



V.54

DATA COMMUNICATION OVER THE TELEPHONE NETWORK

LOOP TEST DEVICES FOR MODEMS

ITU-T Recommendation V.54

(Extract from the *Blue Book*)

NOTES

- 1 ITU-T Recommendation V.54 was published in Fascicle VIII.1 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).
- 2 In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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LOOP TEST DEVICES FOR MODEMS

(Geneva, 1976; amended at Geneva, 1980,
Malaga-Torremolinos, 1984 and at Melbourne, 1988)

1 Introduction

The CCITT,

considering

the increasing use being made of data transmission systems, the volume of the information circulating on data transmission networks, the savings to be made by reducing interruption time on such links, the importance of being able to determine responsibilities in maintenance questions for networks, of necessity involving several parties, and the advantages of standardization in this field,

unanimously declares the following:

The locating of faults can be facilitated in many cases by looping procedures in modems. These loops allow local or remote measurements, analogue or digital, to be carried out optionally by the Administrations and/or users concerned.

2 Scope

This Recommendation specifies modem loop testing procedures for the following cases:

- for synchronous mode of operation over point-to-point leased circuit, multipoint, tandem and general switched telephone network (GSTN) connections;
- for start-stop mode of operation over point-to-point leased circuit and GSTN connections.

3 Definition of the loops

Four loops are defined (numbered 1 to 4) and their locations as seen from DTE A are shown in Figure 1/V.54. A symmetrical set of four loops could exist as seen from DTE B.

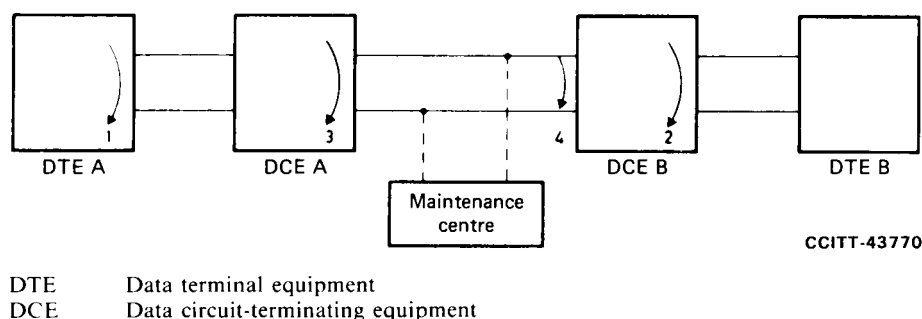


FIGURE 1/V.54

3.1 Loop 1

This loop is used as a basic test on the operation of the DTE, by returning transmitted signals to the DTE for checking. The loop should be set up inside the DTE as close as possible to the interface.

While the DTE is in the loop 1 test condition:

- transmitted data (circuit 103) are connected to received data (circuit 104) within the DTE;
- circuit 108/1 or 108/2 must be in the same condition as it was before the test;
- circuit 105 must be in the OFF condition;
- circuit 125 should continue to be monitored by the DTE so that an incoming call can be given priority over a routine loop test.

Interchange circuit 103 as presented to the DCE must be in the binary 1 condition.

The conditions of the other interchange circuits are not specified but they should if possible permit normal working. The transmitter timing information, in particular if it comes from the DCE, will continue to be sent (see Recommendation V.24, § 4.6.2).

Note - When circuits 108 and 105 are not used by the DTE (for applications on leased lines, for example) the DCE will not be informed of the test condition. This is considered acceptable provided that the remote station is not disturbed.

3.2 Loop 3

This is a local loop established in analogue mode as close as possible to the line to check the satisfactory working of the DCE. The loop should include the maximum number of circuits used in normal working (in particular the signal conversion function, if possible) which may in some cases necessitate the inclusion of devices for attenuating signals, for example.

The establishment of the loop presents no difficulty when using a 4-wire line, except in certain cases in which parts of the line equalization system are removed from service.

For certain 2-wire lines the loop may be obtained by simple unbalance of the hybrid transformer.

While the DCE is in the loop 3 test condition:

- the transmission line is suitably terminated, as required by national regulations;
- all interchange circuits are operated normally, except in the case of 2-wire half-duplex operation where the mandatory clamping involving circuits 105 and 109 (as specified in Recommendation V.24, § 4.3.2 a) is disabled;
- circuit 125 should continue to be monitored by the DTE so that an incoming call can be given priority over a routine loop test, after abandoning the loop 3 condition;
- no signal is transmitted to line on the data channel.

Since most interchange circuits operate normally, a diagram of interchange circuit operation sequence is not presented.

Note 1 - In certain switched networks the loop 3 procedure may clear the connection due to national regulations. During the loop 3 condition, however, the DCE must not be switched to the line, if not already connected.

Note 2 - In 4-wire point-to-point connections circuit 105 may be continuously ON. If in such cases synchronous modems are used, no test data should be transmitted until circuits 106, 109 and 142 are in the ON condition.

3.3 Loop 2

Loop 2 is designed to permit station A or the network to check the satisfactory working of the line (or part of the line) and of the DCE B. It can only be used with a duplex DCE; the application to the backward channel is left for

further study. Pseudo loop 2 may be defined for a half-duplex DCE and will be specified in the Recommendation relating to the DCE concerned.

The establishment of the loop will be effective when the control is applied, regardless of the condition of circuit 108 presented by the DTE associated with the DCE in which the loop is set up.

While the DCE B is in the loop 2 test condition:

- circuit 104 is connected internally in the DCE to circuit 103 (see Note 1);
- circuit 104 to the DTE is maintained in the binary 1 condition;
- circuit 109 is connected internally in the DCE to circuit 105 (see Note 1);
- circuit 109 to the DTE is maintained in the OFF condition;
- circuit 106 to the DTE is maintained in the OFF condition;
- circuit 107 to the DTE is maintained in the OFF condition;
- circuit 115 is connected internally in the DCE to circuit 113 if provided (see Note 1);
- circuit 115 and circuit 114, if provided, to the DTE continue to function.

Note 1 - For the internal DCE connections, the electrical signal characteristics may either be that of the interchange circuits or that of the logic level used inside the DCE.

Note 2 - In certain applications, it may not be desirable to connect circuit 115 to circuit 113. In these cases a flexible buffer between circuits 104 and 103 might be recommended. Alternatively, changes in the transmit clock may be done in a phase-continuous manner.

3.4 Loop 4

This loop arrangement is only considered in the case of 4-wire lines. Loop 4 is designed for the maintenance of lines by Administrations using analogue-type measurements. When receiving and transmitting pairs are connected in tandem, such a connection cannot be measured as a data circuit (conformity with a line characteristic curve, for example).

In the loop position the two pairs are disconnected from the DCE and are connected to each other through a symmetrical attenuator designed to prevent any oscillation of the circuit (the loop, therefore, does not include any of the amplifiers and/or distortion correctors used in the DCE). The value of the attenuator will be fixed by each Administration in compliance with Recommendation G.122 [1].

Loop 4 may be established inside the DCE or in a separate unit.

When loop 4 is inside the DCE, and while in the test condition, the DCE presents circuits 107 and 109 to the DTE in the OFF condition and circuit 142 is in the ON condition. When loop 4 is in a separate unit, these conditions are desirable but not mandatory.

4 Loop control

Two (non-exclusive) types of control might be possible on the DCE:

- manual control by a switch on the equipment;
- automatic control through the DCE-DTE interface or upon recognition of a loop initiation signal in the received data.

The test procedures shall be based on either manual or automatic control of loops. Combined use of these control methods shall be avoided. However, manual release of a test loop shall have priority over automatic control in those DCEs where both test methods are implemented.

Note - The response of a DCE to automatic or manual control attempts in the case where the other control method is used, is not specified.

Interchange circuit 142 shall be used to inform the DTE of a loop condition in the local DCE, even in the case of manual control (but see Note 3 to Table 1/V.54). To avoid ambiguity in interpretation of circuit 142 only one loop should be established at any one time in the DCE.

4.1 Manual control

See Table 1/V.54.

TABLE 1/V.54

Interface signalling for manual control of loops

Loop	Control switch on	Signal to DTE A		Signal to DTE B		Notes
		Circuit 107	Circuit 142	Circuit 107	Circuit 142	
2	DCE B	*)	*)	OFF	ON	Note 1
3	DCE A	ON	ON	*)	*)	Note 2
4	DCE B	*)	*)	OFF	ON	Note 3

*) Not applicable.

Note 1 - Data station A is in the normal operating condition. The loop is established by a switch on DCE B.

Note 2 - In DCE A, the condition of circuit 107 will be determined by the condition of circuit 108. When circuit 108 is not provided on the interface, circuit 107 is ON. The normal case is considered in the table.

Note 3 - When loop 4 is in a unit separate from the DCE, the signals to DTE B are desirable but not mandatory due to the difficulty of implementation. When the loop is implemented within the DCE, loop establishment, shall always be possible by a switch on the DCE.

Note 4 - The conditions represented by ON in the table may also activate a visual indicator on the DCE.

4.2 Automatic control through the DTE/DCE interface (see Table 2/V.54)

Automatic control through the interface is achieved by using circuit 140, 141 and 142 as defined in Recommendation V.24. Circuit 140 is used to control loop 2 and circuit 141 is used to control loop 3. The turning ON of circuit 142 indicates the test mode is established. If circuit 107 is ON, the associated terminal is concerned and subsequent data transmitted on circuit 103 will be looped back on circuit 104. If circuit 107 is OFF, the associated terminal is not concerned.

Note 1 - Automatic control of loop 4 is considered of no use either locally or in the remote station and therefore is not provided.

Note 2 - As an alternative to activation of loop 3 via circuit 141, it could be activated via the four-phase procedure defined in § 4.2 here.

TABLE 2/V.54

Interface signalling for automatic control of loops

Loop	Control signals from DTE A		Signals to DTE A		Signals to DTE B		Notes
	Circuit 140	Circuit 141	Circuit 107	Circuit 142	Circuit 107	Circuit 142	
2	ON	OFF	ON	ON	OFF	ON	Notes 1 and 2
3	OFF	ON	ON	ON	*)	*)	Note 2

*) Not applicable.

Note 1 - There is a risk of head-on collision of controls from the two ends.

Note 2 - In DCE A, the condition of circuit 107 will be determined by the condition of circuit 108. When circuit 108 is not provided on the interface, circuit 107 is ON. The normal case is considered in the table.