
**T1 DIGITAL LINE
TROUBLE LOCATING PROCEDURES
DIGITAL TRANSMISSION SYSTEMS**

This section consists of test procedures for locating split cable pairs, foreign voltage, and ground in a T1 span line between the office repeater bay (ORB) at the central office (CO) and the first apparatus case.

The reasons for reissuing this section are to incorporate corrections and to delete the following trouble locating procedures.

- (1) Power Loop Test
- (2) Fault Locating Test (passive FL lines)
- (3) Observe Trouble Test
- (4) Trouble Isolation in a Line Section

These procedures are now contained in Section 365-800-003 (TOP). Since this reissue is a general revision, no revision arrows have been used to denote significant changes. Equipment Test Lists are not affected.

The tests in this section can be accomplished with or without the 257A adapter (Fig. 1A) or 279A adapter (Fig. 1B). The adapters allow accessing the connector terminals from the front of the 206 and T1C/T1 ORB. They are used in Test 1A and Test 2A. If the adapters are not available, the connector terminals can be accessed at the rear of the ORB. Tests 1B and 2B provide for testing without adapters.

The tests **cannot** be performed on a working line. A working line in trouble must be taken out of service in accordance with Section 365-800-003 (TOP).

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TEST 1

SPLIT PAIRS IN ABAM CABLES

Split pairs are the result of a conductor from one pair being terminated with the conductor of another pair, usually due to transposed tip conductors in the ABAM cable. **The tip conductors in the ABAM cable can be identified by their colors: white, red, black, yellow, and violet.**

Test 1 should only be performed if poor splicing procedures are suspected as the source of a trouble in a span line, or after the pair loss test results (Section 365-800-003, TOP) indicate an open circuit between the ORB and the first apparatus case.

APPARATUS:

- 1—KS-14510 Volt-Ohm-Milliameter (VOM) (Section 100-520-101) or KS-20599, L4 Digital Multimeter (DMM) Section 084-805-101, or equivalent
- 2—257A Adapter for 206 ORB (T1) or STM (T1/OS) (Use in Test 1A)
- 2—279A Adapter for T1C/T1 ORB (Use in Test 1A)

STEP	PROCEDURE
A. With Test Adapters (206 or T1C/T1 ORB)	
1	Remove the office repeater(s) from the shelf indicating trouble.
2	Short the associated cable pairs at the main distributing frame (MDF) if the first apparatus case out of the office is not equipped with line repeaters.
3	Insert test adapters 257A (Fig. 1A) for 206 ORB or T1/OS STM, or 279A (Fig. 1B) for T1C/T1 ORB. (See Fig. 2.)
4	Set the selector switch of the VOM to OHMS X 100 or the selector switches of the DMM to 1 and KΩ.
5	If a VOM is used, calibrate it by shorting the test probes and zero adjusting the ohms scale. If a DMM is used, no adjustment is necessary.

TEST 1 (Contd)

STEP	PROCEDURE
6	Insert the test probes of the VOM or DMM into the T and R jacks (Fig. 2) and read the resistance. Requirement: 3 through 100 ohms.
7	Insert the test probes into the T1 and R1 jacks and repeat the resistance measurement as in Step 6. Note 1: The resistance measured in Step 6 or 7 should equal the resistance of the ABAM cable between the repeater bay and MDF if the cable pair is shorted at the MDF. If the cable pair is not shorted and the apparatus case is equipped with repeaters, the measured resistance should equal the combined resistance of the ABAM cable, outside plant cable pair, and the transformer winding protection resistors if used within the repeater. Note 2: The repeater position with a split pair will have infinite resistance. If the pair is split, proceed to Step 8. If the pair is not split, proceed to Step 12.
8	Insert one test probe of the VOM or DMM into the R or R1 jack.
9	Insert the other test probe successively into T, T1 and R1 or R jacks until the VOM or DMM indicates the resistance required per Step 6.
10	Make a visual inspection after the mate of the pair is found to help identify at which end of the ABAM cable the split took place.
11	Disconnect the transposed conductors, match tip conductor to mate, and reterminate per Table 1 in Fig. 2. Then repeat Steps 6 and 7.
12	Complete Form E-6880 (Fig. 4) as shown on Sheet 1 of Fig. 5.
13	Test is complete. Remove all test equipment and replace the office repeater(s) removed in Step 1.
B. Without Test Adapters	
1	Remove the office repeater(s) from the shelf indicating trouble.
2	Short the associated cable pairs at the main distributing frame (MDF) if the first apparatus case out of the office is not equipped with line repeaters.
3	Remove the rear cover of the 206 or T1C/T1 ORB at the shelf location to be tested.
4	Set the selector switch of the VOM to OHMS X 100 or the selector switches of the DMM to 1 and K Ω .

TEST 1 (Contd)

STEP	PROCEDURE
5	If a VOM is used, calibrate it by shorting the test probes and zero adjusting the ohms scale. If a DMM is used, no adjustment is necessary.
6	Connect the test probes of the VOM or DMM to the T and R connector pins (Fig. 2) and read the resistance. Requirement: 3 through 100 ohms.
7	Connect the DMM or VOM to the T1 and R1 connector pins and repeat the resistance measurement as in Step 6. Note 1: The resistance measured in Step 6 or 7 should equal the resistance of the ABAM cable between the repeater bay and MDF if the cable pair is shorted at the MDF. If the cable pair is not shorted and the apparatus case is equipped with repeaters, the measured resistance should equal the combined resistance of the ABAM cable, outside plant cable pair, and the transformer winding and protection resistors if used within the repeater. Note 2: The repeater position with a split pair will have infinite resistance. If the pair is split, proceed to Step 8. If the pair is not split, proceed to Step 12.
8	Connect one test probe of the VOM or DMM to R or R1 connector pin.
9	Connect the other test probe successively to the T, T1 and R1 or R connector pins for each position in trouble until the VOM or DMM indicates the resistance required per Step 6.
10	Make a visual inspection after mate of the pair is found to help identify at which end of the ABAM cable the split took place.
11	Disconnect the transposed conductors, match tip conductor to mate, and reterminate per Table 1 in Fig. 2. Then repeat Steps 6 and 7.
12	Complete Form E-6880 (Fig. 4) as shown on Sheet 1 of Fig. 5.
13	Test is complete. Remove all test equipment and replace the office repeater(s) and rear cover removed from the ORB.

TEST 2

**DC TESTS OF T CARRIER AND VF
CABLE PAIRS FOR FOREIGN VOLTAGE SHORTS
AND GROUNDS**

This test consists of checking T1 span line cable pairs from the office repeater bay for foreign voltage shorts or grounds. It should be performed whenever the span line is in trouble.

APPARATUS:

- 1—KS-14510 Volt-Ohm-Milliameter (VOM) (Section 100-520-101) or KS-20599, L4 Digital Multimeter (DMM) Section 084-805-101, or equivalent
- 1—257A Adapter for 206 ORB (T1) or STM (T1/OS) (use in Test 2A)
- 1—279A Adapter for T1C/T1 ORB (use in Test 2A)

STEP	PROCEDURE
A. With Test Adapters (206 or T1C/T1 ORB)	
1	Remove the office repeater of the line to be tested. If testing a unidirectional line, remove the power mate.
2	Insert test adapter 257A adapter (Fig. 1A) for 206 ORB and 279A adapter for T1C/T1 ORB (Fig. 1B). (See Fig. 3.)
3	Set the selector switch of the VOM to 300 DC VOLTS or the selector switches of the DMM to VDC and 1K. Readjust to lower dc voltages as required.
4	If a VOM is used, calibrate it by zero adjusting the voltage scale. If a DMM is used no calibration is necessary.
5	Insert the + test probe of the VOM or DMM into the GRD jack on the adapter and the - probe successively into the T, R, T1, and R1 jacks (Fig. 3). Observe the voltage level for each jack.
	Requirement: 0 Volts
6	If the requirement is met, proceed to Step 9. If it is not, disconnect at the mainframe (MDF) the lead(s) associated with the jack(s) where the voltage appeared and repeat Step 5.
7	If voltage is present with the lead(s) disconnected at the MDF, the defect is inside the CO; proceed to Step 16. If it is not, the defect is outside the CO; continue with Step 8.
8	Take corrective action as necessary to remove the defect. Verify by repeating Step 5 and then proceed to Step 16.

TEST 2 (Contd)

STEP	PROCEDURE
9	Set the selector switch of the VOM to OHMS X 100 or the selector switches of the DMM to $K\Omega$ and 1.
10	If a VOM is used, calibrate it by shorting the test probes and zero adjusting the ohms scale. If a DMM is used no calibration is necessary.
11	Insert the + test probe of the VOM or DMM to frame ground and the - probe successively into the T, R, T1, and R1 jacks. Observe the resistance reading at each jack. Requirement: 10M ohms or greater
12	If the requirement is met and the line is out of trouble, proceed to Step 16. If it is not met or the line is still in trouble continue with Step 13.
13	Disconnect at the MDF the lead(s) associated with the jack(s) in Step 11 where the trouble or ground can be detected and repeat Step 11.
14	If the trouble or ground is absent with the lead(s) disconnected, the defect is outside the CO; proceed to Step 16. If it is present, the defect is inside the CO; continue with Step 15.
15	Take corrective action as necessary to remove the defect. Verify by repeating Steps 5 and 11.
16	Complete Form E-6880 (Fig. 4) per example on Sheet 1 of Fig. 5. If the defect is outside the CO, complete the OUTSIDE PLANT INFORMATION part and forward to outside plant.
17	Reterminate all lead(s) disconnected in Step 6 or Step 13. Remove all test equipment and replace the office repeater(s) removed in Step 1.
B. Without Test Adapters (206 or T1C/T1 ORB)	
1	Remove the office repeater of the line to be tested. If testing a unidirectional line, remove the power mate.
2	Remove the rear cover of the 206 or T1C/T1 ORB at shelf location to be tested.
3	Set the selector switch of the VOM to 300 DC VOLTS or the selector switches of the DMM to VDC and 1K. Readjust to lower dc voltages as required.
4	If a VOM is used calibrate it by zero adjusting the voltage scale. If a DMM is used no calibration is necessary.
5	Connect the + test probe of the VOM or DMM to frame ground and the - probe successively to T, R, T1, and R1 connector terminals (Fig. 3). Observe the voltage level at each terminal.

TEST 2 (Contd)

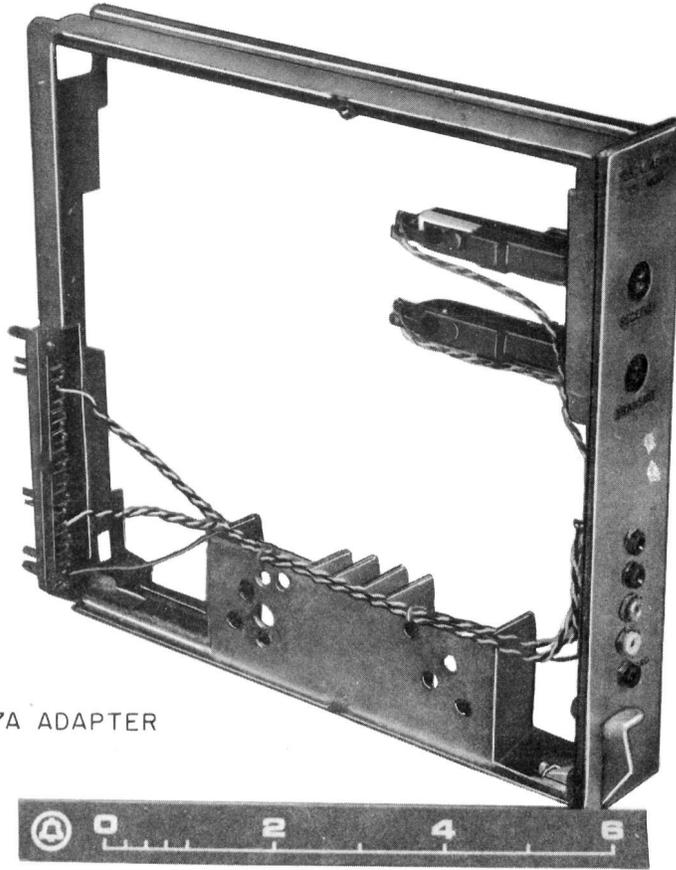
STEP**PROCEDURE**

Requirement: 0 volts

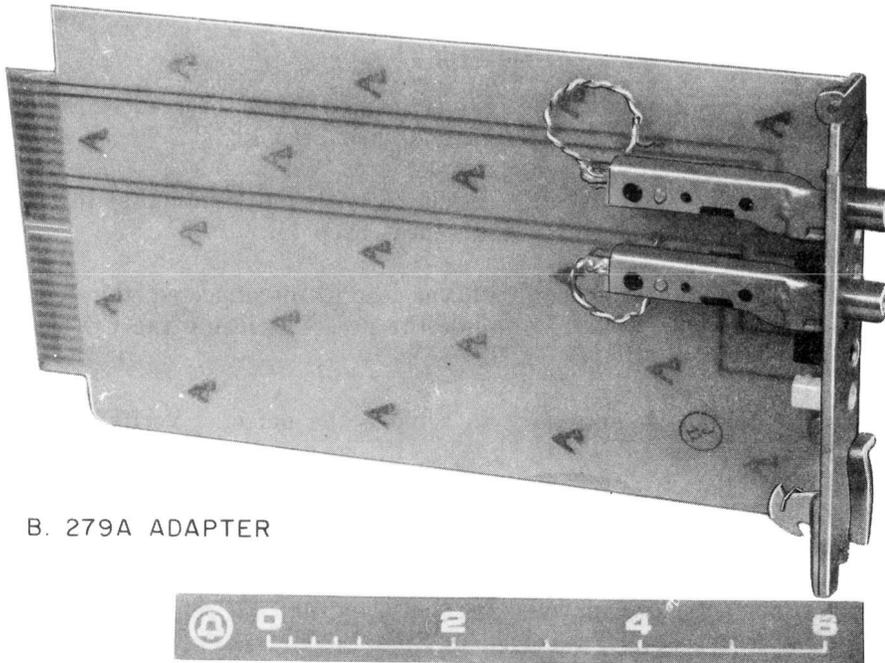
- 6 If the requirement is met proceed to Step 9. If it is not, disconnect at the mainframe (MDF) the lead(s) associated with the jack(s) where the voltage appeared and repeat Step 5.
- 7 If the voltage is absent with the lead(s) disconnected at the MDF, the defect is outside the CO; proceed to Step 16. If it is present, the defect is inside the CO; continue with Step 8.
- 8 Take corrective action as necessary to remove the defect. Verify by repeating Step 5 and then proceed to Step 16.
- 9 Set the selector switch of the VOM to OHMS X 100 or the selector switches of the DMM to $K\Omega$ and 1.
- 10 If a VOM is used, calibrate it by shorting the test probes and zero adjusting the ohms scale. If a DMM is used no calibration is necessary.
- 11 Connect the + test probe of the VOM or DMM to frame ground and the - probe successively to T, R, T1, and R1 connector terminals. Observe the resistance reading at each terminal.

Requirement: 10M ohms or greater

- 12 If the requirement is met **and** the line is out of trouble, proceed to Step 16. If it is not met **or** the line is still in trouble continue with Step 13.
 - 13 Disconnect at the MDF the lead(s) associated with the terminal(s) in Step 11 where the trouble or ground can be detected and repeat Step 11.
 - 14 If the trouble or ground is absent with the lead(s) disconnected, the defect is outside the CO; proceed to Step 16. If it is present, the defect is inside the CO; continue with Step 15.
 - 15 Take corrective action as necessary to remove the defect. Verify by repeating Steps 5 and 11.
 - 16 Complete Form E-6880 (Fig. 4) per example on Sheet 1 of Fig. 5. If the defect is outside the CO, complete the OUTSIDE PLANT INFORMATION part and forward to outside plant.
 - 17 Reterminate all lead(s) disconnected in Step 6 or Step 13, remove all test equipment, and replace the office repeater(s) removed in Step 1.
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A. 257A ADAPTER



B. 279A ADAPTER

Fig. 1—Test Adapters

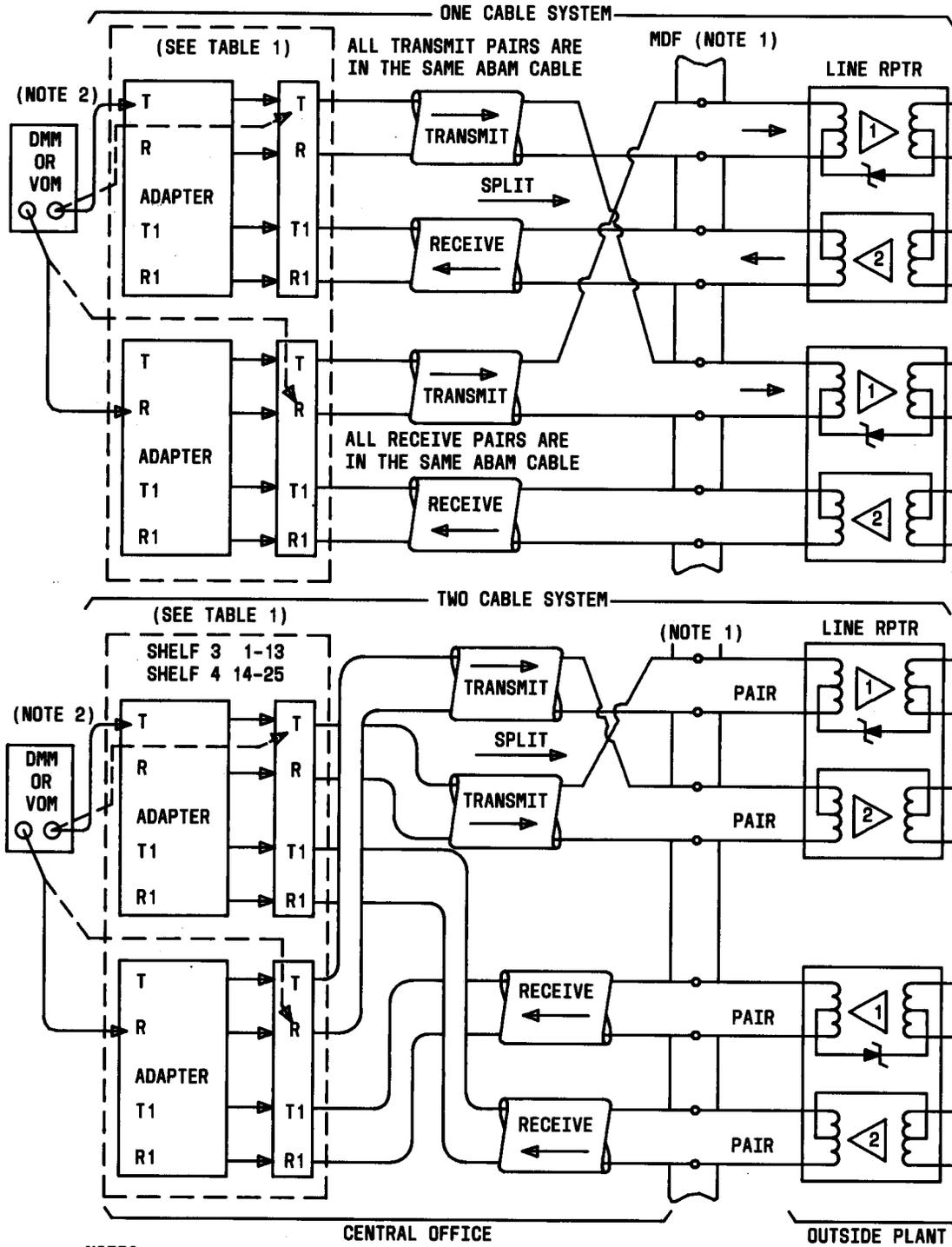
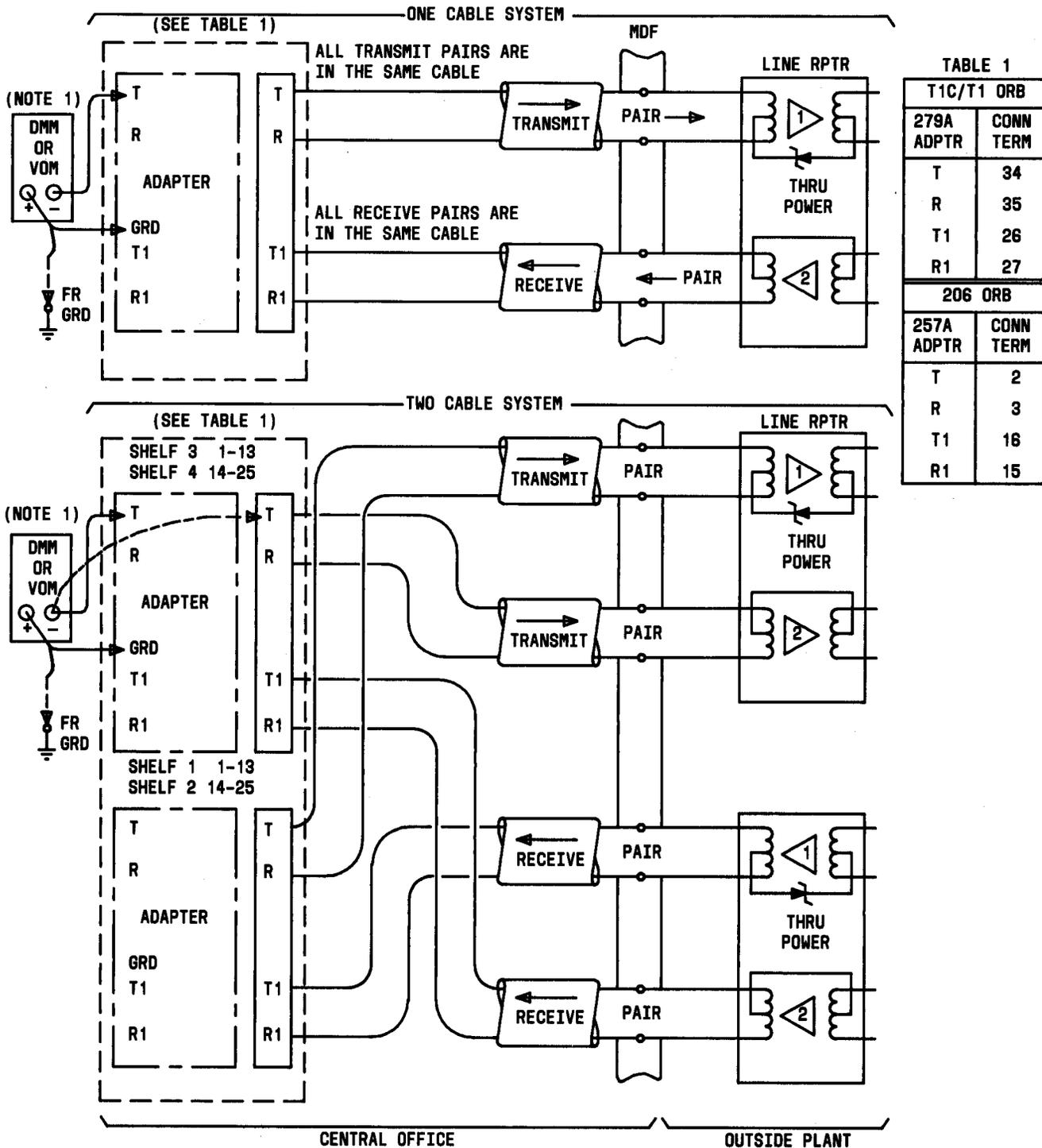


TABLE 1

T1C/T1 ORB	
279A ADPTR	CONN TERM
T	34
R	35
T1	26
R1	27
206 ORB	
257A ADPTR	CONN TERM
T	2
R	3
T1	16
R1	15

- NOTES:**
1. IF LINE REPEATERS ARE NOT INSTALLED, PLACE A SHORT ON THE PAIRS AT THE MDF
 2. TO TEST WITHOUT ADAPTERS CONNECT THE METER TO THE LINE TERMINALS OF THE RPTR CONNECTORS LISTED IN TABLE 1

Fig. 2—Tests for Split Pairs in ABAM Cables



NOTE 1: TO TEST WITHOUT ADAPTERS CONNECT THE METER TO THE LINE TERMINAL OF THE RPIR CONNECTOR LISTED IN TABLE 1.

Fig. 3—Tests for Ground and Foreign Voltage

BSP 365-001 010		E-6880 (11-76)	
T CARRIER SPAN LINE TROUBLE REPORT			
Serial NO.		Equipment Identification	
		Bay	
System Identity		<input type="checkbox"/> New <input type="checkbox"/> Existing	
Reported	Ref. Serial No.	Received	
From	By	By	Date Time
Trouble Reported			
FAULT LOCATE INFORMATION			
System and Power-Mate Patched <input type="checkbox"/> Yes <input type="checkbox"/> No		Test Passed Yes No	
Power Loop Test	Near End	Far End	Location of Trouble <input type="checkbox"/> Inside Central Office <input type="checkbox"/> Near <input type="checkbox"/> Far <input type="checkbox"/> Fault Line Problem
T Line Current	_____	_____	
Reg Voltage	_____	_____	
Line Voltage	_____	_____	
Preparation			Serial No. _____ <input type="checkbox"/> Trouble in Span Line Outside Central Office
Fault Line Resistance or Current	_____	_____	
Fault Line Noise	_____	_____	
Transmission Test (Record on Reverse)		<input type="checkbox"/>	<input type="checkbox"/>
Obscure Trouble Test (Record on Reverse)		<input type="checkbox"/>	<input type="checkbox"/>
Other		<input type="checkbox"/>	<input type="checkbox"/>
Tested		Referred	
By	Date Time	To	Date Time
		Ref. Serial No.	
OUTSIDE PLANT INFORMATION		<input type="checkbox"/> 1 Cable <input type="checkbox"/> Bidirectional <input type="checkbox"/> 2 Cable <input type="checkbox"/> Unidirectional	
Cable No.	Case No.	Slot No.	Pair No. Side 1
			Pair No. Side 2
Direction in Trouble <input type="checkbox"/> Both <input type="checkbox"/> From _____ To _____			
Trouble Location			Filter Code
<input type="checkbox"/> Problem With App. Case Filter At:			
Not Fault Located Due To: <input type="checkbox"/> Fault Line Problem <input type="checkbox"/> Power Loop Problem <input type="checkbox"/> Other			
Start Fault Isolation: <input type="checkbox"/> At _____ <input type="checkbox"/> Where Convenient			
Trouble Found And Location			Trouble Code
System Made Regular		Notified	
By	Date Time	To	Date Time

Fig. 4—T Carrier Span Line Trouble Report Form (E-6880) (Sheet 1 of 2)

BSP 365-200-410 BSP 365-227-500 BSP 365-271-000													E-6880 (11-76)			
FAULT LOCATING RECORD													Test Set Used _____			
Filter Code	Rptr Code	Transmission Test						Obscure Trouble Test-Pulse Period								
		Measure			BIPOLAR	*Test Passed		10	9	8	7	6	5	4	Max Shift	Remarks
		1	2	3		Yes	No									
*Stop If "No" Recorded For 2 Consecutive Readings. Trouble At Location Associated With First "No."																
LOG																

Fig. 4—T-Carrier Span Line Trouble Report Form (E-6880) (Sheet 2 of 2)

BSP 365 001 010		E-6880 (11-76)	
T CARRIER SPAN LINE TROUBLE REPORT			
Serial No. SP16	Equipment Identification Span Name 1920-5 RURUTH Bay 126.05-2-6		
System Identity 103 DI HKRHP2 TO NNWK2		<input type="checkbox"/> New <input checked="" type="checkbox"/> Existing	
Reported From HKRHP2 By PM	Ref. Serial No. 005	Received By SK Date 11/2 Time 1020	
Trouble Reported ERRORS TOWARDS RURUTH			
FAULT LOCATE INFORMATION			
System and Power-Mate Patched <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Test Passed Yes No	
Power Loop Test	Near End 1.40 Far End 1.38	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Location of Trouble
T Line Current	9.4 9.9		<input type="checkbox"/> Near
Reg Voltage	114 112		<input type="checkbox"/> Far
Line Voltage			<input type="checkbox"/> Fault Line Problem
Preparation		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Serial No. _____
Fault Line Resistance	1350 Ω		<input checked="" type="checkbox"/> Trouble in Span
Current			<input type="checkbox"/> Line Outside
Fault Line Noise	10 DBRNC		<input type="checkbox"/> Central Office
Transmission Test (Record on Reverse)		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Obscure Trouble Test (Record on Reverse)		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> No Trouble Found
Other		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Tested By SK Date 11/2 Time 1545	Referred To PK Date 11/2 Time 1610	Ref. Serial No. C 250	
OUTSIDE PLANT INFORMATION		<input checked="" type="checkbox"/> 1 Cable <input checked="" type="checkbox"/> Bidirectional <input type="checkbox"/> 2 Cable <input type="checkbox"/> Unidirectional	
Cable No. 9718	Case No. 5	Slot No. 19	Pair No. Side 1 0244 Pair No. Side 2 0394
Direction in Trouble <input type="checkbox"/> Both <input checked="" type="checkbox"/> From KNKNY To RURUTH			
Trouble Location MH #129 MAIN + CONCORD			Filter Code E
<input type="checkbox"/> Problem With App. Case Filter At:			
Not Fault Located Due To: <input type="checkbox"/> Fault Line Problem <input type="checkbox"/> Power Loop Problem <input type="checkbox"/> Other			
Start Fault Isolation: <input type="checkbox"/> At <input type="checkbox"/> Where Convenient			
Trouble Found And Location DEFECTIVE 201A REPT @ MH 129			Trouble Code 6TRO
System Made Regular By SK/JC Date 11/6 Time 1330		Notified To DC Date 11/6 Time 1340	

Fig. 5—Example—T Carrier Span Line Trouble Report Form (E-6880) (Sheet 1 of 2)

BSP 365-200-410 BSP 365-227-500 BSP 365-271-000																E-6880 (11-76)	
FAULT LOCATING RECORD																Test Set Used <u>J98710F</u>	
Filter Code	Rptr Code	Transmission Test						Obscure Trouble Test-Pulse Period									
		Measure			BIPOLAR	*Test Passed		10	9	8	7	6	5	4	Max Shift	Remarks	
		1	2	3		Yes	No										
A	201A	28	22	21	OK	✓											
B		28	22	21	OK	✓											
C		26	20	19	OK	✓											
D		26	19	20	OK	✓											
E		5	0	0	—												TROUBLE HERE
F		0	0	0	—												
G	↓																
*Stop If "No" Recorded For 2 Consecutive Readings. Trouble At Location Associated With First "No".																	
LOG																	
11/2/6 1610 - PK SAID MAN WILL BE DISPATCHED ON TUESDAY 11/6/5K																	

Fig. 5—Example—T Carrier Span Line Trouble Report Form (E-6880) (Sheet 2 of 2)