All drawings appearing in this Fascicle have been done in Autocad.

Recommendation Q.707

TESTING AND MAINTENANCE

1 General

In order to realize the performance requirements described in Recommendation Q.706, means and procedures for signalling network testing and maintenance are required in addition to the means defined in Recommendations Q.703 and Q.704.

2 Testing

2.1 *Signalling data link test*

As defined in Recommendation Q.702, § 1, the signalling data link is a bidirectional transmission path for signalling. Testing and maintenance functions can be initiated independently at either end.

The signalling data link and the constituent parts of the digital and analogue versions are described in Recommendation Q.702, § 1.

They must be tested before being put into service to ensure that they meet the requirements of Recommendation Q.702, § 3.

Since interruptions of the signalling data link will affect many transactions, they must be treated with the utmost care. Appropriate special measures should be taken to prevent unauthorized maintenance access which could result in interruptions to service. These special measures may include marking or flagging the equipment and indications on distribution frames or test bays where access is possible (see Recommendation M.1050 [1]).

The signal unit error rate monitor and the alignment error rate monitor described in Recommendation Q.703, § 10, also provide means for detecting deterioration of a signalling data link.

Further studies are required with reference to Recommendation V.51 [2].

2.2 *Signalling link test*

As defined in Recommendation Q.703, § 1.1.1 and illustrated in Figure 1/Q.701, the signalling link comprises a signalling data link with signalling link functions at either end.

In the following, an on—line signalling link test procedure is specified which involves communication between the two ends of the concerned signalling link. This procedure is to be used when a signalling link is activated or restored (see Recommendation Q.704, § 12). The signalling link becomes available only if the test is successful. This procedure is intended for use while the signalling link is in service. In addition, local failure detection procedures should be performed at either end; these are not specified in this Recommendation.

In case the signalling link test (SLT) is applied while the signalling link is in service the signalling link test message is sent at regular intervals T2 (see § 5.5). The testing of a signalling link is performed independently from each end.

The ability to send a signalling test acknowledgement message, defined below, must always be provided at a signalling point.

The signalling point initiating the tests transmits a signalling link test message on the signalling link to be tested. This message includes a test pattern which is chosen at the discretion of the end initiating the test. After receiving a signalling link test message, a signalling point responds with a signalling link test acknowledgement message on the signalling link identified by the SLS contained in the signalling link test message. The test pattern included in the signalling link test acknowledgement message is identical to the test pattern received.

The signalling link test will be considered successful only if the received signalling link test acknowledgement message fulfills the following criteria:

a) the SLC identifies the physical signalling link on which the SLTA was received.

b) the OPC identifies the signalling point at the other end of the link.

c) the test pattern is correct.

In the case when the criteria given above are not met or a signalling link test acknowledgement message is not received on the link being tested within T1 (see § 5.5) after the signalling link test message has been sent, the test is considered to have failed and is repeated once. In the case when also the repeated test fails, the following actions have to be taken:

— SLT applied on activation/restoration, the link is put out of service, restoration is attempted and a management system must be informed.

— SLT applied periodically, for further study.

The formats and codes of signalling link test and signalling link test acknowledgement messages used for signalling link testing are specified in § 5.4.

3 Fault location

Fault location operations, employing particular manual or automatic internal test equipment are left to the discretion of the individual signalling points.

Tests requiring provision of messages are for further study. See [3].

4 Signalling network monitoring

In order to obtain information on the status of the signalling network, monitoring of the signalling activity must be provided (for example measures of the signalling load on the signalling data link). The specification of such means and procedures is contained in Recommendations Q.791 and Q.795.

5 Formats and codes of signalling network testing and maintenance messages

5.1 *General*

The signalling network testing and maintenance messages are carried on the signalling channel in message signal units, the format of which is described in Recommendation Q.703, § 2. As indicated in Recommendation Q.704, § 14.2.1, these messages are distinguished by the configuration 0001 of the service indicator (SI). The Sub Service Field (SSF) of signalling network testing and maintenance messages is used in accordance with Recommendation Q.704, § 14.2.2.

The Signalling Information Field (SIF) consists of an integral number of octets and contains the label, the heading code and one or more signals and indications.

5.2 *Label*

For signalling network testing and maintenance messages, the label has the same structure as the label of signalling network management messages (see Recommendation Q.704, § 15.2).

5.3 *Heading code H0*

The heading code H0 is the 4—bit field following the label and identifies the message group. The different heading codes are allocated as follows:

0000 Spare

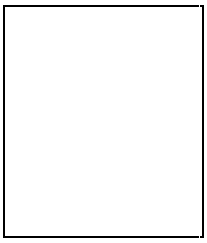
0001 Test messages

The remaining codes are spare.

5.4 *Signalling link test messages*

The format of the signalling link test messages is shown in Figure 1/Q.707.

Figure 1/Q.707 - CCITT 35550



The signalling link test messages, are made up of the following fields:

— Label: (32 bits), see § 5.2

— Heading code H0: (4 bits)

— Heading code H1: (4 bits)

— Spare bits: (4 bits)

— Length indicator: (4 bits)

— Test pattern: ($n \times 8$ bits, 1 n 15).

In the label, the signalling link code identifies the signalling link on which the test message is sent.

The heading code H1 contains signal codes as follows:

bits	D	C	B	A	
	0	0	0	1	signalling link test message (SLTM)
	0	0	1	0	signalling link test acknowledgement message (SLTA)

The length indicator gives the number of octets which the test pattern comprises.

The test pattern is an integral number of octets and is chosen at the discretion of the originating point.

5.5 *Time—out values and tolerances*

Q.707 Timer	Range
T1 (see § 2.2) Supervision timer for signalling link test acknowledgement message	4—12 s (equal or greater than T6 of Q.703)
T2 (see § 2.2) Interval timer for sending signalling link test messages	30—90 s

6 State transition diagrams

The state transition diagram is intended to show precisely the behaviour of the signalling system under normal and abnormal conditions as viewed from a remote location. It must be emphasized that the functional partitioning shown in the following diagram is used only to facilitate understanding of the system behaviour and is not intended to specify the functional partitioning to be adopted in a practical implementation of the signalling system.

FIGURE 2/Q.707 (feuillet 1 sur 2) - T1109700-88

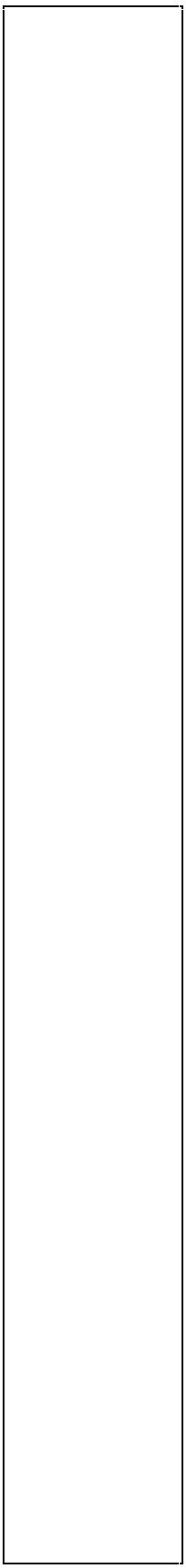
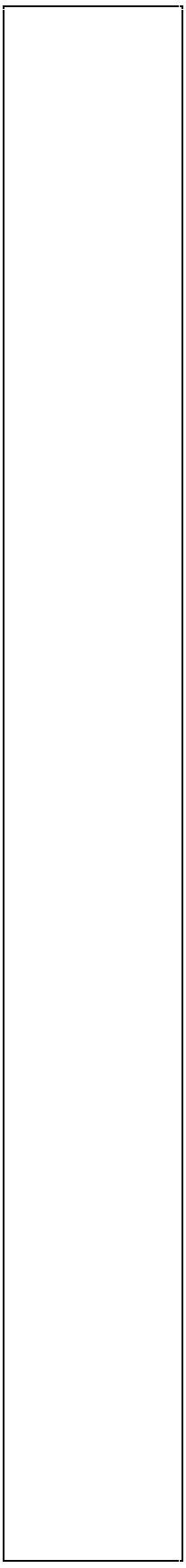


Figure 2/Q.707 (feuillet 1 sur 2) - T1109710-88



References

[1] CCITT Recommendation *Lining up an international point—to—point leased circuit*, Vol. IV, Rec. M.1050.

[2] CCITT Recommendation *Organization of the maintenance of international telephone—type circuits used for data transmission*, Vol. VIII, Rec. V.51.

[3] *Ibid.*, § 5.