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

1 Introduction

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.

2 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.

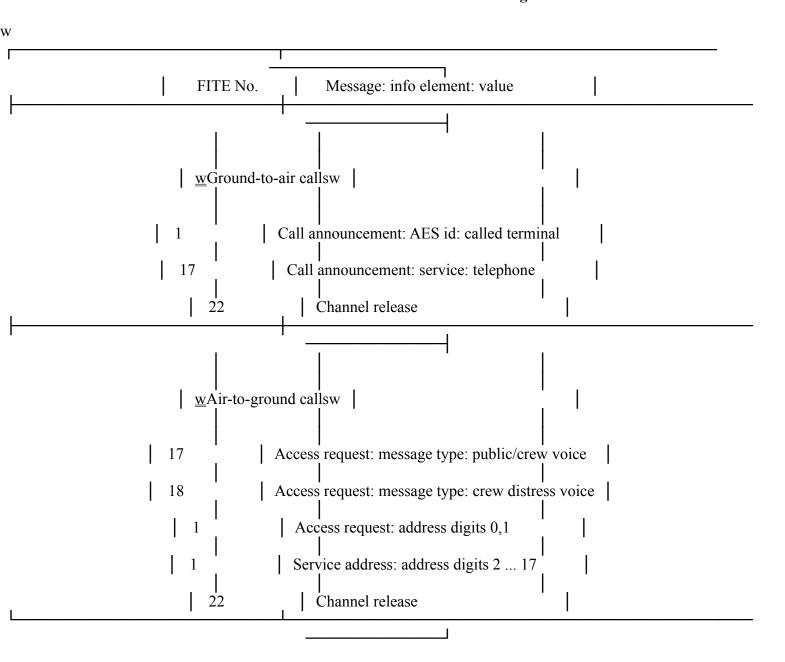
2.1.2 Table 5/Q.1152 gives the relationship between messages in the INMARSAT aeronautical signalling system and backward signals in Signalling System R2 for ground-to-air calls, i.e. interworking of Signalling System R2 to INMARSAT aeronautical.

Backward signals in Signalling System R2 generated by the MSSC for unsuccessful ground-to-air calls are given in Table 5 bis/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.

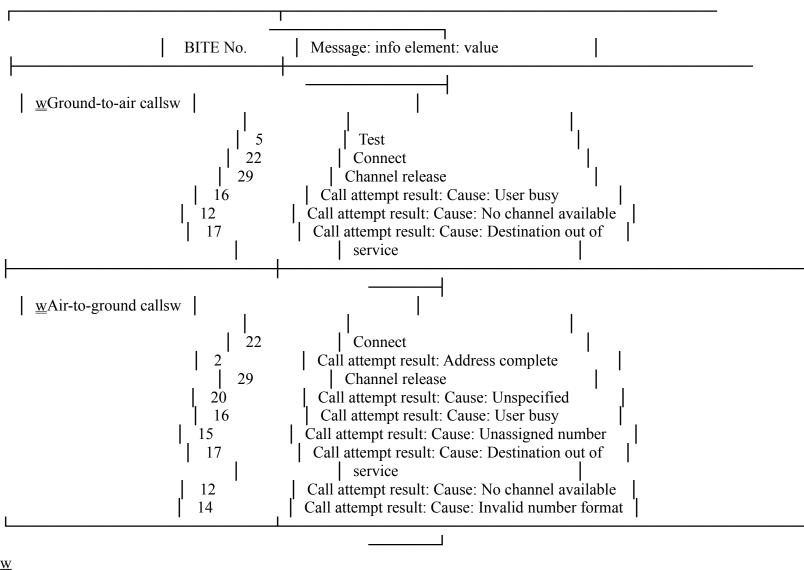
- The signal number of backward signals of Signalling System R2 are those given in Table A-11 of Annex A to Recommendations Q.601-Q.608.
- $2.2_{\rm w}$ Signalling System No. 7 (TUP)<u>w</u>
- 2.2.1 Tables 7/Q.1152 and 8/Q.1152 are similar to Tables 3/Q.1152 and 4/Q.1152, respectively, and apply to forward 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-5bis of Annex A to Recommendations Q.601-Q.608.
- 2.2.2 Tables 9/Q.1152, 9 bis/Q.1152 and 10/Q.1152 are similar to Tables 5/Q.1152, 5bis/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-9bis 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.
- 2.3.2 Tables 13/Q.1152, 13bis/Q.1152 and 14/Q.1152 are similar to Tables 5/Q.1152, 5bis/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.

INMARSAT aeronautical - forward signals



<u>w</u>Notew- Signals required for interworking with Signalling System No. 7 (ISUP) are for further study.

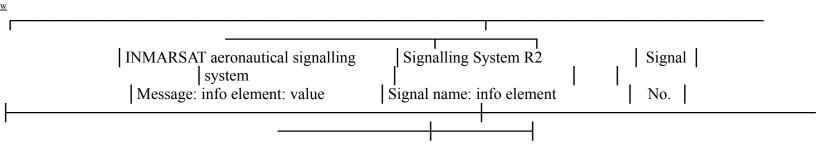
INMARSAT aeronautical - backward signals



Note - 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



Access reque	est: message type	Calling party's category	1 1
 - public void -	' '	bscriber/operator without forv transfer facility	vard 12
- crew voice	e - sub	bscriber/operator without forv transfer facility	vard 12
- crew dist	etress voice -	1 '1 / '41 ' '4	' 14
Access reques digits 0, 1	ets: address digits 0, 1	Country code indicator cho suppressor controls)	
Service Addr	ress: digits 2 to 17	Address signals/first digit	
 Test: res	sponse [Not applicable	
Channel 1	release	Clear forward	16

 $_{\underline{w}}$ Note \underline{w} - Signal No. 21, nature of circuit indicator; one satellite circuit in the connection - is generated by the GES, if required.

TABLE 4/Q.1152

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

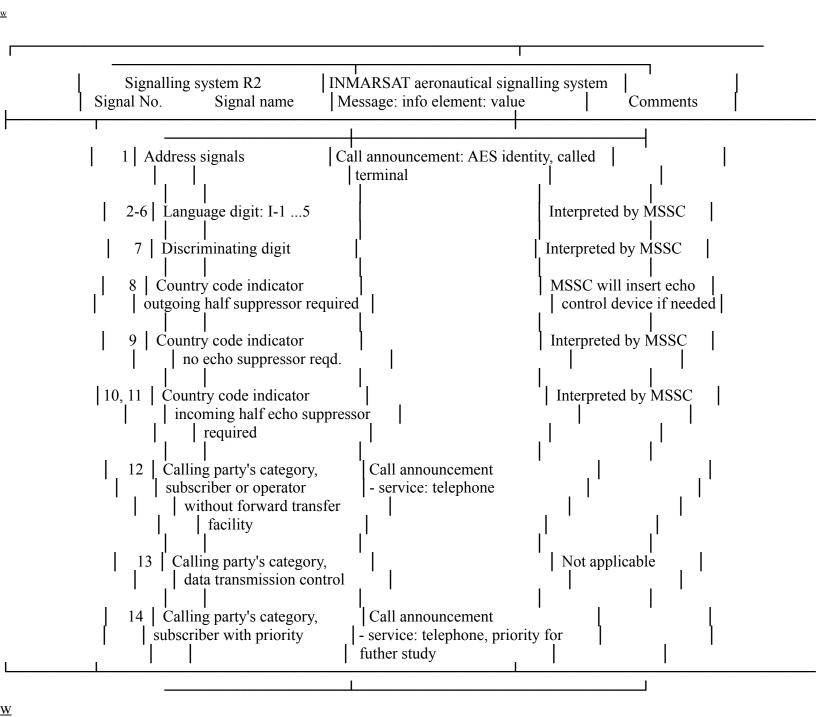


TABLE 4/Q.1152 (Contd.)

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

,	SAT aeronautical signalling system e: info element: value Comments
	ll announcement ervice: telephone
16 Clear forward Cha	annel release
17 Forward transfer	Not applicable
18	Interpreted by MSSC Not applicable
20 Reply to first A-13; I-13	Not applicable
21 Reply to first A-13; I-14	

TABLE 5/Q.1152

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

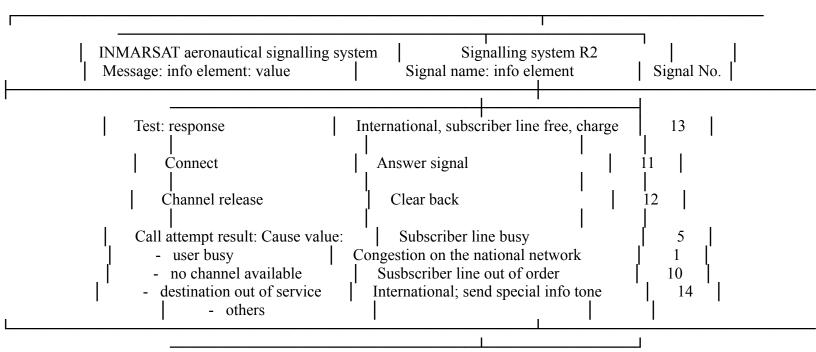


TABLE 5bis/Q.1152

<u>Unsuccessful call events and backward signals in Signalling System R2</u>

<u>Ground-to-air calls</u>

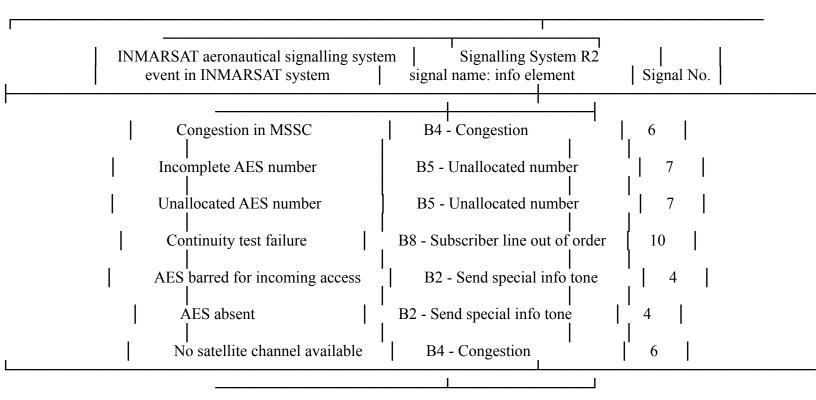


TABLE 6/Q.1152

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

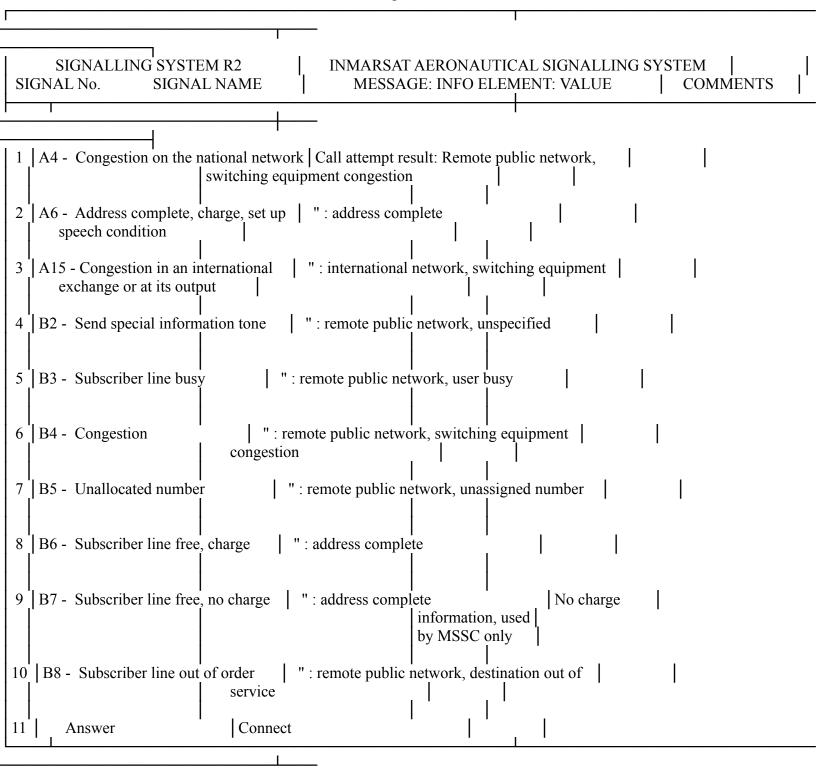


TABLE 6/Q.1152 (Contd.)

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

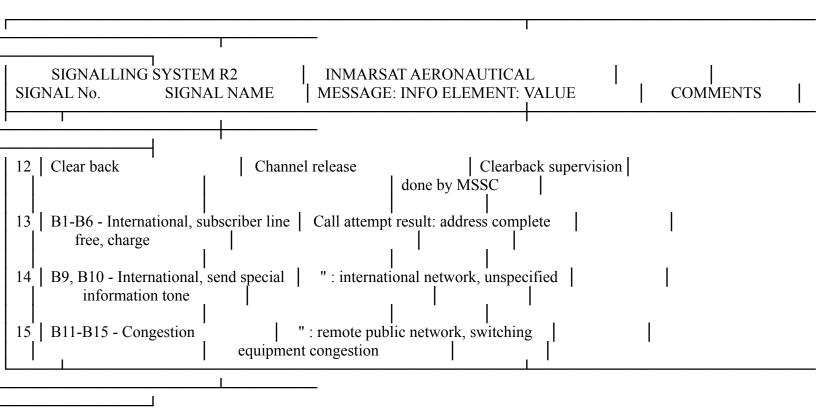


TABLE 7/Q.1152

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

_	·
 S	INMARSAT AERONAUTICAL SIGNALLING SYSTEM No. 7
-	Access request: Message type: Calling party's category indicator: 13
I	Public voice/ Ordinary subscriber/ 13
l	Crew voice/ Ordinary subscriber/ 13
	Access request: Address Address signals: Digit 1, 2 0 1 nature of address indicator, international 3 Service address: Digit 2 to 17 number
	Test: Response Continuity check performed on previous 22 circuit
	Channel release Clear forward signal 16
•	

Note - 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

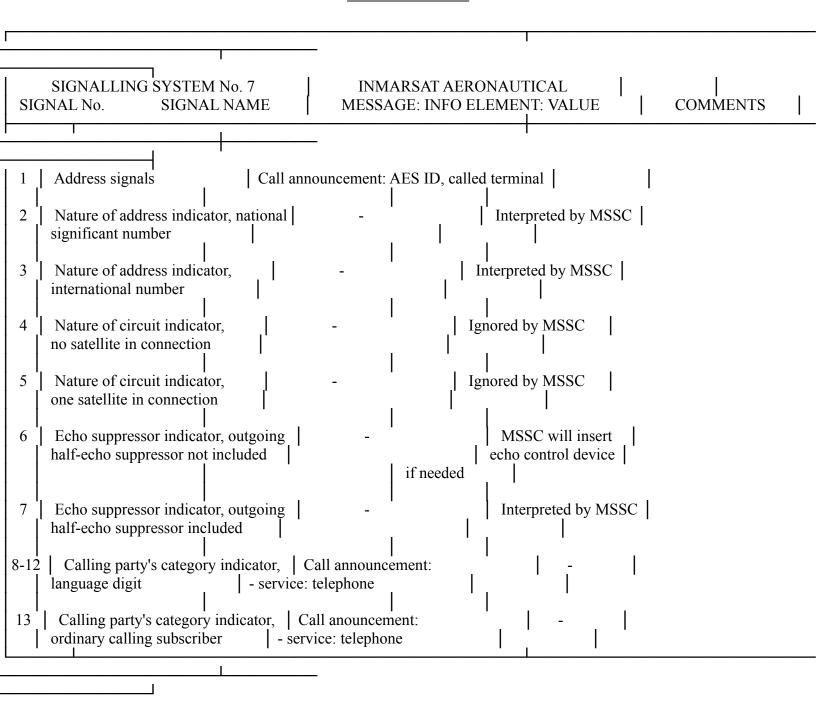


TABLE 8/Q.1152 (Contd.)

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

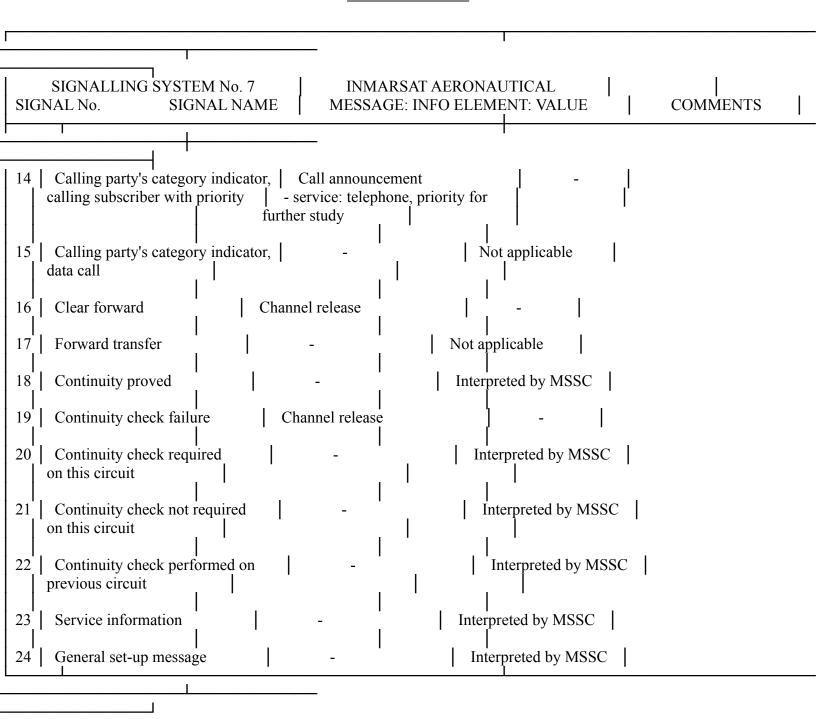


TABLE 9/Q.1152

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

1	l
INMARSAT AERONAUTAL MESSAGE: INFORMATION ELEMENT: VALUE	SIGNALLING SYSTEM No. 7 SIGNAL NAME SIGNAL No.
Test: Response AFC: Address complete	subscriber free, charge 4
Connect ANC: Answer, charge	16
Channel release CLB: Clear back	
' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	
Call attempt result: Cause value:	
- User busy SGB: Subscriber busy	12
- No channel available CGC: Circuit group c	ongestion 8
- Destination out of service LOS: Line out of ser	, , , , , , , , , , , , , , , , , , , ,
- others SST: Send special information	on tone 14
L	L

TABLE 9bis/Q.1152

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

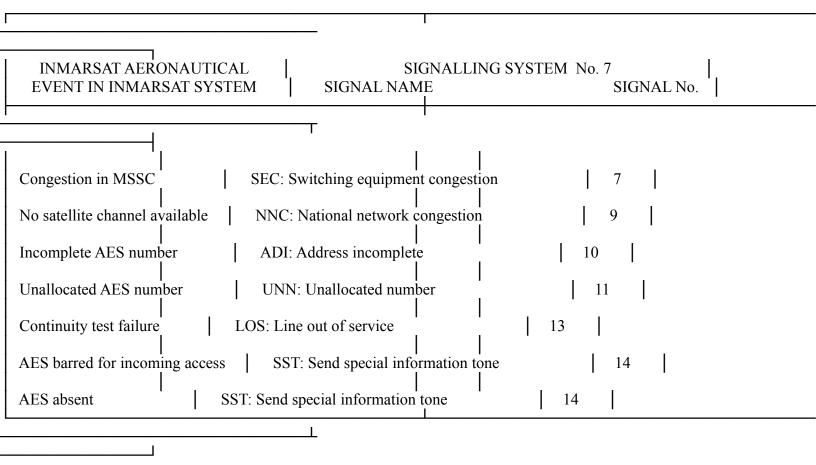


TABLE 10/Q.1152

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

	_
I	
SIG	SIGNALLING SYSTEM No. 7 INMARSAT AERONAUTICAL
<u> </u>	
1	ADC: Address complete, charge Call attempt result: address complete -
	ADN: Address complete, no charge Call result: address complete No- charge information used by MSSC only
3	ADX: Address complete, coinbox Call result: address complete -
4	AFC: Address complete, subscriber Call result: address complete - free charge
5	AFN: Address complete, subscriber Call result: address complete No- charge free no charge by MSSC only
6	AFX: Address complete, subscriber Call result: address complete - free, coinbox
7	SEC: Switching equipment congestion Call result: international network, - switching equipment congestion
8	CGC: Circuit-group congestion Call result: international network, - no channel available
9	NNC: National network congestion Call result: remote public network, - switching equipment congestion

TABLE 10/Q.1152 (contd.)

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

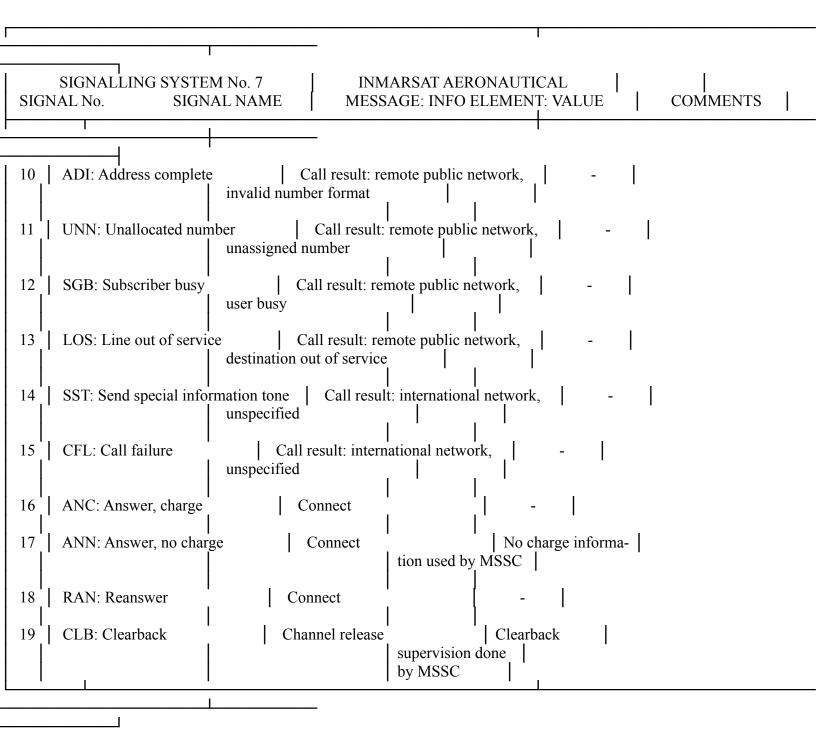


TABLE 10/Q.1152 (contd.)

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

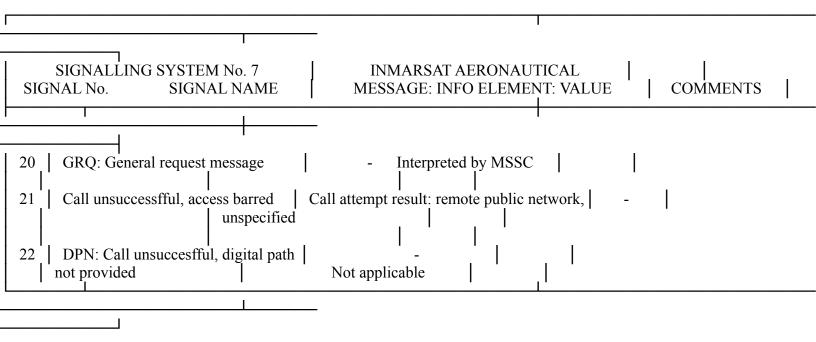


TABLE 11/Q.1152

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

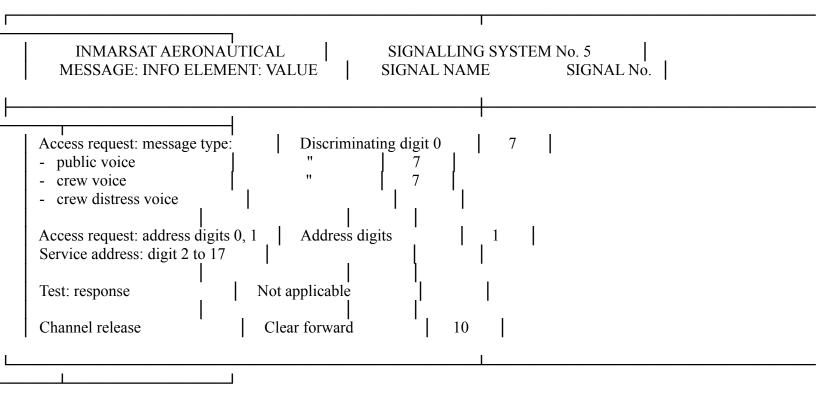


TABLE 12/Q.1152

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

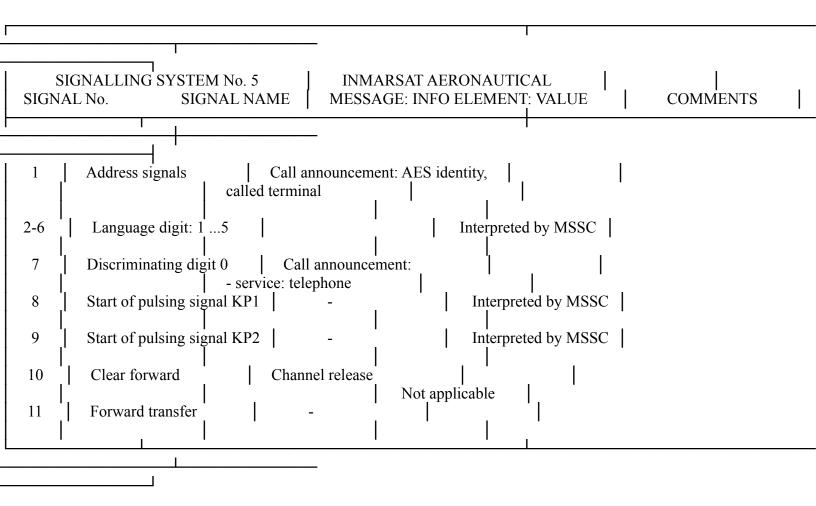


TABLE 13/Q.1152

Conversion of backward signals in INMARSAT aeronautical signalling system to Signalling System No. 5 TUP Ground-to-air calls

INMARSAT AERONAUTAL SIGNALLING SYSTEM No. 5 MESSAGE: INFO ELEMENT: VALUE SIGNAL NAME SIGNAL No.	
Test: response Inform that ST has been sent 5	
Connect Answer signal 2	
Channel release Clear back 3	
Call attempt result: cause value Busy flash signal 1	
- user busy Busy flash signal 1	
- no channel available information tone (Note 1) -	
- destination out of service information tone (Note 1) -	
- others	

Note 1 - May include appropriate recorded announcement.

TABLE 13bis/Q.1152

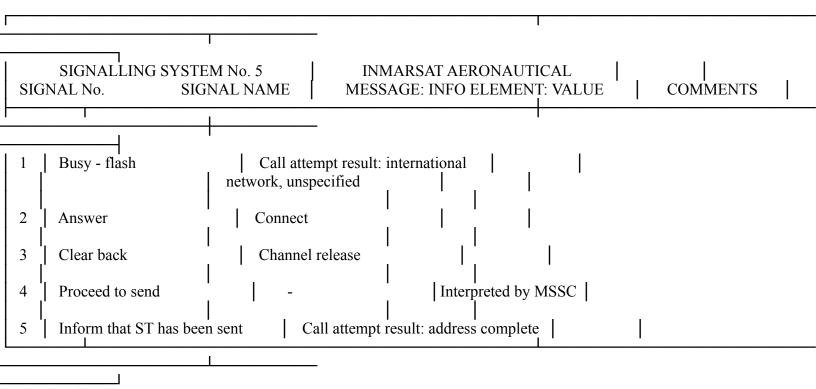
<u>Unsuccessful call events and backward signals in Signalling System No. 5</u> <u>Ground-to-air calls</u>

<u> </u>	1
INMARSAT AERONAUTICAL SIGNAL	SIGNALLING SYSTEM No. 5 NAME SIGNAL No.
Congestion in MSSC Busy flash	1 1
No satellite channel available Busy flash	
Incomplete AES number Information tone (Note	
Unallocated AES number Information tone (Note	
Unallocated AES number Information tone (Note	; 1)
Continuity test failure Information tone (Note 1)	
AES absent Information tone (Note 1)	'
AES barred for incoming access Information tone (No	te 1)
1	

Note 1 - May include appropariate recorded announcement.

TABLE 14/Q.1152

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



3. <u>Incoming INMARSAT aeronautical logic procedures (Air-to-ground calls)</u>

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 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.