
DIGITAL TRANSMISSION SYSTEMS

T1 DIGITAL LINE

MAINTENANCE TESTS

This section contains procedures for a maintenance test of the T1 repeatered lines and a noise and continuity test of the fault locate lines.

This section is reissued to change the testing procedures for the T1 lines and to add the 238B repeater; the 221-, 231-, and 236-type office repeaters; and a noise and continuity test for the passive fault locate lines. Since this is a general revision, change arrows are not used. This issue affects the Equipment Test List (ETL).

The T1 line maintenance test is used to determine network error performance and to help identify the poorest performing systems in each office. The same test is used for an in-service line, a backbone line, or a powered unassigned line. An in-service line transmits bipolar pulses between the terminals connected at each end of the line, and these pulses can be monitored using the J98710G Error Detecting Set or the J98725AC Office Bipolar Violation Detector. The monitor jacks on the DSX-1 or the office repeater are isolated from the line by series resistors so that measurements can be made without affecting service on the line.

A maintenance line consists of a single span between offices, and a backbone line consists of a number of maintenance lines wired in tandem through intermediate offices. Accordingly, maintenance or backbone lines may be tested on a single- or multiple-span basis.

Maintenance or backbone lines must always be supplied with a bipolar signal and terminated properly to maintain stable line operation. This signal should be supplied by a quasi-random signal source (QRSS) (Section 103-493-104). If a QRSS is not available, a spare terminal or a bridging repeater connected to a working line can be used.

Any line not designated as an in-service line, a maintenance line, or a backbone line should not have power applied. However, if for any reason the line must be powered, a QRSS or other acceptable signal source must be applied to the line to prevent oscillation. The line should also be terminated at the receiving end with a 386B (135-ohm) termination plug in the OUT jack of the DSX-1; the OUT jack associated with a 201-type, a 208D, or a 238B repeater; or the X OUT jack associated with the 206- or 236-type office repeater. An example of a powered unassigned line is an unassigned line associated with a unidirectional line repeater system.

The results of the tests are to be recorded for the in-service line tests on the form of Fig. 1. All other tests are to be recorded on the form of Fig. 2. These forms are to be reproduced locally.

The noise and continuity test for the passive fault locate lines checks the amount of noise on the fault locate pair, the continuity of the pair, and the 1000-ohm termination at the far end.

NOTICE

Not for use or disclosure outside the
Bell System except under written agreement

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TEST 1

T1 LINE TEST

This test is to be performed on the T1 lines at the terminal office repeater receive end for in-service lines and at the terminating office repeater receive end for maintenance, backbone, and powered unassigned lines. The test need not be coordinated with the far terminal office.

APPARATUS:

1—J98710G, List 2, List 3, or List 4 Error Detecting Set (EDS), or J98725AC Office Bipolar Violation Detector (BVD), or equivalent

1—P3BH Cord

STEP	PROCEDURE
1	Connect the power cord of the EDS or BVD to the -48V TST jack on the DSX-1 miscellaneous panel or the jack mounting panel of the repeater bay.
2	Connect one end of a P3BH cord to the IN jack of the EDS or the SIG IN jack of the BVD.
3a	If at a DSX-1 cross-connect, connect the free end of the P3BH cord to the MON jack at the terminating end of the line under test.
3b	If the line terminates at a 201-type, a 208D, or a 238B repeater in a 201-type repeater bay, connect the free end of the P3BH cord to the MON jack on the side of the associated span terminating assembly assigned to the receiving direction.
3c	If the line terminates at a 206- or 236-type office repeater, connect the free end of the P3BH cord to the MON jack located below the X IN jack on the front panel of the repeater bay.
3d	If the line terminates at a 221- or 231-type office repeater not associated with a DSX, connect the free end of the P3BH cord to the MON jack located below the appropriate X IN jacks on the bay jack field.

TEST 1 (Cont)

STEP	PROCEDURE
4a	If the BVD is used, set the MODE switch to BV , the TIMER switch to BEGIN , and depress the START/RESET button and proceed to Step 6.
4b	If the EDS is used, set the PULSES-ERRORS switch to PULSES and observe the indicator. Requirement: The indicator either lights continuously or with a slight flicker.
5	On the EDS, set the PULSES-ERROR switch to ERRORS .
6	Observe the lamp on the EDS or the counter on the BVD for 3 seconds. Requirement: The lamp on the EDS should not light or the counter on the BVD should remain at all zeros, indicating error-free operation. Note: On the BVD, if the SIGNAL LOSS lamp is lighted, the BVD will not count errors. The SIGNAL LOSS lamp indicates a complete loss of signal on the line.
7a	If the requirements are met, record a P (pass) in the appropriate space on the form shown in Fig. 1 or Fig. 2.
7b	If the requirements are not met, wait 5 minutes, and retest the line. If the requirements are still not met, record an F (fail) in the appropriate space on the form shown in Fig. 1 or Fig. 2.
8	For each T1 line which does not meet the requirements, verify that a good bipolar signal is supplied to the line and the line is terminated properly. If the requirements are still not met, locate the malfunctioning span line by repeating Steps 1 through 6 at the receiving end of each span. Locate the trouble within the span according to the procedures of Section 365-227-500.

TEST 2

PASSIVE FAULT LOCATE LINE TEST

This test is to be performed on the passive T1 fault locate lines to check continuity, termination, and noise.

APPARATUS:

1—J98725AD T1C/T1 Fault Locate Test Set (FLTS) (Section 103-494-106)

1—P3BH Cord

TEST 2 (Cont)

APPARATUS(Cont):

Note: If the FLTS is not available, the following apparatus may be used:

- 1—KS-14510 Volt-Ohm-Milliammeter (VOM) (Section 100-520-101)
- 1—J94003A or C (3A or 3C) Noise Measuring Set (NMS) (Section 103-611-100 or 103-611-101)
- 1—3P7C Cord for 3C NMS
- 1—3P17B Cord for 3A NMS (double jack input)
- 1—310 Plug

STEP

PROCEDURE

- | STEP | PROCEDURE |
|------|---|
| 1a | If the FLTS is to be used, proceed to Step 2. |
| 1b | If the 3A or 3C NMS is to be used, proceed to Step 7. |
| 2 | Connect the FLTS power cord to a -48V TST jack. |
| 3 | Connect the P3BH cord from the RCV-FL LINE jack on the FLTS to the fault locate line to be tested. |
| 4 | Set the CLOCK RATE switch to T1.

Requirement: CLOCK RATE-T1 indicator lighted. |
| 5 | Set the FUNCTION switch to OHM METER and observe the KILOHMS scale of the meter.

Requirement: The meter indicates a resistance value as specified in the office records, roughly between 1 and 5 kilohms.

Note: If the requirement is not met, verify that the 1000-ohm termination is connected at the far end. If the requirement is still not met, refer to Section 365-227-500 to locate the trouble. |
| 6 | Set the FUNCTION switch to SPAN TERMINATE, the RECEIVER SENSITIVITY switch to -80, and observe the DBM scale of the meter.

Requirement: The meter indicates a value of -92 DBM or less (-95 dBm is less than -93 dBm).

Note: If the requirement is met, proceed to Step 17. If the requirement is not met, proceed to Step 13. |

TEST 2 (Cont)

STEP	PROCEDURE
7	Insert a 310 plug into the jack associated with the fault locate line to be tested.
8	Set the VOM to the X100 scale and measure between the tip and ring of the 310 plug. Requirement: The VOM should indicate a resistance value as specified in the office records, roughly between 1000 and 5000 ohms. Note: If the requirement is not met, verify that the 1000-ohm termination is connected at the far end. If the requirement is still not met, refer to Section 365-227-500 to locate the trouble.
9	Remove the 310 plug.
10	Condition the 3-type NMS as follows: C-Message Weighting DBRN to 10 FUNCTION to NM900 or NM600/900 (3C NMS) NORM-DAMP to NORM
11	Connect the 3P17B cord (3A NMS) or 3P7C cord (3C NMS) between the IN jack of the NMS and the jack associated with the fault locate line to be tested.
12	Observe the NMS meter. Requirement: The meter indicates 14 dBrnC or less. Note: If the requirement is met, proceed to Step 17. If the requirement is not met, proceed to Step 13.
13	Verify that all unassigned lines associated with the fault locate pair have line power removed or are supplied with a bipolar signal and terminated with a 386B termination plug to prevent free-running oscillation of discrete-component repeaters. The following signal sources are listed in the order of preference: (1) A J98710R Quasi-Random Signal Source (QRSS) (2) A spare D-type channel bank (3) A bridging repeater connected to a working line (4) A test set which will produce a good 1.544-mB/s signal.

TEST 2 (Cont)

STEP**PROCEDURE**

Note: T1 lines equipped with bidirectional repeaters must be supplied with signals in both directions and terminated properly.

- 14 Verify that all lines sharing a fault locate pair are terminated by any of the following arrangements:
- (1) A working or a tested spare D-type channel bank
 - (2) Another T1 span line
 - (3) A 386B plug in the DSX-1 OUT jack
 - (4) A 386B plug in the R OUT jack of a 206- or 236-type repeater or in the appropriate OUT jack on the 201-type repeater bay.
- 15 Verify that 349A shorting plugs are in the appropriate OUT jacks on the DSX-1 or 201-type repeater bay or R OUT jacks of the 206- or 236-type repeaters on spare repeaters at intermediate offices in the fault locate system.
- 16 If the noise persists, refer to Section 365-227-500 to locate the trouble.
- 17 Disconnect all test equipment.
-

SYSTEM ERROR TEST RESULTS

OFFICE _____

P = PASS
F = FAIL

PAGE NO. _____
QUARTER, 19 ____

SYSTEM	TEST RESULT	SYSTEM	TEST RESULT	SYSTEM	TEST RESULT
1		26		51	
2		27		52	
3		28		53	
4		29		54	
5		30		55	
6		31		56	
7		32		57	
8		33		58	
9		34		59	
10		35		60	
11		36		61	
12		37		62	
13		38		63	
14		39		64	
15		40		65	
16		41		66	
17		42		67	
18		43		68	
19		44		69	
20		45		70	
21		46		71	
22		47		72	
23		48		73	
24		49		74	
25		50		75	

T1 SYSTEM ERROR TEST

1. PLUG BPV MONITOR INTO RECEIVE MON JACK OF THE TERMINAL OFFICE REPEATER; IGNORE INITIAL ERROR COUNTS
2. COUNT BPV'S FOR 3 SECONDS
3. IF NO BPV'S OCCUR; SYSTEM PASSES. IF ANY BPV'S OCCUR WAIT AT LEAST 5 MINUTES. THEN;
4. RETEST SYSTEM AS IN STEPS (1) AND (2). THEN;
5. IF NO BPV'S OCCUR; SYSTEM PASSES. IF ANY BPV'S OCCUR DURING RETEST, SYSTEM FAILS

PREPARED BY _____

TEL. NO. _____

TOTAL SYSTEMS TESTED
TOTAL FAILED
TOTAL TERMINATING

Fig. 1—Typical System Error Test Results Form

