

**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_w

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 bis_w/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_w Signalling System No. 7 (TUP)_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 wbis_w of Annex A to Recommendations Q.601-Q.608.

2.2.2 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 wbis_w of Annex A to Recommendations Q.601-Q.608.

2.3_w Signalling System No. 5_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, 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.

2.4 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

| | FITE No. | Message: info element: value |
|--|----------|---|
| <u>w</u> Ground-to-air call _w | | |
| | 1 | Call announcement: AES id: called terminal |
| | 17 | Call announcement: service: telephone |
| | 22 | Channel release |
| <u>w</u> Air-to-ground call _w | | |
| | 17 | Access request: message type: public/crew voice |
| | 18 | Access request: message type: crew distress voice |

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

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

TABLE 2/Q.1152

INMARSAT aeronautical - backward signals

w

| BITE No. | Message: info element: value |
|-------------------------------|--|
| <u>w</u> Ground-to-air callsw | |
| 5 | Test |
| 22 | Connect |
| 29 | Channel release |
| 16 | Call attempt result: Cause: User busy |
| 12 | Call attempt result: Cause: No channel available |
| 17 | Call attempt result: Cause: Destination out of service |
| <u>w</u> Air-to-ground callsw | |
| 22 | Connect |
| 2 | Call attempt result: Address complete |
| 29 | Channel release |
| 20 | Call attempt result: Cause: Unspecified |
| 16 | Call attempt result: Cause: User busy |
| 15 | Call attempt result: Cause: Unassigned number |
| 17 | Call attempt result: Cause: Destination out of service |
| 12 | Call attempt result: Cause: No channel available |
| 14 | Call attempt result: Cause: Invalid number format |

w

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**

w

| INMARSAT aeronautical signalling system Message: info element: value | Signalling System R2 Signal name: info element | Signal No. |
|---|---|------------|
| Access request: message type | Calling party's category | |
| - public voice | - subscriber/operator without forward transfer facility | 12 |

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

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

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

| Signalling System R2 | | INMARSAT aeronautical signalling system | | Comments |
|----------------------|---|---|--|--|
| Signal No. | Signal name | Message: | info element: value | |
| 1 | Address signals | Call announcement: | AES identity, called terminal | |
| 2-6 | Language digit: I-1 ...5 | | | Interpreted by MSSC |
| 7 | Discriminating digit | | | Interpreted by MSSC |
| 8 | Country code indicator outgoing half suppressor required | | | MSSC will insert echo control device if needed |
| 9 | Country code indicator no echo suppressor required | | | Interpreted by MSSC |
| 10, 11 | Country code indicator incoming half echo suppressor required | | | Interpreted by MSSC |
| 12 | Calling party's category, subscriber or operator without forward transfer facility | Call announcement | - service: telephone | |
| 13 | Calling party's category, data transmission control | | | Not applicable |
| 14 | Calling party's category, subscriber with priority | Call announcement | - service: telephone, priority for further study | |
| 15 | Calling party's category, operator with forward transfer capability | Call announcement | - service: telephone | |
| 16 | Clear forward | Channel release | | |
| 17 | Forward transfer | | | Not applicable |
| 18 | First digit; I-1, I-2 ... I-10 | | | Interpreted by MSSC |
| 19 | Reply to A-14; I-1 ... I-10 | | | Not applicable |
| 20 | Reply to first A-13; I-13 | | | Not applicable |

| | | | |
|----|---------------------------|--|----------------|
| 21 | Reply to first A-13; I-14 | | Not applicable |
|----|---------------------------|--|----------------|

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TABLE 5/Q.1152

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

w

| INMARSAT aeronautical signalling system Message: info element: value | Signalling System R2 Signal name: info element | Signal No. |
|---|---|------------|
| Test: response | International, subscriber line free, charge | 13 |
| Connect | Answer signal | 11 |
| Channel release | Clear back | 12 |
| Call attempt result: Cause value: | | |
| - user busy | Subscriber line busy | 5 |
| - no channel available | Congestion on the national network | 1 |
| - destination out of service | Subscriber line out of order | 10 |
| - others | International; send special info tone | 14 |

w

TABLE 5_wbisw/Q.1152

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

w

| INMARSAT aeronautical signalling system Event in INMARSAT system | Signalling System R2 Signal name: info element | Signal No. |
|---|---|------------|
| Congestion in MSSC | B4 - Congestion | 6 |
| Incomplete AES number | B5 - Unallocated number | 7 |
| Unallocated AES number | B5 - Unallocated number | 7 |
| Continuity test failure | B8 - Subscriber line out of order | 10 |
| AES barred for incoming access | B2 - Send special info tone | 4 |

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

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

| Signalling System R2 | | INMARSAT aeronautical signalling system | | Comments |
|----------------------|--|--|--|----------|
| Signal No. | Signal name | Message: info element: value | | |
| 1 | A4 - Congestion on the national network | Call attempt result: remote public network, switching equipment congestion | | |
| 2 | A6 - Address complete, charge, set up speech condition | " : address complete | | |
| 3 | A15 - Congestion in an international exchange or at its output | " : international network, switching equipment | | |
| 4 | B2 - Send special information tone | " : remote public network, unspecified | | |
| 5 | B3 - Subscriber line busy | " : remote public network, user busy | | |
| 6 | B4 - Congestion | " : remote public network, switching equipment congestion | | |
| 7 | B5 - Unallocated number | " : remote public network, unassigned number | | |
| 8 | B6 - Subscriber line free, charge | " : address complete | | |
| 9 | B7 - Subscriber line free, no charge | " : address complete | No charge information, used by MSSC only | |
| 10 | B8 - Subscriber line out of order | " : remote public network, destination out of service | | |
| 11 | Answer | Connect | | |
| 12 | Clear back | Channel release | Clearback supervision done by MSSC | |
| 13 | B1-B6 - International, subscriber line free, charge | Call attempt result: address complete | | |
| 14 | B9, B10 - International, send special | " : international network, | | |

| | | | | | | |
|----|----------------------|------------------|-----|--|--|--|
| | | information tone | | unspecified | | |
| 15 | B11-B15 - Congestion | | " : | remote public network, switching equipment congestion | | |

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TABLE 7/Q.1152

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

| INMARSAT aeronautical signalling system | | Signalling System No. 7 | | |
|---|--|-------------------------|------------|--|
| Message: information element: values | Signal name: | Information element | Signal No. | |
| Access request: Message type: | Calling party's category indicator: | | 13 | |
| Public voice/ | Ordinary subscriber/ | | 13 | |
| Crew voice/ | Ordinary subscriber/ | | 13 | |
| Crew distress voice | Subscriber with priority | | 14 | |
| Access request: Address digits 0, 1 | Address signals: Digit 1, 2 ... 0 | | 1 | |
| Service address: Digit 2 to 17 | nature of address indicator, international number | | 3 | |
| Test: Response | Continuity check performed on previous circuit | | 22 | |
| Channel release | Clear forward signal | | 16 | |

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**

| Signalling System No. 7 | | INMARSAT aeronautical signalling system | | |
|-------------------------|---|--|---------------------|--|
| Signal No. | Signal name | Message: info element: value | Comments | |
| 1 | Address signals | Call announcement: AES ID, called terminal | | |
| 2 | Nature of address indicator, national significant number | - | Interpreted by MSSC | |

| | | | |
|------|--|--|--|
| 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 |
| 8-12 | Calling party's category indicator, language digit | Call announcement: - service: telephone | - |

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

| Signalling System No. 7 | | INMARSAT aeronautical signalling system | | Comments |
|-------------------------|--|---|--|---------------------|
| Signal No. | Signal name | Message: info element: | value | |
| 13 | Calling party's category indicator, ordinary calling subscriber | Call announcement: | - service: telephone | - |
| 14 | Calling party's category indicator, calling subscriber with priority | Call announcement | - service: telephone, priority for further study | - |
| 15 | Calling party's category indicator, data call | - | - | Not applicable |
| 16 | Clear forward | Channel release | - | - |
| 17 | Forward transfer | - | - | Not applicable |
| 18 | Continuity proved | - | - | Interpreted by MSSC |
| 19 | Continuity check failure | Channel release | - | - |
| 20 | Continuity check required on this circuit | - | - | Interpreted by MSSC |
| 21 | Continuity check not required on this circuit | - | - | Interpreted by MSSC |
| 22 | Continuity check performed on previous circuit | - | - | Interpreted by MSSC |
| 23 | Service information | - | - | Interpreted by MSSC |
| 24 | General set-up message | - | - | Interpreted by MSSC |

w

TABLE 9/Q.1152

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

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| | |
|---|-------------------------|
| INMARSAT aeronautical signalling system | Signalling System No. 7 |
| Message: information element: value | Signal name Signal No. |

| | | |
|-----------------------------------|--|----|
| Test: Response | AFC: Address complete, subscriber free, charge | 4 |
| Connect | ANC: Answer, charge | 16 |
| Channel release | CLB: Clear back | 19 |
| Call attempt result: Cause value: | | |
| - User busy | SGB: Subscriber busy | 12 |
| - No channel available | CGC: Circuit group congestion | 8 |
| - Destination out of service | LOS: Line out of service | 13 |
| - Others | SST: Send special information tone | 14 |

TABLE 9 _wbisw/Q.1152

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

w

| INMARSAT aeronautical signalling system | | Signalling System No. 7 | |
|---|-------------------------------------|-------------------------|------------|
| 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 |

w

TABLE 10/Q.1152

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

w

| Signalling System No. 7 | | INMARSAT aeronautical signalling system | | |
|-------------------------|---|---|---|--|
| Signal No. | Signal name | Message: info element: value | Comments | |
| 1 | ADC: Address complete, charge | Call attempt result: address complete | - | |
| 2 | 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 free charge | Call result: address complete | - | |

| | | | |
|---|--|--|-----------|
| 5 | AFN: Address complete, subscriber free no charge | Call result: address complete information used by MSSC only | No-charge |
| 6 | AFX: Address complete, subscriber free, coinbox | 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 | - |

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

| Signalling System No. 7 | | INMARSAT aeronautical signalling system | | Comments |
|-------------------------|---|---|--|------------------------------------|
| Signal No. | Signal name | Message: info element: value | | |
| 9 | NNC: National network congestion | | Call result: remote public network, switching equipment congestion | - |
| 10 | ADI: Address complete | | Call result: remote public network, invalid number format | - |
| 11 | UNN: Unallocated number | | Call result: remote public network, unassigned number | - |
| 12 | SGB: Subscriber busy | | Call result: remote public network, user busy | - |
| 13 | LOS: Line out of service | | Call result: remote public network, destination out of service | - |
| 14 | SST: Send special information tone | | Call result: international network, unspecified | - |
| 15 | CFL: Call failure | | Call result: international network, unspecified | - |
| 16 | ANC: Answer, charge | | Connect | - |
| 17 | ANN: Answer, no charge | | Connect | No charge information used by MSSC |
| 18 | RAN: Reanswer | | Connect | - |
| 19 | CLB: Clearback | | Channel release | Clearback supervision done by MSSC |
| 20 | GRQ: General request message | | - | Interpreted by MSSC |
| 21 | Call unsuccessful, access barred | | Call attempt result: remote public network, unspecified | - |
| 22 | DPN: Call unsuccessful, digital path not provided | | - | Not applicable |

TABLE 11/Q.1152

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

w

| INMARSAT aeronautical signalling system | Signalling System No. 5 |
|---|-------------------------|
| Message: info element: value | Signal name |
| Signal name | Signal No. |
| Access request: message type: | Discriminating digit 0 |
| - public voice | Discriminating digit 0 |
| - crew voice | Discriminating digit 0 |
| - crew distress voice | Discriminating digit 0 |
| Access request: address digits 0, 1 | Address digits |
| Service address: digit 2 to 17 | Address digits |
| Test: response | Not applicable |
| Channel release | Clear forward |

w

TABLE 12/Q.1152

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

w

| Signalling System No. 5 | INMARSAT aeronautical signalling system | Comments |
|-------------------------|---|--|
| Signal No. | Signal name | Message: info element: value |
| 1 | Address signals | Call announcement: AES identity, called terminal |
| 2-6 | Language digit: 1 ...5 | Interpreted by MSSC |
| 7 | Discriminating digit 0 | Call announcement: - service: telephone |
| 8 | Start of pulsing signal KP1 | - |
| 9 | Start of pulsing signal KP2 | - |

| | | | |
|----|------------------|-----------------|----------------|
| 10 | Clear forward | Channel release | Not applicable |
| 11 | Forward transfer | - | |

W

TABLE 13/Q.1152

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

w

| INMARSAT aeronautical signalling system | 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) - |
| - destination out of service | Information tone (Note) - |
| - others | |

w

wNotew - 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**

w

| INMARSAT aeronautical signalling system | Signalling System No. 5 |
|---|-------------------------|
| Event in INMARSAT system | Signal name Signal No. |
| Congestion in MSSC | Busy flash 1 |
| No satellite channel available | Busy flash 1 |
| Incomplete AES number | Information tone (Note) |
| Unallocated AES number | Information tone (Note) |
| Continuity test failure | Information tone (Note) |

| | | | | |
|--------------------------------|--|-------------------------|--|--|
| AES absent | | Information tone (Note) | | |
| AES barred for incoming access | | Information tone (Note) | | |

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**

| Signalling System No. 5 | | INMARSAT aeronautical signalling system | | Comments |
|-------------------------|------------------------------|---|---------------------|----------|
| Signal No. | Signal name | Message: info element: value | | |
| 1 | Busy - flash | Call attempt result: international network, unspecified | | |
| 2 | Answer | Connect | | |
| 3 | Clear back | Channel release | | |
| 4 | Proceed to send | - | Interpreted by MSSC | |
| 5 | Inform that ST has been sent | Call attempt result: address complete | | |

w

3

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.

Note 1_w - Analyze for authorized AES ID, availability of service requested, find a suitable satellite channel and channel unit.

Note 2_w - 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)**