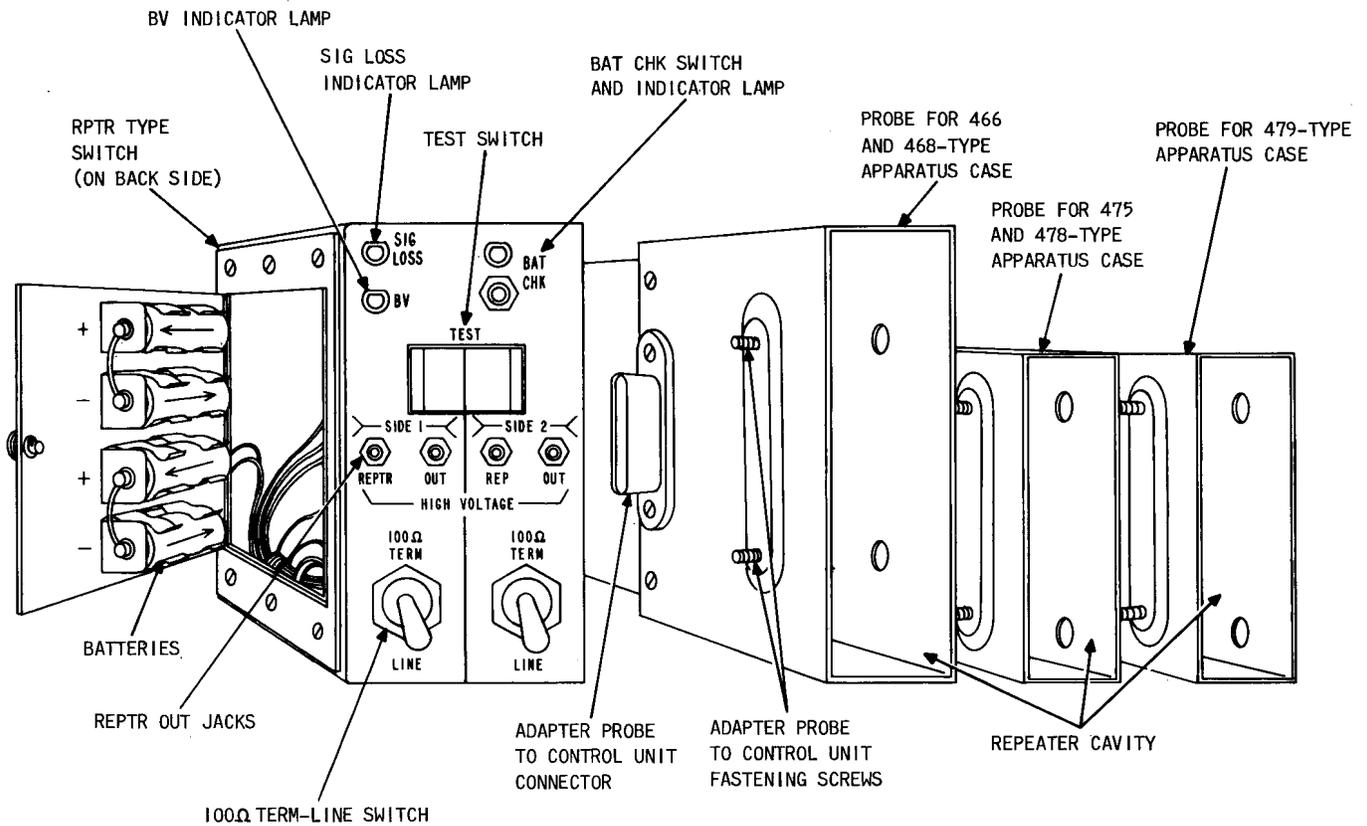


J98725AB TEST SET
T1C, T1, T1/OS BIPOLAR
VIOLATION DETECTOR—USE

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1. GENERAL	1	1.01 This section covers the instructions for operating the J98725AB T1C/T1 Bipolar Violation Detector (Fig. 1) when used for monitoring bipolar violations on a T1C, T1, or T1/OS Carrier Line and for repeater testing on a subscriber carrier digital line such as that used on Subscriber Loop Multiplexer (SLM) or SLC-40 (installed with apparatus cases).
2. PRECAUTIONS	4	This portable battery powered detector is designed for repeater testing in the apparatus case at line repeater stations.
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NOTE:
FUNCTIONS ARE LISTED IN TABLE A.

Fig. 1—T1C/T1 Bipolar Violation Detector J98725AB

NOTICE

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TABLE A

NOMENCLATURE	FUNCTION
RPTR TYPE switch (T1 only) Note 1	Permits the detector to be used for bidirectional or unidirectional T1 repeaters. This switch does not affect T1C repeaters and can be set to either position.
BAT CHK switch and indicator lamp	Upon depressing this spring loaded pushbutton, the green light comes on if the battery voltage is greater than a nominal 4.5 volts. If the green light does not come on, the batteries should be replaced.
SIG LOSS indicator lamp (Note 2)	This red light is on when output signal of the test repeater is absent or has a frequency lower than 25 kHz.
BV indicator lamp (Note 2)	This red light flashes on when the output contains a bipolar violation. The light will be on continuously if the bipolar violation rate exceeds 33 per second.
TEST switch	Spring loaded rocker switch. Connects battery to test set circuit. Selects one of two repeater outputs (side 1 or 2) and connects it to test circuit.
REP OUT jacks	Provides access to outputs of repeater for monitoring with a voltmeter or an oscilloscope.
100 Ω TERM-LINE switch	Terminates the output of each side of the repeater into a 100-ohm resistor or the next line section.
Batteries location	Four 1.5 volt AA-type cells located on the inside of the test set cover.
PROBE for 466- and 468-type apparatus case (Note 3)	Used with the 466- and 468-type apparatus case. T1 applications only. (Note 4)
PROBE for 475- and 478-type apparatus case (Note 3)	Used with the 475- and 478-type apparatus case. T1 applications only (Note 4)
PROBE for 479-type apparatus case	Used with the 479-type apparatus case. T1C or T1 applications. (Note 4)

Note 1: This switch is located on the rear of the test set and is not visible in the drawing.

Note 2: When 10 kHz oscillations caused by a free running repeater are present, depressing the TEST button will cause SIG LOSS lamp to be on, and depending on the waveform of the oscillations, BV lamp may also be on.

Note 3: For T1 outstate use, these probes must be L2 type.

Note 4: Stamping on the probe indicates which apparatus case it is to be used with.

1.02 The detector is designed as a plug-in unit like the line repeater and can be plugged in place of the line repeater into the apparatus case (Fig. 2). The displaced repeater is then plugged into a slot in the detector to reconnect the repeater to the line and perform testing. The original power loop configuration is not disturbed during testing.

1.03 Switches are provided to adapt the detector for use on systems using either unidirectional or bidirectional repeaters and to permit monitoring either of the two outputs. Additional switches are provided to connect repeater outputs side 1 and 2 to either the outgoing line or a 100 ohm termination (the characteristic impedance of the cable at the T1C/T1 Carrier frequencies). The TEST switch is depressed to test for signal loss (SIG LOSS) or bipolar violation (BV). A BAT CHK pushbutton switch and green indicator light are provided to

test the batteries in the detector. Pin jacks are also connected to repeater outputs side 1 and 2 to permit monitoring line voltage with respect to ground with a voltmeter or the waveform with an oscilloscope. The four output pin jacks are labeled "HIGH VOLTAGE" indicating that voltages appearing on the pairs also appear on the jacks.

1.04 Testing for two types of trouble conditions in a T1C/T1 Carrier line is described below:

- (1) TEST A is performed when a total signal failure occurs.
- (2) TEST B is performed when the operating line is marginal.

Information on the type of failure condition present should be obtained from the central office.

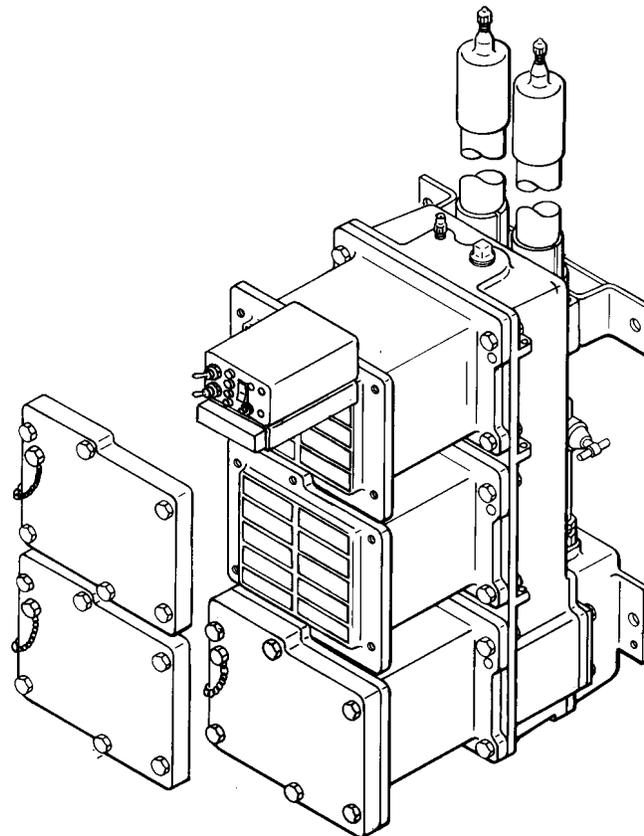


Fig. 2—T1C/T1 Bipolar Violation Detector—Plugged into 479-Type Apparatus Case

SECTION 640-527-225

1.05 Description and maintenance of the J98725AB test set T1C/T1 (bipolar violation detector) are covered in Section 103-494-101.

2. PRECAUTIONS

2.01 Before entering manholes they shall be tested, purged, and ventilated as described in Section 620-140-501.

2.02 Observe the precautions outlined in the following sections when opening and closing apparatus cases:

- 466- and 468-Type Apparatus Cases, Section 640-525-210
- 475-Type Apparatus Case, Section 640-525-211

- 479-Type Apparatus Case, Section 640-527-211
- SLM 468-Type Apparatus Case, Section 640-250-204
- SLM 478-Type Apparatus Case, Section 640-250-206

3. T1C, T1, AND T1/OS TESTING PROCEDURES

Warning: After the test set is plugged into the apparatus case the battery compartment shall not be opened because high line voltage may be present.

3.01 The test procedures listed must be performed in the sequence indicated in the following steps and in flow chart Fig. 3.

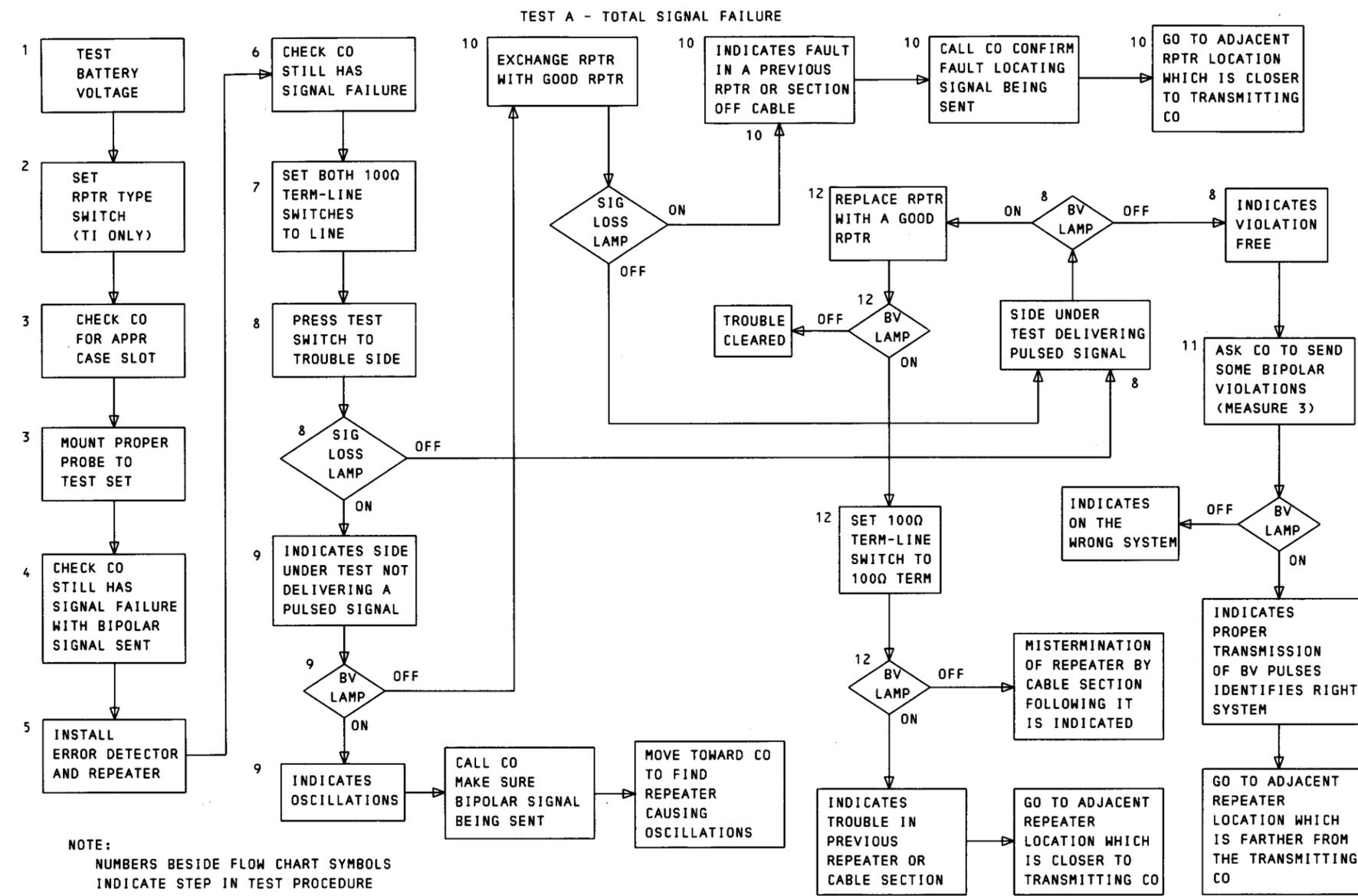


Fig. 3—Test A

STEP	PROCEDURE
TEST A—TOTAL SIGNAL FAILURE	
1	<p>Check battery voltage before using the test set. Depress the spring loaded BAT CHK switch.</p> <ul style="list-style-type: none"> • If the battery voltage is greater than approximately 4.5 volts the BAT CHK green light will come on. • If the green light does not come on, a low battery voltage is indicated. The batteries should be replaced with 4 type KS-14368 or equivalent AA size penlite batteries.
2	<p>When testing T1 systems, set RPTR TYPE (T1 ONLY) switch to proper setting depending on the type of repeater under test. For the 201A, D, G, H, 205A, D, G, H, M, N, 208A, B, E, F, and 209A, B, E, F repeaters set to BIDIRECTIONAL. For the 201B, E, J, K, 205B, E, J, K, 208C, D, and 209C, D repeaters set to UNIDIRECTIONAL. Not used for T1C Systems.</p>
3	<p>Call central office on order wire to determine the apparatus case slot associated with the faulty line. Ensure that service is patched off in the CO (in a system using unidirectional repeaters, two systems must be patched off.) Select proper probe for the apparatus case and fasten it to the test set by tightening the two captive screws in the probe.</p>
4	<p>Before removing repeater from slot, check that receiving office still has signal failure with the BIPOLAR signal sent from the sending CO by the T1C/T1 fault locating set, J98725AD.</p>
5	<p>Remove repeater and replace with J98725AB bipolar violation detector then insert the same repeater in slot provided in the error detector.</p>
6	<p>Check again with the receive office to ensure that they still have signal failure.</p>
7	<p>Set both 100Ω TERM-LINE switches to the line position.</p>
8	<p>Press the TEST switch to SIDE 1 or SIDE 2 position corresponding to the side in trouble. (Obtainable from office record cards.)</p> <p>Requirement 1: The SIG LOSS lamp on the detector shall be off, indicating the side under test is delivering a pulsed signal. If the SIG LOSS lamp is on, then proceed to Step 9.</p> <p>Requirement 2: The BV lamp shall be off, indicating violation free transmission. If the BV lamp is off, then proceed to Step 11, otherwise go to Step 12.</p>
9	<p>If both the SIG LOSS and BV lamps are on, oscillations caused by a free running repeater are indicated. Call the CO to make sure a bipolar signal is being sent per Step 4, and then move toward CO to find the repeater causing oscillation.</p>
10	<p>Exchange the repeater with a good repeater.</p> <ul style="list-style-type: none"> • If the SIG LOSS lamp continues to be on, a fault in a previous repeater or section of cable is indicated.

STEP	PROCEDURE
	<ul style="list-style-type: none"> • However, before proceeding to the previous repeater location, the CO should be called to make sure that a fault locating test set signal was connected per Step 4 above.
11	<p>If the BV lamp is off, have the employee in the sending office set the FUNCTION switch on the T1C/T1 fault locating set J98725AD to MEASURE 3. (Now the fault locating set is sending bipolar violations.)</p> <ul style="list-style-type: none"> • The BV lamp should now be on, indicating proper transmission of bipolar violations as well as identifying the system under test. • The employee should now move to the next repeater location along the direction of transmission for further trouble shooting.
12	<p>If the BV lamp flashes more often than approximately once per second or is on, bipolar violations are indicated.</p> <ul style="list-style-type: none"> • The repeater should be replaced with a good repeater. • If the same indications persist, set the 100Ω TERM-LINE switch to the 100Ω TERM position. • If the same indications still persist, trouble in a previous repeater or cable section is indicated. • If BV lamp turns OFF a mistermination of the repeater is indicated. Cable records should be checked for recent cable splicing activity. The record cards should be checked to see if the correct 836 LBO network has been installed (T1 only). (Further trouble locating tests require more sophisticated equipment such as a reflectometer or oscilloscope. Section 634-305-515).
13	<p>Replace the original repeater, unless defective, before leaving that repeater location.</p>

TEST B—MARGINALLY OPERATING LINE

3.02 This test is similar to TEST A—TOTAL SIGNAL FAILURE, except that it uses a J98725AF quasi random signal source, or a working system through a bridging repeater as a signal source.

- Consequently, Step 4 in TEST A should be changed to use either of the above signal sources.
- Also, in Step 11 of TEST A the system should be identified by momentarily removing the signal source.
- With the exception of Steps 4 and 11 as modified above, the TEST PROCEDURE

for TEST B—MARGINALLY OPERATING LINE, is the same as previously outlined for TEST A—TOTAL SIGNAL FAILURE.

BRIEF SUMMARY OF TESTING PROCEDURE

3.03 A summarized testing procedure is shown by the block diagram drawing in Fig. 4.

4. SLM TESTING PROCEDURES

Warning: After the test set is plugged into the apparatus case, the battery compartment shall not be opened because high line voltages may be present.

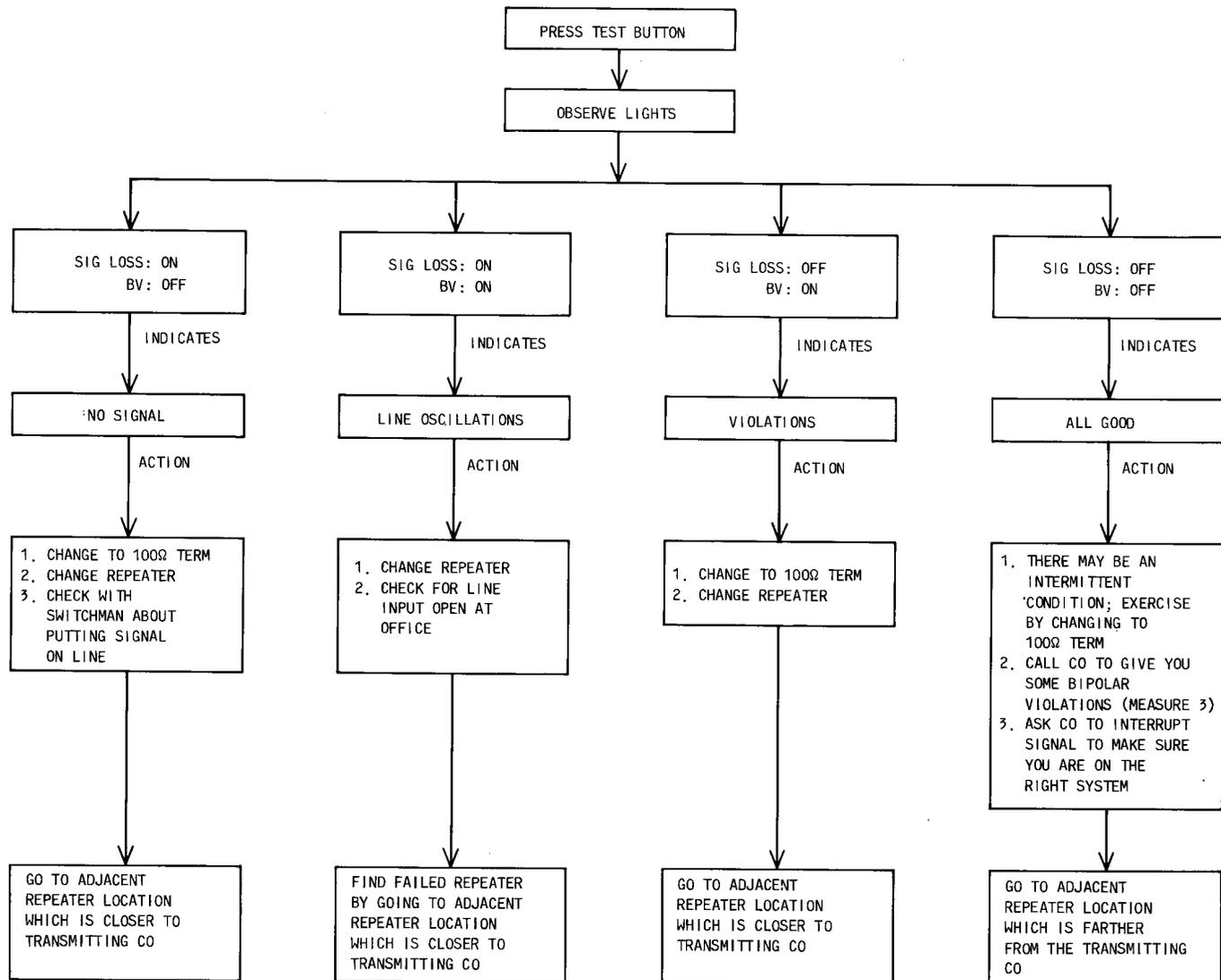


Fig. 4—Summarized Testing Procedure

4.01 Procedures for testing an SLM Digital Line Repeater with the J98725AB test set (bipolar violation detector) are outlined in Test C and flow chart Fig. 5. Similar procedures will apply for testing SLC-40 digital lines when they are installed using standard apparatus cases.

Prerequisite: The Preparation For Testing Digital Line Repeaters Of Section 363-200-515 Must Be Completed. The procedure involves patching the digital line under test around the SLM remote terminals (RT) and looping the test signal back to the control terminal (CT) in the central office.

Note: This procedure assumes that the SLM digital line is set up for one-cable operation

and that the repeaters are spliced so that side 1 serves the outgoing direction of transmission (from the CT to the RTs) and that side 2 serves the incoming direction (from the RTs toward the CT).

4.02 For the following test procedure to give correct results, the procedure *must* be performed in the order listed. In SLM testing, the test signal is sent from the CO, looped back at a remote terminal by a manually installed patch and returned to the CO; thus, one must ensure that an error free signal is produced by side 1 of a repeater before results of testing side 2 are meaningful.

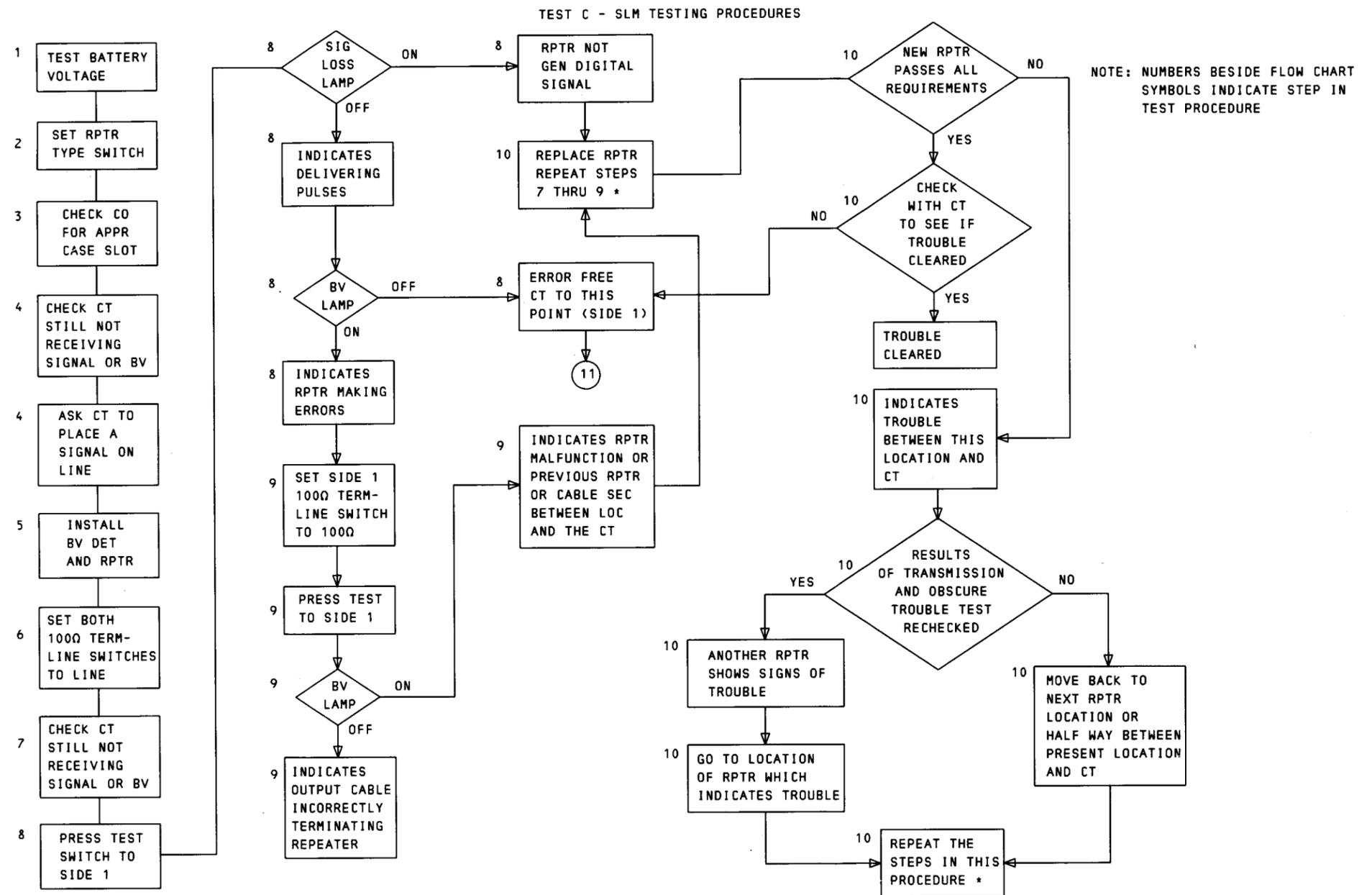


Fig. 5—Test C, Sheet 1

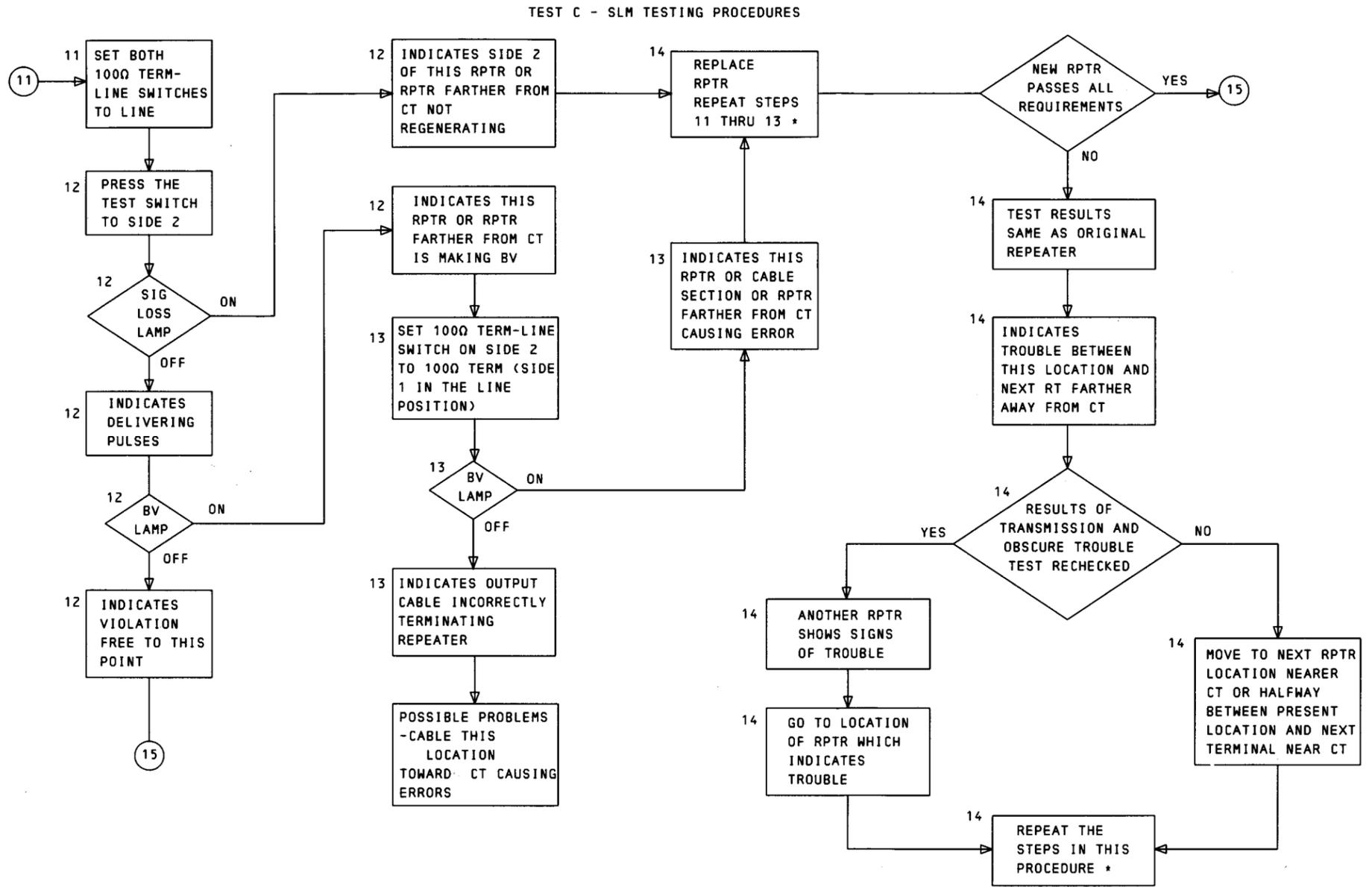


Fig. 5—Test C, Sheet 2

TEST C - SLM TESTING PROCEDURES

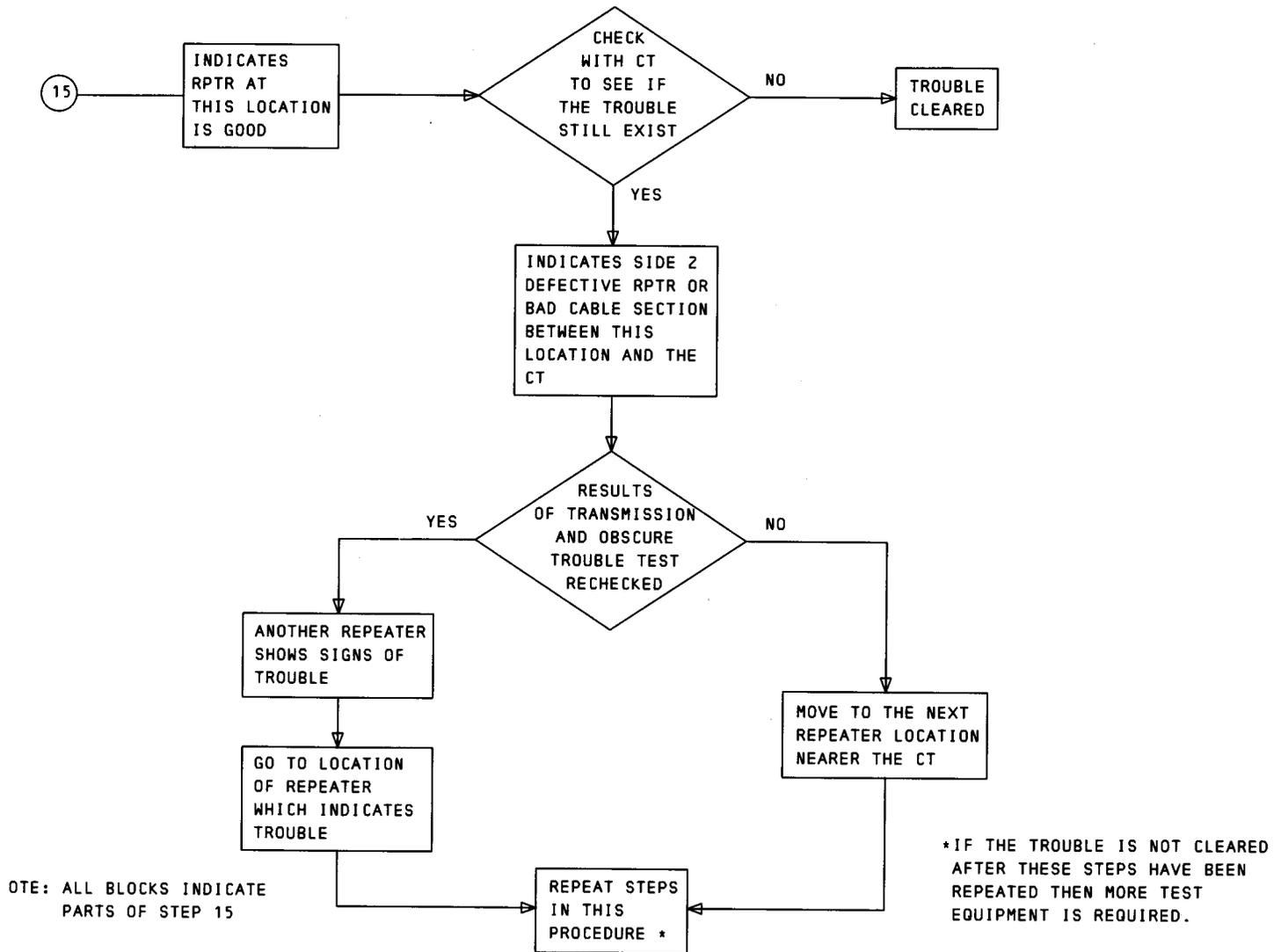


Fig. 5—Test C, Sheet 3

STEP

PROCEDURE

TEST C

- 1 Check battery voltage before using the test set. Depress the spring loaded BAT CHK switch.
 - If the battery voltage is greater than a nominal 4.5 volts the BAT CHK green light will turn on.
 - If the green light does not turn on, a low battery voltage is indicated. The batteries should be replaced with 4-type KS-14368 or equivalent AA size penlite batteries.
- 2 Set the RPTR TYPE switch (located on the back of the test set) to the BIDIRECTIONAL position.
- 3 Call central office on order wire to determine the apparatus case slot associated with the faulty line. Select proper probe for the apparatus case and fasten it to the test set by tightening the two captive screws in the probe.
- 4 Before removing the repeater from slot, check that the CT is still not receiving a signal or if a signal is being received, that bipolar violations are present. A MEASURE 1 BIPOLAR signal must be placed on the digital line at the CT from T1C/T1 fault locating test set J98725AD or equivalent. See Section 103-494-106.
- 5 Remove repeater and replace with J98725AB detector, then insert the same repeater in slot provided in the detector.
- 6 **SET BOTH 100Ω TERM-LINE** switches to the LINE position.
- 7 Check again with the CT to ensure that they are still not receiving a signal or if a signal is being received, that BV are still present.
- 8 Press the TEST switch to side 1.

Requirement 1: The SIG LOSS lamp on the BV detector shall be off, indicating that the side under test is delivering pulses.

Note: If the lamp lights, this indicates that the side 1 of this repeater or a previous repeater (one nearer the CT) is not regenerating the digital signal.

Requirement 2: The BV lamp should be off, indicating that the digital line is error free from the CT to this point.

Note: If the BV lamp flashes more often than once per second or is on, it indicates that the repeater or some previous repeater (nearer the CT) is making errors.

STEP

PROCEDURE

- 9 If the BV lamp was flashing or was on in Step 8 (repeater making errors), set the side 1, 100 Ω TERM-LINE switch to 100 Ω TERM, and press the TEST button on the detector toward side 1.

Requirement: The BV lamp on the detector should be off, indicating that the output cable was incorrectly terminating the repeater and causing the repeater to make errors. If the cable terminating the output of the repeater (cable from this location away from CT) is causing the errors, it should be checked for build-out capacitors, bridge taps, bad splices, opens, or shorts.

Note: If the BV lamp still flashes more often than once per second or is on, it is an indication that the repeater itself is malfunctioning or that the trouble is in side 1 of a previous repeater or cable section between this location and the CT.

- 10 If any of the requirements of Steps 8 or 9 are failed, replace the repeater with one that has been tested according to Section 363-200-520 and repeat Steps 7 through 9 for the new repeater.

Note 1: If the new repeater passes all the requirements, check with the CT to see if the trouble is cleared. If the trouble is not cleared, continue with this procedure.

Note 2: If the test results obtained with the new repeater are the same as those obtained with the previous repeater, it indicates that the trouble is not at this location, but in some previous repeater or cable section between this location and the CT. The results of the transmission and obscure trouble tests (from Section 363-200-515) should be checked again to see if another repeater shows signs of trouble. If one is found, the employee should go to that repeater location and repeat the steps in this procedure. If another likely defective repeater cannot be found from the results of the transmission or obscure trouble tests or if these tests were not performed, the employee should move back to the next repeater location nearer the CT or move back to a location which is halfway between the present location and the CT and repeat the steps in this procedure.

- 11 **Set both** 100 Ω TERM-LINE switches to the LINE position.

- 12 Press the TEST switch to side 2.

Requirement 1: The SIG LOSS lamp on the detector shall be off, indicating the side under test is delivering pulses.

Note: If the SIG LOSS lamp lights, this indicates that side 2 of this repeater or side 1 or 2 of a repeater farther away from the CT (toward the field from this location) is not regenerating the digital signal.

Requirement 2: The BV lamp should be off, indicating that the line is violation free to this point.

Note: If the BV lamp flashes more often than once per second or is on, it indicates that this repeater or a repeater farther away from the CT (toward the RT) is making bipolar violations.

STEP	PROCEDURE
13	<p>If the BV lamp was on in Step 12 (repeater making violations), set the 100Ω TERM-LINE switch on side 2 to 100Ω TERM. Make sure the side 1 100Ω TERM-LINE switch is in the LINE position. Press the TEST switch to side 2.</p> <p>Requirement: The BV lamp on the detector should be off, indicating that the output cable was incorrectly terminating the repeater and causing the repeater to make errors. If the cable terminating the output of the repeater (cable from this location toward CT) is causing the errors, it should be checked for build-out capacitors, bridge taps, bad splices, opens, or shorts.</p> <p>Note 1: If the BV lamp lights, it is an indication that this repeater itself is malfunctioning or that the trouble is in a repeater or cable section farther away from the CT than this location (toward the field).</p> <p>Note 2: In this step the side 1 100Ω TERM-LINE switch must be in the LINE position or no signal will reach the input of side 2 of this repeater. This would cause misleading test results.</p>
14	<p>If any of the requirements of Steps 12 or 13 are failed, replace the repeater with one that has been tested according to Section 363-200-520 and repeat Steps 11 through 13 for the new repeater.</p> <p>Note 1: If the new repeater passes all the requirements, check with the CT to see if the trouble is cleared. If the trouble is not cleared, continue with this procedure.</p> <p>Note 2: If the test results obtained with the new repeater are the same as those obtained with the previous repeater, it indicates that the trouble is not at this location, but in a repeater or cable section between this location and the next RT farther away from the CT. The result of the transmission or obscure trouble test (from Section 363-200-515) should be checked again to see if another repeater shows signs of trouble. If one is found, the employee should go to the repeater location and repeat the steps in this procedure. If another likely defective repeater cannot be found from the results of the transmission or obscure trouble tests or if these tests were not performed, the employee should move to the next repeater location farther away from the CT or move to a location which is halfway between the present location and the next RT farther away from the CT and repeat the steps in this procedure.</p>
15	<p>If the repeater passes all the requirements of Steps 8, 9, 12, 13 and 14, it indicates that the repeater at this location is good. Check with the CT to see if the trouble condition still exists. If it does still exist, there is a defective repeater or bad cable section between this location and the CT. The results of the transmission and obscure trouble tests should be checked again to see if another repeater shows signs of trouble. If one is found, the employee should go to that repeater and repeat the steps in this procedure. If another likely defective repeater cannot be found from the results of the transmission or obscure trouble tests, or if these were not performed, the employee should move to the next repeater location nearer to the CT or move to a location which is halfway between the present location and the next terminal nearer the CT and repeat steps in this procedure.</p>
16	<p>Replace original repeater, unless defective, before leaving a repeater location.</p>