5.3.2	DSP - 4
51	N/A	UP	Ground GMT Report	4.3.1	DSP - 4
52	N/A	DN	Ground UTC Request	5.3.3	DSP - 4
52	N/A	UP	Ground UTC Report	4.3.2	DSP - 4
54	AVR	DN	Voice Contact Request (Ground Party Address)	5.2.2	DEL
54	GVR	UP	Voice Go-ahead (or ACARS Frequency Uplink)	4.2.3	DEL
57	AEP	DN	Alternate Aircrew Initiated Position Report	5.3.47	AIR - 6
5D	TIS	DN	ATIS Request	5.3.4	DSP - 7
5P	N/A	DN	Temporary Suspension	5.2.4	DEL
5R	AEP	DN	Aircrew Initiated Position Report	5.3.5	AIR - 6
5U	WXR	DN	Weather Request	5.3.6	AIR - 5
5V	N/A	DN	VDL Switch Advisory	5.2.10	DEL
5Y	ETA	DN	Aircrew Revision to Previous ETA/Diversion Report	5.3.8	AIR - 6
5Z	AGM	DN	Airline Designated Downlink	5.3.7	AIR - 6
7A	ENG	DN	Aircrew Initiated Engine Data/Takeoff Thrust Report	5.3.9	AIR - 6
7B	AGM	DN	Aircrew Entered Miscellaneous Message	5.3.10	AIR - 6
80 to 8~	A80 to A8~	DN	Aircrew-Addressed Downlink Message	5.3.11	AIR - 6

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APPENDIX C
MESSAGE INFORMATION

Table C-2 Message List by Label

LABEL	SMI	UPLINK or DOWNLINK	ESCRIPTION	SECTION	SERVICE PRIORITY
A1	CLX	UP	Oceanic Clearance	4.5.1	DSP - 3
A2	Unassigned	UP	Unassigned	4.5.2	DSP - 3
A3	CLD	UP	Departure Clearance	4.5.3	DSP - 3
A4	FSM	UP	Flight Systems Message	4.5.4	DSP - 3
A5	Unassigned	UP	Unassigned	4.5.5	DSP - 3
A6	RAR	UP	Request ADS Reports	4.5.6	DSP - 3
A7	FTU	UP	“Free Text” from ATC	4.5.7	DSP - 3
A8	DDS	UP	Deliver Departure Slot	4.5.8	DSP - 3
A9	DAI	UP	ATIS Report	4.5.9	DSP - 3
A0	AFU	UP	ATS Facility Notification (AFN)	4.5.10	DSP - 3
AA	ATC	UP	ATC Communications	4.5.11	DSP - 3
AB	TWI	UP	Terminal Weather Information for Pilots (TWIP)	4.5.12	DSP - 3
AC	PBC	UP	Pushback Clearance	4.5.13	DSP - 3
AD	ETC	UP	Expected Taxi Clearance	4.5.14	DSP - 3
AE	Unassigned	UP	Unassigned	4.5.15	DSP - 3
AF	CPR	UP	CPC Command Response	4.5.16	DSP - 3
AG	Unassigned	UP	Unassigned	4.5.17	DSP - 3
B1	RCL	DN	Request Oceanic Clearance	5.5.1	DSP - 3
B2	CLA	DN	Oceanic Clearance Readback	5.5.2	DSP - 3
B3	RCD	DN	Request Departure Clearance	5.5.3	DSP - 3
B4	CDA	DN	Departure Clearance Readback Downlink	5.5.4	DSP - 3
B5	POS	DN	Waypoint Position Report	5.5.5	DSP - 3
B6	PAR	DN	Provide ADS Report	5.5.6	DSP - 3
B7	FTD	DN	“Free Text” to ATC	5.5.7	DSP - 3
B8	RDS	DN	Request Departure Slot	5.5.8	DSP - 3
B9	RAI	DN	Request ATIS Report	5.5.9	DSP - 3
B0	AFD	DN	ATS Facility Notification (AFN)	5.5.10	DSP - 3
BA	ATC	DN	ATC Communications	5.5.11	DSP - 3
BB	TWR	DN	Terminal Weather Information for Pilots	5.5.12	DSP - 3
BC	PBR	DN	Pushback Clearance Request	5.5.13	DSP - 3
BD	ETR	DN	Expected Taxi Clearance Request	5.5.14	DSP - 3
BE	CPL	DN	CPC Log-on/Log-off Request	5.5.15	DSP - 3
BF	CWR	DN	CPC WILCO/UNABLE Response	5.5.16	DSP - 3
BG	Unassigned	DN	Unassigned	5.5.17	DSP - 3

Legend:	N/A = Not Applicable	GG=Ground to Ground UP=Uplink DN=Downlink	AIR = Label Optionally Addressed to Airline Host or DSP DEL = Label Not Supported under ATN DSP = Label Always Addressed to Data Link Service Provider	Priority 1=high Priority 16=low

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MESSAGE INFORMATION

Table C-2 Message List by Label

LABEL	SMI	UPLINK or DOWNLINK	ESCRIPTION	SECTION	SERVICE PRIORITY
C0	CP0	UP	Undesignated Cockpit/Cabin Printer Messages, All Call	4.3.4	AIR - 6
C1	AGM	UP	Designated Cockpit/Cabin Printer Messages	4.3.4	AIR - 6
C2 to C9	CP2 to CP9	UP	Designated Cockpit/Cabin Printer Messages	4.3.4	AIR - 6
CA	SVC	DN	Communication Service Message, Printer Status Annunciation - Error in Printer	5.2.9	AIR - 6
CB	SVC	DN	Printer Busy	5.2.9	AIR - 6
CC	SVC	DN	Printer in Local or Test Mode	5.2.9	AIR - 6
CD	SVC	DN	Printer Out of Paper	5.2.9	AIR - 6
CE	SVC	DN	Printer Buffer Overrun	5.2.9	AIR - 6
CF	SVC	DN	Printer Initialized Before Completion Printer Status Communication - Error in Printer	5.2.9	AIR - 6
E1	EML	DN	Internet E-Mail Message	5.3.53	AIR-6
E2	EMS	DN	Internet E-Mail Message/DSP Service	5.3.55	AIR-6
F3	N/A	DN	Dedicated Transceiver Advisory	5.2.8	EL
H1	Various	UP/DN	See Table C-2A	Table C-2A	Table C-2A
H2	WXM	UP	Meteorological Report Command	4.3.9	AIR - 5
H2	WXM	DN	Meteorological Report	5.3.13	AIR - 5
H3	ICE	DN	Icing Report	5.3.52	AIR - 5
H4	WXC	DN	Meteorological Version 4 Configuration Report	5.3.54	AIR - 5
H4	WXC	UP	Meteorological Command	4.3.10	AIR - 5
HX	REJ	DN	Undelivered Uplink Report	5.3.46	AIR - 6
M2	MVA	DN	User Defined Message	5.6	AIR - 6
Q0	N/A	DN	Link Test	5.3.15	DSP - 6
Q1	AGM	DN	Departure/Arrival Report	5.3.16	AIR - 6
Q1	ARR	DN	Arrival Report	5.3.16	AIR - 6
Q1	DEP	DN	Departure Report	5.3.16	AIR - 6
Q2	ETA	DN	Estimated Time of Arrival Report	5.3.17	AIR - 6
Q3	CLK	DN	Clock Update Advisory	5.3.18	DSP - 4
Q4	N/A	UP	Voice Circuit Busy (Not Supported)	4.2.4	DEL
Q5	SVC	DN	Unable to Deliver Uplink Messages	5.2.5	AIR - 6

Legend:	N/A = Not Applicable	GG=Ground to Ground UP=Uplink DN=Downlink	AIR = Label Optionally Addressed to Airline Host or DSP DEL = Label Not Supported under ATN DSP = Label Always Addressed to Data Link Service Provider	Priority 1=high Priority 16=low

APPENDIX C
MESSAGE INFORMATION

Table C-2 Message List by Label

LABEL	SMI	UPLINK or DOWNLINK	ESCRIPTION	SECTION	SERVICE PRIORITY
Q6	N/A	DN	Voice to Data Channel Changeover Advisory	5.2.6	DEL
Q7	DLA	DN	Delay Message	5.3.21	AIR - 6
QA	DEP	DN	OUT/Fuel Report (IATA Airport Code)	5.3.24	AIR - 6
QB	DEP	DN	OFF Report (IATA Airport Code)	5.3.25	AIR - 6
QC	ARR	DN	ON Report (IATA Airport Code)	5.3.26	AIR - 6
QD	ARR	DN	IN/Fuel Report (IATA Airport Code)	5.3.27	AIR - 6
QE	DEP	DN	OUT/Fuel/Destination Report (IATA Airport Code)	5.3.28	AIR - 6
QF	DEP	DN	OFF/Destination Report (IATA Airport ode)	5.3.29	AIR - 6
QG	RTN	DN	OUT/Return IN Report (IATA Airport Code)	5.3.30	AIR - 6
QH	DEP	DN	OUT Report (IATA Airport Code)	5.3.31	AIR - 6
QK	ARR	DN	Landing Report (IATA Airport Code)	5.3.32	AIR - 6
QL	ARR	DN	Arrival Report (IATA Airport Code)	5.3.33	AIR - 6
QM	ARR	DN	Arrival Information Report (IATA Airport Code)	5.3.34	AIR - 6
QN	DIV	DN	Diversion Report (IATA Airport Code)	5.3.35	AIR - 6
QP	DEP	DN	OUT Report (ICAO Airport Code)	5.3.36	AIR - 6
QQ	DEP	DN	OFF Report (ICAO Airport Code)	5.3.37	AIR - 6
QR	ARR	DN	ON Report (ICAO Airport Code)	5.3.38	AIR - 6
QS	ARR	DN	IN Report (ICAO Airport Code)	5.3.39	AIR - 6
QT	RTN	DN	OUT/Return IN Report (ICAO Airport Code)	5.3.40	AIR - 6
QV	N/A	DN	Autotune Reject	5.2.11	DSP-6
QX	SVC	DN	Intercept/Unable to Process	5.2.7	AIR - 6
RA	CMD	UP	Command/Response Uplink	4.3.5	AIR - 6
RB	RDO	DN	Command/Response Downlink	5.3.14	AIR - 6
S1	NSR	UP	Network Statistics Report Request	4.3.6	DEL
S1	NSR	DN	VHF Network Statistics Report	5.3.48	DEL
S2	NPR	UP	VHF Performance Report Request	4.3.7	DEL
S2	NPR	DN	VHF Performance Report	5.3.49	DEL
S3	APR	UP	LRU Configuration Report Request	4.3.8	AIR - 6
S3	APR	DN	LRU Configuration Report	5.3.50	AIR - 6

Legend:	N/A = Not Applicable	GG=Ground to Ground UP=Uplink DN=Downlink	AIR = Label Optionally Addressed to Airline Host or DSP DEL = Label Not Supported under ATN DSP = Label Always Addressed to Data Link Service Provider	Priority 1=high Priority 16=low

APPENDIX C
MESSAGE INFORMATION

Table C-2 Message List by Label

LABEL	SMI	UPLINK or DOWNLINK	ESCRIPTION	SECTION	SERVICE PRIORITY
SA	MED	DN	Media Advisory	5.3.51	DEL
SQ	N/A	UP	Squitter Message	4.2.5	EL
VA to VZ and V0 to V9	VMA to VMZ and VM0 to VM9	UP/DN	Vendor Defined Message (No header)	4.7 and 5.7	AIR-6
X1 to X9	MX1 to MX9	UP/DN	Service Provider Defined	4.8 and 5.8	DSP - 6

Legend:	N/A = Not Applicable	GG=Ground to Ground UP=Uplink DN=Downlink	AIR = Label Optionally Addressed to Airline Host or DSP DEL = Label Not Supported under ATN DSP = Label Always Addressed to Data Link Service Provider	Priority 1=high Priority 16=low

APPENDIX C
MESSAGE INFORMATION

Table C-2A Peripheral Messages (Label H1) Listed by Sub-Label

SUBLABEL	SMI	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
10 to 4~	N10 to N4~	DN	User Defined Messages (No Header)	5.4	AIR-6
CF	CFD	UP/DN	Central Fault Display	4.4.3, 5.4	AIR-6
CF	CFX	UP	Central Fault Display (No Header)	4.4.4	AIR-6
DF	DFD	UP/DN	Digital Flight Data Acquisition Unit (Header)	4.4.3, 5.4	AIR-6
DF	DFX	UP	Digital Flight Data Acquisition Unit (No Header)	4.4.4	AIR-6
EC	ECS	DN	Engine Display System	5.4	AIR-6
EI	ENG	DN	Engine Report	5.4	AIR-6
H1	HDL	UP/DN	HF Data Radio, Left (No Header)	4.4.4, 5.4	AIR-5
H2	HDR	UP/DN	HF Data Radio, Right (No Header)	4.4.4, 5.4	AIR-6
HD	HDD	UP	HF Data Radio, Selected (No Header)	4.4.4	AIR-6
M1	FCL	UP	Flight Management Computer, Left (Header)	4.4.3	AIR-6
M1	FML	UP/DN	Flight Management Computer, Left (No Header)	4.4.4, 5.4	AIR-6
M2	FCR	UP	Flight Management Computer, Right (Header)	4.4.3	AIR-6
M2	FMR	UP/DN	Flight Management Computer, Right (No Header)	4.4.4, 5.4	AIR-6
M3	FC3	UP	Flight Management Computer, Center (Header)	4.4.3	AIR-6
M3	FM3	UP/DN	Flight Management Computer, Center (No Header)	4.4.4, 5.4	AIR-6
MD	FCD	UP	Flight Management Computer, Selected (Header)	4.4.3	AIR-6
MD	FMD	UP/DN	Flight Management Computer, Selected (No Header)	4.4.4, 5.4	AIR-6
None	OAT	UP/DN	Optional Auxiliary Terminal (Header)	4.4.3	AIR-6
None	OAX	UP	Optional Auxiliary Terminal (No Header)	4.4.4, 5.4	AIR-6
PS	OAT	DN	Keyboard/Display Unit	4.4.4, 5.4	AIR-6
S1	SDL	UP/DN	SDU, Left (No Header)	4.4.4, 5.4	AIR-6
S2	SDR	UP/DN	SDU, Right (No Header)	4.4.4, 5.4	AIR-6
SD	SDD	UP	SDU, Selected (No Header)	4.4.4	AIR-6
T0	TT0	UP	Cabin Terminal Message (Undefined)	4.4.4	N/A

Legend: N/A = Not Applicable; GG=Ground to Ground; UP=Uplink; DN=Downlink; AIR = Label Optionally Addressed to Airline Host or DSP; DEL = Label Not Supported under ATN; DSP = Label Always Addressed to Data Link Service Provider; Priority 1=high; Priority 16=low

APPENDIX C
MESSAGE INFORMATION

Table C-2A Peripheral Messages (Label H1) Listed by Sub-Label

SUBLABEL	SMI	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
T1 to T8	TT1 to TT8	UP/DN	Cabin Terminal Messages (No Header)	4.4.4	AIR-6
T1 to T8	TX1 to TX8	UP	Cabin Terminal Messages (Header)	4.4.3	AIR-6
WO	WXO	DN	Weather Observation Report	5.4	AIR-6

Legend:	N/A = Not Applicable	GG=Ground to Ground UP=Uplink DN=Downlink	AIR = Label Optionally Addressed to Airline Host or DSP DEL = Label Not Supported under ATN DSP = Label Always Addressed to Data Link Service Provider	Priority 1=high Priority 16=low

APPENDIX C
MESSAGE INFORMATION

Table C-2B MFI Assignments

MFI	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
A1	UP	Oceanic Clearance	4.5.1	DSP-3
A2	UP	Unassigned	4.5.2	DSP-3
A3	UP	Departure Clearance Response	4.5.3	DSP-3
A4	UP	Flight Systems Message	4.5.4	DSP-3
A5	UP	Unassigned	4.5.5	DSP-3
A6	UP	Request ADS Reports	4.5.6	DSP-3
A7	UP	Free Text	4.5.7	DSP-3
A8	UP	Deliver Departure Slot	4.5.8	DSP-3
A9	UP	ATIS report	4.5.9	DSP-3
A0	UP	ATS Facility Notification (AFN)	4.5.10	DSP-3
AA	UP	ATCComm	4.5.11	DSP-3
AB	UP	TWIP Report	4.5.12	DSP-3
AC	UP	Pushback Clearance	4.5.13	DSP-3
AD	UP	Expected Taxi Clearance	4.5.14	DSP-3
AE	UP	Unassigned	4.5.15	DSP-3
AF	UP	CPC Command/Response	4.5.16	DSP-3
B1	DN	Request Oceanic Clearance	5.5.1	DSP-3
B2	DN	Oceanic Clearance Readback	5.5.2	DSP-3
B3	DN	Request Departure Clearance	5.5.3	DSP-3
B4	DN	Departure Clearance Readback	5.5.4	DSP-3
B5	DN	Reserved	5.5.5	DSP-3
B6	DN	Provide ADS Report	5.5.6	DSP-3
B7	DN	Free Text	5.5.7	DSP-3
B8	DN	Request Departure Slot	5.5.8	DSP-3
B9	DN	Request ATIS Report	5.5.9	DSP-3
B0	DN	ATS Facility Notification	5.5.10	DSP-3
BA	DN	ATCComm	5.5.11	DSP-3
BB	DN	Request TWIP Report	5.5.12	DSP-3
BC	DN	Pushback Clearance Request	5.5.13	DSP-3
BD	DN	Expected Taxi Clearance Request	5.5.14	DSP-3
BE	DN	CPC Aircraft Log-On/Off Request	5.5.15	DSP-3
BF	DN	CPC WILCO/UNABLE Response	5.5.16	DSP-3
E1	DN	Internet E-mail Message	5.3.53	AIR-6
E2	DN	Internet E-mail Message/DSP Service	5.3.53	AIR-6
H2	UP	Meteorological Report Request	4.3.9	DSP-3
H2	DN	Meteorological Report	5.3.13	DSP-3
H3	DN	Icing Report	5.3.52	DSP-3
H4	DN	Meteorological Report, Configuration	5.3.13	AIR - 5

Legend:	N/A = Not Applicable	GG=Ground to Ground UP=Uplink DN=Downlink	AIR = Label Optionally Addressed to Airline Host or DSP DEL = Label Not Supported under ATN DSP = Label Always Addressed to Data Link Service Provider	Priority 1=high Priority 16=low

APPENDIX C
MESSAGE INFORMATION

Table C-2B MFI Assignments

MFI	UPLINK or DOWNLINK	DESCRIPTION	SECTION	SERVICE PRIORITY
		Report, Version 4		
H4	UP	Meteorological Report, Command, Version 4	4.3.10	AIR - 5

APPENDIX D
RESERVED

This appendix, formerly entitled BLOCKING MULTI-BLOCK MESSAGES, has been removed from Supplement 5 but retained as a placeholder.

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APPENDIX E
ISO 5 CHARACTERS

Table E-1 Baudot Limits to ASCH (ISO #5 Code Set

BIT 7----->					0	0	0	0	1	1	1	1
BIT 6----->					0	0	1	1	0	0	1	1
BIT 5----->					0	1	0	1	0	1	0	1
BIT 4	BIT 3	BIT 2	BIT 1	Column → Row ↓	0	1	2	3	4	5	6	7
0	0	0	0	0	00 NUL	10 DLE	20 SP	30 0	40 @	50 P	60 ′	70 p
0	0	0	1	1	01 SOH	11 DC1	21 !	31 1	41 A	51 Q	61 a	71 q
0	0	1	0	2	02 STX	12 DC2	22 "	32 2	42 B	52 R	62 b	72 r
0	0	1	1	3	03 ETX	13 DC3	23 #	33 3	43 C	53 S	63 c	73 s
0	1	0	0	4	04 EOT	14 DC4	24 $	34 4	44 D	54 T	64 d	74 t
0	1	0	0	4	05 ENQ	15 NAK	25 %	35 5	45 E	55 U	65 e	75 u
0	1	1	0	6	06 ACK	16 SYN	26 &	36 6	46 F	56 V	66 f	76 v
0	1	1	1	7	07 EL	17 ETB	27 ′	37 7	47 G	57 W	67 g	77 w
1	0	0	0	8	08 BS	18 CAN	28 (	38 8	48 H	58 X	68 h	78 x
1	0	0	1	9	09 HT	19 EM	29)	39 9	49 I	59 Y	69 i	79 y
1	0	1	0	10	0A LF	1A SUB	2A *	3A :	4A J	5A Z	6A j	7A z
1	0	1	1	11	0B VT	1B ESC	2B +	3B ;	4B K	5B [	6B k	7B {
1	1	0	0	12	0C FF	1C FS	2C ,	3C <	4C L	5C \	6C l	7C |
1	1	0	1	13	0D CR	1D GS	2D /	3D =	4D M	5D]	6D ³ m	7D }
1	1	1	0	14	0E SO	1E RS	2E 1 .	3E >	4E N	5E ^	6E n	7E ~
1	1	1	1	15	0F SI	1F US	2F 1 /	3F ?	4F O	5F _	6F o	7F DEL

Hex value → / Character →	04 1 / EOT	← Note
(shaded box)	Characters not recommended in "Free Text" portion Uplink or Downlink messages	

Notes :

1. See Section 2.2.8 for guidance on usage.
2. The ESC Character will pass through the SITA network.
3. The BEL character will pass through the ARINC network.
4. The DEL character is reserved.

APPENDIX E
ISO 5 CHARACTERS

Table E-2 Baudot Character Set

BIT 7------->					0	0	0	0	1	1	1	1
BIT 6------->					0	0	1	1	0	0	1	1
BIT 5------->					0	1	0	1	0	1	0	1
BIT 4	BIT 3	BIT 2	BIT 1	Column → Row ↓	0	1	2	3	4	5	6	7
0	0	0	0		00 NUL	10 DLE	20 SP	30 0	40 @	50 P	60 ’	70 p
0	0	0	1	1	01 SOH	11 DC1	21 !	31 1	41	51 Q	61 a	71 q
0	0	1	0	2	02 STX	12 DC2	22 "	32 2	42 B	52 R	62 b	72 r
0	0	1	1	3	03 ETX	13 DC3	23 #	33 3	43 C	53 S	63 c	73 s
0	1	0	0	4	04 EOT	14 DC4	24 $	34 4	44 D	54 T	64 d	74 t
0	1	0	0	4	05 ENQ	15 NAK	25 %	35 5	45 E	55 U	65 e	75 u
0	1	1	0	6	06 ACK	16 SYN	26 &	36 6	46 F	56 V	66 f	76 v
0	1	1	1	7	07 BEL	17 ETB	27 ’	37 7	47 G	57 W	67 g	77 w
1	0	0	0	8	08 BS	18 CAN	28 (	38 8	48 H	58 X	68 h	78 x
1	0	0	1	9	09 HT	19 EM	29)	39 9	49 I	59 Y	69 i	79 y
1	0	1	0	10	0A LF	1A SUB	2A *	3A :	4A J	5A Z	6A j	7A z
1	0	1	1	11	0B VT	1B ESC	2B +	3B ;	4B K	5B [	6B k	7B {
1	1	0	0	12	0C FF	1C FS	2C ,	3C <	4C L	5C \	6C l	7C |
1	1	0	1	13	0D CR	1D GS	2D -	3D =	4D M	5D]	6D m	7D }
1	1	1	0	14	0E SO	1E RS	2E 1 .	3E >	4E N	5E ^	6E n	7E ~
1	1	1	1	15	0F SI	1F US	2F /	3F ?	4F O	5F _	6F o	7F DEL

Hex value → 04 1 ← Note
Character → EOT

(shaded) Characters not recommended in Free Text that is intended to pass through baudot ground-ground connections.

Notes:

1. See Section 2.2.8 for guidance on usage.
2. IThe ESC character will pass through the SITA network.
3. The BEL character will pass through the ARINC network.
4. The DEL character is reserved.

APPENDIX E
ISO 5 CHARACTERS

NULL	Null, or all zeros	DC1	Device control 1
SOH	Start of heading	DC2	Device control 2
STX	Start of text	DC3	Device control 3
ETX	End of text	DC4	Device control 4
EOT	End of transmission	NAK	Negative acknowledge
ENQ	Enquiry	SYN	Synchronous idle
ACL	Acknowledge	ETB	End of transmission
BEL	Bell, or alarm	CAN	Cancel
BS	Backspace	EM	End of medium
HT	Horizontal tabulation	SUB	Substitute
LF	Line feed	ESC	Escape
VT	Vertical tabulation	FS	File separator
F	Form feed	G8	Group separator
CR	Carriage return	R8	Record separator
SO	Shift out	US	Unit separator
SI	Shift in	SP	Space
DLE	Data link escape	DEL	Delete

APPENDIX F
VHF ACARS NETWORK PERFORMANCE REPORTING

F-1.1 Background

There is a growing interest among some ACARS users to improve the Network Management function found within the present air-ground ACARS systems. The user, from its Ground Host, should be able to request the status of a VHF RF activity. Similarly, the DSP will be able to probe the aircraft system to check its ACARS activity status. This capability will assist the management of ACARS traffic congestion and fault isolation.

F-1.2 S2 Label

The label S2 should be used to provide reports of air-ground systems indicators pertinent to RF load level and protocol management.

- The S2 label will serve as a tool to provide pertinent Indicators of real time performance such as :
  - Downlink success rate
  - Retransmmission rate
  - Delivery delays
  - Block Error Rate

F-1.3 S2 Format and Content

A standardized suite of data measurements and set of indicators needs to be identified. This section provides an overview of a proposed set of indicators. It is recommended that the whole set of data would fit in a **single block.**

F-1.3.1 Aircraft Profile

The 618 Specification contains many system requirements which are not mandatory (i.e., may, can) and it may be useful to know from Service Providers' point of view what kind of options are supported by an aircraft. To cope with such an implementation diversities, this report would allow the DSP to dynamically integrate data's per aircraft basis and accommodate the 618 protocol to certain specificities.

Example of Aircraft Profile field (Yes/No):

- FANS-1 Equipped Aircraft
- SAT Equipped Aircraft
- HF Equipped Aircraft
- LAT/LON available (FMC)
- AT7 range (12-25 sec or 6-12 sec as an example)
- AC1 value (3-8)
- Support ATS applications on-board
- Support S1 Statistic Label
- Support nested downlink *ACARS* multiblock message
- Support nested uplink *ACARS* multiblock message
- Category-A/B

- Support 5P/Q6/F3 enable/disable
- Support SA label
- Support Tracker Timer (optional in cat-B..)
- MAC algorithm (P-persistent, 1-persistent, Non-persistent)

F-1.3.2 Environmental indicators

F-1.3.2.1 Channel Utilization

This data indicator will provide on frequency use so as isolate traffic conditions. An S2 label can be used as a probing point in the air to measure the Channel load as seen from aircraft in a particular area and take appropriate decision within the respective DSP's multi frequency management algorithms.

- Possible definitions (in percentage)

This parameter represents the percentage of time the channel is busy with ACARS traffic blocks. The Channel Utilization is calculated by dividing the cumulative time the channel has been busy over the measurement period (Tf-Ts). It includes the contribution of aborted packets and invalid packets which occupy the channel for some period but which are not successfully received.

$$CUtil1_{(\Delta t)} = \frac{\alpha}{\Delta t} \times NB\_BLK \times (\overline{TXT} + \overline{PRK} + NTXT)$$

Where :

α is the character duration within a 2400bps transmission rate (1/300 sec)

Δt is the time slot duration (Tf-Ts sec)

$\overline{TXT}$ is the text field length (in characters) over the time slot duration

$\overline{PRK}$ is the average block Prekey length (fixed for 42 characters for SITA)

$NTXT$ is the fixed number of characters in each ACARS block which are not text characters

(22 characters for BAR, SYN, SOH, Mode, ETX, BCS, DEL).

NB_BCK is the total number of decoded block : uplink, downlink, pass, failed, squitters.

or

$$CUtil2 = \frac{Tcu}{Tf - Ts}$$

Where:

Tcu	is the cumulative amount of time the MU detects the channel is busy.
Ts	is the start time of Data Collection.
Tf	is the stop time of Data Collection.

F-1.3.2.2 MAC Delay

It is defined as the time spent to get on the channel. This time depends on the MAC algorithm used (p-persistent, non-persistent...) and channel utilization. A MAC average delay can be measured in the Tf-Ts period by adding each MAC interval computed from the time the block is sent to the MAC layer up to the time it is transmitted over the RF channel.

Cumulative MAC delay within Tf-Ts as computed by the MU:

$$Tmac = \sum_{t=Ts}^{Tf} (Time\_Block\_sent\_to\_MAC_i - Time\_block\_sent\_to\_RF_i)$$

Average MAC delay:

$$AvMacDelay = \frac{Tmac}{D1 + D2}$$

where Tmac is those downlinks requiring ACKs:	D1 = Number of first downlink block transmissions that require an ACK
where Tmac is those downlinks requiring ACKs:	D2 = Number of re-transmitted downlink block s that require an ACK

See Section 5.3.49 for usage. See Section 5.10.2 of ARINC Specification 618 for further detail.

F-1.3.2.3 Aircraft VHF Management Indicators

The management indicators aims at defining data elements necessary to live performance management of congestion and fault isolation.

Example of Management Indicators fields:

- Start time of Data Collection: s (hhmmss)
- Stop time of Data Collection: Tf (hhmmss)
- Service Provider Id provided in Squitter (XS, XA AC ...)
- Frequency (Base/Alternate): XYZ.abc
- Air / Ground character indication (cruise or on the ground - OOOI State)
  - OUT time (hhmmss
  - OFF time (hhmmss)

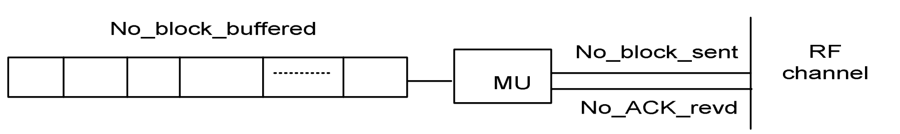
  - ON time (hhmmss) may not be necessary since these data are
  - IN time (hhmmss) already present in the OOOI messages
  - Origin Airport
  - Destination Airport
- LAT at Tf define the area where the indicators
- LON at Tf apply, information which may facilitate
- Altitude at Tf Frequency Management
- Cumulative Downlink Success Rate made of :
  - Number of Acknowledgment received
  - Number of blocks transmitted
- Repetition Rate made of:
  - Number of first block transmissions
  - Number of blocks transmitted (encompasses first transmissions and re-transmissions)
- Error Rate Indicators-(i.e Number of Uplink/Downlink Block with failed BCS collected during Tf-Ts)
- Block Delivery Average Delay
- Number of Hand-offs in Category-B
- Number of distinct Logical Channel heard during Tf-Ts.
- Number of distinct Squitters received during Tf-Ts

F-1.3.3 Indicator calculations

The following sections give an insight into some indicators that can be extracted from the Statistics Record S2 found in Section 5.3.49.

F-1.3.3.1 Cumulative Downlink Success Rate

This indicator refers to the cumulative number of acknowledgment received to date divided by the number of block transmitted to date (comprise first block transmission and re-transmissions).

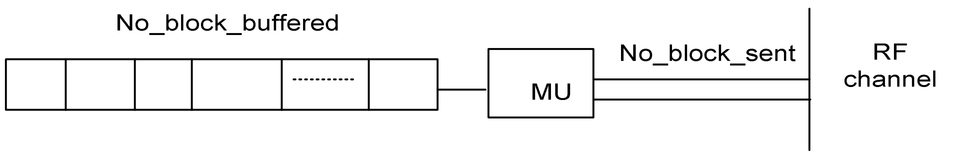


$$R1(Ts,Tf) = \frac{\sum_{t=Ts} Nb\_Ack\_rcvd}{\sum_{t=Ts}^{t=Tf} Nb\_Block\_sent} = \frac{U1}{D1+D2}$$ where *Tf is the stop time and Ts Start Time*

This indicator has a maximum outcome value is 1, when all the downlinks did receive their corresponding acknowledgment on the first attempt. The ideal result would be the indicator value equals to 1 during the whole flight. It also check for command response efficiency.

F-1.3.3.2 Channel Efficiency Ratio

This indicator is computed by dividing the total number of ACARS blocks which have been buffered by the total number of blocks transmitted (no count for re-transmissions) over the RF channel. The R2 ratio provides an accurate measure as regards the RF channel capacity usage.



$$R2(Ts,Tf) = \frac{\sum_{t=Ts}^{t=Tf} Nb\_Block\_buffered}{\sum_{t=Ts}^{t=Tf} Nb\_FirstBlock\_sent} = \frac{B1}{D1}$$

where *Tf* is the Stop time and Ts Start time

F-1.3.3.3 Downlink retransmissions or repetition rate

This indicator records the number of times an ACARS block is transmitted before getting an acknowledgment. This indicator can measure the average magnitude of the repetitionsenc to quantify high traffic symptoms.

$$R3(Ts,Tf) = \frac{\sum_{t=Ts}^{t=Tf} Nb\_FirstBlock\_sent}{\sum_{t=Ts}^{t=Tf} Total\_Block\_sent} = \frac{D1}{D1+D2}$$

F-1.3.3.4 Block Error Rate (Bad BCS + Incomplete messages)

The following is a non-exhaustive sample of Error Rate Indicators that could be derive from the Statistics Record S2 found in Section 5.3.49:

Downlink Error Rate = $\frac{ID3 + BD3}{ID3 + BD3 + D3}$

Uplink Error Rate= $\frac{IU3 + BU3 + BU4 + IB4}{IU3 + BU3 + BU4 + IU4 + U2 + U3 + U4}$

Downlink BCS Error Rate = $\frac{BD3}{BD3 + D3}$

Uplink BCS error Rate = $\frac{BU3 + BU4}{BU3 + BU4 + U2 + U3 + U4}$

F-1.3.3.5 Number of Hand-offs (Category-B only)

All Category-B downlink are identified within the mode characters @ through]. The actual mode character inserted in each transmission depends upon the preferred ground system access code the MU may use, based on all valid uplink mode characters captured. This indicator defines the total number of successive mode characters selected by the aircraft during Category-B mode of operation (except the mode 2 which is reserved for the broadcast).

Number of Hand-offs = CTB1

F-1.3.3.6 Downlink Delivery Average Delay

This indicator gathered data related to the maximum or average delay per ACARS block (due to retransmissions). The maximum delivery time is correlated to the maximum number of times the MU attempts to downlink a block. This indicator encompasses the MAC delay and the uniform distributed AT7 timer and can be defined as follows :

Cumulative block delivery delay within Tf-Ts as computed by the MU:

$$Tbdd = \sum_{t=Ts}^{Tf} (Time\_FirstBlock\_sent_i - Time\_Ack\_received_i)$$

Average block delivery delay: $AvBlDelay = \frac{Tbdd}{D1 + D2}$

APPENDIX G
UPLINK CONTROL PROGRAMMING NOTES FOR VERSION 4 ONBOARD SOFTWARE

G-1 Introduction

Version 4 of the ARINC 620 Meteorological Report specification defines the protocols to be used to automatically collect and report meteorological observations on board appropriately equipped aircraft using the Aircraft Communications and Reporting System (ACARS). This version enhances previous versions by defining a number of onboard functions to control where and when observations are taken in order to meet operational requirements of all data users. New functions include the ability to optimize collection of data and to be able to target or inhibit the collection of observations only in specific areas or at defined airports. These control functions are used to provide more efficient and effective national and regional data collection programs.

Version 4 differs from previous versions in several important respects:

- Profile (ascent and/or descent) reports may be selected by pressure interval instead of time interval.
- Geographical areas for enabling and/or inhibiting reports may be selected.
- Specific airports may be selected to enable ascents and/or descents to be reported and/or specific airports may be selected to inhibit ascent and/or descent reports.
- Reporting can be inhibited during a pre-set interval in each 24 hr (UTC) period.
- Maximum wind reporting can be enabled during the enroute reporting phase.

The options in previous versions for modifying reporting parameters are retained.

G-2 Options

In order to obtain maximum flexibility in the use of the various options, default values of relevant control variables are stored onboard as part of the basic software. These values can only be changed by reprogramming the software. The default values are used to populate look-up tables and are stored in volatile memory following a complete system reset and/or initialization. The initial set of default variables if left unchanged automatically enable the AMDAR system to run a basic program almost identical in format to Version 2 of the Downlink Meteorological Report. Any variables can be modified by uplink command and additional variables can be uplinked to expand the functionality of each table as required. Any changes are retained in volatile memory until the next system reset and/or initialization whereupon the default values are reinstalled. The data table contents are given as follows:

Table 1 - Basic Configuration

Element No	Default Value	Description	Possible Value(s)	Link to Table(s)	Remarks
1	1	Enable AMDAR	0		0 = disable, 1 = enable
			1		
2	0	Inhibit reporting in selected time interval.	0		0 = disable (report through 24hrs every day), 1 = enable
			1	9	
3	0	Report in designated region	0		0 = disable, 1 = enable
			1	2	
4	0	Airport selection	0		0 = disable, 1 = enable
			1	3	
5	1	Ascent selection	0	6, 4	0 = disable, 1= enable
			1	5, 3	
6	1	Enroute selection	0		0 = disable, 1 = enable
			1	4, 3	
7	1	Descent selection	0	8, 4	0 = disable, 1 = enable
			1	7, 3	

The above table shows defaults and possible values for the basic configuration. It is used as follows:

- Element 1 enables AMDAR. If set to 0 by uplink command AMDAR is disabled.
- Element 2 if set to 1 allows an interval stored in Table 9 to be used to inhibit AMDAR reporting in every 24 hour period. Default is 0.
- Element 3 if set to 1 points to Table 2 where reporting and/or non-reporting regions (defined by latitude/longitude boxes) are stored. Default is 0 meaning report globally.
- Element 4 if set to 1 points to Table 3 where airports selected or inhibited for profile (ascent/descent) reporting are stored. Default is 0 meaning report all ascents/descents (wherever AMDAR is enabled).
- Element 5 if set to 0 means inhibit all ascent reports and points to Tables 6 and 4. Default is 1 meaning report at all airports in selected regions as determined by Elements 3 and 4 and points to Tables 5 and 3.
- Element 6 if set to 0 means inhibit Enroute reporting. Default is 1 meaning enable Enroute reporting and points to Table 4.
- Element 7 if set to 0 means inhibit all descent reports and points to Tables 8 and 4. Default is 1 meaning report at all airports in selected regions as determined by Elements 3 and 4 and points to Tables 7 and 3.

Table 2 - Report in Designated Region

Element Number	Default value	Description	Possible Values	Link to Table(s)	Remarks
1	00	Number (n) of boxes following	00-16	3 (n = 00)	Up to 16 boxes
2 to (n+1), omitted if n=0	L1L1 A1L2L2A2 L3 L3L3 B1L4L4 L4B2	Report in Lat/ Long box	90N-90S, 180W-180E	3	Lat in degrees north (A = N) or south (A = S) Lon in degrees east (B = E) or west (B = W) Convention is L1L1 to L2L2 (N -S) and L3L3L3 to L4L4L4 (W-E).
(n+2)	00	Number (nn) of boxes following	00-16		Up to 16 boxes
(n+3) – (n + 2 + nn), omitted if nn=0	L1L1 A1L2L2A2 L3 L3L3 B1L4L4 L4B2	Inhibit reporting in Lat/ Long box	As above		Inhibit has priority over enable

Table 2 stores up to 16 geographical boxes in which AMDAR is enabled, meaning all ascent and descent profiles and enroute data are reported unless modified by subsequent commands, and up to 16 boxes in which reporting is inhibited. Following a complete system reset and/or initialization, n and nn are set to 00 and the table contains 2 elements only. The elements are used as follows:

- Element 1 indicates the number (n) of reporting boxes following. If n= 00, global reporting is enabled. A link to Table 3 checks if specific airports are designated for profile reporting.
- Elements 2 – (n+1) define the geographical areas for reporting.
- Element (n+2) indicates the number (nn) of boxes following in which all reporting is to be inhibited. Specified boxes have priority over reporting boxes. Thus if Element 1 is 00 and Element 2 is 01 all regions except the one following are designated reporting regions.
- Elements (n+3) to (n+2+nn) define the inhibit regions
- The minimum number of elements stored (i.e., following a complete system reset and/or initialization) is 2 (00,00).

Table 3 - Airport Selection

Element Number	Default Value	Description	Possible Values	Link to Table(s)	Remarks
1	00	Number (n) of airfields following	00-20		Up to 20 airfields may be selected for ascent reporting
2 to (n+1), omitted if n = 00		Airfield selected for ascent	4 character airfield code		
n+2	00	Number (nn) of airfields following	00-20		Up to 20 airfields may be selected for descent reporting
(n+3) to (n+2+nn), omitted if nn = 00		Airfield selected for descent	4 character airfield code		
(n+nn +3)	00	Number (N) of airfields following	00-20		Up to 20 airfields may be inhibited for reporting ascents
(n+nn+4) to (n+nn+3+N), omitted if N= 00		Airfield inhibited for ascent	4 character airfield code		
(n+nn+N+4)	00	Number (NN) of airfields following	00-20		Up to 20 airfields may be inhibited for reporting descents
(n+nn+N+5) to (n+nn+N+4+NN), omitted if NN= 00		Airfield inhibited for descent	4 character airfield code		
(n+nn+N+NN+5)	0	Routine observations: enabled = (1), disabled = (0)	0-1	4 (if enabled)	1 = enable routine observations during ascent and descent for above selected (inhibited) airfields. Routine observations are observations made at set intervals as defined in Table 4. 0 = no routine observations to be made at any above selected airfields.

Table 3 stores airfield address codes for either selecting or inhibiting profile (ascent/descent) reporting. Following a complete system reset and/or initialization n, nn, N and NN are set to 00 and the table contains 5 elements only. The elements are used as follows:

- Element 1 indicates the number (n) following of airports designated for ascent reporting in any region where AMDAR is enabled for reporting. The default value 00 means this function is to be ignored and all ascents in reporting areas shall be reported unless disabled in the basic configuration table (Table 1, Element 5).
- Elements 2 to (n+1) give the 4-character ICAO airfield code for airfields designated for ascent reporting by uplink command. If n = 00 the elements are omitted.
- Element (n+2) gives the number (nn) following of airports designated for descent reporting. The default value 00 means this function is to be ignored and all descents in reporting areas shall be reported unless disabled in the basic configuration table (Table 1, Element 7).
- Elements (n+3) to (n+2+nn) give the 4-character airfield code for airfields designated for descent reporting by uplink command. If n = 00 the elements are omitted.
- Element (n+nn+3) gives the number (N) following of airports inhibited in reporting regions from ascent reporting. The default value 00 means no airports inhibited.
- Elements (n+nn+4) to (n+nn+3+N) give the 4-character airfield code for airfields designated for inhibiting ascent reporting by uplink command. If N = 00 the elements are omitted.
- Element (n+nn+N+4) gives the number (NN) following of airports inhibited in reporting regions from descent reporting. The default value 00 means no airports inhibited.
- Elements (n+nn+N+5) to (n+nn+N+4+NN) give the 4-character airfield code for airfields designated for inhibiting descent reporting by uplink command. If NN = 00 the elements are omitted.
- Element (n+nn+N+NN+5) can be set to allow routine reporting during ascents and descents (as appropriate) even if airports are inhibited from reporting profiles. Routine reports are observations taken at fixed enroute intervals regardless of flight phase. The default value 0 means no routine reports are to be made during the profile phase for any selected airfield. If set to 1 reports are required at the interval set in Table 4.
- The minimum no of elements stored (following a complete system reset and/or initialization) is 5.

Table 4 – Routine-Enroute Observing Interval and Maximum Wind Reporting

Element Number	Default value	Description	Possible Values	Link to Table(s)	Remarks
1	07	Routine-level flight observing interval (min)	01 - 60	1, 3, 4, 6, 8	Used if enroute or routine reporting enabled
2	1	Maximum wind reporting: enabled = (1), disabled = (0)	0-1	1	Applicable to enroute reporting.

Table 4 gives the routine-enroute observing interval and allows maximum wind to be reported during the enroute observing phase. The default value for Element 1 is 07 meaning that reports (observations) are required at 7 minute intervals in the enroute flight phase if enabled (Table 1, Element 6) or if required, during pauses in ascent and/or descent flight phases for periods of level flight (Table 5, Element 8). Also, the selected value may be required in ascent and/or descent phase if profile reporting is disabled (Table 1, Elements 5 and 7; Table 3, last element; Table 6; Table 8). The default value for Element 2 is 1 indicating that maximum wind reporting is required. If set to 1 maximum wind identification and reporting is enabled during the enroute phase.

Table 5 - Ascent Profile Options

Element Number	Default Value	Description	Possible Values	Link to Table(s)	Remarks
1	1	Pressure level (0) or Time interval (1) selection	0-1	1	Designates ascent profile intervals as time or pressure intervals.
2	06	Series 1 time intervals(s)	03-20		See downlink message format
3	090	Series 1 duration(s)	030-200		
4	20	Series 2 intervals(s)	20-60		
5	051	Total duration (sx10)	051-111		Series 1 + Series 2 or total duration of climb
6	200	Top of climb (ftx100)	150-250		
7	2	Pressure target list selected	1-2		See Table 10, List 1 and 2
8	1	Level flight reporting: enable = (1), disable = (0)	0-1	4	Enables level flight reports during pauses in ascent

This table designates the ascent profile parameters either for time interval or pressure interval selection. If ascent reporting is enabled in any region (Table 1, Elements 1, 3, 4 and 5; Table 3) this Table is used as follows:

- Element 1 determines if time or pressure intervals are to be used. The default 1 indicates time interval selection as detailed in the following Elements 2-5.
- If set to 0, pressure intervals are to be used determined according to pre-set pressure heights stored in Table 10 and to the flag set in Element 7.
- Element 2 gives the time interval for the first ascent (series 1) phase of flight after the initial sample (observation) is taken at take-off. The default interval is 6 seconds in an allowed range of 3-20 seconds.
- Series 1 observations continue until the duration set by Element 3 is reached. The default value is 90 seconds (090) in a range of 30-200 seconds.
- Element 4 gives the time interval for observations in the second ascent phase (series 2). The default value is 20 seconds in a range of 20-60 seconds.
- Element 5 gives the total duration of Ascent series1 and series 2 sampling, after which AMDAR goes into the enroute flight phase. The default value is 510 seconds in a range of 510 to 1110 seconds.
- Element 6 gives the top of climb as a pressure altitude. The default value is 200 (20,000 ft) in a range of 150-250. The enroute phase shall commence when the aircraft first reaches the limit set by element 5 (time) or the limit set by Element 6 (pressure) irrespective of the method of profile interval in use.
- Element 7 points to one of two pressure-altitude target lists contained in a stored table (Table 10). The default value is 2 meaning that Table 10; List 2 shall be used for pressure interval selection. List 2 contains target heights designed for 10hPa interval and 50hPa interval selection and is used as follows: After the initial observation is made at take-off, 10 measurement samples are taken at 10hPa intervals, starting at the first target height after the pressure altitude at take-off. For example if the take-off pressure altitude is 100 ft the first sample will be taken at height 11 (364 ft) and the last 10hPa sample will be taken at height 29 (2994 ft). Thereafter samples shall continue at 50hPa intervals until top of climb (element 6) is exceeded or total duration (Element 5) is exceeded. In the example, if top of climb is set to 200 (20,000 ft) samples will be taken at height 31 (3243 ft), 41(4781 ft), 51 (6394 ft) 81 (20812 ft) assuming the total duration is not exceeded. (Note. If an aircraft does not reach the top of climb altitude the total duration set (Element 5) will ensure reaching the enroute flight phase unless the total flight duration is less than this pre-set duration. In this case ascent observation samples will cease at the last 50hPa interval target level reached and, if enabled, descent sampling will commence when the aircraft descends through target altitudes at or below the target set for initiating the descent phase (Table 7).
- For pressure based sampling, Element 8 enables the selection of timed reporting in level flight during pauses in the ascent phase and points to Element 1 of Table 4 for the routine observations interval. This function is disabled if ascent is not selected in Table 1 Element 5. In the event that the top of climb is not reached, this element automatically enables detection of the enroute phase. These samples are transmitted as part of the ascent report even though pressure altitude may not be changing during the pause in ascent.

Table 6 - Enable Routine Observations During Ascent

Element Number	Default Value	Description	Possible Values	Link to Table(s)	Remarks
1	1	Routine observations enabled = (1), disabled = (0)	0-1	Table 1	Enables or disables routine observations when ascent profiling is disabled.

This Table is used only if ascents are disabled in Table 1 (Element 5). If set to the default value, routine observing intervals (Table 4) will be used during ascent instead of detailed profile interval as given in Table 5.

Table 7 - Descent Profile Options

Element Number	Default Value	Description	Possible Values	Link To Table(s)	Remarks
1	1	Pressure interval (0)/time interval (1) selection	0-1	1	Designates descent profile sampling at time or pressure intervals.
2	040	Descent intervals	020-300		
3	200	Top of descent(PALT) (ft x 100	150-250		
4	2	Pressure target list selected	1-2		See Table 10, List 1 and 2.
5	1	Level flight sampling: enable = (1), disable = (0)	0-1	4	Enables or disables timed level flight reports during pauses in descent

This table designates the descent profile parameters either for time interval or pressure interval selection. If descent reporting is enabled in any region (Table 1, Elements 1, 3, 4 and 7; Table 3), the Table is used as follows:

- Element 1 determines if time or pressure intervals are too be used. The default 1 indicates time interval selection as determined by Element 2. If set to 0, pressure intervals are to be used determined according to pre-set pressure heights stored in Table 10 and to the flag set in Element 4.
- Element 2 sets the descent time interval. The default value is 40 seconds in a range of 20-300 seconds.
- Element 3 sets the top of descent. The default value is 200 (20,000 ft) in a range of 150-250 (15,000-25,000 ft). Whichever interval (pressure or time) is designated for descent profiling the descent flight phase will start on passing though this pre-set value. In the event that the enroute altitude is already lower than top of descent, the descent phase shall commence on descending through two consecutive 25hPa target altitudes taken from Table 10, List 1. For example, if cruise level is 24,000 ft and top of descent is set to 25,000 ft, descent sampling shall commence at target level 82 (22,160 ft).
- Element 4 points to one of two pressure-altitude target lists contained in a stored table (Table 10). The default value is 2 meaning that Table 10; List 2 shall be used for pressure interval selection. List 2 contains target heights designed for 10hPa interval and 50hPa interval selection. List 1 contains

target heights designed for higher density profiles with 5hPa interval and 25hPa interval selection

- Table 10 is used as follows:
    - For pressure based sampling, if Element 3 (top of descent) is lower than the cruise (enroute reporting phase) altitude, descent phase sampling shall commence when the aircraft descends through the first 50hPa or 25hPa (as appropriate) target height encountered. For example if Element 3 is set to 20,000ft, and Element 4 points to Table 10, List 2, descent sampling starts at height 79 (18, 289 ft). Sampling continues at 50hPa target intervals until the 700hPa level is reached. All samples from the top of descent to 700hPa including the 700hPa sample are transmitted in one report. On passing through 700hPa (target height 71, samples are taken at 10hPa intervals and stored until touchdown. On touchdown, the most recent 10 samples at 10hPa intervals above touchdown altitude are retained. Above this 100hPa layer, samples at integer multiples of 50hPa are taken from the stored 10hPa samples and transmitted with the most recent 10hPa samples in one report. All remaining intermediate 10hPa samples are discarded. The profile thus contains 50hPa samples from 750hPa to 100hPa above touchdown altitude followed by 10, 10hPa samples for the lowest portion of the profile. If element 4 had pointed to List 1, descent sampling would have started at target height 80 and continued at 25hPa intervals until and including 700hPa. These samples would be transmitted in one report. On passing through 700hPa (target height 71) additional samples would then have been taken at 5hPa intervals (target heights 70, 69, 68, 67…) until touchdown. The 20 most recent 5hPa samples are retained. Above this 100hPa layer, samples at integer multiples of 25hPa are taken from the stored 10hPa samples and transmitted with the most recent 10hPa samples in one report. All remaining intermediate 10hPa samples are discarded. The profile thus contains 25hPa samples from 750hPa to 100hPa above touchdown altitude followed by 20, 5hPa samples for the lowest portion of the profile.
- In the event that the enroute altitude is already lower than top of descent, the descent phase shall commence on descending through two consecutive 25hPa target altitudes taken from Table 10, List 1. The first sample shall be taken at the first target height encountered i.e., the second of the two trigger levels if List 1 is used and the first available trigger at or immediately following the second 25hPa value if List 2 is used (as defined by Element 4). For example, if cruise level is 24,000 ft and top of descent is set to 25,000 ft, Element 4 set to 2, descent sampling shall commence at target level 41 (20, 812). In this case the trigger levels are 23,574 ft and 22,160 ft. and 20,812 is the first available list 2 trigger following the decision that descent is under way.
- For pressure based sampling, Element 5 enables the selection of timed reporting in level flight during pauses in the descent phase and points to Element 1 of Table 4 for the interval of routine sampling. This function is disabled if descent is not selected in Table 1 Element 7. These samples are transmitted as part of the descent report.

Table 8 - Enable Routine Observations During Descent

Element Number	Default Value	Description	Possible Values	Link To Table(S)	Remarks
1	1	Routine observations: enabled = (1), disabled = (0)	0-1	Table 1	Routine observations are enabled when descent profiling is disabled.

This Table is used only if descents are disabled in Table 1 (Element 7). If set to the default value, routine observing intervals (Table 4) will be used during descent instead of detailed profile interval as specified in Table 7.

Table 9 - Inhibit Reporting in Selected Time Interval

Element Number	Default Value	Description	Possible Values	Link To Table(S)	Remarks
1	0000	Disable observations between selected hours (00-23) UTC, every day	00-23, 00-23	Table 1	First two chrs = start of inhibit period Second two chrs = end of inhibit period

This table allows AMDAR to be disabled for one selected period each 24 hrs. The Default value 0000 means report through 24 hrs. When enabled, the times set are interpreted as first two characters give start of inhibit period, second two characters give end of inhibit period. Thus 0918 means inhibit from 0900UTC to 1800UTC. 2304 means inhibit at 2300UTC through 0000 to 0400UTC.

Table 10 - Preset Target Heights based on Pressure Level Selection

This table is not uplinked but stored in the on-board AMDAR program

Pressure (hPa)	Height (ft)	List 1	List 2	Height No (nn)
1050	-989	1	1	01
1045	-856	2		02
1040	-723	3	2	03
1035	-589	4		04
1030	-454	5	3	05
1025	-319	6		06
1020	-184	7	4	07
1015	-48	8		08
1010	89	9	5	09
1005	226	10		10
1000	364	11	6	11
995	502	12		12
990	641	13	7	13
985	780	14		14
980	920	15	8	15
975	1061	16		16

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Pressure (hPa)	Height (ft)	List 1	List 2	Height No (nn)
970	1202	17	9	17
965	1344	18		18
960	1486	19	10	19
955	1629	20		20
950	1773	21	11	21
945	1917	22		22
940	2062	23	12	23
935	2207	24		24
930	2353	25	13	25
925	2500	26		26
920	2647	27	14	27
915	2795	28		28
910	2944	29	15	29
905	3093	30		30
900	3243	31	16	31
895	3394	32		32
890	3545	33	17	33
885	3697	34		34
880	3850	35	18	35
875	4003	36		36
870	4157	37	19	37
865	4312	38		38
860	4468	39	20	39
855	4624	40		40
850	4781	41	21	41
845	4939	42		42
840	5098	43	22	43
835	5257	44		44
830	5417	45	23	45
825	5578	46		46
820	5739	47	24	47
815	5902	48		48
810	6065	49	25	49
805	6229	50		50
800	6394	51	26	51
795	6560	52		52
790	6727	53	27	53
785	6894	54		54
780	7062	55	28	55
775	7232	56		56
770	7402	57	29	57
765	7573	58		58
760	7745	59	30	59
755	7917	60		60
750	8091	61	31	61
745	8266	62		62
740	8442	63	32	63

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Pressure (hPa)	Height (ft)	List 1	List 2	Height No (nn)
735	8618	64		64
730	8796	65	33	65
725	8974	66		66
720	9154	67	34	67
715	9334	68		68
710	9516	69	35	69
705	9699	70		70
700	9882	71	36	71
675	10817	72		72
650	11780	73	37	73
625	12774	74		74
600	13801	75	38	75
575	14862	76		76
550	15962	77	39	77
525	17103	78		78
500	18289	79	40	79
475	19524	80		80
450	20812	81	41	81
425	22160	82		82
400	23574	83	42	83
375	25061	84		84

Notes:

1. The contents of this table are the same as in Table 5.3.13.4-4 and Table 4.3.10-10. If changes are necessary, please change all three tables.

2. The following two equations are used in the process to calculate pressure (P(hPa)) from pressure altitude (PALT) and pressure altitude from pressure if Table 4.3.10-10 is not used to determine pressure target heights.

   Computation of pressure, P(hPa) in ICAO Standard Atmosphere from pressure altitude, PALT:

   P(hPa) = 1013.25[1 – 10-6x6.8756(PALT)]
   5.2559 ----------------------------(1)

   Computation of pressure altitude, PALT from pressure, P(hPa) in ICAO Standard Atmosphere:

   PALT = 1.4544x105[1 - (P(hPa)/1013.25)0.19026]---(2)

For pressure-based observations during ascent and descent phases of flight, all sampling takes place at multiples of 10 or 50 hPa if List 2 is selected (5 and 25 hPa if List 1 is selected) except for the initial observation following the Off event and predefined tops of ascent and descent both of which are defined in thousands of feet.

APPENDIX H
METEOROLOGICAL REPORT COMPRESSION

H-1 Introduction

The following proposal for the Meteorological Report downlink compressed format is intended to increase efficiency and reduce message congestion by sending fewer characters (and AIRCOM data blocks) for each Meteorological Report. This document needs to be read in conjunction with Draft Specification ARINC 620 Meteorological Report, Version 4 as contained in ARINC Supplement 5.0 Downlink Message Text Formats. Some aspects of this draft may need further reviewing in light of formal decisions to be taken on the format of the Downlink Meteorological Report.

Two simple coding techniques have been applied to the standard Meteorological Report, Version 4:

The first technique codes all numerical values using all available printable characters (i.e., a range of 19 to +20 can be mapped onto 40 printable characters). For this purpose the limited Teledyne character set has been used which it is understood has only 44 characters available.

The second technique reduces the magnitude of some of the numerical values by coding them as delta changes from their previous value. This method provides a saving because many of the quantities are physical values that vary slowly with time.

H-2 Assumptions

It is desirable that each observation be kept to a fixed length format where each field occupies the same character positions in every record of the same type. However, due to the way turbulence is proposed to be reported, this is not possible.

There are 44 printable characters available in the communication character (Teledyne limitation).

H-3 Compression Method

The follow tables summarize the effect of the compression method when applied to Meteorological Report, Version 4.

Only 40 of the available characters will be used. The CR and LF will not be used to represent data and the space character <$_{sp}$> will be reserved to:

- Indicate that an error has occurred during the integer to character string conversion process.
- Show that a value is unavailable or out of range.
- The / character is reserved to signify a change from Ascent series#1 to Ascent series #2.

The ARINC 620 Type of Met Format character will be used to identify a compressed Meteorological Report. Unique characters will be used to identify samples selected by time interval or by pressure level for each individual flight phase (ascent, enroute or descent message).

H-4 Tables

The following tables provide a description of the element to be encoded with units and resolution as appropriate, the type of character used in the code (alpha character, absolute value or change in value (delta)), the range of absolute values permissible, and the number of compressed characters required.

The first sample: For each report the first sample will contain every field, coded as absolute values mapped directly to the 40 usable characters. A single character can therefore represent any value in the range -19 to +20. Two characters can represent any integer between -799 to +800, and so on, the numbers increasing as 40n where n is the number of characters. All numerical values are reduced to a quantity of a single unit – e.g.,longitude is reduced to a signed number representing tenths of minutes north and east of the meridian.

Subsequent samples: All subsequent observation records are coded as a mixture of absolute values and delta changes (coded as incremental changes from the previous corresponding observation). If any of the delta values exceeds the allowed range then the observation is terminated with a space, carriage return (CR) and line feed (LF) characters and the meteorological report transmitted. A new report is then started where the next observation is coded in absolute values. In this way the exception cases are naturally dealt with. It is anticipated that the exception overheads should be very small under normal circumstances.

CRLF characters are needed at least every 69 characters due to an ARINC/SITA restriction. The use of these characters is specified in the message format description below. The Committee is invited to determine if this situation is still valid.

Ascent Meteorological Report - Compressed Format

Ascent Header Block			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Standard message header	Character code	N/A	10
Version number	Absolute value	0 to +20	1
Type of message format	Character code	N/A	1
Date message assembled (day)	Absolute value	0 to +31	2
Time message assembled (in minutes)	Absolute value	0 to +1439	3
Departure station	Character code	N/A	4
Destination station	Character code	N/A	4
Total number of characters			25

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Ascent Initial Report			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Absolute value	-54,000 to +54,000	4
Longitude (in tenths of minutes)	Absolute value	-107,999 to +108,000	4
Date of observation	Absolute value	0 to +31	2
Time of observation (minutes)	Absolute value	0 to +1439	3
Series 1 time interval (seconds)	Absolute value	+3 to +20	1
Series 2 time interval (seconds)	Absolute value	+20 to +60	2
Pressure altitude (tens of feet)	Absolute value	-99 to +799	2
Static air temperature (tenths of deg C)	Absolute value	-800 to +799	2
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Character	N/A	1
Total number of characters			24

Ascent Series #1 - First Sample			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Absolute value	-54,000 to +54,000	4
Longitude (in tenths of minutes)	Absolute value	-107,999 to +108,000	4
Pressure Altitude	Absolute value	-99 to +799	2
Static air temperature (tenths of deg C)	Absolute value	-800 to +799	2
Wind direction (degrees true)	Absolute value	0 to +360	2
Wind speed (knots)	Absolute value	0 to +800	2
Roll angle flag/flight phase	Character	N/A	1
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Character	N/A	1
Total number of characters			21

Ascent Series #1 - Subsequent Samples			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Delta	-7999 to +8000	3
Longitude (in tenths of minutes)	Delta	-7999 to +8000	3
Pressure Altitude	Delta	-800 to +799	2
Static air temperature (tenths of deg C)	Absolute value	-800 to +799	2
Wind direction (degrees true)	Absolute value	0 to +360	2
Wind speed (knots)	Absolute value	0 to +800	2
Roll angle flag/flight phase	Character	N/A	1
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Character	N/A	1
Total number of characters			19

APPENDIX H
METEOROLOGICAL REPORT COMPRESSION

Ascent Series #2 - First Sample			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Absolute value	-54,000 to +54,000	4
Longitude (in tenths of minutes)	Absolute value	-107,999 to +108,000	4
Time of observation (minutes)	Absolute value	0 to +1,439	3
Pressure altitude (tens of feet)	Absolute value	-99 to +5,000	3
Static air temperature (tenths of deg C)	Absolute value	-800 to +799	2
Wind direction (degrees true)	Absolute value	0 to +360	2
Wind speed (knots)	Absolute value	0 to +800	2
Roll angle flag/flight phase	Character	N/A	1
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Character	N/A	1
Total number of characters			25

Ascent Series #2 - Subsequent Samples			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Delta	-7999 to +8000	3
Longitude (in tenths of minutes)	Delta	-7999 to +8000	3
Time of observation (minutes)	Delta	0 to +800	2
Pressure altitude (tens of feet)	Delta	-800 to +799	2
Static air temperature (tenths of deg C)	Absolute value	-800 to +799	2
Wind direction (degrees true)	Absolute value	0 to +360	2
Wind speed (knots)	Absolute value	0 to +800	2
Roll angle flag/flight phase	Character	N/A	1
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Character	N/A	1
Total number of characters			21

Enroute Meteorological Report - Compressed Format

Enroute Header Block			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Standard message header	Character code	N/A	10
Version number	Absolute value	0 to +20	1
Type of message format	Character code	N/A	1
Date message assembled (day)	Absolute value	0 to +31	2
Departure station	Character code	N/A	4
Destination station	Character code	N/A	4
Total number of characters			22

APPENDIX H
METEOROLOGICAL REPORT COMPRESSION

Enroute – First Sample			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Absolute value	-54,000 to +54,000	4
Longitude (in tenths of minutes)	Absolute value	-107,999 to +108,000	4
Time of observation (minutes)	Absolute value	0 to +1,439	3
Pressure altitude (tens of feet)	Absolute value	-99 to +5,000	3
Static air temperature (tenths of deg C)	Absolute value	-800 +799	2
Wind direction (degrees true)	Absolute value	0 to +360	2
Wind speed (knots)	Absolute value	0 to +799	2
Roll angle flag/flight phase	Character	N/A	1
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Character	N/A	1
Turbulence code (ZZ, QQ, integers nn)	Character or absolute value	N/A or 00 to +99	2
Turbulence data (variable multiples of 4 characters)	Character	0000 to +FFFF	4nn
Total number of characters			27+4nn

Enroute - Subsequent Samples			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Delta	-7999 to +8000	3
Longitude (in tenths of minutes)	Delta	-7999 to +8000	3
Time of observation (minutes)	Delta	0 to +799	2
Pressure Altitude (tens of feet)	Delta	-800 to +799	2
Static air temperature (tenths of deg C)	Absolute value	-800 to +799	2
Wind direction (degrees true)	Absolute value	0 to +360	2
Wind speed (knots)	Absolute value	0 to +799	2
Roll angle flag/flight phase	Character	N/A	1
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Absolute value	N/A	1
Turbulence code (ZZ, QQ, integers nn)	Character or absolute value	N/A or 00 to +99	2
Turbulence data (variable multiples of 4 characters)	Character	0000 to +FFFF	4nn
Total number of characters			23+4nn

Descent Meteorological Report - Compressed Format

Descent Header Block			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Standard Message Header	Character code	N/A	10
Version Number	Absolute value	0 to +20	1
Type of Message Format	Character code	N/A	1
Date Message Assembled (Day)	Absolute value	0 to +31	2
Departure station	Character code	N/A	4
Destination station	Character code	N/A	4
Total number of characters			22

Descent – First Sample			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Absolute value	-54,000 to +54,000	4
Longitude (in tenths of minutes)	Absolute value	-107,999 to +108,000	4
Time of observation (minutes)	Absolute value	0 to +1439	3
Pressure altitude (tens of feet)	Absolute value	0 to +5,000	3
Static air temperature (tenths of deg C)	Absolute value	-800 to +799	2
Wind direction (degrees true)	Absolute value	0 to +360	2
Wind speed (knots)	Absolute value	0 to +799	2
Roll angle flag/flight phase	Character	N/A	1
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Character	N/A	1
Turbulence code (ZZ, QQ, integers nn)	Character or absolute value	N/A or 00 to +99	2
Turbulence data (variable multiples of 4 characters)	Character	0000 to +FFFF	4nn
Total number of characters			27+4nn

APPENDIX H
METEOROLOGICAL REPORT COMPRESSION

Descent – Subsequent Samples			
Description	**Type**	**Absolute Range**	**Number of Encoded Characters**
Latitude (in tenths of minutes)	Delta	-7999 to +8000	3
Longitude (in tenths of minutes)	Delta	-7999 to +8000	3
Time of observation (minutes)	Delta	0 to +799	2
Pressure Altitude (tens of feet)	Delta	-800 to +799	2
Static air temperature (tenths of deg C)	Absolute value	-800 to +799	2
Wind direction (degrees true)	Absolute value	0 to +360	2
Wind speed (knots)	Absolute value	-800 to +799	2
Roll angle flag/flight phase	Character	N/A	1
WV mixing ratio	Absolute value	0 to +999	3
WV mixing ratio quality	Character	N/A	1
Turbulence code (ZZ, QQ, integers nn)	Character or absolute value	N/A or 00 to +99	2
Turbulence data (variable multiples of 4 characters)	Character	0000 to +FFFF	4nn
Total number of characters			23+4nn

H-5 The Resulting Message

When accumulating samples at target heights using default settings a flight departing from an airport with surface pressure 1035hPa, with an Enroute duration of 2 hours 50 minutes and arriving at an airport with surface pressure 1035hPa, will generate the following number of Weather Reports:

Phase of Flight	Message	Number of reports generated	Number of samples within each report	Number of samples during flight phase	Number of characters	
					Standard	**Compressed**
Ascent	Header Block	1	-	-	27	25
Ascent	Initial report	1	1	1	35	24
Ascent	Series #1	1	15	15	480	287
Ascent	"/" character	1	-	-	1	1
Ascent	Series #2	1	21	21	756	445
Enroute	Header Block	4	-	-	92	88
Enroute	Series #1	4	6	24	1584	1228
Descent	Header Block	2	-		46	44
Descent	Series #1	2	10 and 9	19	1188	973
Totals				80	4,209	3,115

This result indicates that the total number of characters transmitted will be reduced by nearly 30%. A larger character set would allow this compression ratio to be increased.

EXAMPLE OF BASE 40 MAPPING TECHNIQUE

Base Chart: The table below illustrates how the 40 characters are mapped to the integer values 0 to 39. Taking 27 as an example, this number is represented by the character R.

	0	1	2	3	4	5	6	7	8	9
0X	0	1	2	3	4	5	6	7	8	9
1X	A	B	C	D	E	F	G	H	I	J
2X	K	L	M	N	O	P	Q	R	S	T
3X	U	V	W	X	Y	Z	:	,	-	.

Negative Numbers: To allow negative values to be represented the conversion routine must also do the following:

- Find the range (or the number of characters) required to represent the value (see table below).
- Add an offset value (40^y)/2 to the value to compress, where y is the same y value as in the previous step. This provides a new value that falls into the range [0, (40^y) – 1].
- Take the new value and convert to a base 40 character string using the existing method.

Number of characters (y)	Smallest Value Represented 0 – (40^y)/2	Largest Value Represented (40^y)/2 – 1	Offset Value (40^y)/2
1	-20	+19	+20
2	-800	+799	+800
3	-32,000	+31,999	+32,000
4	-1,280,000	+1,279,999	+1,280,000
5	-51,200,000	+51,199,999	+51,200,000

COMPRESSION EXAMPLE: To code latitude 3º43.5’ South in tenths of degrees.

Step1 (if required)
Convert value into the required units. 3º43.5’ South = [(3*60)+43.5]*10*-1 = -2,235 tenths of minutes

Step 2
Deduce which range (the value of y) the new value falls into using the table above. In this case the value falls between –32,000 and +31,999. Therefore y=3.

Step 3
Add the required offset to the value to get the coded value.

Coded value = -2,235 + (40^3)/2 = -2,235 + 32,000 = 29,765

Step 4
Convert the coded value in to base 40 using the base table above:

Character 1 (most significant):	Trunc (29,765 / (40^2)) = 18
	From look up table 18 = I
Remainder = 29,765 - (18 * 40^2) = 965	
Character 2	Trunc(965 / (40^1)) = 24
	From look up table 24 = O
	Remainder = 965 - (24 * 40^1) = 5
Character 3 (least significant)	Trunc (5 / (40^0) = 5
	From look up table 5 = 5

Result
Coded character string is IO5

Decompression

Decompression of this value should be a straightforward process.

Step 1
Note the number of characters (y) used to represent the value.

Step 2
Convert the base 40 string to the decimal representation of this value.

Step 3
From this value subtract (40^y)/2 to get the original number (or delta change from the value in the previous observation if this technique has been adopted).

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SUPPLEMENT 1
TO
ARINC SPECIFICATION 620

DATA LINK GROUND SYSTEM STANDARD AND INTERFACE SPECIFICATION (DGSS/IS)

Published: January 15, 1994

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: October 19, 1993

A. PURPOSE OF THIS DOCUMENT

This Supplement describes the enhancements to the definition of the interface between the data link service provider and the users of this service.

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, vertical change bars in the margin will indicate those areas of text changed by the current Supplement only.

C. CHANGES TO ARINC CHARACTERISTIC 620 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.

General Comments

A number of changes were made that affect extensive portions of the Specification. The contents of Chapter 3 were reorganized for clarity. In Chapter 4, the definition of the Message Sequence Number has been revised to reflect the definition in newly adopted ARINC Specification 618, “Air-Ground Character-Oriented Protocol Specification”. The entry in message text for Flight Number has been revised to “Flight Identifier”, again, to align with the definition in ARINC Specification 618.

Table of Contents

Revise old entries to reflect new structure of Chapter 3 and message text moved within Chapter 4. Add new section entries.

2.2.1 Uplink Message Handling

Revise section references.

2.2.2 Downlink Message Handling

Revise section reference. Revise reference from “block reception” timer to Incomplete Downlink Message Delivery timer to agree with ARINC Specification 618.

2.2.3 Accountability

Note restriction of message delivery.

3.0 Message Handling

Moved sections as follows:

Old	New
3.1	31
3.1.1.1	3.2
3.1.1.2	3.5

3.1.1.2.1	3.5.1
3.1.1.2.2	3.5.2
3.1.2	3.3
3.2	3.6
3.2.1	3.2.1
3.2.2	3.6.1
3.2.3	3.3.1
3.3	3.7
3.3.1	3.2.2
3.3.1.1	3.7.1
3.3.1.2	3.7.3
3.3.2	3.7.2
3.3.3.1	3.3.2
3.3.3.2	3.3.3
3.4	3.4
3.2.1	3.8
3.2.1	3.8.1
-----	3.8.2
3.2.1	3.8.3

3.1 Introduction

Editorial corrections. Introduce new organization of the document.

3.2 General Ground/Ground Message Format

Introduce Flight Identifier format. Explain 2-letter vs 3 letter airline identification.

3.2.1 Downlink General Format

Expand description of format. Expand list of service provider codes.

3.2.2 Uplink Message Format

Expand description of format.

3.3.1 Unformattable Downlink Service Messages

Expand description of format.

3.3.2 Untransmittable Uplink Service Messages

Expand description of format.

3.3.3 Undeliverable Uplink Service Messages

Expand description of format.

3.4 Network Advisory Messages

Editorial clarifications.

3.5 General Air/Ground Message Format

Editorial clarifications.

3.6 Downlink Messages

Editorial refinements.

3.8 Addressing

New section added for clarity.

3.8.1 Uplink Addresses

New Section added.

3.8.1.1 Aircraft Address

New Section added.

3.8.1.2 Uplink Addresses for Messages Delivered to an ACARS Peripheral

New Section added.

3.8.1.3 Air-Ground Uplink User Address(es)

New Section added.

3.8.1.3.1 AOC Messages

New Section added.

3.8.1.3.2 ATC Messages

New section added to describe addressing of Air Traffic Service messages generated by an avionics subsystem.

3.8.2 Downlink Addresses

New Section added.

3.8.3 Supplementary Addresses

New section; derived from old Section 3.2.1.

4.1 Introduction

Editorial expansion.

4.2 Uplink Message Formats, System Control

Expanded the list of System Control labels.

4.2.6 Data Transceiver Autotune - Label :;

Move here from Section 4.3.16.

4.3 Uplink Message Formats, Service Related

Expand the list of messages. Add section references. Introduce the need for a CRC in ATS message text.

4.3.4 Cockpit/Cabin Printer Messages - Labels C0-C9

Change title.

4.3.5 OAT, DFDAU, ADSU and FMC - Label H1

Expand description. Add format diagrams for general case and for ATS message.

4.3.5.1 OAT - Label H1

Add note concerning MFI.

4.3.5.2 AX - Label H1

Expand description.

4.3.5.3 With Header: CFD, DFD, FCD, FCL, FCR, TXx, Mxx - Label H1

Expand description.

4.3.7 Oceanic Clearance - MFI or Label A1

Add note concerning MFI.

4.3.8 Unassigned - MFI or Label A2

Add note concerning MFI.

4.3.9 Domestic Clearance - MFI or Label A3

Add note concerning MFI.

4.3.10 Unassigned - MFI or Label A4

Add note concerning MFI.

4.3.11 Request Position Report - MFI or Label A5

Add note concerning MFI.

4.3.12 Request ADS Reports - MFI or Label A6

Add note concerning MFI.

4.3.13 ATC Free Talk - MFI or Label A7

4.3.14 Delivery Departure Slot - MFI or Label A8

4.3.15 Delivery ATIS Information - MFI or Label A9

4.3.16 ATS Facilities Notification - MFI or Label A0

Add replacement section. Previous section, Data Transceiver Autotune moved to Section 4.2.6.

4.3.17 Pilot/Controller Dialogue - MFI or Label AA

Add new section.

5.0 Downlink Message Text Field Formats

All downlink message definitions were moved from Chapter 4 to a new Chapter 5. Section 5.1 provides an introduction. Thus former Section 4.5 became Section 5.2, former Section 4.6 became 5.3 and former Section 4.6 became Section 5.4.

5.1 Introduction

New section added.

5.2 Downlink Message Formats, System Control

Change title from Essential to Control. Add new messages to list. Add section references.

5.2.1 General Response - Label _DEL

Change coding of Message Sequence Number and Airline Identifier.

5.2.2 Voice Contact Request - Label 54

Change coding of Message Sequence Number and Airline Identifier.

5.2.3 Reserved Characters

Delete reference to Polled mode, a provision that was initially thought to offer some future service, but never implemented.

5.2.4 Temporary Suspension - Label 5P

Change coding of Message Sequence Number and Airline Identifier.

5.2.5 Unable to Deliver Uplinked Message - Label Q5

Change coding of Message Sequence Number and Airline Identifier. Correct figure from Printer Status to Unable to Deliver.

5.2.6 Voice to Data Channel Changeover Advisory - Label Q6

Expand description. Change coding of Message Sequence Number and Airline Identifier.

5.2.7 Intercept/Unable to Process - Label QX

Change title. Relocate from Section 4.6.36 to System Control category. Change coding of Message Sequence Number and Airline Identifier.

5.2.8 Dedicated Transceiver Advisory - Label F3

Move to Section 4.5.8 from Section 4.6.13. Change coding of Message Sequence Number and Airline Identifier.

5.2.9 Cockpit Printer Status - Label CA Through CF

Change coding of Message Sequence Number and Airline Identifier.

5.3 Downlink Message Formats, Service-Related Message Formats

Add new messages. Add section references. Add introduction to ATS messages.

5.3.1 Emergency Situation Report - Label 00

Change coding of Message Sequence Number and Airline Identifier. Add introduction to ATS messages.

5.3.2 Ground GMT Request - Label 51

Change coding of Message Sequence Number and Airline Identifier.

5.3.4 ATIS Request - Label 5D

Change coding of Message Sequence Number and Airline Identifier. Revise figure.

5.3.5 Aircrew Initiated Position Report - Label 5R

Change coding of Message Sequence Number and Airline Identifier.

5.3.6 Weather Request - Label 5U

Change coding of Message Sequence Number and Airline Identifier.

5.3.7 Airline Designated Downlink - Label 5Z

Change coding of Message Sequence Number and Airline Identifier.

5.3.8 Aircrew Revision to Previous ETA/Diversion – Label 5Y

Change coding of Message Sequence Number and Airline Identifier.

5.3.9 Aircrew Initiated Engine Data/Takeoff Thrust Report - Label 7A

Change coding of Message Sequence Number and Airline Identifier.

5.3.10 Not Yet Assigned

Contents were moved to Section 4.2.6.

5.3.11 Aircrew-Addressed Downlink - Labels 80 through 8~

Editorial changes for clarity. Change coding of Message Sequence Number and Airline Identifier.

5.3.12 Not Yet Assigned

Contents were moved to Section 4.5.9.

5.3.13 Not Yet Assigned

Contents were moved to Section 4.5.8.

5.3.14 Command/Response Downlink - Label RB

Change coding of Message Sequence Number and Airline Identifier.

5.3.15 Link Test - Label Q0

Change coding of Message Sequence Number and Airline Identifier. Add figure.

5.3.16 Departure/Arrival Reports - Label Q1

Change coding of Message Sequence Number and Airline Identifier.

5.3.17 ETA Report - Label Q2

Change coding of Message Sequence Number and Airline Identifier.

5.3.18 Clock Update Advisory - Label Q3

Change coding of Message Sequence Number and Airline Identifier.

5.3.20 Unable to Deliver Uplink - Label Q5

Change title. Change coding of Message Sequence Number and Airline Identifier.

5.3.21 Delay Message - Label Q7

Change coding of Message Sequence Number and Airline Identifier.

5.3.24 Out/Fuel Reports - QA

Change coding of Message Sequence Number and Airline Identifier.

5.3.26 ON Reports - QC

Change coding of Message Sequence Number and Airline Identifier.

5.3.27 IN/Fuel Report - QD

Change coding of Message Sequence Number and Airline Identifier.

5.3.28 UT/Fuel/Destination Report - Label QE

Change coding of Message Sequence Number and Airline Identifier.

5.3.29 OFF/Destination Report - Label QF

Change coding of Message Sequence Number and Airline Identifier.

5.3.30 OUT/Return IN Report - Label QG

Change coding of Message Sequence Number and Airline Identifier.

5.3.31 OUT Report - Label QH

Change coding of Message Sequence Number and Airline Identifier.

5.3.32 Landing Report - Label QK

Change coding of Message Sequence Number and Airline Identifier.

5.3.33 Arrival Report - Label QL

Change coding of Message Sequence Number and Airline Identifier.

5.3.34 Arrival Information Report - Label QM

Change coding of Message Sequence Number and Airline Identifier.

5.3.35 Diversion Report - Label QN

Change coding of Message Sequence Number and Airline Identifier.

5.3.36 Undelivered Uplink Report- Label HX

Change title. Change coding of Message Sequence Number and Airline Identifier. Add new message description.

5.3.37 Alternate Aircrew Initiated Position Report – Label 57

Change coding of Message Sequence Number and Airline Identifier.

5.3.38 Optional Auxiliary Terminal (OAT) Message - Label H1

Add general format diagram. Add discussion of messages with CRC and related format diagram.

5.3.38.1 Messages from Airborne Subsystems: ARINC 597 ACARS - Label H1

Change coding of Message Sequence Number and Airline Identifier.

5.3.38.2 Messages from ARINC 724 ACARS Airborne Subsystems - Label H1

Change coding of Message Sequence Number and Airline Identifier.

5.3.38.2.1 OAT - Simple H1 Message

Add new section.

5.3.38.2.2 OAT - H1 Message With Additional Addresses

Add new section.

5.3.38.2.3 CFDIU, DFDAU, FMC or Cabin Terminal Messages

Add new section.

5.3.38.2.4 CFDIU, DFDAU, FMC or Cabin Terminal Messages With Additional Addresses

Add new section.

5.3.39 Request Oceanic Clearance - MFI or Label B1

Add MFI. Refer to RTCA for format.

5.3.40 Oceanic Clearance Readback - MFI or Label B2

Add MFI. Refer to RTCA for format.

5.3.41 Request Domestic Clearance - MFI or Label B3

Add MFI. Refer to RTCA for format.

5.3.42 Reserved - MFI or Label B4

Add MFI.

5.3.43 Provide Position Report - MFI or Label B5

Add MFI.

5.3.44 Provide ADS Reports - MFI or Label B6

Add MFI. Refer to ARINC Characteristic 745 for format and ARINC Specification 622 for processing.

5.3.45 Forward Free Text to ATC - MFI or Label B7

Add MFI.

5.3.46 Request Departure Slot - MFI or Label B8

Add MFI.

5.3.47 Request ATIS Information - MFI or Label B9

Add MFI. Refer to ARINC Specification 622 for format.

5.3.48 ATS Facilities Notification - MFI or Label B0

Add new message.

5.3.49 Pilot/Controller Dialogue - MFI or Label BA

Add new message.

5.3.50 Reserved - MFI or Label BB

Anticipated future use.

5.3.51 Weather Report - Label H2

Add new message.

ATTACHMENT 2

New Attachment containing the list of Reason Codes for unformattable messages from Chapter 3.

APPENDIX A

Add new acronyms.

APPENDIX B

Add new Standard Message Identifiers (SMI).

APPENDIX C

Add new SMI and associated Label identifiers. Add new message services from Air Canada and AVICOM.

Add new Tables C-5 through C-13 to identify the SMI, Label, Sublabel and MFI of messages directed to a peripheral to the ACARS MU.

APPENDIX G

New Appendix added.

APPENDIX Z

Delete Items B, D, E, F and G. Add new Item C.

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SUPPLEMENT 2
TO
ARINC SPECIFICATION 620

DATA LINK GROUND SYSTEM STANDARD AND INTERFACE SPECIFICATION (DGSS/IS)

Published: December 30, 1994

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: October 19, 1994

A. PURPOSE OF THIS DOCUMENT

This Supplement adds changes to Air Traffic Service (label Ax and Bx) message definitions to cooperate with the processing functions defined in Specification 622. This Supplement adds Version 2 of the Meteorological report downlink message and its related uplink request (label H2) and Version 2 of the Squitter (label H2) uplink. Sections 3.3.3 and 3.3.4 have been reorganized to clarify the provisions needed to support Message Assurance. Appendix C has been updated to include an expanded list of labels. The Imbedded Message Identifiers (MFI) and Message Format Identifier tables C-3 through C1-3 have been moved to Specification 622.

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, vertical change bars in the margin will indicate those areas of text changed by the current Supplement only.

C. CHANGES TO ARINC SPECIFICATION 620 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.

2.4.3 Aircraft Identification

New section added.

3.2.1 Forwarding Dowlink Messages

Table 3.2.1-2 was added to define the encoding rules for Table 3.2.1-1. Commentary was modified to note that, although ARINC adds carriage-return/line feed <crlf> characters to AOC messages to satisfy the ICM, ARINC does not add <crlf> characters to ATS messages to avoid violations of the CRC.

3.2.2 Uplink Message Format

This section was revised in its entirety. The change includes expansion of the responsibility of the MU to recognize messages with the aircraft's Flight Number as valid addresses.

3.3.3 Untransmittable Uplink Service Messages

Added explanation that an aircraft that is not logged on to the satellite network cannot be reached.

3.3.3.1 Message Assurance Reports

This new section incorporates provisions from Section 3.3.3 and clarifies the role of Message Assurance.

A reference to the new Table 3.2.1-2 was added to clarify the reading of the Example column of Table 3.3.3.3.1-1.

3.3.4 Undeliverable Uplink Service Messages

A description of processing of QX downlinks was added.

3.3.4.1 Message Assurance Reports

This new section incorporates provisions from Section 3.3.4 and clarifies the role of Message Assurance. A reference to the new Table 3.2.1-2 was added to clarify the reading of the Example column of Table 3.3.3.4.1-1.

3.5 General Air/Ground Message Format

Previous text was replaced by a reference to Specification 618 to avoid duplication. Caution to designers of peripherals regarding the need to restrict downlinks to valid text characters. Data in the Text field is not screened by the MU.

3.6 Downlink Messages

The field labeled Free Text was changed to Application Text in order to clarify that this field may contain fixed text, free text or both.

3.7 Uplink Messages

The field labeled Free Text was changed to Application Text in order to clarify that this field may contain fixed text, free text or both.

3.7.1 Uplink Message Re-formatting

Added note 3.

3.7.3 Uplink Message Delivery

Added text to note that use of the Geographical Locator (GL) is optional. If used, in conjunction with the Text Element ‘TP’ identifying the transmission path, the medium of the ground station must match the ‘TP’ Text Element Identifier.

3.8.1.1 Aircraft Address

Commentary added.

3.8.1.2 Uplink Addresses for Messages Delivered to an ACARS Peripheral

Explanatory text was added to claify how MUs identify messages destined for a peripheral.

4.2.3 ACARS Frequency Uplink- Label 54 or Voice Go-Ahead- Label 54

Editorial correction: Changed Step 3 from “ground system” to “aircraft”.

4.2.4 Voice Circuit Busy - Label Q4

Editorial correction: Changed Step 2 from “aircraft” to “DSP”.

4.2.5 Uplink Squitter - Label SQ

Version 2 was added.

4.3.7 Oceanic Clearance - MF1 or Label A1

As the first occurrence of an Air Traffic Service (ATS) uplink message, this Section is now used as a generic model for the format of label Ax messages. The format is consistent with the definition of ATS messages in Specifications 622 and 623.

4.3.8 Unassigned - MF1 or Label A2

This Section is a placeholder for a future assignment.

4.3.9 Departure Clearance - MF1 or Label A3

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

4.3.10 Flight System Message - MF1 or Label A4

New Section added.

4.3.11 Unassigned - MF1 or Label A5

This Section is a placeholder for a future assignment.

4.3.12 Request ADS Reports - MF1 or Label A6

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

4.3.13 ATC Free Text - MF1 or Label A7

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

4.3.14 Deliver Departure Slot - MF1 or Label A8

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

4.3.15 Deliver ATIS Information - MF1 or Label A9

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

4.3.16 ATS Facilities Notification (AFN) - MF1 or Label A0

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

4.3.17 ATCComm - MF1 or Label AA

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

4.3.18 Unassigned - MF1 or Label AB

This Section is a placeholder for a future assignment.

4.3.19 Unassigned - MF1 or Label AC

This Section is a placeholder for a future assignment.

4.3.20 Unassigned - MF1 or Label AD

This Section is a placeholder for a future assignment.

4.3.21 Unassigned - MF1 or Label AE

This Section is a placeholder for a future assignment.

4.3.22 Unassigned - MF1 or Label AF

This Section is a placeholder for a future assignment.

4.3.23 Unassigned - MF1 or Label AG

This Section is a placeholder for a future assignment.

4.3.24 Network Statistics Report Request - MFI or Label S1

Added new Section.

4.3.25 Terminal Weather Information Report - MF1 or Label 54

This Section is a placeholder for a future assignment.

5.2.7 Intercept/Unable to Process - Label QX

Figure 5.2.7-1 was revised to correct message identification.

5.3.13 Meteorological Report - MFI or Label H2

The depiction of Version 1 format changed to clarify the multiple entries of data samples. Version 2 was added.

5.3.39 Request Oceanic Clearance - MFI or Label B1

As the first occurrence of an Air Traffic Service (ATS) downlink message, this Section is now used as a generic model for the format of label Ax messages. The format is consistent with the definition of ATS messages in Specifications 622 and 623.

5.3.40 Oceanic Clearance Readback - MFI or Label B2

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.41 Request Departure Clearance - MFI or Label B3

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.42 Departure Clearance Readback Downlink - MFI or Label B4

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.43 Unassigned - MFI or Label B5

This Section is a placeholder for a future assignment.

5.3.44 Provide ADS Reports - MFI or Label B6

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.45 Forward Free Text to ATC - MFI or Label B7

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.46 Request Departure Slot - MFI or Label B8

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.47 Request ATIS Information - MFI or Label B9

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.48 ATS Facilities Notification (AFN) - MFI or Label B0

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.49 ATCComm - MFI or Label BA

Editorial revisions were made to coordinate with the provisions of Specifications 622 and 623. Section 4.3.7 is referenced for format.

5.3.50 Unassigned - MFI or Label BB

This Section is a placeholder for a future assignment.

5.3.51 Unassigned - MFI or Label BC

This Section is a placeholder for a future assignment.

5.3.52 Unassigned - MFI or Label BD

This Section is a placeholder for a future assignment.

5.3.53 Unassigned - MFI or Label BE

This Section is a placeholder for a future assignment.

5.3.54 Unassigned - MFI or Label BF

This Section is a placeholder for a future assignment.

5.3.55 Unassigned - MF1 or Label BG

This Section is a placeholder for a future assignment.

5.3.56 Network Statistics Report - Label or MF1 S1

New Section added.

Attachment 2 - SERVICE MESSAGES - REASON CODES

Three new reason codes were added to Table 2-2. One new reason code was added to Table 2-3.

Section B.2 of Appendix B - TEI Codes

Editorial correction to element TP.

Section B.3 of Appendix B - Rules for SMI/TEI Application

Rule 1 was expanded to limit the number of SMIs in a message to one, with the exception of Possible Duplicate Messages which will carry the SMI of ‘PDM’.

Appendix C - SMI Information

New assignments added. IMI/MFI Tables C-3 through C-13 were moved to Specification 622.

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SUPPLEMENT 3
TO
ARINC SPECIFICATION 620

DATA LINK GROUND SYSTEM STANDARD AND INTERFACE SPECIFICATION (DGSS/IS)

Published: December 19, 1997

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: October 14, 1997

A. PURPOSE OF THIS DOCUMENT

This Supplement introduces several changes. Sections 5.3.36 through 5.3.42 were inserted to define OOOI messages that use the 4-character ICAO Airport codes in place of the 3-character IATA Airport codes. To accommodate this change, subsections describing messages to peripherals were moved to Section 5.4; subsections describing ATS messages were renumbered and moved to Section 5.5. This Supplement also adds new ATS application definitions: Terminal Weather Information to Pilots (TWIP), Waypoint Position Report (WPR),Digital Delivery of Taxi Clearance (DDTC), and Controller/Pilot Communications (CPC). Corrections and additions were also entered; e.g., editorial corrections to label QX, and harmonizing the rules for TEIs in Appendix B with the provisions for Message Assurance. Finally, new SMIs and labels were added to Appendix C.

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, vertical change bars in the margin will indicate those areas of text changed by the current Supplement only.

C. CHANGES TO ARINC SPECIFICATION 620 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.

1.3 Relationship of the Specification to Other Standards

The figure was updated to reflect new equipment.

1.4.2 ATN System Description

Editorial correction.

2.4.3 Aircraft Identification

Text was added to describe a table-based mechanism for ensuring a valid uplink address to the aircraft. The service provider will accept either the aircraft tail number, the Flight number or both.

3.2.1 Forwarding Downlink Messages

The range of values for hexadecimal characters was corrected in Table 3.2.1-2. The SMI for AAR was corrected to read ARR in the second paragraph of the SMI line description. Text was added to TE Line to describe processing of NULs and SPACE characters in fixed field messages.

The definition of ground station identification was expanded in the DT line.

3.3.1 Uplink Message Receipt Confirmation

In the first sentence of the Commentary, replaced SITA with SITA and ARINC.

3.3.3 Untransmittable Uplink Service Messages

Note 3 was added to Table 3.3.3-1.

3.3.3.1 Message Assurance Report - Untransmittable Link

Note 6 was added to Table 3.3.3.1-1.

3.3.4 Undeliverable Uplink Service Messages

Editorial change: N .N123xx was changed to AN N123xx in line 7-n of Table 3.3.4-1. The third line in Note 4 was added.

3.3.4.1 Message Assurance Reports

Editorial change: AN .N123xx was changed to AN N123xx in line 7-n of Table 3.3.4.1-1. Note 6 was added to Table 3.3.4.1-1.

3.3.5 Unformattable Downlink Service Messages

Editorial change: AN .N123xx was changed to AN N123xx in line 7-n of Table 3.3.5-1. The last sentence was added to Note 3 of the table.

3.6.1 Multiblock Downlink Messages

Editorial change: If Timer VGT4 expires, an Incomplete Downlink message report is sent with the SMI of SVC and the Reason Code of QTB.

3.8.1.1 Aircraft Address

Text, complementary to Section 2.4.3, was added to indicate that the service provider would be prepared to accept uplink messages by tail number, Flight number or both. Text was added to correctly identify the reason for rejecting a message that fails the address criteria. The code 240 is used.

Text was added stating that messages coded with both the Aircraft Registration Number and the Flight Number will be rejected by certain DSPs..

3.8.2.2 Downlink Supplementary Addresses

In the first Commentary, ARINC now supports 4-letter optional addressing.

A second Commentary was added to note that translation from a 3 or 4 character Supplementary Address to the 7 character format will be affected by airline identifier as well as the downlink label used.

Chapter 4.0 Uplink Message Text Field Formats

Changes were made to the organization of Chapter 4.0 to isolate Label H1 messages (and messages to peripherals) and Air Traffic Service messages (Label Ax). These topics are located in Sections 4.4 and 4.5 respectively.

4.2 Uplink Message Formats, System Control

Reference to Tables C1 and C2 of Appendix C was added for system control uplink messages.

4.2.1 General Response - Label _DEL

Editorial correction to change ground sub-system to DSP and uplink to downlink.

4.2.3 ACARS Frequency Uplink - Label 54 or Voice Go-Ahead - Label 54

Commentary added to inform the reader that some MU may not support the presentation of free text in this message. Figure 4.2.3-1 deleted. Figure 4.2.3-2 Voice Frequency - SITA Implementation is now 4.2.3-1 Voice Frequency Uplink or Voice Go-Ahead.

4.2.4 Voice Circuit Busy - Label Q4

Figure 4.2.4-1 was deleted. This message is not supported.

4.2.5 Uplink Squitter - Label SQ

MASCOM was removed from the list of Data Link Service Providers.

4.3 Uplink Message Formats, Service Related

The table of Service Related Uplink Messages was deleted. This information was replaced by a reference to Appendix C.

Message Text description for ATS messages was moved to Section 4.5 to complement the new organizational structure of the document.

4.3.1 Ground GMT Update - Label 51

Ax labels were moved to Section 4.4. Ground GMT Report was replaced by Ground GMT Update. Alternative Ground UTC Report was replaced by Ground UTC Update.

4.3.5 Command/Response Uplink - Label RA

This section was previously Section 4.3.6.

A listing of the message format was added. The previous listing of a message format was moved below and identified as typical of that defined by users.

4.4 ACARS Peripherals - Label H1

Note 1 was modified to state that some avionics simply ignore character 10 in uplinks.

A reference to ARINC Specification 622 was added to the Sublabel field description. Table 4.4.-1C was added.

4.3.6 Network Statistics Report Request - Label S1

This section, previously Section 4.3.24, was renumbered to accommodate document restructuring. The text remains the same.

4.3.7 Network Performance Report Request - Label S2

This is a placeholder for a future supplement.

4.3.8 Aircraft Profile Report Request

This is a placeholder for a future supplement.

4.4 ACARS Peripherals - Label H1

This section was created to group messages to peripherals. H1 messages were renumbered as follows:

Old	New
4.3.5.1	4.4.1
4.3.5.2	4.4.2
4.3.5.3	4.4.3
4.3.5.4	4.4.4

A reference to Table C-2A of Appendix C was added.

Message Text description for ATS messages was moved to Section 4.5 to complement the new organizational structure of the document.

4.4.3 Peripherals With Header - Label H1

SMIs deleted from Section title and displayed in table format. The list of SMIs was expanded to include FM3 and TX1-TX4.

4.4.4 Peripheral With No Header: - Label H1

SMIs deleted from Section title and displayed in table format. The list of SMIs was expanded to include FM3, TT1-TT8, HDR, HDL, and HDD.

4.5 ATS Messages - MFI or Label Ax

The definition of new ATS messages was added to the already existing pool of messages. To accommodate future expansion, a separate section was created to group ATS message definitions. Figures depicting the enveloping of ATS messages were added. One figure depicts messages to/from an MU. The other depicts messages to/from an onboard peripheral. ATS messages were renumbered as follows:

The ground host PIKCLXS was changed to LA05xx as more representative of an ATS facility.

The listings of ATS messages was moved from Section 4.3 to 4.5 which is not strictly devoted to ATS messages. The previous subsections are listed below.

Old	New
4.3.7	4.5.1
4.3.8	4.5.2
4.3.9	4.5.3
4.3.10	4.5.4
4.3.11	4.5.5
4.3.12	4.5.6
4.3.13	4.5.7
4.3.14	4.5.8
4.3.15	4.5.9
4.3.16	4.5.10

4.3.17	4.5.11
4.3.18	4.5.12
4.3.19	4.5.13
4.3.20	4.5.14
4.3.21	4.5.15
4.3.22	4.5.16
4.3.23	4.5.17

New ATS applications defined in this supplement are:

Section	Function	Label
4.5.12	TWIP	AB
4.5.13	Pushback Clearance	AC
4.5.14	Expected Taxi Clearance	AD
4.5.15	Unassigned	AE
4.5.16	CPC	AF

4.5.12 Terminal Weather Information for Pilots (TWIP) - MFI or Label AB

New Section added.

4.5.13 Pushback Clearance - MFI or Label AC

New Section added.

4.5.14 Expected Taxi Clearance - MFI or Label AD

New Section added.

4.5.15 Unassigned - MFI or Label AE

This is a placeholder for future assignments.

4.5.16 CPC Command/Response - MFI or Label AF

New Section added.

Chapter 5.0 Downlink Message Text Field Formats

Organizational changes were made to Chapter 5 to isolate Label H1 messages (messages from peripherals) as Air Traffic Service messages. These topics are now located in Sections 5.4 and 5.5 respectively. The Coding of the Message Sequence Number was changed (to reflect the new Version) in numerous diagrams.

The messages were renumbered as follows:

Old	New
5.3.36	5.3.46
5.3.37	5.3.47
5.3.38	5.4
5.3.38.2	5.4.2

5.3.38.2.1	5.4.2.1
5.3.38.2.2	5.4.2.2
5.3.38.2.3	5.4.2.3
5.3.38.2.4	5.4.2.4
5.3.40	5.5.2
5.3.41	5.5.3
5.3.42	5.5.4

5.2 Downlink Message Formats, System Control

A reference to Table C1 and C2 of Appendix C was added.

5.2.1 General Response - Label _ DEL

Editorial change; corrected reference.

5.2.7 Intercept/Unable to Process - Label QX

Corrections to the SMT text in the Figure were made to change Q5 RJCT 332 (60-62) and address to read QX RJCT 333 (60-62). Note was added to indicate position of data on the printed page.

5.3 Service-Related Message Formats

The content of the table listing applications was modified by deleting the entries for IATA Movement Messages and adding those of new messages. New messages consist of OOOI reports with ICAO Airport codes and Media Advisory. Placeholders were added for Network Performance Report and Airplane Profile Report. A complete listing of SMI/Label/Sublabels is contained in Appendix C.

5.3.1 Emergency Situation Report (Aircraft Hijack) - Label 00

Editorial change in section title.

5.3.3 Ground UTC Request - Label 52

Diagram added.

5.3.4 ATIS Request - Label 5D

Diagram added.

5.3.7 Airline Designated Downlink

Diagram added.

5.3.9 Aircrew Initiated Engine Data/Takeoff Thrust Report - Label 7A

Diagram added.

5.3.10 Aircrew Entered Miscellaneous Message - Label 7B

Diagram added.

5.3.11 Aircrew-Addressed Downlink - Labels 80 through 8~

Changes to Character Content for Character Nos. 15 through n from IATA (3) to ICAO (4) character station identifiers.

5.3.13.1 Meteorological Report, Version 1

Note 2 was modified to correct the resolution of position from tenths of degrees to degrees and minutes. An example of the appropriate coding was added.

5.3.13.3 Meteorological Report, Version 3

New Section added.

5.3.14 Command/Response Downlink - Label RB

New Figure added.

5.3.16 Departure/Arrival Reports (IATA Airport Code) - Label Q1

Reference to Section 3.2.1 added.

5.3.17 ETA Report - Label Q2

New figure added.

5.3.20 Unassigned - Label Q5

This section added as a placeholder for future assignment.

5.3.21 Delay Message - Label Q7

Diagram added.

5.3.24 OUT/Fuel Report (IATA Airport Code) - QA

The Free text definition for data entry was revised from manual input to defined by the airline.

Text was modified to indicate that, in addition to NUL characters, spaces could be used as fill in fixed format messages.

5.3.25 OFF Report (IATA Airport Code) - Label QB

Commentary was added stating the Label QF format is preferred over the Label QB format.

Text was modified to indicate that, in addition to NUL characters, spaces could be used as fill in fixed format messages.

5.3.26 through 5.3.31

Text was modified to indicate that, in addition to NUL characters, spaces could be used as fill in fixed format messages.

5.3.32 Landing Report – (IATA Airport Code) Label QK

Changed Station of Activity to Destination Station and Flight Segment Originating Station to Departure Station.

Figure edited.

5.3.33 Arrival Report – (IATA Airport Code) Label QL

Changed Station of Activity to Destination Station and Flight Segment Originating Station to Departure Station.

5.3.34 Arrival Information Report – (IATA Airport Code) Label QM

Changed Station of Activity to Destination Station and Flight Segment Originating Station to Departure Station.

5.3.36 UT Report (ICAO Airport Code) - Label QP

New section inserted to provide message with ICAO Airport Code identifier. This section was inserted directly following other OOOI messages to provide continuity, resulting in renumbering of subsequent sections.

5.3.37 FF Report (ICAO Airport Code) - Label QQ

New section inserted to provide message with ICAO Airport Code identifier. This section was inserted to following other OOOI messages to provide continuity, resulting in renumbering of subsequent sections.

5.3.38 ON Report (ICAO Airport Code) - Label QR

New section inserted to provide message with ICAO Airport Code identifier. This section was inserted following other OOOI messages to provide continuity, resulting in renumbering of subsequent sections.

5.3.39 IN Report (ICAO Airport Code) - Label QS

New section inserted to provide message with ICAO Airport Code identifier. This section was inserted following other OOOI messages to provide continuity, resulting in renumbering of subsequent sections.

5.3.40 OUT/Return/IN Report (ICAO Airport Code) - Label QT

New section inserted to provide message with ICAO Airport Code identifier. This section was inserted following other OOOI messages to provide continuity, resulting in renumbering of subsequent sections.

5.3.41 Unassigned - Label QU

New section inserted as a placeholder.

5.3.42 Unassigned - Label QV

New section inserted as a placeholder.

5.3.43 Unassigned - Label QW

New section inserted as a placeholder.

5.3.44 Unassigned - Label QY

New section inserted as a placeholder.

5.3.45 Unassigned - Label QZ

New section inserted as a placeholder.

5.3.46 Undelivered Uplink Report - Label HX

This section, previously Section 5.3.36, was renumbered to accommodate the addition of new Qx messages. The text remains the same.

5.3.47 Aircrew Initiated Position Report, Alternate Format - Label 57

This section, previously Section 5.3.37, was renumbered to accommodate the addition of new Qx messages. Title revised for clarity; figures renumbered to refection new section number. The text remains the same.

5.3.49 VHF Network Statistics Report - MFI or Label S1

This is a placeholder for a future supplement.

5.3.50 Aircraft Profile Report Label S3

This Section is a placeholder for a future supplement.

5.3.53 Media Advisory - Label SA

New Section added.

5.4 Messages from Avionics Sybsystem - Label H1

The ground host PICKLXS was changed to LA05xx to reflect an ATS facility.

This section and its subsections, previously Section 5.3.38 and its subsections, were renumbered to accommodate the addition of new Qx messages. The text remains the same. Figures renumbered to reflect new section number.

5.4.1 Messages from Airborne Subsystems: ARINC 597 ACARS - Label H1

Editorial changes were made to Tables 5.4.1A and 5.4.1B.

5.5 ATS Messages - MFI or Label Bx

ATS messages were renumbered to accommodate the addition of new Qx messages. As a part of the renumbering scheme, ATS messages are now grouped under Section 5.4. The text of the ATS messages remains the same. This new section now contains introductory material. Affected section titles are shown below.

The ground host address was changed from PICKLXS to LAX05xx to reflect an ATS facility.

The messages were renumbered as follows:

Old	New
5.3.40	5.5.2
5.3.41	5.5.3
5.3.42	5.5.4
5.3.43	5.5.5
5.3.44	5.5.6
5.3.45	5.5.7
5.3.46	5.5.8
5.3.47	5.5.9

5.3.48	5.5.10
5.3.49	5.5.11
N/A	5.5.12
N/A	5.5.13
N/A	5.5.14

5.5.5 Waypoint Position Report - MFI or Label B5

New Section added.

5.5.8 Request Departure Slot - MFI Label B8

Editorial change.

5.5.9 Request ATIS Report - MFI or Label B9

Editorial change.

5.5.12 Terminal Weather Information for Pilots - MFI or Label BB

New application defined using unassigned label BB. This section was previously Section 5.3.50.

5.5.13 Pushback Clearance Request - MFI or Label BC

Text moved from Section 5.3.51.

5.5.14 Expected Taxi Clearance Request - MFI or Label BD

Text moved from Section 5.3.52.

5.5.15 CPC Aircraft Log-on/Log-Off Request - MFI or Label BE

New Section added.

5.5.16 CPC WILCO/UNABLE Response - MFI or Label BF

New Section added.

5.5.17 Unassigned - MFI or Label BG

New Section added as a placeholder for future supplement.

5.6 Downlink Message Format, User-Defined

This section, previously Section 5.4, was renumbered to accommodate the addition of new Qx messages. The text remains the same.

Attachment 2

A note was added to inform the reader that messages that are undeliverable are returned to the originator with the SMI of SVC. Added 6 new service messages Codes: 143, 240, 246-249.

Appendix B.1

SMI Code table deleted. Identical SMI documentation is available in Appendix C. The deleted table was replaced by the former Appendix B.2.

New code assignments were added to the MA definition to resolve a conflict with the body of the Specification. A new subsection 7.c was added to clarify the position of the TEI in the message.

Text was added to the TP TEI definition to state that only one value should be entered. The new TEI of CP was added.

Appendix B.2

Section B.3 renumbered as B.2.

Appendix C

The format of Table C-1 and C-2 was revised to include a reference to the section of text associated with each entry.

Table C-1 New SMIs CPL, CPR, CWR, ETC, ETR, HDL, HDR, HDD PBR, PBC, NPR and associated Label/Sublabels were added. Table C-2 updated to reflect changes made in Table C-1.

New labels (QP through QV) and associated SMIs were added. TWIP assignment was modified from label 53 to labels AB and BB; Pushback Clearance Labels AC and BC were added; Expected Taxi Clearance AD and BD were added; and CPC Log-on/Log-off Label BE was added.

Numerous editorial corrections were made to eliminate contradictions between Table C-1 and C-2. The identification of data link service provider support was updated.

Numerous corrections and updates were entered. The format of Table 1 and Table 2 was modified to increase clarity. The tables were reorganized to increase its structure. Messages to/from peripherals to the MU are broken out separately in sub-table C-2A.

Appendix E

Note to Table E-1 was revised to change reference from obsolete Characteristic 597 to ARINC Specification 618.Table E-2 revised to include BEL and SYN characters.

Appendix F

Deleted.

Appendix Z

Deleted.

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SUPPLEMENT 4
TO
ARINC SPECIFICATION 620

DATA LINK GROUND SYSTEM STANDARD AND INTERFACE SPECIFICATION (DGSS/IS)

Published: November 24, 1999

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: September 21, 1999

A. PURPOSE OF THIS DOCUMENT

This Supplement introduces provisions for delivering bit-oriented messages through a VDL Mode 2 air/ground link and complementary X.25 based ground/ground network. This Supplement introduces new messages to deliver reports of RF network activity, Aircraft profile data, and Icing conditions.

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, vertical change bars in the margin will indicate those areas of text changed by the current Supplement only.

C. CHANGES TO ARINC SPECIFICATION 620 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.

1.0 Introduction

This section has been revised to encompass both ACARS and VDL Mode 2. Some sections were renumbered:

Old	New
1.4.1.1	1.4.2.1
1.4.2.2	1.4.2.2
1.4.3.1	1.4.2.3

1.2 Scope

The Commentary has been moved (deleted) to ARINC Specification 618.

1.3 Relationship of the Specification to Other Standards

Replaced figure to reflect both ACARS and VDL Mode 2 paths.

1.4 System Description

New text inserted.

1.4.1 ACARS System Description

Editorial changes were made to make this section generic, covering both ACARS and VDL Mode 2. New paragraph 5 was added.

1.4.2 ACARS Use of ICAO-Compliant Communication Services

New section title added.

1.4.2.1 ICAO-Compliant Subnetworks

New section added. Text from first paragraph was deleted.

1.4.2.2 ICAO ATN Communications Services

New section added.

1.4.2.3 ACARS Transition Aspects

New section added.

2.0 Data Link System

This section has been revised to encompass both ACARS and VDL Mode 2. Some sections were renumbered:

Old	New
2.4	2.3
2.4.1	2.3.1
2.4.2	2.3.2
2.4.3	2.3.3
2.5	2.4
2.5.1	2.4.1
2.5.2	2.4.2
2.5.3	2.4.3
2.6.2	2.5.1
2.7	2.6

2.1 Overview

Text has been deleted from paragraphs 3, 4, 6 and 7.

2.2.1 Uplink Message Handling

Reference to multiple message blocks deleted.

Text (previously paragraph 2) has been moved to ARINC Specification 618.

2.2.2 Downlink Message Handling

Text (previously paragraphs 1, 2 and 3) were moved to ARINC Specification 618.

Paragraph 4 was reworded to encompass VDL Mode 2.

2.2.3.1 Internetworking

New section added.

2.3 Flight Following

This section and sub-sections (previously 2.4) were renumbered.

2.4 Network Management

This section and sub-sections (previously 2.5) were renumbered.

2.6 Internetworking

This section was deleted from Supplement 3 and replaced by the previous Section 2.7, Function Summary.

3.0 Message Handling

Some sections were renumbered:

Old	New
3.2.3	3.2.2
3.8	3.2.2.1
3.8.2.1	3.2.2.1.1
3.8.2.2	3.2.2.1.2
3.2.1.1.3	3.2.3.1.3
3.8.1.1	3.2.3
3.8.1	3.2.3.2
3.8.1.2	3.2.3.2.1
3.8.1.3	3.2.3.3

3.1.1 Chapter Outline

New section added.

3.1.2 Definitions

New section added.

3.2 Ground-Ground Segment Specification (DSP to Ground User Interface)

New section title.

3.2.1 General Ground-Ground Message Format

Text was deleted from paragraph 7. Reference to ARINC Specification 618 for definition of Flight ID added. Added definition of Text Element delimiter to Table 3.2.1-2.

3.2.2 Downlink Conversion and Processing Function

New section title. Reference to ARINC Specification 618 was added to SMI Line definition. Text in DT Line description of fields ‘a’ and ‘d’ were revised to remove inferences of multiblock because they would be inconsistent with ATN protocols. Four additional three letter DSP Identifier Codes added.

3.2.2.1 Downlink Addressing

New section added using text already in this Specification. Previously the text was in Section 3.8.

3.2.2.1.1 Downlink Addresses of Messages from an ACARS Peripheral

Section renumbered. A reference to Table C-2B (MFI assignments) was added to the Commentary.

3.2.2.1.2 Downlink Supplementary Addresses

Section renumbered. This material was formerly in Section 3.8.2.2. The last sentence was added to the first commentary to clarify that there could be multiple destinations at a single ATC location. Users were advised to inform DSPs of addressing requirements in the last sentence of paragraph 4.

3.2.2.1.3 Supplementary Address Field

Examples were added to clarify coding.

3.2.2.1.4 Downlink Address Conversion

New section added.

3.2.3 Uplink Conversion and Processing Functions

This section was formerly Section 3.7. New section title. Paragraphs 1 through 4 were deleted. Reference to Table 3.3.3-2 for valid TEIs added.

3.2.3.1 TEI Processing of Uplink Ground-Ground Message

New section added.

3.2.3.1.1 AN (Aircraft Tail Number) and FI (Flight Identifier) TEIs Processing

New section added.

3.2.3.1.2 GL (Ground Locator)/AP (Airport Locator) and TP (Transmission Path) TEIs Processing

New section added. Only the first paragraph is new material, the remainder came from Section 3.7. A reference to Appendix B for values of the TEI of ‘TP’ was added.

3.2.3.1.3 MA (Message Assurance) TEI Processing

Section renumbered. New section title. This material was formerly Section 3.2.2.1.1.

3.2.3.2 Uplink Addressing

New section number. This material was formerly Section 3.8.1.

3.2.3.2.1 Uplink Addresses for Messages Delivered to an ACARS Peripheral

Section renumbered. This Section was formerly 3.8.1.2.

3.2.3.3 Uplink Supplementary Address(es)

Section renumbered. This Section was formerly 3.8.1.3. New text, paragraph 3, and Table 3.2.3-2 were added.

3.3.3 Untransmittable Uplink Service Messages

The AN line of Table 3.3.3-1 was corrected. Note 3 was expanded.

3.3.3.1 Message Assurance Report – Untransmittable Uplink

The AN line of Table 3.3.3.1-1 was corrected. Note 6 was expanded.

3.3.4.1 Message Assurance Reports

The AN line of Table 3.3.4.1-1 was corrected.

3.3.5.1 Incomplete Downlink Service Message Intercept

New section added. Significant portions of this material were formerly in Section 3.6.1.

3.5 ACARS Messaging Function Primitives

New section replaced the previous section "General Air/Ground Message Format."

3.5.1 Standardized Acknowledgment Format

Deleted. Section moved to ARINC Specification 618.

3.5.2 Correlated Acknowledgment Format

Deleted. Section moved to ARINC Specification 618.

3.5.3 Multiblock Downlink Messages

Deleted. Section moved to ARINC Specification 618.

3.6 Air0Ground Messages

New title and text inserted. Former Section 3.6, Downlink Messages, and its subsections were moved to ARINC Specification 618.

3.7 Uplink Messages (and its Subsections)

Section and its subsections moved to ARINC Specification 618.

3.8 Addressing (and its Subsections)

Section and its subsections moved to other sections of this document (see table above) or moved to ARINC Specification 618.

4.0 Uplink Message Text Formats

New chapter title; formerly the title was Uplink Message Text Field Formats.

4.2.3 ACAARS Frequency Uplink – Label 54 Or Voice Go-Ahead – Label 54

New text was added to define the range of VHF frequencies. Also, the commentary was expanded to note that some existing radio control units have only 5 digit frequency displays.

4.2.5 Uplink Squitter – Label SQ

Revised format of Version 2 to include VDL Mode 2 Flag and Base Frequency. This resulted in new notes 3, 4, and 5 In note 1, DSP identifiers are included by reference to Section 3.2.2.

4.2.7 DSP Autotune Broadcast Uplink - Label ::

New section added.

4.3.7 Network Performance Report Request - Label S2

New section added.

4.3.8 LRU Configuration Profile Report Request – Label S3

New section added.

4.3.9 Meteorological Report Command Uplink – Label H2

New section added.

5.5 ATS Messages

Reference to Application Data changed to Application Text in this section and subsections. The relation of Application Text to Application Data is explained.

4.5.11 ATCCommunications – MFI or Label AA

New text was added to clarify the relationships of controller-pilot dialogue definitions.

5.0 Downlink Message Text Formats

New Chapter title; formerly the title was Downlink Message Text Field Formats.

5.3.13.2 Meteorological Report, Version 2 – MFI or Label H2

Ascent data measurements added to Initial Meteorological data Series #2. Note 12 added.

5.3.13.3 Meteorological Report, Version 3 – MFI or Label S2

Editorial corrections were made to clarify date and time of observation from date and time of message assembly.

5.3.14 Command Response Downlink – Label RB

An addition (the second sentence) was made to Note 1.

5.3.30 Out/Return IN Report (IATA Airport Code) – Label QG

The SMI line was changed from “RET” to “RTN”.

5.3.36 Out Report (ICAO Airport Code) – Label QP

Note added.

5.3.48 VHF Network Statistics Report – Label S1

The acronym “ACARS” was inserted in front of the word multiblock to avoid extension of this concept to VDL Mode 2 and ATN. Length of example increased to match the length in the ‘size’ column in Tables.

5.3.49 VHF Network Statistics Report - Label S2

New section added.

5.3.50 LRU Configuration Report Format

New section added. This was formerly a placeholder entitled “Aircraft Profile Report - Label S3.”

5.3.51 Media Advisory – Label SA

Reformatted section. Added coding for ICO SATCOM and VDL Mode 2 in Note 3. Also, in Note 3, the generic SATCOM assignment was expanded to encompass AERO-L, AERO-H and both AERO-H and AERO I. In note 5, a reference to ARINC Specification 618 was added.

5.3.52 Icing Report - Label or MFI H3

New section added.

5.4 Messages from Avionics Subsystem – Label H1

Revised Table 5-4-1B to reflect the definition of Application Text.

5.4.2 Messages from Airborne Subsystems: ARINC 724 or 724B ACARS MU – Label H1

Replaced Message Text with Application Text.

5.4.2.1 OAT – Simple H1 Message

Replaced Message Text with Application Text. Editorial clarification was added to “Free Text” character content description.

5.4.2.2 OAT – H1 Message With Additional Addresses

Editorial clarification was added to “Free Text” character content description.

5.4.2.3 CFDIU, DFDAU, FMC or Cabin Terminal Messages Without Additional Addresses

New section title. Editorial clarification was added to “Free Text” character content description.

5.4.2.4 CFDIU, DFDAU, FMC or Cabin Terminal Messages With Additional Addresses

Editorial clarification was added to “Free Text” character content description.

5.5 ATS Messages – MFI or Label Bx

IMI Application data CRC was replaced by Application Text in Table 5-5. The field Message Text was changed to Application Text. Related changes were made within the new Application Text description to identify the format of both character and bit-oriented applications.

5.5.10 ATS Facilities Notification (AFN) – MFI or Label B0

Replaced reference to Specification 622 with 623. Replaced Application Text with Application Data.

6.0 Transit Times

Paragraph 4 was revised to eliminate a reference to specific transit times. The subsections of Section 6.2 were deleted. The data these subsections contained is covered in Specification 618.

Attachment 3

New attachment added.

Appendix B

TP – Transmission Path definition was refined. Specifically, both Satcom and HF are accommodated.

Appendix C

Added new SMIs of APR, ICE and WXM. Deleted duplicate OAT SMI. Added Table C-2B, MFI Assignments.

Appendix

Appendix D deleted.

Appendix F

New appendix added.

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SUPPLEMENT 5
TO
ARINC SPECIFICATION 620

DATA LINK GROUND SYSTEM STANDARD AND INTERFACE SPECIFICATION (DGSS/IS)

Published: June 30, 2005

Prepared by the Airlines Electronic Engineering Committee

Adopted by the Airlines Electronic Engineering Committee: October 14, 2004

A. PURPOSE OF THIS DOCUMENT

This Supplement introduces a new downlink message to announce the capability of the CMU to support data communications over the VDL Mode 2 air/ground link. Additional housekeeping changes were also made. These include the addition of designators for the handling and priority of ACARS messages that are carried over the VDL air/ground link in an ATN environment.

Vendor defined labels and associated formats were added to ARINC 620. New meteorological labels were added to the document.

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, vertical change bars in the margin will indicate those areas of text changed by the current Supplement only.

C. CHANGES TO ARINC SPECIFICATION 620 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.

All references to ARINC Specification 637 have been deleted. ARINC Specification 637 is obsolete.

3.2.2 Downlink Conversion and Processing Functions

The entry for Air Canada as a data link service provider was deleted from Table 3.2.2-3.

3.2.2.1.2 Downlink Supplementary Addresses

Labels VA to VR were added to the list.

In Table 3.2.2.1.2-1 the Vendor Defined Downlink in the Label column was changed from VA to VR to VA to VZ and V0 to V9. Labels HX, S1, and S3 were added. Label M1, M2, M3, M4 was changed to M2, and the description was changed to User Defined Message.

The table in Section 3.2.2.1.2 was given an identification of Table 3.2.2.1.2-1 Downlink Messages with Possible Supplementary Addresses.

Table 3.2.2-3 title changed from Three Letter DSP Identifier Codes to ICAO/IATA DSP Identifier Letter Codes. Table 3.2.2-3 restructured to identify the ICAO and IATA columns. The service provider China code was corrected to XA, and all code underlines were removed. Note 1 was added in the IATA air to ground column for Brazil/SITA Internetworking and SITA/AVICOM Internetworking

4.2.5 Uplink Squitter – Label SQ

The Version 2 format was extended to better serve AOA. Changes included the addition of Notes 5 through 7.

The table for Version 2 format was reconstructed. Service provider codes XC and XJ removed from all locations.

The table describing Version 2 of the Uplink Squitter-Label SQ was completely reworked. New information was introduced that better defines the structure of the format. The word optional was added in the Character Content column for character numbers 31, 32-38, m+1, and m+2 to n. Notes 5 and 6 were reworked to better describe the reworked Version 2 table.

In the example of Version 2 (following Note 8), the frequency information was corrected. The description of the example was enhanced and changed to a bulletized format for ease of comprehension. A clarifying statement was added at the end of Note 4.

In Figure 4.2.5-2, characters 30, 31, and 32 are identified in the drawing.

4.2.6 Data Transceiver Autotune – Label :;

The first sentence ending in Section 4.2.6 was changed from DEL as appropriate to _DEL. The table in Section 4.2.6 is expanded for characters 7-10. For characters 7-10 in the above table, remove the phrase to ignore AOA Squitters.

4.2.8 POA to AOA Autotune – Labels :}

New section added.

4.3.5 Command/Response Uplink - Label RA

Figure 4.3.5-1 was incorrect and was replaced with the correct figure.

4.3.6 Network Statistics Report Request – Label S1

In the second paragraph, last sentence 5.3.52 was changed to 5.3.48.

The format of the Report Type Identifier in Table 4.3.6.1 was originally defined as a two-character field. A four-character variation was added by this Supplement to obtain greater control of Network Statistics downlinks. New Report Types SANN and DANN and Notes 5 and 6 were added to support this feature. Note 5 for Table 4.3.6-1 has the word legs added.

In Table 4.3.6-1 an entry was made for the number of flight legs and XX was added in the FORMAT column. Note 3, Section 3.8 was changed to Section3.2.3.3.

4.3.7 VHF Network Performance Report Request – Label *S2*

In Section 4.3.7, VHF was added to the title. In the first paragraph, first sentence of Section 4.3.7, The Network etc. was changed to The VHF Network, etc.

Table 4.3.7-1 Statistics Report Request Format – Label S2 was completely reworked. Two notes were added at the end of the table. The example following the table was moved to Section 5.3.49.

4.3.8 LRU Configuration Profile Report Request – MFI or Label S3

Note 2 was added to the table.

4.3.10 Meteorological Report Command Uplink—MFI or Label H4

Section 4.3.10 was added. In the fourth sentence of the Note following Table 4.3.10-1, On power up was changed to Following a cold start.

In the note following Table 4.3.10-1, fourth sentence, Following a cold start, was changed to Following a complete system reset and/or initialization.

In the fourth sentence of the Note following Table 4.3.10-2, On power up was changed to Following a cold start. In the fourth sentence, Following a cold start, was changed to Following a complete system reset and/or initialization.

In the note following Table 4.3.10-5, third sentence, Following a cold start, was changed to Following a complete system reset and/or initialization.

Following Table 4.3.10-9, additional Notes were added. Additional notes were completely reworked to read as follows: Default data for Tables 4.3.10-1 through to 4.3.10-9 are stored onboard as part of the basic software but can only be altered through software re-programming. Following a complete system reset and/or initialization, the table variables in volatile memory filled with these default values which are retained in volatile memory until altered by uplink command. Default values can only be altered through software re-programming. Any subsequent uplinked changes are retained in volatile memory until the next system reset and/or initialization.

Following Table 4.3.10-10, two notes were added. Formulas were also added that would allow the computation of pressure and pressure altitude.

4.6.1 Uplink Message Formats, Vendor Defined

New Section added.

4.7 Uplink Message Formats, Vendor Defined

New section added.

4.8 Uplink Message Formats, DSP Defined

A new section was added.

5.2.10 VDL Switch Advisory - Label 5V

New section added. In Figure 5.2.10-1 SUSPENSION ADVISORY changed to SWITCH ADVISORY.

5.2.11 Autotune Reject – Label QV

New section added.

5.3.13 Meteorological Report - Label or MFI H2

Section was modified to reflect increasing versions from two to four. Note at the end of Section 5.3.13.

In Table 5.3.13.3-1, for VW Mixing Ratio (2 places) the # of characters was changed from 5 to 4, and nnnnQ was changed to nnnQ.

5.3.13.4 Meteorological Report, Version 4 - MFI or Label H2

New Section added.

In Series #2 ASCENT REPORTS second paragraph/second sentence, Table 5.3.13.4-4 was changed to Table 4.3.10-10.

In Series #2 ASCENT REPORTS within Section 5.3.13.4, second paragraph/second sentence, Table 4.3.10.10 was changed back to Table 5.3.13.4-4.

In Series #1 DESCENT REPORTS within Section 5.3.13.4, second paragraph/second sentence, Table 5.3.13.4-4 was changed to Table 4.3.10-10.

In Series #1 DESCENT REPORTS within Section 5.3.13.4, second paragraph/second sentence, Table 4.3.10-10 was changed back to Table 5.3.14.4-4.

In Series #1 DESCENT REPORTS within Section 5.3.13.4, fourth paragraph/fourth sentence, and Table 5.3.13.4-4 was changed to Table 4.3.10-10.

In Series #1 DESCENT REPORTS within Section 5.3.13.4, fourth paragraph/fourth sentence, and Table 4.3.10-10 was changed back to Table 5.3.13.4-4.

In Table 5.3.13.4-1, a new character 14 (Altitude Pressure References) was defined. This advanced the character number for the remaining data. Initial Report, Pressure Altitude was changed to Altitude. Series #1, Pressure Altitude was changed to Altitude. Series #2, Pressure Altitude was changed to Altitude.

In Table 5.3.13.4-2, a new character 14 (Altitude Pressure References) was defined. This advanced the character number for the remaining data. Sample Format, Pressure Altitude was changed to Altitude.

In Table 5.3.13.4-3, a new character 14 (Altitude Pressure References) was defined. This advanced the character number for the remaining data. Pressure Altitude is changed to Altitude for both Series #1 and #2. Note 12 was added at the end of Section 5.3.13.4.

Table 5.3.13.4-4 Preset Target Heights for Pressure Level Selection was added back to Section 5.3.13.4. Following Table 5.3.13.4-4, two notes were added.

Formulas were also added that would allow the computation of pressure and pressure altitude.

5.3.42 Unassigned - Label QV

The section title has been changed to Reserve.

5.3.48 VHF Network Statistics Report – Label S1

Fields were added for Start of Statistics Capture and End of Statistics Capture. The range of Times Retransmit Counter (VAC1) Limit is reached was increased by making the field 2 digits rather than 1. This occurs in 3 places. Editorial corrections were made; e.g., HHMM became <hhmm> and NNNN became NNnn.

In Table 5.3.48-3, entries in the Example column were corrected for the proper number of characters. The examples for Departure Station and Destination Station were changed from XYZB and LAXB to XYZ<$_{sp}$> and LAX<$_{sp}$>. Note 5 reference to Section 3.8 is changed to Section 3.2.3.3. Note 6 reference to Section 3.8 is changed to Section 3.2.2.1.3.

5.3.49 VHF Network Performance Report - Label S2

Four sentences were added to Paragraph 2 of Section 5.3.49 describing the duration of data taking and the time between sending reports. A third paragraph was also added. The example that was removed from Section 4.3.7 was placed at the end of Section 5.3.49.

In Table 5.3.49 three lines were added to the Data Field; Optional Slash, Optional Supplemental Address, and Optional Period. Lnes 5 & 6 were modified.

5.3.51 Media Advisory - Label SA

Figure 5.3.51-1 was labeled.

5.3.53 Internet E-Mail Message – MFI or Label E1

New section added.

In the first table of Section 5.3.53, corrections were made to the CHARACTER NUMBER column. In Table 5.3.53, line 5 was added, and the old line 5 was changed to 6-n. Added Figure 5.3.53-1. Blocks were eliminated and Free text was replaced by a message. Figure 5.3.53-1 was corrected to reflect the example. In the first table of Section 5.3.53, an Example column was added.

The first table of Section 5.3.53 was compressed to show lines 1-10 as Standard Header. For Character Number

11 to m, the Example Column was corrected. For character (m+2) to k, the Example Column was corrected.

5.3.54.1 Meteorological Report Configuration Downlink - MFI or Label H4

New section added.

5.3.55 Internet E-Mail Message – DSP Service – MFI or Label E2

New section added.

5.7 Downlink Message Formats, Vendor Defined

New section added.

5.8 Downlink Message Format, Vendor Defined

New section added.

ATTACHMENT 2 SERVICE MESSAGES—REASON CODES

In Table 2-3 code 313 was added.

APPENDIX C MESSAGE INFORMATION

Tables C-1 and C-2 was expanded to include a new column in which the service priority of ACARS messages is listed. This data applies only to the air/ground link when operating in a full ATN environment.

New Label E1 and its associated SMI of EML was added in Table C-1 and C-2.

In Table C-2A, unused Sub-Label entries A1, A2, and AD were deleted. Service priorities applicable to the ATN environment were added. In Table C-2A, Sub-Label E1 was changed to EI.

In Table C-1, LABEL/SUB-LABEL H1/E1 was corrected to H1/EI for the ENG SMI. SERVICE PRIORITY was changed from DEL to AIR-6 for SMIs ECS and ENG.

In Table C-1, CP1 SMI and EMS SMI were added to the table. In Table C-1, SMI N10-N4 has been changed to downlink only.

In Table C-1, for SMIs MX1 and MX2 to MX9, 4.8 and 5.8 were added to the Section column. In Table C-1,SMI OAT, AIR was added as a Service priority. In Table C-1, the WXC SMI was added. In Table C-1, the VMA to VMR SMI was added.

In Table C-1, MX1 SMI row was eliminated. The MX2 to MX9 SMI was changed to MX1 to MX9 with the Sub-Label becoming X1 to X9. In Table C-1 the TTO SMI was corrected to TT0.

In Table C-1, the VMA to VMR SMI was changed to VMA to VMZ and VM0 to VM9 and the corresponding Label/Sub-Label to VA to VZ and V0 to V9.

In Table C-2 added Labels :}, 5V, QV, VA to VR Labels and EMS were added. In Table C-2 for the H1 Label, Table C-2A was added in the Service Priority column.

In Table C-2, Labels V0 to V9 were changed to VA to VR and 4.7 and 5.9 were added to the Section column.

In Table C-2A, the EL Sub-Label and 10-4~ label were added. In Table C-2A, Label H4 (Up and Down) was added.

In Table C-2B, the EL and H4 MFIs were added. In Table C-2B, MFI H4 (Up and Down) was added to the table. In Table C-2B, MFI E2 was added to the table.

In Table C-2 Label VA to VR was changed to VA to VZ and V0 to V9. Likewise, VMA to VMR was changed to VMA to VMZ and VM0 to VM9.

The X1 label row was eliminated. The X2 to X9 label row was changed to X1 to X9 and the corresponding SMI was changed to MX1 to MX9.

APPENDIX G UPLINK CONTROL PROGRAMMING NOTES FOR VERSION 4 ONBOARD SOFTWARE

New Appendix G added.

APPENDIX H DOWNLINK METEOROLOGICAL REPORT COMPRESSION

New Appendix H added.

ARINC Standard – Errata Report

1. Document Title

Supplement 5 to ARINC Specification 620: *Data Link Ground System Standard and Interface Specification (DGSS/IS)*
Published: August 12, 2005

2. Reference

Page Number:______ Section Number: ______________ Date of Submission: ______________

3. Error

(Reproduce the material in error, as it appears in the standard.)

4. Recommended Correction

(Reproduce the correction as it would appear in the corrected version of the material.)

5. Reason for Correction

(State why the correction is necessary.)

6. Submitter (Optional)

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

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

Please return comments to fax +1 410-266-2047 or standards@arinc.com

ARINC IA Project Initiation/Modification (APIM) Guidelines for Submittal

(Date of Submittal ______________)

1. ARINC Industry Activities Projects and Work Program

A project is established in order to accomplish a technical task approved by one or more of the committees (AEEC, AMC, FSEMC) Projects generally but not exclusively result in a new ARINC standard or modify an existing ARINC standard. All projects are typically approved on a calendar year basis. Any project extending beyond a single year will be reviewed annually before being re-authorized. The work program of Industry Activities (IA) consists of all projects authorized by AEEC, AMC, or FSEMC (The Committees) for the current calendar year.

The Committees establish a project after consideration of an ARINC Project Initiation/Modification (APIM) request. This document includes a template which has provisions for all of the information required by The Committees to determine the relative priority of the project in relation to the entire work program.

All recommendations to the committees to establish or reauthorize a project, whether originated by an airline or from the industry, should be prepared using the APIM template. Any field that cannot be filled in by the originator may be left blank for subsequent action.

2. Normal APIM Evaluation Process

Initiation of an APIM

All proposed projects must be formally initiated by filling in the APIM template. An APIM may be initiated by anyone in the airline community, e.g., airline, vendor, committee staff.

Staff Support

All proposed APIMs will be processed by committee staff. Each proposal will be numbered, logged, and evaluated for completeness. Proposals may be edited to present a style consistent with the committee evaluation process. For example, narrative sentences may be changed to bullet items, etc. When an APIM is complete, it will be forwarded to the appropriate Committee for evaluation.

The committee staff will track all ongoing projects and prepare annual reports on progress.

Committee Evaluation and Acceptance or Rejection

The annual work program for each Committee is normally established at its annual meeting. Additional work tasks may be evaluated at other meetings held during the year. Each committee (i.e., AMC, AEEC, FSEMC) has its own schedule of annual and interim meetings.

The committee staff will endeavor to process APIMs and present them to the appropriate Committee at its next available meeting. The Committee will then evaluate the proposal. Evaluation criteria will include:

- Airline support – number and strength of airline support for the project, including whether or not an airline chairman has been identified
- Issues – what technical, programmatic, or competitive issues are addressed by the project, what problem will be solved
- Schedule – what regulatory, aircraft development or modification, airline equipment upgrade, or other projected events drive the urgency for this project

Accepted proposals will be assigned to a subcommittee for action with one of two priorities:

- High Priority – technical solution needed as rapidly as possible
- Routine Priority – technical solution to proceed at a normal pace

Proposals may have designated coordination with other groups. This means that the final work must be coordinated with the designated group(s) prior to submittal for adoption consideration.

Proposals that are not accepted may be classified as follows:

- Deferred for later consideration - the project is not deemed of sufficient urgency to be placed on the current calendar of activities but will be reconsidered at a later date
- Deferred to a subcommittee for refinement – the subcommittee will be requested to, for example, gain stronger airline support or resolve architectural issues
- Rejected – the proposal is not seen as being appropriate, e.g., out of scope of the committee

3. APIM Template

The following is an annotated outline for the APIM. Proposal initiators are requested to fill in all fields as completely as possible, replacing the italicized explanations in each section with information as available. Fields that cannot be completed may be left blank. When using the Word file version of the following template, update the header and footer to identify the project.

ARINC IA Project Initiation/Modification (APIM)

Name of proposed project **APIM #: _____**

Name for proposed project.

Suggested Subcommittee assignment

Identify an existing group that has the expertise to successfully complete the project. If no such group is known to exist, a recommendation to form a new group may be made.

Project Scope

Describe the scope of the project clearly and concisely. The scope should describe "what" will be done, i.e., the technical boundaries of the project. Example: "This project will standardize a protocol for the control of printers. The protocol will be independent of the underlying data stream or page description language but will be usable by all classes of printers."

Project Benefit

Describe the purpose and benefit of the project. This section should describe "why" the project should be done. Describe how the new standard will improve competition among vendors, giving airlines freedom of choice. This section provides justification for the allocation of both IA and airline resources. Example: "Currently each class of printers implements its own proprietary protocol for the transfer of a print job. In order to provide access to the cockpit printer from several different avionics sources, a single protocol is needed. The protocol will permit automatic determination of printer type and configuration to provide for growth and product differentiation."

Airlines supporting effort

Name, airline, and contact information for proposed chairman, lead airline, list of airlines expressing interest in working on the project (supporting airlines), and list of airlines expressing interest but unable to support (sponsoring airlines). It is important for airline support to be gained prior to submittal. Other organizations, such as airframe manufacturers, avionics vendors, etc. supporting the effort should also be listed.

Issues to be worked

Describe the major issues to be addressed by the proposed ARINC standard.

Recommended Coordination with other groups

Draft documents may have impact on the work of groups other than the originating group. The APIM writer or, subsequently, The Committee may identify other groups which must be given the opportunity to review and comment upon mature draft documents.

Projects/programs supported by work

If the timetable for this work is driven by a new airplane type, major avionics overhaul, regulatory mandate, etc., that information should be placed in this section. This information is a key factor in assessing the priority of this proposed task against all other tasks competing for subcommittee meeting time and other resources.

Timetable for projects/programs

Identify when the new ARINC standard is needed (month/year).

Documents to be produced and date of expected result

The name and number (if already assigned) of the proposed ARINC standard to be either newly produced or modified.

Comments

Anything else deemed useful to the committees for prioritization of this work.

Meetings

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

Activity	**Mtgs**	**Mtg-Days**
Document a	*# of mtgs*	*# of mtg days*
Document b	*# of mtgs*	*# of mtg days*

For IA staff use

IA staff assigned: ____

Forward to committee(s) (AEEC, AMC, FSEMC): __________________

Potential impact: ____
(A. Safety B. Regulatory C. New aircraft/system D. Other)

Committee resolution: ____
(1. Authorized 2. Deferred 3. More detail needed 4. Rejected)

Assigned Priority: ____

A. – High (execute first) B. – Normal (may be deferred for A.)