PROCEDURES FOR INTERWORKING BETWEEN INMARSAT AERONAUTICAL MOBILE SATELLITE SYSTEM AND THE INTERNATIONAL PUBLIC SWITCHED TELEPHONE NETWORK/ISDN

1 Introduction

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This Recommendation provides the detailed procedures for interworking between the INMARSAT aeronautical system and signalling systems of the public fixed network. For a brief description of the INMARSAT aeronautical system, see Appendix I to Recommendation Q.1151.

Conversion of information elements

Tables 1/Q.1152 and 2/Q.1152 list the signals of the INMARSAT aeronautical system that are relevant for the purpose of interworking with the PSTN/ISDN. The forward interworking telephone events (FITEs) and backward interworking telephone events (BITEs), as defined in Annex A to Recommendations Q.601 to Q.608, that correspond to each of these signals is also provided in the tables.

Tables 3/Q.1152 to 18/Q.1152 give the relationship between signals of the fixed network signalling systems and the INMARSAT aeronautical system.

2.1_w Signalling System R2<u>w</u>

- 2.1.1 Table 3/Q.1152 gives the relationship between messages in the INMARSAT aeronautical signalling system and forward signals in Signalling System R2 for air-to-ground calls i.e. interworking of INMARSAT aeronautical to Signalling System R2.
- Table 4/Q.1152 shows the relationship between forward signals in Signalling System R2 and messages in the INMARSAT aeronautical signalling system for ground-to-air calls. In the comment column actions taken by the MSSC are indicated, in particular for signals of R2 which have no equivalent message in the INMARSAT aeronautical system.
- The signal numbers for forward signals of Signalling System R2 are those given in Table A-7 of Annex A to Recommendations Q.601-Q.608.
- 2.1.2 Table 5/Q.1152 gives the relationship between messages in the INMARSAT aeronautical signalling system and backward signals in Signalling System R2 for ground-to-air calls, i.e. interworking of Signalling System R2 to INMARSAT aeronautical.
- Backward signals in Signalling System R2 generated by the MSSC for unsuccessful ground-to-air calls are given in Table 5_w bisw/Q.1152. These signals are not related to any specific message received from the aircraft earth station.
- Table 6/Q.1152 gives the relationship between backward signals in Signalling System R2 and messages in the INMARSAT aeronautical signalling system for air-to-ground calls, i.e. interworking of INMARSAT aeronautical to Signalling System R2. The comments column indicates specific actions taken by the MSSC.

The signal number of backward signals of Signalling System R2 are those given in Table A-11 of Annex A to



- $2.2_{\underline{w}}$ Signalling System No. 7 (TUP) \underline{w}
- 2.2.1 Tables 7/Q.1152 and 8/Q.1152 are similar to Tables 3/Q.1152 and 4/Q.1152, respectively, and apply to forward signals in Signalling System No. 7 (TUP).

The signal numbers for forward signals of Signalling System No. 7 (TUP) are those given in Table A-5 $_{w}$ bis \underline{w} of Annex A to Recommendations Q.601-Q.608.

Tables 9/Q.1152, 9 wbis w/Q.1152 and 10/Q.1152 are similar to Tables 5/Q.1152, 5 wbis w/Q.1152 and 6/Q.1152, respectively, and apply to backward signals in Signalling System No. 7 (TUP).

The signal numbers for backward signals in Signalling System No. 7 (TUP) are those given in Table A-9 $_{w}$ bis \underline{w} of Annex A to Recommendations Q.601-Q.608.

- $2.3_{\underline{w}}$ Signalling System No. $5\underline{w}$
- 2.3.1 Tables 11/Q.1152 and 12/Q.1152 are similar to Tables 3/Q.1152 and 4/Q.1152, respectively, and apply to forward signals in Signalling System No. 5.

The signal numbers for forward signals of Signalling System No. 5 are those given in Table A-4 of Annex A to Recommendations Q.601-Q.608.

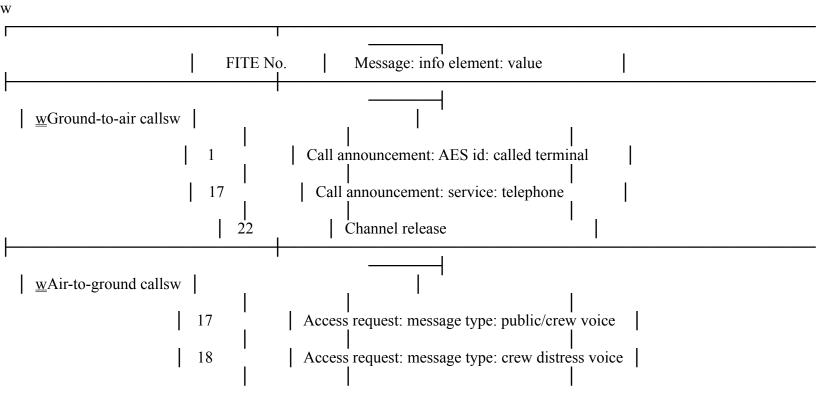
Tables 13/Q.1152, 13 wbis w/Q.1152 and 14/Q.1152 are similar to Tables 5/Q.1152, 5 wbis w/Q.1152 and 6/Q.1152, respectively, and apply to backward signals in Signalling System No. 5.

The signal numbers for backward signals in Signalling System No. 5 are those given in Table A-8 of Annex A to Recommendations Q.601-Q.608.

The relationship between forward and backward signals of Signalling System No. 7 (ISUP) and messages of the INMARSAT aeronautical signalling system is for further study.

TABLE 1/Q.1152

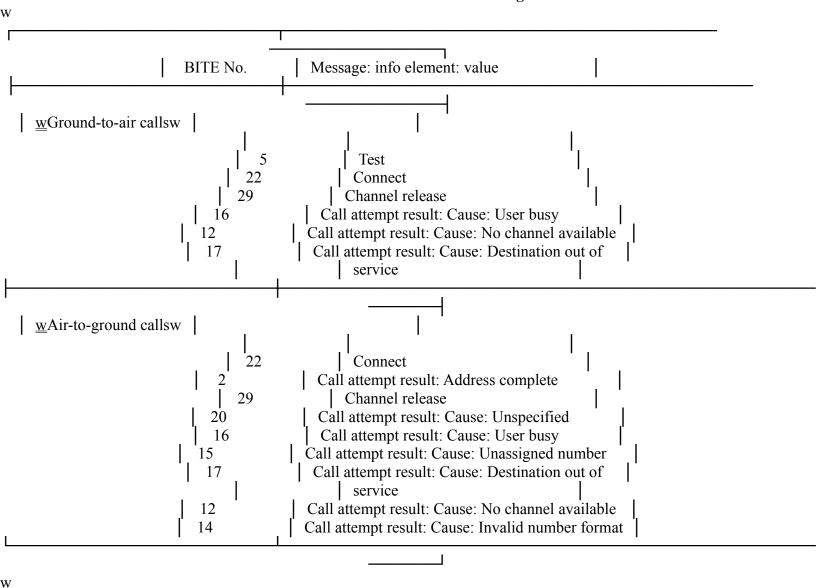
INMARSAT aeronautical - forward signals



1 1 1 22	Access request: address digits 0,1 Service address: address digits 2 Channel release	17

_wNotew - Signals required for interworking with Signalling System No. 7 (ISUP) are for further study.

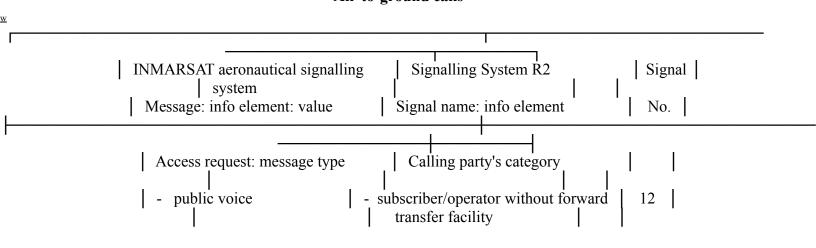
INMARSAT aeronautical - backward signals



wNotew - Signals required for interworking with Signalling System No. 7 (ISUP) are for further study.

TABLE 3/Q.1152

Conversion of forward signals in the INMARSAT aeronautical signalling system to Signalling System R2 Air-to-ground calls



- crew voice - s	ubscriber/operator without forward 12 transfer facility - subscriber/with priority 14
Access requests: address digits 0, 1	Country code indicator 10 10 10 10 10 10 10 1
Service address: digits 2 to 17	Address signals/first digit 1
Test: response	Not applicable
Channel release	Clear forward 16

wNotew - Signal No. 21, nature of circuit indicator; one satellite circuit generated by the GES, if required.

W

in the connection - is

Conversion of forward signals in Signalling System R2 to INMARSAT aeronautical signalling system

Ground-to-air calls

Signalling System R2 INMARSAT aeronautical signalling system Signal No. Message: info element: value Signal name Comments Address signals Call announcement: AES identity, called terminal 2-6 Language digit: I-1 ...5 Interpreted by MSSC 7 Discriminating digit Interpreted by MSSC Country code indicator MSSC will insert echo 8 outgoing half suppressor required control device if needed Interpreted by MSSC Country code indicator no echo suppressor required 10, 11 | Country code indicator Interpreted by MSSC incoming half echo suppressor required 12 | Calling party's category, Call announcement subscriber or operator service: telephone without forward transfer facility 13 | Calling party's category, Not applicable data transmission control 14 | Calling party's category, Call announcement subscriber with priority - service: telephone, priority for further study 15 | Calling party's category, Call announcement operator with forward - service: telephone transfer capability Channel release 16 | Clear forward Not applicable 17 | Forward transfer 18 | First digit; I-1, I-2 ... I-10 Interpreted by MSSC 19 | Reply to A-14; I-1 ... I-10 Not applicable Not applicable Reply to first A-13; I-13

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Conversion of backward signals in the INMARSAT aeronautical signalling system to Signalling System R2 Ground-to-air calls

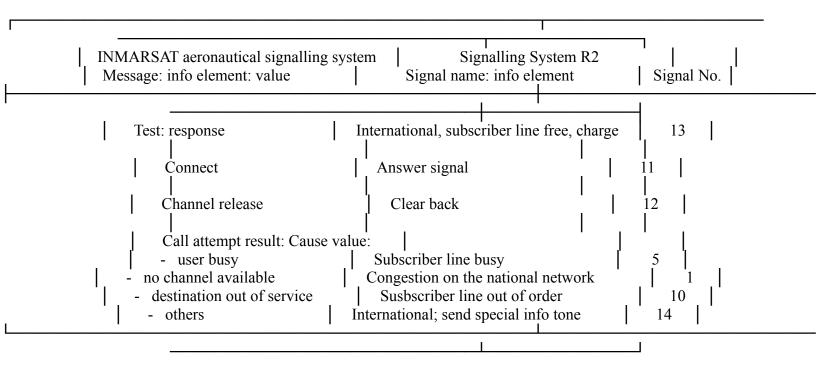
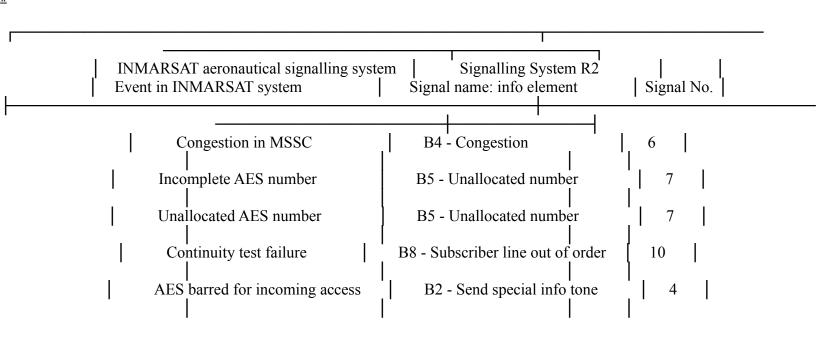


TABLE 5 wbisw/Q.1152

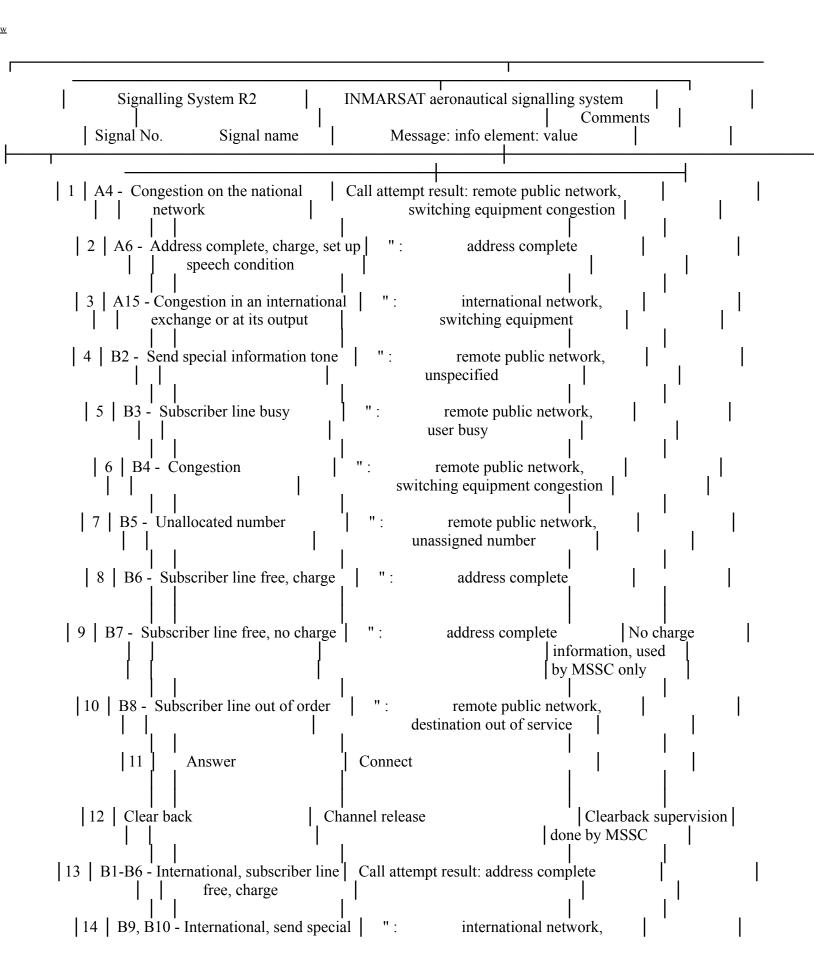
Unsuccessful call events and backward signals in Signalling System R2 Ground-to-air calls



	AES absent	B2 - Send special info tone	4	
	No satellite channel available	B4 - Congestion	6	
		1		

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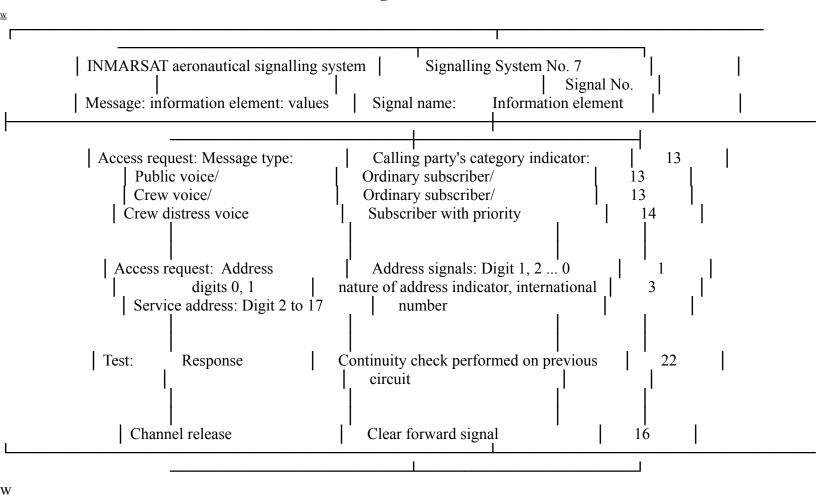
Conversion of backward signals in Signalling System R2 to INMARSAT Aeronautical Signalling System Air-to-ground calls



information tone	unspecified	Ι . Ι	
	remote public network switching equipment congesti		I
		·	

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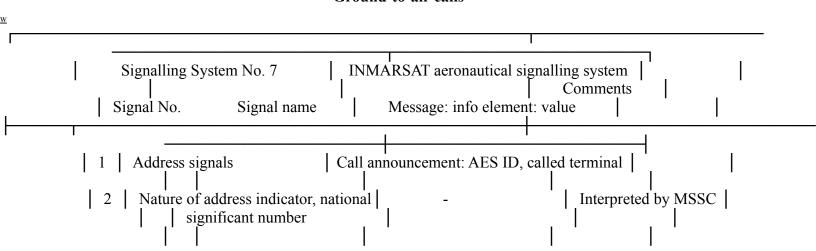
Conversion of forward signals in INMARSAT aeronautical signalling system to Signalling System No. 7 Air-to-ground calls



wNote w- Signal No. 5, nature of circuit indicator, one satellite in connection, is generated by the MSSC.

TABLE 8/Q.1152

Conversion of forward signals in Signalling System No. 7 TUP to INMARSAT aeronautical signalling system Ground-to-air calls



3 Nature of address indicator, - international number	Interpreted by MSSC
4 Nature of circuit indicator, - - no satellite in connection	Ignored by MSSC
5 Nature of circuit indicator, - one satellite in connection	Ignored by MSSC
6 Echo suppressor indicator, outgoing - half-echo suppressor not included	MSSC will insert echo control device if needed
7 Echo suppressor indicator, outgoing - half-echo suppressor included	Interpreted by MSSC
language digit - service: telephone	

Conversion of forward signals in Signalling System No. 7 TUP to INMARSAT aeronautical signalling system Ground-to-air calls

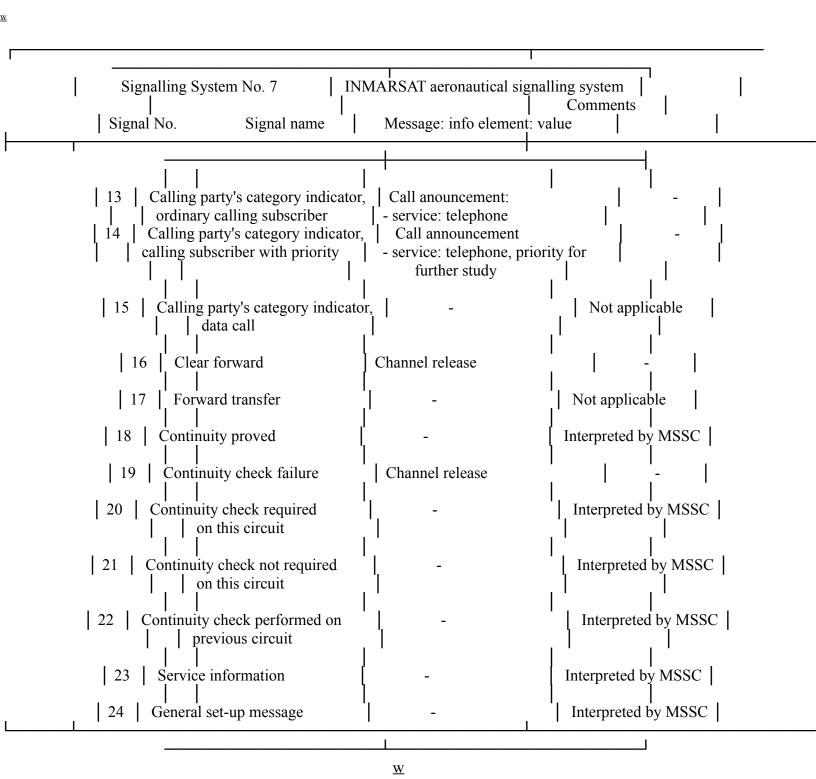
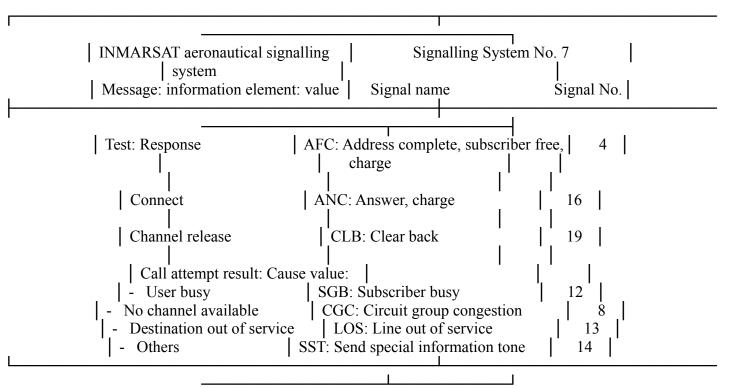


TABLE 9/Q.1152

Conversion of backward signals in INMARSAT aeronautical signalling system to Signalling System No. 7 TUP

Ground-to-air calls

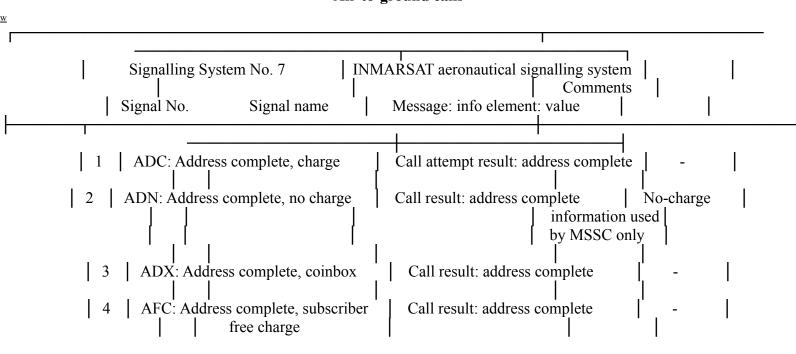


Unsuccessful events and backward signals in Signalling System No. 7 Ground-to-air calls

F
INMARSAT aeronautical signalling Signalling System No. 7 system Event in INMARSAT system Signal name Signal No.
Congestion in MSSC SEC: Switching equipment congestion 7
No satellite channel available NNC: National network congestion 9
Incomplete AES number ADI: Address incomplete 10
Unallocated AES number UNN: Unallocated number 11
Continuity test failure LOS: Line out of service 13
AES barred for incoming access SST: Send special information tone 14
AES absent SST: Send special information tone 14

TABLE 10/Q.1152

Conversion of backward signals in Signalling System No. 7 TUP to INMARSAT aeronautical signalling system Air-to-ground calls



6 AFX: Address complete, subscriber Call result: address complete - -	
7 SEC: Switching equipment congestion Call result: international network, - switching equipment - congestion	
8 CGC: Circuit-group congestion Call result: international network, - no channel available	

W

Conversion of backward signals in Signalling System No. 7 TUP to INMARSAT aeronautical signalling system Air-to-ground calls

Signalli Signal No.	ng System No. 7 Signal name	• •	I IARSAT aeronautical sig Message: info element: v	, , , , , , , , , , , , , , , , ,
9 NNC: N	Jational network conges	tion	Call result: remote p switching equipme	
10 ADI 	Address complete	' 	Call result: remote pub invalid number for	
11 UNN:	Unallocated number	\ 	Call result: remote pu unassigned number	
12 SGE 	s: Subscriber busy	 	Call result: remote pub user busy	lic network, -
13 LOS	: Line out of service		Call result: remote pub destination out of	
14 SST: S	Send special information	tone	Call result: internation	onal network, -
15 Cl	FL: Call failure	'	Call result: international unspecified	network, -
16	ANC: Answer, charge		Connect	
17 ANN 	I: Answer, no charge		Connect	No charge informa-
18	RAN: Reanswer		Connect	
19 Cl	LB: Clearback		Channel release	Clearback supervision done by MSSC
20 GI _	RQ: General request mes	sage 	-	Interpreted by MSSC
21 Call 	Insuccessful, access barr	red 	Call attempt result: remetwork, unsp	·
22 DF	 'N: Call unsuccesful, dig not provided	ا gital pa	th -	Not applicable

<u>W</u>		

Conversion of forward signals in INMARSAT aeronautical signalling system to Signalling System No. 5 Air-to-ground calls

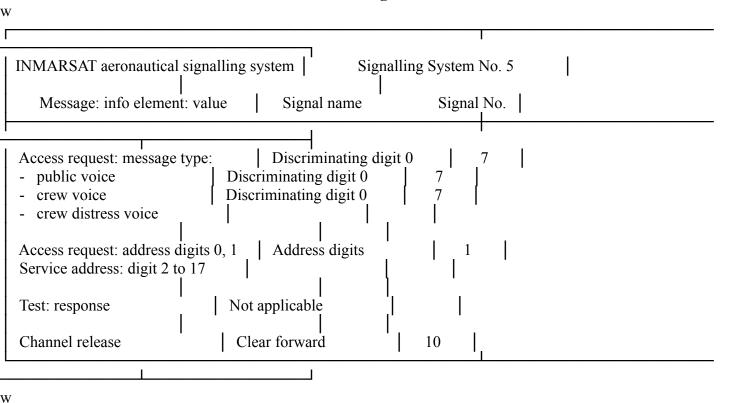
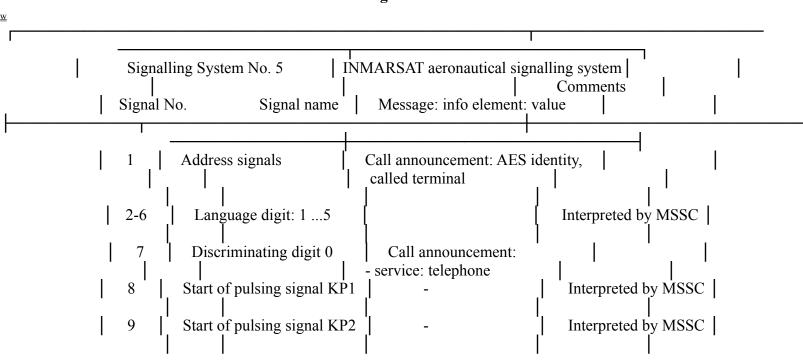


TABLE 12/Q.1152

Conversion of forward signals in INMARSAT aeronautical signalling system to Signalling System No. 5 Air-to-ground calls



1	10	Clear forward		Channel release		
, I	' 11 	Forward transfer		-	Not applicable	
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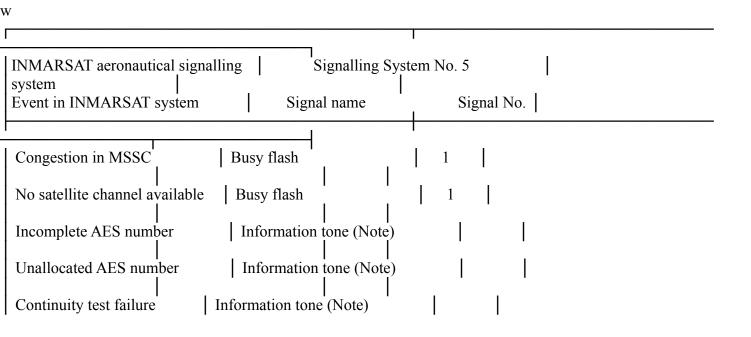
Conversion of backward signals in INMARSAT aeronautical signalling system to Signalling System No. 5 Ground-to-air calls

W		
INMARSAT aeronaut system Message: info element		System No. 5 Signal No.
Test: response	Inform that ST has been sent	5
Connect	Answer signal	2
Channel release	Clear back	3
Call attempt result: ca - user busy - no channel availabl - destination out of so - others	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1 1 - -

Notew - May include appropriate recorded announcement.

TABLE 13 wbisw/Q.1152

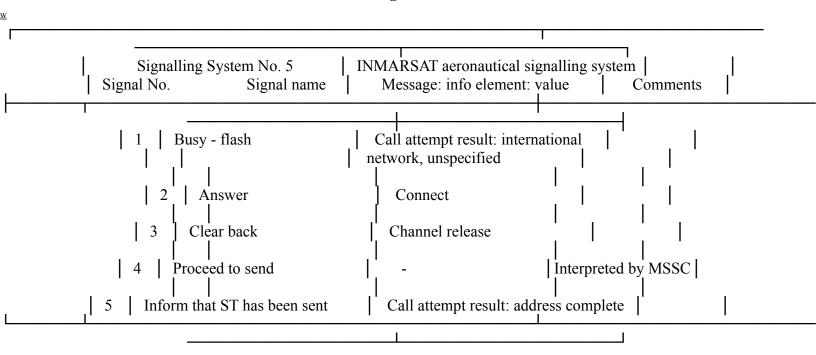
Unsuccessful call events and backward signals in Signalling System No. 5 Ground-to-air calls



AES absent	Information tone (Note)	1			
AES barred for incom	ing access Information tone (Note)	<u> </u>			

w/wNotew - May include appropriate recorded announcement.

Conversion of backward signals in Signalling System No. 5 to INMARSAT aeronautical signalling system Air-to-ground calls



Incoming INMARSAT aeronautical logic procedures (Air-to-ground calls)

Figure 1/Q.1112 contains the procedures for the incoming INMARSAT aeronautical signalling system.

This description only includes those aspects of the INMARSAT aeronautical system which have to be implemented for interworking purposes. Internal procedures, such as those required for setting up and clearing satellite channels are not shown. This also applies to pre-emption procedures for assigning channels to distress calls.

The following details should be noted:

- 3.1 The access request contains information elements for the required service, and the required network, plus two address digits. For some private networks, and/or subscription services on public networks, this information will be sufficient to determine the complete call routing. In all but the most exceptional cases, it will be enough information to select a circuit for onward routing from the MSSC.
- 3.2 The initial analysis of the request checks that the AES is authorized for the service requested and finds a suitable channel and channel unit, on which to service the call. The call is aborted if the AES is not an authorized user of the INMARSAT system.
- 3.3 In the cases where all of the required address information is contained in the access request signal unit, an address message is received by the incoming procedure, once continuity of the assigned satellite channel has been successfully tested.
- 3.4 The called address is analysed to verify its integrity. The satellite channel may be cleared at this point, either if the dialled address is incomplete or if the AES goes on-hook. The call may also be aborted if proper credit card data is not received from the AES.
- 3.5 The dialled digits are transferred to the interworking procedure, and the answer signal is awaited. The last digit may

be withheld until receipt of credit card information. All successful address complete signals are converted to a call attempt result message, with the cause field set to address complete.

- 3.6 Unsuccessful call event signals (BITEs 9-20) are transferred to the AES by the call attempt result message, with the cause field set appropriately.
- 3.7 On receipt of the answer signals, the connect message is sent to the AES.
- 3.8 The call is cleared in the normal way, either on receipt of a release message from the interworking procedure, or an indication of AES on-hook conveyed by means of a channel release message.

 \underline{w} Note $1\underline{w}$ - Analyze for authorized AES ID, availability of service requested, find a suitable satellite channel and channel unit.

wNote 2w - Includes translation of prefixes to the appropriate B-party number, and verification that the number is valid.

FIGURE 1/Q.1152 (sheet 1 of 3)

Logic procedures for incoming INMARSAT aeronautical signalling (air-to-ground calls)

FIGURE 1/Q.1152 (sheet 2 of 3)

Logic procedures for incoming INMARSAT aeronautical signalling (air-to-ground calls)

FIGURE 1/Q.1152 (sheet 3 of 3)

Logic procedures for incoming INMARSAT aeronautical signalling (air-to-ground calls)