

# ES 200 794 V1.1.1 (1997-10)

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*ETSI Standard*

**Electromagnetic compatibility  
and Radio spectrum Matters (ERM);  
Terrestrial Flight Telecommunications System (TFTS);  
Circuit mode voice-band data services;  
Group 3 fax support**

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*European Telecommunications Standards Institute*

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**Reference**

DES/ERM-RP05006 (7co00icp.PDF)

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**Keywords**

Circuit mode, data, fax, group 3, interface,  
terminal, TFTS

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## Foreword

This ETSI Standard (ES) has been produced by the Electromagnetic compatibility and Radio spectrum Matters (ERM) Technical Committee of the European Telecommunications Standards Institute (ETSI).

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## 1 Scope

The present document specifies the minimum technical requirements for support of circuit mode voice-band data services within the Terrestrial Flight Telecommunications System (TFTS) Aeronautical Public Correspondence (APC) system defined in ETS 300 326, parts 1 to 3, [1] to [3], using the Terminal Interface Function (TIF) of the voice-band data coding system described in the Inmarsat Aeronautical System Definition Manual, Module 5 [9].

The present document restricts voice-band data services to group 3 fax transmission which, due to the expected service characteristics in flight, is believed to offer sufficient service quality under the conditions of missing handover support within the adopted preliminary technical solution.

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## 2 Normative references

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETS 300 326-1 (1996): "Radio Equipment and Systems (RES); Terrestrial Flight Telephone System (TFTS); Part 1: Speech services, facilities and requirements".
- [2] ETS 300 326-2 (1996): "Radio Equipment and Systems (RES); Terrestrial Flight Telephone System (TFTS); Part 2: Speech services, radio interface".
- [3] ETS 300 326-3 (1996): "Radio Equipment and Systems (RES); Terrestrial Flight Telephone System (TFTS); Part 3: Speech services, network aspects".
- [4] ITU-T Recommendation V.21: "300 bits per second duplex modem standardized for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [5] ITU-T Recommendation V.22 bis: "2400 bits per second duplex modem using the frequency division technique standardized for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits".
- [6] ITU-T Recommendation V.27 ter: "4800/2400 bits per second modem standardized for use in the general switched telephone network".
- [7] ITU-T Recommendation T.4: "Standardization of Group 3 facsimile terminals for document transmission".
- [8] ITU-T Recommendation T.30: "Procedures for document facsimile transmission in the general switched telephone network".
- [9] Inmarsat Aeronautical System Definition Manual, Module 5 (March 1993): "Circuit-Mode Service Voice Codec Algorithm and Terminal Interface Function Specification for Facsimile and Data services".
- [10] ARINC Characteristic 746 (1996): "Cabin Communications System".

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## 3 Abbreviations and symbols

### 3.1 Abbreviations

For the purposes of the present document, the following abbreviations apply:

APC	Aeronautical Public Correspondence
AT	Avionic Termination
BC	Bearer Capability
CC	Call Control
CCM	Call Control Message
CTU	Cabin Telecommunications Unit
GS	Ground Station
GSS	Ground Station System
PCM	Pulse Code Modulation
RR	Radio Resource
TIF	Terminal Interface Function
TFTS	Terrestrial Flight Telecommunications System

### 3.2 Symbol

For the purposes of the present document, the following symbol applies:

bit/s	bits per second
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## 4 Service definition

The present document specifies support of the following circuit mode voice-band data services for the TFTS APC system specified in ETS 300 326 [1], [2] and [3]:

- group 3 facsimile transmission service at 4 800 bit/s maximum data rate, see ITU-T Recommendations V.27 ter [6], T.4 [7], T.30 [8].

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## 5 Network architecture

The network architecture shall be as specified in ETS 300 326 [1], [2] and [3]:

- The connection of terminal equipment and the transmission of voice-band data to/from the Cabin Telecommunications Unit (CTU) shall be as specified by the Airlines Electronic Engineering Committee (AEEC) in ARINC Characteristic 746 [10].
- The transmission of voice-band data between CTU and Avionic Termination (AT) shall be as specified in ARINC 746 [10].
- The exchange of user data between AT and Ground Station System (GSS) shall take place on one Ba-channel.

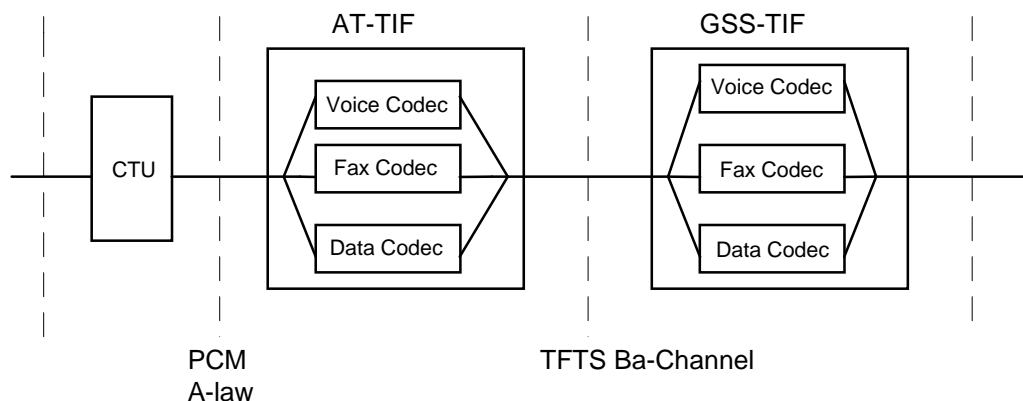
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## 6 Functions

### 6.1 Coder/decoder algorithm

The coder/decoder algorithm, which is specified in the Inmarsat Aeronautical System Definition Manual, Module 5 [9], shall be used for implementation of voice-band data services in the TFTS system.

The function specified in the Inmarsat Aeronautical System Definition Manual, Module 5 [9] for support of such services is called "Terminal Interface Function" (TIF). The functional block structure is shown in figure 1.



**Figure 1: TIF structure**

The modem types supported by the TIF are given in table 1:

**Table 1: Supported modem types**

ITU-T modem specification	Half duplex or duplex	Service	User data rates
V.21 [4]	half duplex	facsimile	300 bit/s
V.27 ter [6]	half duplex	facsimile	2,4 kbit/s 4,8 kbit/s
V.22 bis [5]	full duplex	voice-band data	1,2 kbit/s 2,4 kbit/s
NOTE: The service described in the present document does not use the V.22 bis modem type.			

The TIF implements a method to detect the type of circuit mode data and perform automatic switching to the correct codec, appropriate for the type of data.

## 6.2 Fail safety function

On default, the voice codec function is selected by the calling AT. In case of the transmission of circuit mode data, the necessary codec is selected by the AT and the GSS.

In case of inability to decode the received circuit mode data signals, the AT and the GSS select the voice decoder automatically.

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# 7 Interface aspects

## 7.1 CTU to AT interface

The interface between CTU and AT shall be as specified in the ARINC 746 [10].

The circuit mode data signal which originates and terminates in the Cabin Communication Subsystem shall be transferred in PCM A-law coded format as a traffic channel via the CEPT E1 connection with the CTU as described in ARINC 746 [10] Attachments 9 and 11.

Within the Call Control Message (CCM) information elements, the information transfer capability field in the Bearer Capability (BC) information element shall be used in accordance with the required service.

**Table 2: Bearer Capability (BC) to be used for the different circuit mode data services**

Service	ITU-T Modem Specification	Half duplex or duplex	Information transfer capability
facsimile	V.21 [4], V.27 ter [6]	half duplex	Circuit Mode FAX - Analogue

Refer to ARINC 746 [10], Attachment 11, subclause 4.2.4.1.

## 7.2 AT to GSS interface

The interface between AT and GSS shall be as specified in ETS 300 326 [1], [2] and [3].

The circuit mode data signal shall be transferred in a Ba-channel.

### 7.2.1 Radio Resource (RR) messages

During layer 3 establishment of the connection between AT and GSS, the AT shall use the resource request information element "data 9,6 kbit/s" within the RR-Establish Request message, see ETS 300 326-2 [2], subclauses 10.11.7.1.1 and 10.11.8.5.2.9.

If the Ground Station (GS)/GSS does not support the circuit mode data function, it shall deny the resource with a Resource Request Cause information "GS does not support the requested service" within the RR-Establish Reject message, see ETS 300 326-2 [2], subclauses 10.11.7.1.3 and 10.11.8.5.2.2.

### 7.2.2 Call control messages

The AT shall use the Bearer Capability (BC) information "3,1 kHz audio" within the Call Control (CC) set-up message. This is a value which is defined in addition to ETS 300 326 [1], [2] and [3]. Refer to ETS 300 326-2 [2], subclauses 10.11.7.2.9 10.11.8.5.3.2 and to table 3 in the present document.

**Table 3: Bearer Capability (BC), Information Transfer Capability field**

Bits:					Information
5	4	3	2	1	
0	0	0	0	0	Speech
1	0	0	0	0	3,1 kHz audio

Table 3 supplements table 100 within ETS 300 326-2 [2] subclause 10.11.8.5.3.2.

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## 8 Handover during circuit mode data transmission

### 8.1 General

Circuit mode data transmission need not remain intact over a handover. This is in violation of the requirements to ETS 300 326-1 [1]. Therefore, to improve service quality, the measures described in subclauses 8.2 and 8.3 shall be taken.

### 8.2 Intra cell handover

While any Ba channel for voice-band data services is established, the AT shall ignore HANDOVER COMMAND messages for slot to slot or carrier to carrier handovers issued by the GSS for traffic balancing purposes according to ETS 300 326-3 [3], subclause 6.2.7.

NOTE: Without response, the GSS terminates the handover procedure after expiry of timer T3104 (see ETS 300 326-2 [2] subclause 10.11.9.2.1).



### 8.3 Inter cell handover

The Radio Resource (RR) manager of the AT shall manage the establishment of a fax transmission service in the case of the necessity to perform inter cell handovers and it shall also adjust the point of time for handover in the case of a running fax transmission in such a way that sufficient availability and reliability of that service for the passenger is ensured.

However, inter cell handover shall in every case be performed according to ETS 300 326 [1], [2] and [3].

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## History

<b>Document history</b>				
	October 1996	Public Enquiry	PE 116:	1996-10-21 to 1997-02-14
V1.1.1	August 1997	Membership Approval Procedure	MV 9740:	1997-08-05 to 1997-10-03
V1.1.1	October 1997	Publication		