
Meridian 1

Transmission testing capabilities

Description and operation

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December 1, 1991

Standard, release 2.0. Reissued to include technical content updates. Due to the extent of the changes, revision bars were not used.

December 1994

Standard, release 3.0. Reissued to include editorial changes and indexing. Due to the extent of the changes, revision bars are not used.

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About this document

This document describes the tie trunk transmission testing capabilities available on Meridian 1 systems equipped with Generic X11 release 2 and later. The transmission testing capabilities are the following:

- a 100 test-line termination
- a software loop-around termination

These capabilities enable the transmission performance of tie trunks to be measured and maintained at acceptable performance levels. The tie trunk transmission testing capabilities are of particular value for Meridian 1 systems equipped with the Network Alternate Route Selection (NARS), Basic Alternate Route Selection (BARS), or Coordinated Dialing Plan (CDP) features, where tie trunks are used extensively to interconnect systems.

Reference documentation

- *Electronic Switched Network signaling guidelines* (309-3001-180)
- *Electronic Switched Network transmission guidelines* (309-3001-181)
- *Summary of transmission parameters* (553-2201-182)
- *QPC237 4-Wire E&M/DX Trunk Card description* (553-2001-190)
- *Basic and Network Alternate Route Selection description* (553-2751-100)
- *Coordinated Dialing Plan description* (553-2751-102)

Test procedures

100 test-line termination

The 100 test-line termination allows access to a Meridian 1 termination that provides 5.5 seconds of 1020-Hz tone, followed by a quiet (balance) termination. The tone and quiet terminations are provided by the tone and digit switch (TDS) circuit card (all codes and vintages).

The termination can be accessed at a remote location from a local location to obtain loss and noise measurements on outgoing or two-way 2-wire (QPC71) and 4-wire (QPC237) E&M tie trunks.

The QPC71 and QPC237 trunk cards provide either 600 or 900 ohms termination, selectable by the appropriate cross-connection at the distribution frame. See *QPC237 4-Wire E&M/DX Trunk Card description* (553-2001-190) for a full description of the QPC71 and QPC237.

The 100 test-line termination is assigned a unique maintenance Directory Number (DN) at a Meridian 1 system equipped with the 100 test-line termination. Only one maintenance DN may be assigned for the 100 test-line at any one system.

Access to the termination at a remote location is gained by dialing the maintenance DN assigned to the termination. (Ringback tone is not provided to the caller for such a call.) Connection to the termination, once established, remains until the caller goes on-hook or the test-line time limit of 30 minutes has expired. Access to test-line terminations at a Meridian 1 is limited to incoming trunk calls. A network call from any far-end station to a maintenance DN is treated as a normal call by the system. The number of termination connections is limited to four. Overflow tone is provided if the termination cannot be accessed.

Unless performed from an attendant console, a specific trunk to the 100 test-line termination at a remote location cannot be selected. The attendant can select a specific trunk to the termination at a remote system, using the Barge-In key. The attendant at the terminating end cannot barge in on a trunk currently connected to the termination.

When the termination is accessed at a remote location through dial access, the echo suppressors on the trunk circuit at the remote location are switched out. At the originating Meridian 1 system, the echo suppressors are configured as for a normal trunk call. The pad switching, on trunks connected to the termination at a remote location, cannot be controlled from the originating end. (The pad is switched in during the 5.5 seconds of 1020-Hz test tone and is then switched out for quiet termination.)

Procedure 1 outlines the procedures for testing transmission levels (tone) and noise levels (quiet). These tests are performed for the following purposes:

- to identify faulty circuits or facilities
- to ensure that transmission parameters on newly installed tie trunk circuits are within acceptable limits before the circuits are put into service
- to provide routine preventive maintenance so that changes in transmission parameters can be detected and corrected before transmission performance is hindered
- to support the repair of tie trunk problems

Procedure 1 is to be performed at each end of a tie trunk to ensure that both directions of transmission are checked.

Procedure 1 Using the 100 test-line

An attendant console equipped with a Barge-In key is recommended for this test, since the trunk used for the test cannot be specified with other station equipment.

- 1 Press an idle LPK key.
- 2 Press the Barge-In key.
- 3 First dial the trunk-access code, then the member number of the trunk to be tested, and then press the octothorpe (#) key. A dial tone is heard.
- 4 Dial the DN of the 100 test-line at the far end. When the test connection is made, a 1020-Hz test tone is heard for 5.5 seconds, and then quiet termination is established.

Transmission level tests

During the 5.5 seconds of 1020-Hz test tone, transmission level tests should be performed as follows:

- 5 At the near end (see Figure 1), connect a transmission level meter to the "facility in" access jack of the trunk transmission interface and measure the level of the 1020-Hz test tone. Table 2 lists the minimum and maximum level requirements for trunks with various degrees of design loss, based on switched out echo suppression and switched-in pads on the far end.

If the measurement obtained is not within an acceptable range, access the local test-line termination at site B and measure the transmission level at the "facility out" access jack of the trunk transmission interface (see Figure 2). Acceptable levels, based on switched-in pad mode at the near end, are the following:

- QPC71: -15 dBm minimum, -13 dBm maximum
- QPC237: -15.5 dBm minimum, -13.5 dBm maximum

If the measured level is not acceptable at either (or both) site A or B, corrective maintenance must be performed at the appropriate site and the test must be repeated.

If the measured level is acceptable at both site A and site B, corrective maintenance must be performed on the transmission interface facilities or on the local 2W-4W E&M trunk.

Noise measurements

- 6 During the quiet termination, connect a noise level meter to the “facility in” access jack of the trunk transmission interface and measure the noise level of the quiet termination. **Table 1** lists noise level measurements that require maintenance action.

If the measurement obtained indicates that maintenance action is required, access the 100 test-line termination at site B (see **Figure 2**) and measure the noise level at the “facility out” access jack of the trunk transmission interface. The requirement is that the noise level not exceed 23 dBrnC.

If the requirement is not met at either (or both) site A or site B, corrective maintenance must be performed at the appropriate site and the test must be repeated.

- 7 If the requirement is met at both site A and site B, corrective maintenance must be performed on the transmission interface facilities or on the local 2W-4W E&M trunk.

Table 1
Maintenance parameter for noise measurements

Distance (miles)			Distance (km)			Noise level (dBrnC)		
0	–	15	0	–	24	28	–	35
16	–	50	26	–	80	28	–	35
51	–	100	82	–	160	29	–	35
101	–	200	162	–	320	31	–	35
201	–	400	322	–	640	33	–	39
401	–	1000	642	–	1600	35	–	39
1001	–	1500	1602	–	2400	36	–	39
1502	–	2500	2402	–	4000	39	–	43
2501	–	4000	4002	–	6400	41	–	45

Note 1: No corrective action is required if noise measurements are below these levels.

Note 2: Trunk maintenance can be performed with the trunk in service for measurements within these ranges. If measurements exceed these ranges, remove trunk from service before initiating corrective procedures.

Figure 1
A typical 100 test-line termination configuration

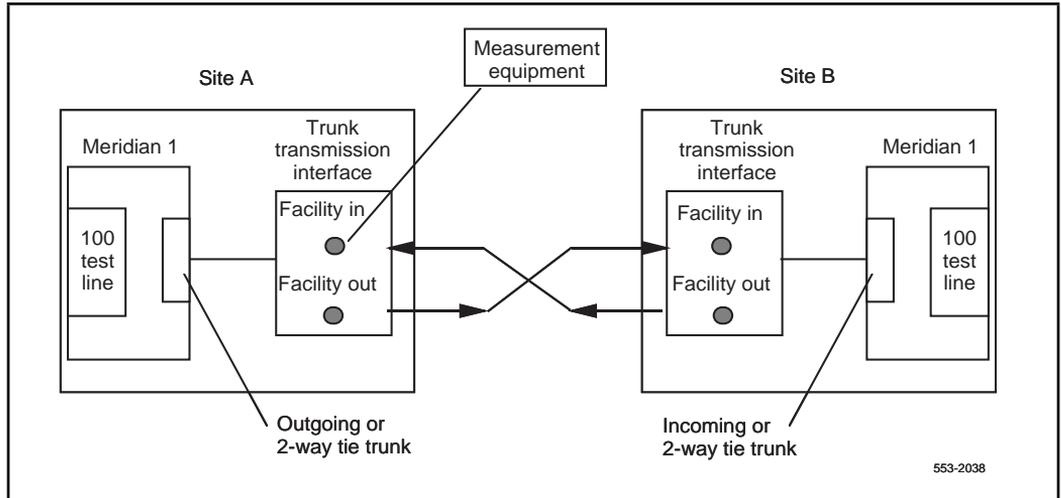
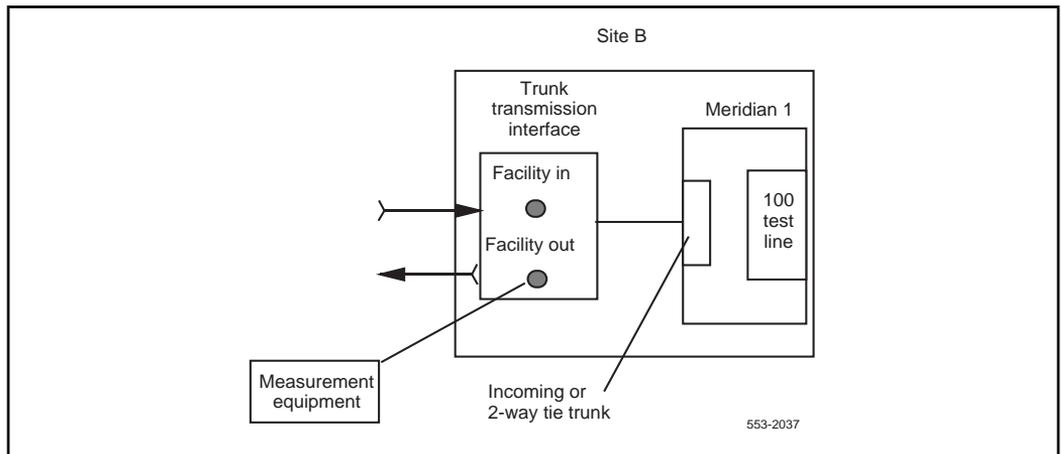


Figure 2
Local 100 test-line access



Loop-around termination

The loop-around termination is two separate terminations: a reference trunk termination and a test trunk termination. Each termination is assigned a different maintenance DN at the system arranged for the loop-around termination. There can be up to eight maintenance DNs (four for reference trunks and four for test trunks) assigned in a Meridian 1 system.

The reference trunk termination is dial accessed at a remote location through a selected trunk at the local end. When the termination is accessed, the echo suppressor is switched out, the pad is switched in, and a constant 1020-Hz test tone is provided from the termination. The transmission parameters of the trunk are then measured and adjustments are made to bring the trunk up to the specified grade-of-service transmission requirements.

A second trunk is then selected at the local end and used to access the test trunk termination at the remote location. When the test trunk termination is accessed, the constant 1020-Hz test tone is removed from the reference trunk, and a software connection at the remote location is established between the reference trunk and the test trunk, thus completing the loop-around termination. Echo suppressors are switched out and pads are configured as for a normal call.

Transmission measurements obtained on the test trunk reflect the loss/noise values for the test trunk plus the reference trunk. The loss/noise values applicable to the test trunk are obtained by subtracting the loss/noise values previously obtained for the reference trunk from the total loss/noise values measured at the reference trunk.

Procedure 2 outlines the steps necessary to establish a loop-around termination. The loss/noise values obtained for the test trunk should conform to the values of **Tables 1** and **2**. **Figure 3** shows a typical loop-around termination configuration.

Procedure 2

Establishing a loop-around test termination

An attendant console equipped with a Barge-In key is recommended for this test, since the trunk used for the test cannot be specified with other station equipment.

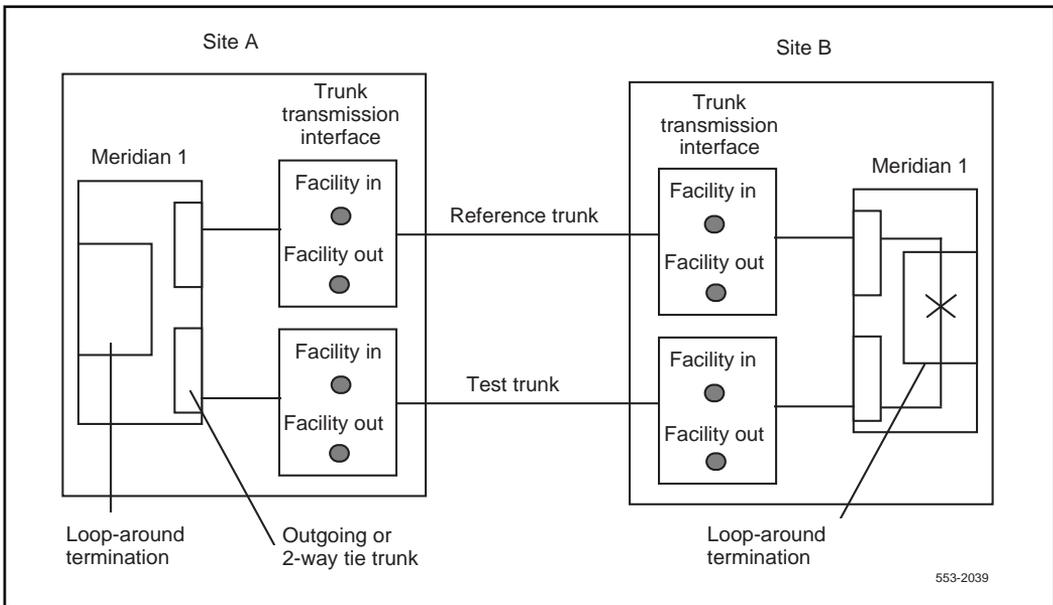
- 1 From the local end, access the reference trunk termination at the far end by performing steps 1 through 4 of [Procedure 1](#), dialing the reference trunk loop-around termination. The 1020-Hz test tone is heard.
- 2 Measure the trunk parameters of the reference trunk, and bring them up to specification as outlined in steps 5 and 6 of [Procedure 1](#) and in [Tables 1](#) and [2](#).
- 3 Put the trunk on hold by pressing the Hold key at the attendant console.
- 4 At the attendant console, access the test trunk and connect it to the far end test trunk termination in the same way as the reference trunk, but by dialing the test trunk termination DN instead of the reference trunk termination DN.
- 5 Connect a noise level meter to the “facility in” access jack of the trunk transmission interface of the test trunk. Measurements obtained reflect the combined noise levels of the reference trunk and the test trunk. Subtract the reference trunk noise measurement from the total noise measurement to obtain the test trunk noise measurement. Proceed as for noise measurements described in [Procedure 1](#), step 6, referring to [Tables 1](#) and [2](#).
- 6 When the measurements are completed, another test trunk can be dialed up and measured.

Table 2
Transmission level parameters

Trunk design loss	Minimum level (dBm)	Maximum level (dBm)
0	-17.5	-11.5
0.5	-18.0	-12.0
1.0	-18.5	-12.5
1.5	-19.0	-13.0
2.0	-19.5	-13.5
2.5	-20.0	-14.0
3.0	-20.5	-14.5
3.5	-21.0	-15.0

Note: Values shown in the table are based on measurements obtained at the near-end trunk with pads switched in at the far-end trunk.

Figure 3
Typical loop-around termination configuration



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