"SLC*"-96 SUBSCRIBER LOOP CARRIER SYSTEM DIGITAL LINE FAULT-LOCATING PROCEDURES USING PASSIVE (598 OR 1068) FILTERS

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1. GENERAL

1.01 This section contains procedures for testing and evaluating the results of SLC-96 main and protection lines where passive fault-locating filters are used on the fault-locating pair(s).

1.02 This section is reissued to revise the Initial Fault-Locating Test Form (IFLT) and the Fault-Locating Record (FLR) form. Since this reissue is a general revision, arrows ordinarily used to denote changes have been omitted. This section affects the Equipment Test List (ETL).†

1.03 The procedures of this section will be used to test all new and rearranged SLC-96 digital lines assigned passive fault-locating filters and fault-locating lines. These procedures will also be used to locate trouble on SLC-96 digital lines after the lines have been placed in service.

1.04 Several SLC-96 systems using the same route may be connected to the same fault-locating pair. ***The fault-locating pair must always be terminated in some manner.*** This can be accomplished by maintaining a 262C terminating plug in the FLT jack of the remote terminal (RT) ***most distant*** from the central office terminal (COT).

1.05 Each SLC-96 system is provided with a protection line, with automatic switching from any failed main line to the protection line.

Caution: Care should be used when testing on the protection line to ensure

† This ETL has not been issued as of this date. Consult future indices to determine when this section becomes available.

that it is idle before connecting test gear to any of the test jacks.

1.06 The tests of this section should be performed in sequence as shown in Fig. 1.

2. APPARATUS

2.01 The tests of this section require the following types of test equipment:

1—Fault-Locating Set (FLS), such as:

- Sierra 315B or 415A-2 T1 Span and Repeater Test Set (315B) (Fig. 2) or (415A) (Fig. 3)

Note: If a ***315A*** is used, the 25 dB pad on the FL panel may be required when testing filters close to the office if returned signal levels are larger than the test set is capable of handling.

- J98725AD T1C/T1 Fault-Locate Set (25AD), Fig. 4 (Section 103-494-106)

1—Fault-Locate and Order Wire Panel (J1C141AC-L1) (Fig. 5) or (J1C141AC-L1, L2) (Fig. 6)

1—Monitoring headphone

1—262C Plug (900-ohm terminating plug)

2—P3-Type Patch Cords, equipped with 310 plugs. P3BH cords are recommended.

1—J98725AB Bipolar Violation Detector (25AB), Fig. 7, or equivalent (used at the repeater apparatus case)

1—3-Type Noise Measuring Set (NMS), or equivalent

1—KS-14510 Volt-Ohm-Milliameter (VOM), or equivalent

1—ED-3C841—LIU Test Cord (Fig. 8)

3. FAULT-LOCATING CABLE PAIR TESTS

3.01 The cable pair used for the fault-locating line must be tested ***before*** the pair is approved for fault-locating SLC-96 digital lines. The tests include noise level tests. Both broadband and narrowband noise measurements are performed to ensure that the amount of noise does not exceed the limit for successful fault-locating tests. If the noise level exceeds the requirements, another pair must be selected or corrective action taken to bring the fault-locating pair within the limits specified.

3.02 Once the fault-locating pair has been selected and placed in service, the fault-locating cable pair tests should be performed periodically or at any time the line is suspected of causing improper fault-locating results. The fault-locating pair must be properly terminated at the far end when making noise measurements and when performing fault-locating tests. Chart 1 provides procedures for testing the fault-locating pair, including the broadband noise measurement. The narrowband noise measurements are performed prior to the fault-locating tests, and the procedures are given in the respective fault-locating chart.

4. FAULT-LOCATING TESTS

4.01 Fault-locating tests provide a method for locating faulty repeaters or cable sections that may be causing excessive errors on the system or total signal failure. Fault-locating tests can be performed in the transmit direction only; therefore, all of the repeaters must be set to the STD option and fault-locating tests will be made from the COT or the RT, depending on which direction of transmission has the problem.

4.02 Fault-locating tests from the COT will always be made from the fault-locating and order wire panel. RT fault-locating tests will be made from the RT fuse alarm and jack panel.

4.03 If initial fault-locating tests are being performed on the fault-locating system or new digital lines, all fault-locating results are recorded on two forms [Initial Fault Line Tests (IFLT) form, Fig. 11, and SLC-96 Fault-Locating Record (FLR) form, Fig. 12] and the information retained for future reference and trouble analysis. The Initial Fault-Locating Tests (IFLT) form should be supplied by outside plant engineering and contain calculated values as noted on the form. If the form is not available from engineering, it can be reproduced locally and the test data recorded as specified in the procedures of this section.

4.04 The Fault-Locating Record (FLR) form is completed during fault-locating tests and the results compared with the recorded test data

when the line was known to be good (original tests). If obscure (marginal) troubles exist on the digital line, the test data recorded on the FLR form will be used to analyze and locate the troubled line section.

4.05 The IFLT and FLR forms are used to record test data for both active and passive fault-locating systems.

5. ISOLATING TROUBLE TO A DIGITAL LINE SECTION OR REPEATER

5.01 After using the fault-locating procedures to determine which repeater or line section that is causing a particular problem, it may be necessary to perform tests at the repeater location to identify the particular repeater or cable section at fault. These tests will require the use of the J98725AB (25AB) Line Error Detector or equivalent. Charts 5 and 6 of this section provide information concerning these tests.

5.02 Central office or RT personnel ***must*** be contacted before any repeaters are pulled or any tests are made at the repeater location. This will help prevent disruption of service that could be caused by pulling the wrong repeater. Tests at the repeater location will be made with the coordination of central office or RT personnel. The procedures of Chart 6 are provided to coordinate activities between the COT or RT and the repeater location.

6. OBSCURE DIGITAL LINE TROUBLES

6.01 In some cases, excessive errors occur on new systems or a working system will not hold on one particular line. A concentrated effort may be necessary to locate the cause of the problem. Something other than a repeater may be at fault.

6.02 Careful comparisons of line voltage measurements between lines on the same route may indicate a cable problem. A comparison of fault-locate records should also be made.

6.03 Following is a checklist that may be helpful in locating obscure troubles associated with SLC-96 digital lines and fault-locating pairs.

(a) Check for malfunctioning test equipment.

(b) Check main frame connections and jumpers.

(c) Check carbons at MDF. Replace pitted carbons.

(d) Check carrier line connections at SLC-96 bay.

(e) Check for proper termination of fault-locating line.

(f) Check for improper or incomplete digital line cable pair preparation, such as:

(1) bridge taps left on

(2) load coil left on

(3) split pairs or transposed pairs

(4) carbons at repeater cases not replaced with gas-tube protectors

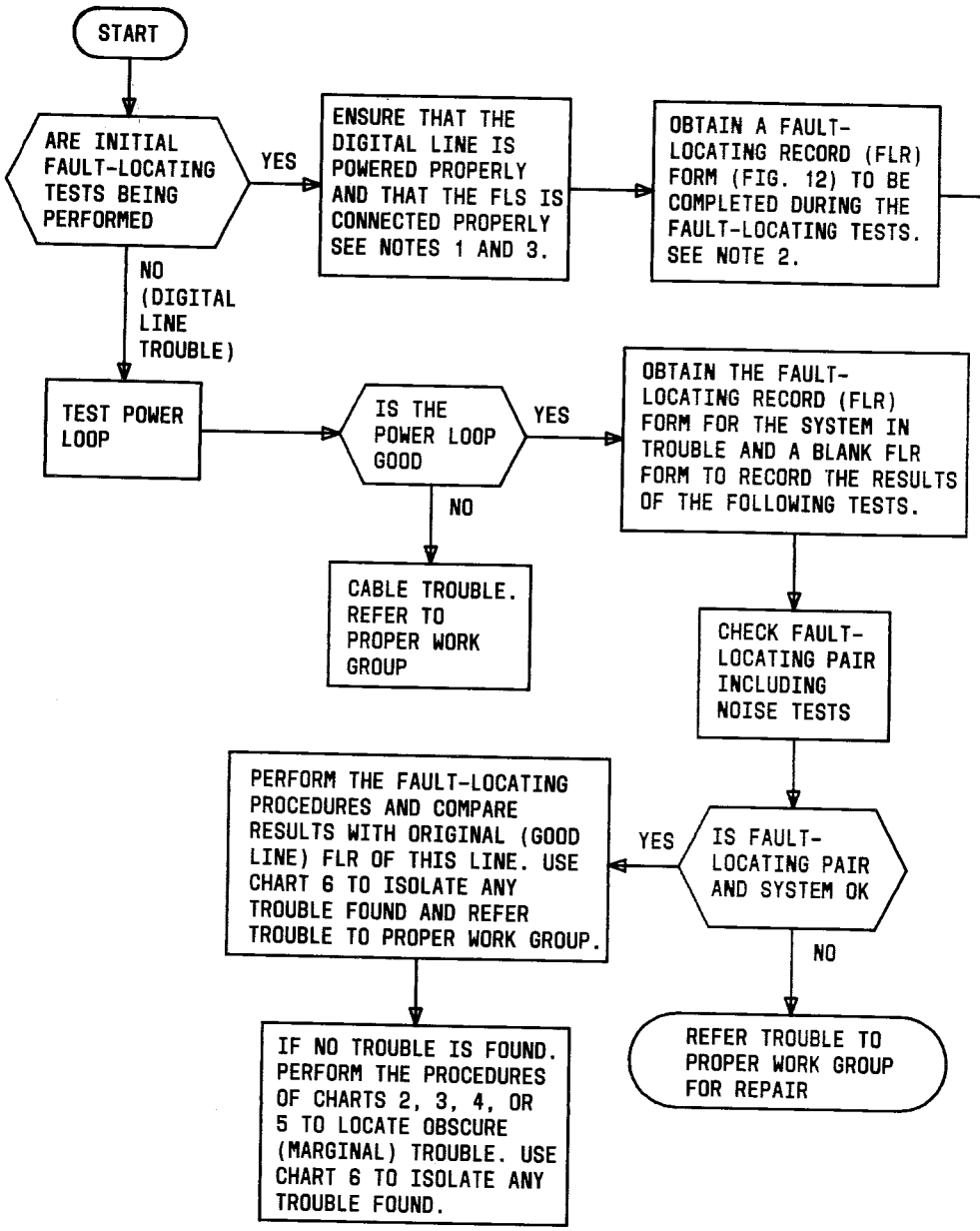
(5) build-out capacitors left on.

(g) If difficulty is experienced with fault-locating check for: improperly wired fault-locating filters, wrong filter codes, defective apparatus case filter switch (located behind the filter), or defective fault-locating panel.

(h) Check for poor repeater contact in the apparatus cases, repeaters, or filters not held securely with retaining bars.

(i) Check for proper repeater options (STD or OS).

(j) Check for improperly wired tests jacks.



NOTES:

1. THE CONNECTIONS MADE DURING THESE TESTS MUST BE MAINTAINED FOR FAULT-LOCATING TESTS UNLESS OTHERWISE STATED.
2. THE FLR AND IFLT (FIGS. 11 AND 12) FORMS MUST BE COMPLETED AND MAINTAINED FOR FUTURE REFERENCE.
3. THE PROCEDURES OF TASK ORIENTED PRACTICE (TOP) 363-202-400 OR 363-202-401 MUST HAVE BEEN PERFORMED PRIOR TO ENTERING THIS SECTION.

Fig. 1—SLC-96 Fault-Locating Sequence Chart

CHART 1

FAULT-LOCATING CABLE PAIR TESTS

Note: Failure to meet the requirements of Chart 1 indicates trouble on the fault-locating (FL) cable pair. The trouble on this pair must be corrected or another pair selected for use. If another pair is selected, it might be advantageous to have the pair terminated with a 900-ohm resistor near the last RT to which it will be connected and the tests of Steps 3 through 8 should then be performed on the new pair ***before*** it is determined suitable for connection to the FL filters.

APPARATUS:

1—3-Type Noise Measuring Set (NMS)

1—KS-14510 Volt-Ohm-Milliammeter (VOM)

1—262C Plug (900-ohm terminating)

STEP	PROCEDURE
1	Verify that the FL pair has been properly terminated in 900 ohms. This requires a 262C plug to be placed in the FLT jack at the RT. If more than one RT ***shares*** this FL line, ***the last RT and only the last RT out from the COT*** should have a 262C plug in the FLT jack. The 262C plug should be left in the proper RT except when fault-locating tests are being performed ***from that particular RT.***
	Note: If the FL pair is ***bridged*** to other locations, all branches should have a 262C plug installed for noise and fault-locating tests.
2	If the tests being performed are ***new system tests,*** obtain the IFLT form for the FL pair to be tested.
3	If digital line trouble tests are being performed, proceed to Step 8. If not, continue to Step 4.
4	If cross-connections have been made at the MDF, proceed to Step 8. If cross-connections have not been made at the MDF, continue to Step 5.
5	At the MDF, use the VOM on the 60 DC VOLTS scale and measure between tip and ground and between ring and ground of the outside cable pair being tested.
	Requirement: 0 Volts.
	Note: If the requirement is not met, refer trouble to outside plant repair forces.
6	Using the VOM on the X100 scale, measure the resistance between tip and ground and between ring and ground of the outside cable pair.

CHART 1 (Contd)

STEP	PROCEDURE

Requirement: Infinite resistance (open circuit).

Note: If requirement is not met, refer trouble to outside plant repair forces.

7 At the MDF, make the necessary fault-locate pair cross-connections and install the heat coils.

8 At the COT, remove the FLCU from the FL control panel.

9 Using the VOM on the 60 DC VOLTS scale, measure between tip and ground and between ring and ground of the FL line under test on terminal strip 2 (TS2).

Requirement: 0 volts. Record this reading on the IFLT form in the DC TESTS block, FOREIGN VOLTAGE, T-GRD and R-GRD if new system tests are being performed.

Note 1: If new system tests are being performed and Steps 5 and 6 were performed earlier, use office records and drawings to clear foreign voltage from the FL pair if the requirement is not met.

Note 2: If the requirement is ***not*** met and Step 5 was ***not*** performed earlier, open the FL pair (remove heat coils) at the MDF and perform Step 5. If the requirement is met, clear the foreign voltage from the office FL pair using office records and drawings.

10 Using the VOM on the X100 scale, measure the resistance between tip and ground and between ring and ground of the FL pair on TS2.

Requirement: Infinite resistance. Note this indication on the IFLT form in the space marked LEAKAGE RES, T-GRD and R-GRD if new system tests are being performed.

Note 1: If the requirement is not met and new system tests are being performed and Step 6 ***was*** performed earlier, use office records and drawings to clear ground from the office FL pair.

Note 2: If the requirement is not met and Step 6 was ***not*** performed earlier, open the FL pair (remove heat coils) at the MDF and perform Step 6. If the requirement is now met, use office drawings and records to correct the trouble on the office FL pair.

Danger: The 467A electron tube (protector) may have up to 124 volts dc on the tube socket.

11 At the RT, remove the 467A electron tube from its socket (on the front of the 1A Power and Jack Panel) for the fault line that is to be tested (FL1 or FL2) (see Fig. 9). Remove the 262C terminating plug from the FL jack.

12 At the rear of the COT Fault-Locate Control Panel, connect the VOM to measure resistance between the T and R terminals of the associated FL LINE terminals on TS2.

CHART 1 (Contd)

STEP	PROCEDURE
13	At the RT, connect a temporary strap between the T and R of the protector tube socket associated with the FL under test (see Fig. 10).
14	At the COT, measure the loop resistance of the FL under test. ***Requirement:*** This reading should be within ±20 percent of the specified resistance. ***Note:*** Record the meter indication on the IFLT form in the space marked PAIR MAKE-UP.
15	At the RT, remove the temporary strap that was installed in Step 13.
16	At the rear of the COT Fault-Locate Control Panel, connect the VOM to measure resistance between the T and R terminals of the associated FL LINE terminals on TS2. ***Requirement:*** Infinite resistance. Note this indication on the IFLT form in UNTERM RES block if this is a new system test. ***Note:*** This requirement verifies that there are no shorts on the FL pair. If the requirement is ***not*** met, open the FL pair (remove heat coils) at the MDF and repeat the measurement. If the requirement is still failed, the trouble is in the bay or office wiring. If the requirement is now met, refer trouble to the outside plant repair forces.
17	At the COT, replace the FLCU (removed in Step 8) and connect the 3-type NMS IN jack to the FL jack serving the FL pair being tested. Use the proper cord for the type NMS being used.
18	Set the NMS controls as follows: DBRN ***to*** 10 FUNCTION ***to*** NM900 DAMP/NORM ***to*** NORM WTG ***to*** C MESSAGE (497A Network)
19	Measure the noise level of the FL pair. ***Requirement:*** 16 dBrnc or less (15 dBrnc is less than 16 dBrnc). Record this reading on the IFLT form (if used) in the NOISE block labeled BROADBAND. Also record this reading on the FLR form in the space marked BROADBAND NOISE.

CHART 1 (Contd)

STEP	PROCEDURE
	Note: If the requirement is not met, open the pair at the MDF and repeat the measurement at the MDF on the outside pair. If the requirement is still not met, refer the trouble to the outside plant repair forces. If the requirement is met at the MDF, check protection units and office and bay wiring.
20	Return to the Fault-Locating Sequence Chart (Fig. 1).

CHART 2

FAULT-LOCATING TESTS FROM THE COT USING THE SIERRA 315B OR 415A T1 SPAN AND REPEATER TEST SET

This chart provides procedures for continued testing of the FL line and procedures for digital line fault-locating using the Sierra 315B T1 Span and Repeater Test Set.

The fault-locating records (Fig. 11 and 12) must be completed during the tests. In some installations, calculated values for the tone level signal return will be provided by engineering and recorded on the IFLT form (Fig. 11) for each filter position. In other installations, the filter codes may be obtained from the work order or span line record card. The IFLT form must be completed during initial tests of the FL line. Only the FLR form must be completed when performing fault-locating procedures on SLC-96 digital lines. Fault-locating records of each SLC-96 system must be kept for future reference and trouble analysis.

APPARATUS:

1—Sierra 315B or 415A-2 T1 Span and Repeater Test Set (315B) or (415A)

1—Monitoring Headphone

2—P3-Type Patch Cords, equipped with 310 plugs. (P3BH cords are recommended.)

1—ED-3C841—LIU Test Cord (Fig. 8)

STEP	PROCEDURE

Note: Complete the FLR form (Fig. 12) during the tests. The filter codes can be obtained from the work order or span line record card. ***Fault-locating records of each SLC-96 system must be kept for future reference and trouble analysis.***

Narrowband Noise Tests

Caution: To prevent service interruptions, insert patch cord or dummy plug into receiving MONITOR jack and then connect the ED-3C841 LIU test cord to the jack panel before connecting the other end to the LIU plug-in unit. Remove connections in reverse order.

1 Using the LIU test cord, connect between an LIU location on the COT jack panel ***first*** and the LIU plug-in unit associated with the digital line to be tested.

2 Using P3-type patch cords, connect the 315B as follows (Fig. 17):

From: 315B GEN XMT jack

CHART 2 (Contd)

STEP	PROCEDURE

To: TRMTG LINE jack on the COT jack panel

From: 315B FAULT LOC LINE IN jack

To: FLT LINE OUT jack on the Fault-Locate (FL) panel.

3 Set the FL panel FL LINE switch to the designation (1, 2, 3, 4, 5, or 6) corresponding to the fault-locate line to be used.

4 Connect the 315B power cord to a 117-Vac source, and set the POWER/LAMP TEST switch to the POWER position.

Requirement: The 315B POWER lamp lights.

5 Set the 315B controls as follows:

FUNCTION ***to*** QRW GEN

PULSE PERIOD ***or*** REF 11

LINE FILTER ***to*** same as code letter of filter to be tested. Start with the first filter out from the COT (A, B, etc).

6 Set the red vernier knob on the 315B REC LEVEL switch to the fully clockwise position.

7 Set the 315B REC LEVEL control for an on-scale meter reading.

Requirement: Less than -90 dBm. Record the reading on the FLR form under NB (narrowband) NOISE BIPOLAR. ***If this is a new digital line,*** also record the meter indication under the NOISE NARROWBAND column on the IFLT form.

Note 1: -92 dBm is less than -90 dBm.

Note 2: If the requirement is not met, open the FL pair at the MDF and install a 900-ohm test termination across the tip and ring of the inside FL pair. Repeat the noise measurement. If the requirement is now met, the outside FL pair is noisy. Refer the trouble to the outside plant repair forces. See Note 2 in Step 10.

8 Set the FILTER switch to the next filter on the line (second filter, third, etc) and repeat Step 7.

Fault-Locating Tests

9 Set the 315B FUNCTION switch to MEAS 1 and the FILTER switch to the code letter of first filter out from the COT.

CHART 2 (Contd)

STEP	PROCEDURE
10	Set the 315B REC LEVEL control for an on-scale reading. ***Requirement 1:*** Greater than -74 dBm. ***If this is a new digital line*** and engineering has provided calculated values under TONE LEVEL ENGR column (IFLT form), the meter indication shall be ±6 dB of value provided. ***Note 1:*** Record this reading in the MEASURE 1 column on the FLR form. ***If this is a new digital line,*** also record the reading in TONE LEVEL MEAS column of the IFLT form. ***Requirement 2:*** The FL audio tone can be clearly heard at the monitoring headphone. ***Note 2:*** Failure to meet these requirements may be caused by one or more of the following: (a) Test equipment or connections faulty (b) Defective repeater (c) Filter missing, defective, or not connected to the fault-locating pair (d) Defective apparatus case fault-locating filter switch (located behind, and operated by, a plugged-in fault-locating filter) (e) Fault-locating pair defective (see Chart 1) (f) Digital line cable trouble.
11	Set the LINE FILTER switch to the next filter out on the line (second filter, third, etc). ***Requirement:*** The meter indication is within ±10 dB of that recorded for the previous filter. All filters shall indicate greater than -74 dBm and the audio tone can be clearly heard at the headphone. ***If this is a new digital line*** and engineering has provided calculated values under the TONE LEVEL ENGR column, the meter indication shall be ±6 dB of the value provided. ***Note:*** Record this reading on the FLR form in the space marked MEASURE 1. ***If this is a new digital line,*** also record the meter indication under TONE LEVEL MEAS column on the IFLT form.
12	Repeat Step 11 for each filter on the line. If a second FL line is required, change the connections to the second FL line and repeat Steps 5 through 11. ***Note:*** The result of these tests should indicate any major problems on the line. If a problem is encountered, refer to Chart 6. If the problem has not been detected, or ***if this is a new digital line, proceed to Step 13.***

CHART 2 (Contd)

STEP	PROCEDURE
13	Return the LINE FILTER switch to the letter code of the first filter tested (see the fault-locating record).
14	Set the FUNCTION switch to MEAS 2. ***Requirement:*** The meter indicates a drop of 4 to 8 dB from that recorded for MEAS 1. Record this reading in the MEASURE 2 column on the FLR form.
15	Set the FUNCTION switch to MEAS 3. ***Requirement:*** The meter does not change more than 1.0 dB in either direction. Record this reading in the MEASURE 3 column on the FLR form. ***Note:*** If the requirements of Step 14 or 15 are not met, the repeater under test or the cable section on either side of the repeater is probably at fault. Refer to Chart 6 for further tests at the repeater site.
16	Set the FUNCTION switch to MEAS 1 and adjust the REC LEVEL and vernier knob for -2.0 dB on the meter.
17	Rotate the PULSE PERIOD switch clockwise from REF 11, pausing at each numbered position (10 through 4) to read and record the meter readings on the FLR form as follows: (a) If the deviation from the reference reading is not more than ±0.5 dB, record a zero. (b) If the deviation is more than -2.0 (more than 0.5 dB to the right of), enter the ***deviation amount*** preceded by a plus (+) sign. (c) If the deviation is less than -2.0 (more than 0.5 dB to the left of), enter the ***deviation amount*** preceded by a minus (-) sign.
18	Set the LINE FILTER switch to the next filter code on the line and repeat Steps 14 through 17. If a second FL line is required, change the connection to the second FL line and repeat Steps 13 through 17.
19	Evaluate the test results per Chart 7. ***Note:*** In general, a span of good repeaters will show a gradually increasing meter reading that may go as high as a +3.0 dB deviation from the reference reading of -2.0 dB. A section of digital line that has a problem may show a flattening or a decrease in the

CHART 2 (Contd)

STEP	PROCEDURE
	upward trend from that recorded when the line was known to be good. Figure 13 is a typical record of a good digital line. ***Always*** compare the fault-locating record of a line suspected of having excessive errors with the record of the same line when the line was known to be working properly. Refer to Chart 6 for further tests at the repeater site of the suspected repeater or cable section. Part 6 provides a checklist of things that could cause a problem on the digital line. Figure 14 shows the fault-locating record of a digital line with a marginal repeater.

CHART 3

FAULT-LOCATING TESTS FROM THE COT USING THE J98725AD (25AD) FAULT-LOCATING TEST SET (FLTS)

This chart provides procedures for continued testing of the FL line and procedures for digital line fault-locating using the J98725AD fault-locate test set.

The fault-locating records (Fig. 11 and 12) must be completed during the tests. In some installations, calculated values for tone level return will be provided by engineering and recorded on the IFLT form (Fig. 11) for each filter position. In other installations, the filter codes may be obtained from the work order or span line record card. Fault-locating records of each SLC-96 system must be kept for future reference and trouble analysis.

APPARATUS:

1—J98725AD T1C/T1 Fault-Locating Test Set (Fig. 4) (Section 103-494-106)

1—Monitoring Headphone

2—P3-Type Patch Cords, equipped with 310 plugs. (P3BH cords are recommended.)

1—ED-3C841—LIU Test Cord (Fig. 8)

STEP	PROCEDURE

Prerequisite: The FL line and all branches must be tested and terminated per Chart 1.

Narrowband Noise Test

1 Connect the 25AD -48V cord to the -48V office battery.

Caution: To prevent service interruptions, insert patch cord or dummy plug into receiving MONITOR jack and then connect the ED-3C841 LIU test cord to the jack panel before connecting the other end to the LIU plug-in unit. Remove connections in reverse order.

2 Using the LIU test cord, connect between an LIU location on the COT jack panel and the LIU plug-in unit associated with the digital line to be tested.

3 Using P3-type patch cords, connect the 25AD as follows (Fig. 17):

From: 25AD GEN SPAN LINE jack

To: TRMTG LINE jack on the COT jack panel

From: 25AD RCV FL LINE jack

CHART 3 (Contd)

STEP	PROCEDURE

To: FL LINE OUT jack on the Fault-Locate (FL) panel

4 Set the FL panel FL LINE switch to the designation (1, 2, 3, 4, 5, or 6) corresponding to the fault-locate line to be used.

5 Connect the monitoring headphone to the 25AD RCV MON jack.

6 Set the 25AD controls as follows:

CONTROL	POSITION
CLOCK RATE	T1
FUNCTION	BIPOLAR
PULSE DENSITY	11 REF
RECEIVER SENSITIVITY	-80

7 Set the FILTER switch to the code letter of the filter to be tested. Start with the first filter out from the COT.

Note: If the filter sequence is not listed on the IFLT form under the FL FILTER SEQ column or on the FLR form, the filter codes may be obtained from the work order or span line record card.

8 Read the 25AD meter indication on the DBM scale and add to the RECEIVER SENSITIVITY setting.

Requirement: -90 dBm or less

Note: -92 dBm is less than -90 dBm.

9 If the requirement of Step 8 is met, record the meter indication under the NB (Narrowband) NOISE column on the FLR form (Fig. 12). ***If this is a new digital line,*** also record the meter indication on the IFLT form (Fig. 11) under the NOISE NARROWBAND column.

If the requirement of Step 8 is ***not*** met, open the FL pair at the MDF and install a 900-ohm test termination across the tip and ring of the inside pair. Repeat the noise measurements. If the requirement is now met, the outside cable pair is noisy. Refer the trouble to the outside plant repair forces. See Note 2 in Step 13.

10 Rotate the FILTER switch to succeeding positions and read the meter indication at each position that has a filter installed. Repeat Steps 8 and 9.

CHART 3 (Contd)

STEP	PROCEDURE

Fault-Locating Tests

11 Set the FILTER switch to the code letter of the first filter out from the COT.

12 Set the RECEIVER SENSITIVITY switch to -60 and the FUNCTION switch to MEAS 1 SIGNAL.

13 Read the meter indication on the DBM scale and add to the RECEIVER SENSITIVITY setting.

Requirement: Greater than -74 dBm and the audio tone can be clearly heard at the monitoring headphone. ***If this is a new digital line*** and engineering has provided calculated values under the TONE LEVEL ENGR column on the IFLT form, the meter indication shall be ±6 dBm of the value provided.

Note 1: Record this reading under the MEASURE 1 column on the FLR form. ***If this is a new digital line,*** also record the meter reading under the TONE LEVEL MEAS column on the IFLT form.

Note 2: -72 dBm is greater than -74 dBm. Failure to meet this requirement may be caused by one or more of the following:

(a) Test equipment or connections faulty. ***If this is a new digital line,*** consult with engineering for possible changes in furnished values

(b) Defective repeater

(c) Filter missing, defective, or not connected to the fault-locating pair

(d) Defective apparatus case fault-locating filter switch (located behind, and operated by, a plugged-in fault-locating filter)

(e) Fault-locating pair defective (see Chart 1)

(f) Digital line cable trouble.

14 Set the FILTER switch on the 25AD to the next filter out on the line (second filter, third, etc).

Requirement: The meter indication is within ±10 dBm of that just recorded in the previous step. All filters shall indicate greater than -74 dBm. ***If this is a new digital line*** and engineering has provided calculated values under TONE LEVEL ENGR column, the meter indication shall be ±6 dBm of value provided on the IFLT form.

15 Repeat Step 14 for each filter on the line. If a second FL line is required, change the connections to the second FL line and repeat Steps 4 through 14.

CHART 3 (Contd)

STEP	PROCEDURE
	Note: The results of these tests should indicate any major problems on the line. If a problem is encountered, refer to Chart 6. If the problem has not been detected, or ***if this is a new digital line,*** continue to Step 16.
16	Return the FILTER switch to the letter code of the first filter tested.
17	Set the FUNCTION switch to MEAS 2 SIGNAL.
18	Read the meter indication on the DBM scale and add to the RECEIVER SENSITIVITY setting. ***Requirement:*** Within ±2 dB of the value recorded for MEAS 1 in Steps 13 and 14. Record this reading under the MEASURE 2 column on the FLR form.
19	Set the FUNCTION switch to MEAS 3 SIGNAL.
20	Read the meter indication on the DBM scale and add to the RECEIVER SENSITIVITY setting. ***Requirement:*** ±1 dB of the value recorded for MEAS 2 in Step 18. Record this reading under the MEASURE 3 column on the FLR form. ***Note:*** If the requirement of Step 18 or 19 ***or any of the following requirements*** cannot be met, the repeater under test or the cable section on either side of the repeater is probably at fault. Refer to Chart 6 for further tests at the repeater site. If the requirements are met, proceed with the test.
21	Set the FUNCTION switch to MEAS 1 SIGNAL and RECEIVER SENSITIVITY to obtain an on-scale reading.
22	Set the PULSE DENSITY switch to 10.
23	Read the meter indication on the DBM scale and add to the RECEIVER SENSITIVITY setting.
24	Record the meter indication on the FLR form in the area labeled PULSE PERIOD 10.
25	Repeat Step 23 and record as in Step 24 for the PULSE DENSITY switch setting 9 through 4.
26	Calculate the maximum shift from the meter indication at PULSE DENSITY 10 to the meter indication at PULSE DENSITY 4. ***Requirement:*** 1 dB or less

CHART 3 (Contd)

STEP	PROCEDURE
	Note: Generally, a good line will show an almost flat response from PULSE PERIOD 10 to 4. Figure 15 is a typical record of a good digital line and Figure 16 is a record of a line with a marginal trouble.
27	Set the FILTER switch to the next filter code on the line and repeat Steps 17 through 26.
28	Evaluate the test results per Chart 7.

CHART 4

FAULT-LOCATING TESTS FROM ANY RT USING THE SIERRA 315B OR 415A T1 SPAN AND REPEATER TEST SET

APPARATUS:

1—Sierra 315B or 415A-2 T1 Span and Repeater Test Set (315B) or (415A)

1—Monitoring Headphone

2—P3-Type Patch Cords, equipped with 310 plugs

1—ED-3C841—LIU Test Cord (Fig. 8)

STEP	PROCEDURE

Prerequisite: The FL line(s) to be used must have been tested per Chart 1.

Note: Complete the FLR form (Fig. 12) during these tests. The filter codes can be obtained from the work order or span line record card. Fault-locating records of each SLC-96 system must be kept for future reference and trouble analysis.

Caution: To prevent service interruptions, insert patch cord or dummy plug into receiving MONITOR jack and then connect the ED-3C841 LIU test cord to the jack panel before connecting the other end to the LIU plug-in unit. Remove connections in reverse order.

1 Using the LIU test cord, connect between an LIU location on the RT jack panel and the LIU plug-in unit associated with the digital line to be tested.

2 Using P3-type patch cords, connect the 315B as follows (Fig. 18):

From: 315B GEN XMT jack

To: RT jack panel TRANSMITTING LINE jack

From: 315B FAULT LOC LINE IN jack

To: FL() jack on RT jack panel. () = FL1 or FL2

3 Connect the monitoring headphone to the 315B PHONE jack.

4 Connect the 315B power cord to the 117-Vac utility outlet located at the RT, and place the POWER/LAMP TEST switch to the POWER position.

Requirement: The 315B POWER lamp lights.

CHART 4 (Contd)

STEP	PROCEDURE

5 Set the 315B controls as follows:

FUNCTION ***to*** MEAS 1

PULSE PERIOD ***to*** REF 11

LINE FILTER ***to*** same as code letter of filter to be tested. Start with the first filter out from the RT (H, G, etc).

6 Set the red veriner knob on the 315B REC LEVEL switch to the fully clockwise position.

7 Set the 315B REC LEVEL control for an on-scale meter reading.

Requirement 1: Greater than -74 dBm. ***If this is a new digital line*** and engineering has provided calculated values under the TONE LEVEL ENGR column (IFLT form), the meter indication shall be ±6 dB of the value provided.

Note 1: Record this reading in the MEAS 1 column on the FLR form. ***If this is a new digital line,*** also record the reading in the TONE LEVEL MEAS column on the IFLT form.

Requirement 2: The FL audio tone can be clearly heard at the monitoring headphone.

Note 2: Failure to meet these requirements may be caused by one or more of the following:

(a) Test equipment or connections faulty

(b) Defective repeater

(c) Filter missing, defective, or not connected to the fault-locating pair

(d) Defective apparatus case fault-locating filter switch (located behind, and operated by, a plugged-in fault-locating filter)

(e) Fault-locating pair defective (see Chart 1)

(f) Digital line cable trouble.

8 Set the LINE FILTER switch to the next filter out on the line (second filter, third, etc).

Requirement: The meter indication is within ±10 dB of that recorded for the previous filter. All filters shall indicate greater than -74 dBm and the audio tone can be clearly heard at the headphone. ***If this is a new digital line*** and engineering has provided calculated values under the TONE LEVEL ENGR column, the meter indication shall be ±6 dB of the value provided.

CHART 4 (Contd)

STEP	PROCEDURE

Note: Record this reading on the FLR form in the space marked MEASURE 1. ***If this is a new digital line,*** also record the meter indication under the TONE LEVEL MEAS column on the IFLT form.

9 Repeat Step 8 for each filter on the line. If a second FL line is required, change the connections to the second FL line and repeat Steps 5 through 9.

Note: The results of these tests should indicate any major problems on the line. If a problem is encountered, refer to Chart 6. If the problem has not been detected, or ***if this is a new digital line, proceed to Step 10.***

10 Return the LINE FILTER switch to the letter code of the first filter tested (see the fault-locating record).

11 Adjust the REC LEVEL control for an on-scale reading.

12 Set the FUNCTION switch to MEAS 2.

Requirement: The 315B meter indicates a drop of 4 dB to 8 dB from that recorded for MEAS 1. Record this reading in the MEASURE 2 column on the FLR form.

13 Set the FUNCTION switch to MEAS 3.

Requirement: The 315B meter does not change more than 1.0 dB in either direction. Record this reading in the MEASURE 3 column on the FLR form.

Note: If the requirement of Steps 12 and 13 ***or any of the following requirements*** cannot be met, the repeater under test or the cable section on either side of the repeater under test is probably at fault. Refer to Chart 6 for further tests at the repeater site. If the requirements are met, proceed with the test.

14 Set the FUNCTION switch to MEAS 1 and adjust the REC LEVEL and vernier knob for -2.0 dB on the meter.

15 Rotate the PULSE PERIOD switch clockwise from REF 11, pausing at each numbered position (10 through 4) to read and record the meter readings on the FLR form (Fig. 12) as follows:

(a) If the deviation from the reference reading is not more than ±0.5 dB, record a zero.

(b) If the deviation is more than -2.0 (more than 0.5 dB to the right of), enter the ***deviation amount*** preceded by a plus (+) sign.

(c) If the deviation is less than -2.0 (more than 0.5 dB to the left of), enter the ***deviation amount*** preceded by a minus (-) sign.

CHART 4 (Contd)

STEP	PROCEDURE
16	Set the LINE FILTER switch to the next filter code to be tested and repeat Steps 11 through 16 for each succeeding repeater associated with the FL pair between this RT and the COT.
17	Evaluate the test results per Chart 7. ***Note:*** In general, a span of good repeaters will show a gradually increasing meter reading that may go as high as a +3.0 dB deviation from the reference reading of -2.0 dB. A section of the digital line that has a problem may show a flattening or a decrease in the upward trend from that recorded when the line was known to be good. Figure 13 is a typical record of a good digital line. ***Always*** compare the fault-locating record of a line suspected of having excessive errors with the record of the same line when the line was known to be working properly. Refer to Chart 6 for further tests at the repeater site of the suspected repeater or cable section. Part 6 provides a checklist of things that could cause a problem on the digital line. Figure 14 shows the fault-locating record of a digital line with a marginal repeater.

CHART 5

FAULT-LOCATING TESTS FROM ANY RT USING THE J98725AD (25AD) FAULT-LOCATING TEST SET (FLTS)

APPARATUS:

1—J98725AD T1C/T1 Fault-Locating Test Set (Fig. 4) (Section 103-494-106)

1—Monitoring Headphone

2—P3-Type Patch Cords equipped with 310 plugs

1—ED-3C841—LIU Test Cord (Fig. 8)

STEP	PROCEDURE

Prerequisite: The FL line(s) must have been tested per Chart 1.

Note: Complete the FLR form (Fig 12) during these tests. The filter codes can be obtained from the work order or span line record card. Fault-locating records of each SLC-96 system must be kept for future reference and trouble analysis.

Caution: To prevent service interruptions, insert patch cord or dummy plug into receiving MONITOR jack and then connect the ED-3C841 LIU test cord to the jack panel before connecting the other end to the LIU plug-in unit. Remove connections in reverse order.

1 Using the LIU test cord, connect between an LIU location on the RT jack panel and the LIU plug-in unit associated with the digital line to be tested.

2 Using P3-type patch cords, connect the 25AD as follows (see Fig. 18):

From: 25AD RCV FL LINE jack

To: FL() jack on RT jack panel () = FL1 or FL2

From: 25AD GEN SPAN LINE jack

To: RT jack panel TRANSMITTING LINE jack

Monitoring headphone ***To:*** 25AD RCV MON jack.

3 Connect the 25AD -48V cord to -48V RT battery supply.

4 Set the 25AD controls as follows:

CLOCK RATE ***to*** T1

CHART 5 (Contd)

STEP	PROCEDURE

FUNCTION ***to*** MEAS 1

PULSE DENSITY ***to*** 11 REF

FILTER ***to*** same as code letter of filter to be tested. Start with the first filter out from the RT (H, G, etc).

5 Set the RECEIVER SENSITIVITY switch for an on-scale reading.

Requirement: Greater than -74 dBm and the audio tone can be clearly heard at the monitoring headphone. ***If this is a new digital line*** and engineering has provided calculated values under the TONE LEVEL ENGR column on the IFLT form, the meter indication shall be ±6 dBm of the value provided.

Note 1: Record this reading under the MEASURE 1 column on the FLR form. ***If this is a new digital line,*** also record the meter reading under the TONE LEVEL MEAS column on the IFLT form.

Note 2: -72 dBm is greater than -74 dBm. Failure to meet this requirement may be caused by one or more of the following:

(a) Test equipment or connections faulty. ***If this is a new digital line,*** consult with engineering for possible changes in furnished values

(b) Defective repeater

(c) Filter missing, defective, or not connected to the fault-locating pair

(d) Defective apparatus case fault-locating filter switch (located behind, and operated by, a plugged-in fault-locating filter)

(e) Fault-locating pair defective (see Chart 1)

(f) Digital line cable trouble.

6 Set the FILTER switch on the 25AD to the next filter out on the line (second filter, third, etc).

Requirement: The meter indication is within ±10 dB of that just recorded in the previous step. All filters shall indicate greater than -74 dBm. ***If this is a new digital line*** and engineering has provided calculated values under the TONE LEVEL ENGR column, the meter indication shall be ±6 dBm of the value provided on the IFLT form.

7 Repeat Step 6 for each filter on the line. If a second FL line is required, change the connection to the second FL line and repeat Steps 4 through 7.

CHART 5 (Contd)

STEP	PROCEDURE
	Note: The results of these tests should indicate any major problems on the line. If a problem is encountered, refer to Chart 6. If the problem has not been detected, or ***if this is a new digital line,*** continue to Step 8.
8	Return the FILTER switch to the letter code of the first filter tested.
9	Set the FUNCTION switch to MEAS 2 SIGNAL.
10	Read the meter indication on the DBM scale and add to the RECEIVER SENSITIVITY setting. ***Requirement:*** Within ±2 dB of the value recorded for MEAS 1 in Steps 5 and 6. Record this reading under the MEASURE 2 column on the FLR form.
11	Set the FUNCTION switch to MEAS 3 SIGNAL.
12	Read the meter indication on the DBM scale and add to the RECEIVER SENSITIVITY setting. ***Requirement:*** ±1 dB of the value recorded for MEAS 2 in Step 10. Record this reading under the MEASURE 3 column of the FLR form. ***Note:*** If the requirement of Step 10 or 12 ***or any of the following requirements*** cannot be met, the repeater under test or the cable section on either side of the repeater is probably at fault. Refer to Chart 6 for further tests at the repeater site. If the requirements are met, proceed with the test.
13	Set the FUNCTION switch to MEAS 1 SIGNAL and RECEIVER SENSITIVITY to obtain an on-scale reading.
14	Set the PULSE DENSITY switch to 10.
15	Read the meter indication on the DBM scale and add to the RECEIVER SENSITIVITY setting.
16	Record the meter indication on the FLR form in the area labeled PULSE PERIOD 10.
17	Repeat Step 15 and record as in Step 16 for PULSE DENSITY switch setting 9 through 4.
18	Calculate the maximum shift from the meter indication at PULSE DENSITY 10 to the meter indication at PULSE DENSITY 4. ***Requirement:*** 1 dB or less.

CHART 5 (Contd)

STEP	PROCEDURE
	Note: Generally, a good line will show an almost flat response from PULSE PERIOD 10 to 4. Figure 15 is a typical record of a good digital line and Figure 16 is a record of a line with a marginal trouble.
19	Set the FILTER switch to the next filter code on the line and repeat Steps 9 through 18.
20	Evaluate the test results per Chart 7.

CHART 6

ISOLATING TROUBLE TO A DIGITAL LINE SECTION OR REPEATER

Note: This chart is provided to coordinate activities between the personnel at the repeater apparatus case location and the COT and RT locations. The actual tests at the repeater location will be performed in accordance with Section 640-525-225 or 640-527-225 using the line error-detector, or equivalent.

STEP	PROCEDURE
1	Inform personnel who will be performing tests at the repeater location as to which location is to be tested first and the type repeater at the location, and instruct them to call in on the order wire before attempting any repeater tests.
2	Verify that the digital line to be tested is properly powered and that fault-locating equipment is connected.
3	After a talk circuit has been established between the repeater location and the testing location (COT or RT), direct the tester at the repeater location to the proper slot in the apparatus case and the side of the repeater (side 1 or side 2) to be tested.
4	Verify that the fault-locating equipment is set up to test the filter associated with the repeater to be tested.
5	Have the tester at the repeater location remove the repeater, insert the 25AB (Fig. 7) test set into the vacated slot, and then insert the repeater into the test set.
6	Set the fault-locating set to send bipolar signals and have the tester at the repeater location test the repeater for signals and errors with the test set, including the 100-ohm termination.
7	If the repeater tests OK, send errors on the line (XMT ERRORS on 315B, 415A or MEAS 3 on 25AD). The repeater tester will see errors verifying that the proper repeater is being tested.
8	If the repeater tester sees errors when ***bipolar signals*** are sent, replace the repeater and repeat the tests. If the repeater tester still sees errors, select the next repeater location toward the testing terminal and repeat the tests. Continue in this manner until the faulty repeater or cable section is found. ***Note:*** When a repeater is replaced, the fault-locating tests must be performed on the new repeater. Indicate in the notes column when any particular repeater is replaced.

CHART 7

EVALUATION OF FAULT-LOCATING TEST RESULTS

The evaluation involves determining the PULSE PERIOD setting at which the performance of each line section declines. This setting can be thought of as the stress point which causes the declined performance. The stress points for adjacent line sections are then compared to identify the greatest increase in stress point. The greatest increase in stress point between adjacent line sections indicates a source of trouble.

STEP	PROCEDURE
1	If the 25AD test set was used in performing the fault-locating test, proceed to Step 7. Continue to Step 2 if the 315B or 415A was used.
	315B Test Set
2	On the completed FLR form (Fig. 14), examine each row of filter data and perform the following:
	(a) Search each row from ***left*** to ***right*** for PULSE PERIOD data in which the recorded data fails to show a ***positive*** increase.
	(b) ***Mark*** the first point in ***each*** filter row that fails to show a ***positive*** increase. (See note.)
	(c) Ignore all zero entries until a nonzero entry is encountered, then the zero should be used.
	Note: On Fig. 14 for filter code B, the first point in the row that fails to show a ***positive*** increase is at PULSE PERIOD 4 as marked. For filter code E, the first point is at PULSE PERIOD 7. Only one mark should appear in each row.
3	On the FLR form, in the MAX SHIFT or NOTES column for each filter row, note the PULSE PERIOD setting in which a mark was made.
4	Begin with the first row from the top with a mark in it and perform the following:
	(a) Proceed down the MAX SHIFT or NOTES column and locate the row having the largest ***positive*** increase in PULSE PERIOD setting with respect to the previous row. See note.
	(b) Mark this row as the trouble section. (Other rows may be marked as likely candidates.) Use Chart 6 to isolate trouble on the identified line section.
	Note: On Fig. 14 note that between filter code G and filter code H the recorded MAX SHIFT increased from 6 to 10 (an increase of 4), respectively, making the trouble section at filter H. Between filter codes D and E, the increase was from 4 to 7 (an increase of

CHART 7 (Contd)

STEP	PROCEDURE
	3), making a likely second candidate at filter code E. Also notice that between filter code F and G, the recorded MAX SHIFT showed a ***decrease*** (8 to 6) and is not considered.
5	If a suspected trouble section cannot be identified and there are no marks on the record, confer with supervision on the approach to locate the trouble. Ensure the completed FLR form is compared to the FLR form for the line when it was known to be good.
6	If a suspected trouble section cannot be identified and there are some marks on the FLR form, use the first mark encountered in the highest numbered PULSE PERIOD column working from the top down (eg, Fig. 14 filter code H, PULSE PERIOD 10).
	25AD Test Set
7	On the completed FLR form (see Fig. 16), examine each row of filter data on the FLR form and perform the following: (a) Determine the ***lowest*** and ***highest*** reading for PULSE PERIOD setting 10 through 4. (b) Calculate the difference between the two readings. (c) Record the difference in the MAX SHIFT column on the FLR form for each filter row.
8	On the FLR form, in the MAX SHIFT column, note if there is any value recorded greater than 1 dB. See note. ***Note:*** In Fig. 16, notice that in filter row K the MAX SHIFT value recorded is 1.4. The value is the difference between PULSE PERIOD 8 reading (58.6) and PULSE PERIOD 5 reading (60.0).
9	Mark the row with the greater than 1 dB value as the troubled section. Use Chart 6 to isolate the trouble in the identified line section.

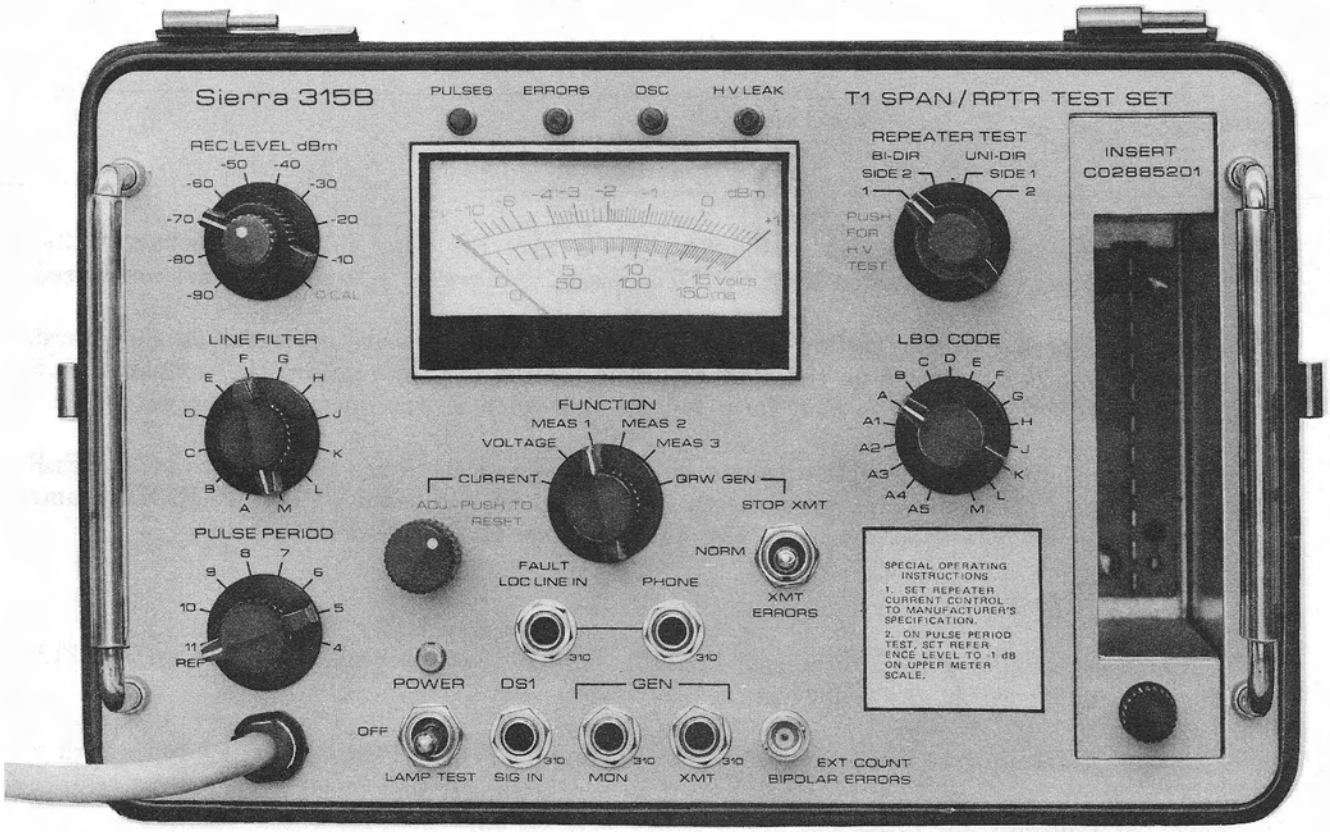


Fig. 2—Sierra 315B T1 Span and Repeater Test Set

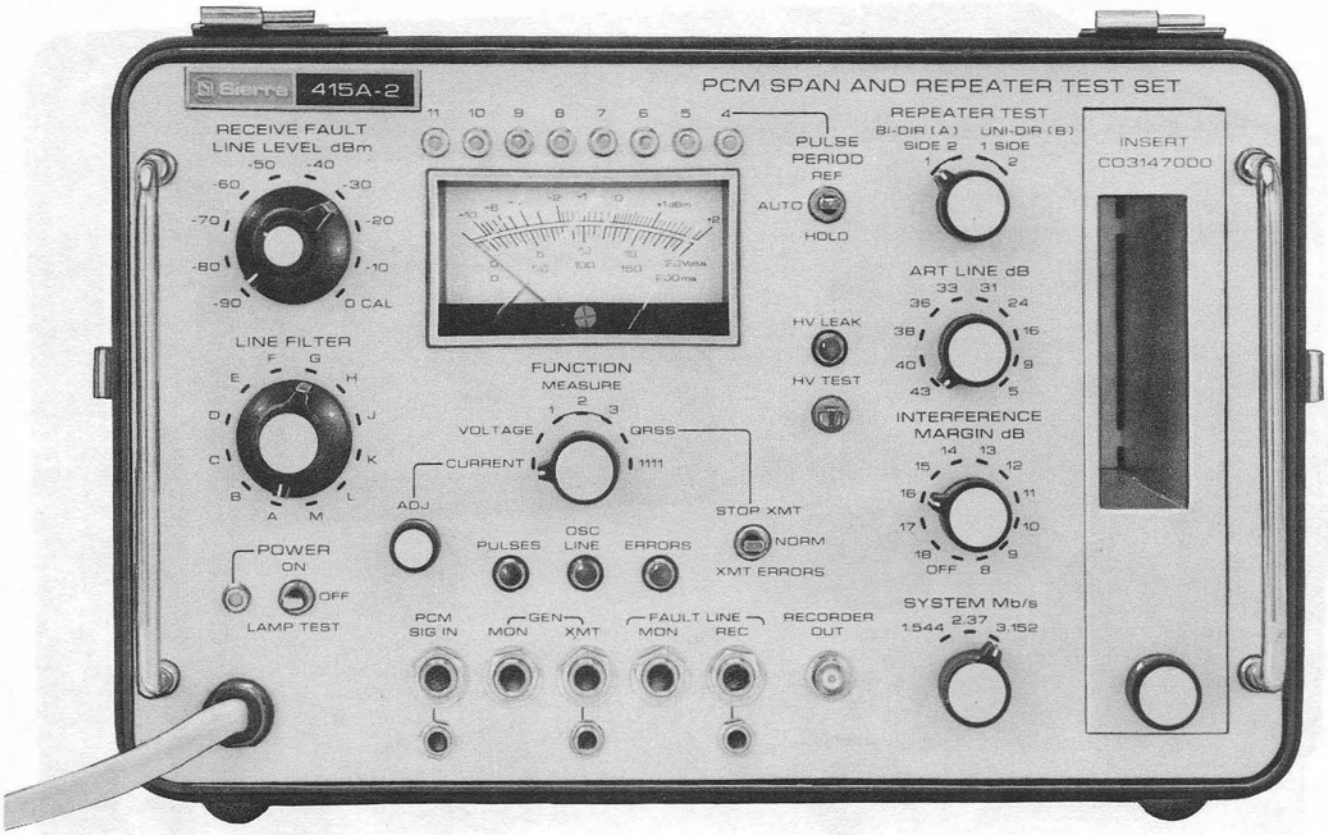


Fig. 3—Sierra 415A-2 PCM Span and Repeater Test Set

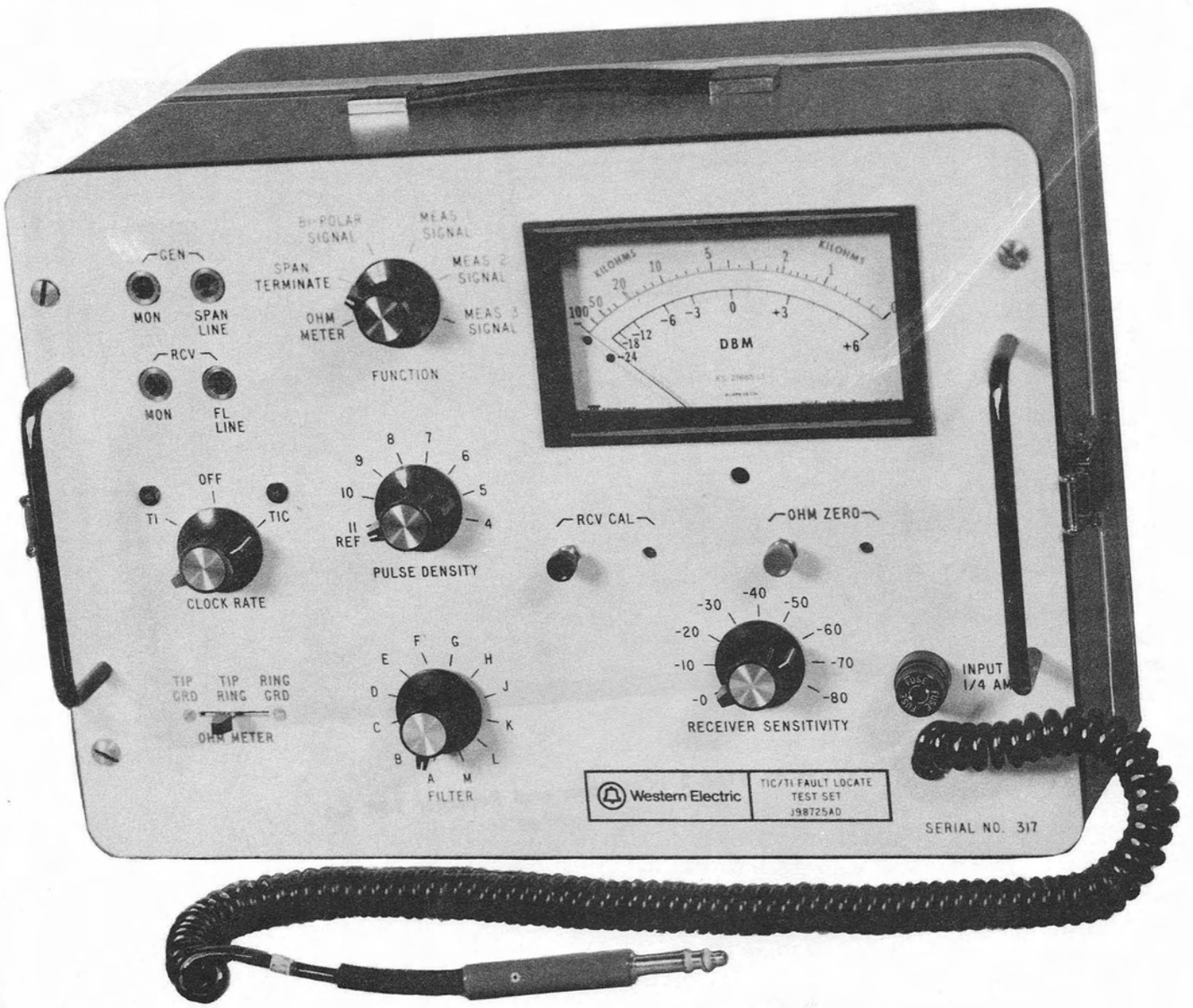


Fig. 4—J98725AD T1C/T1 Fault-Locate Test Set

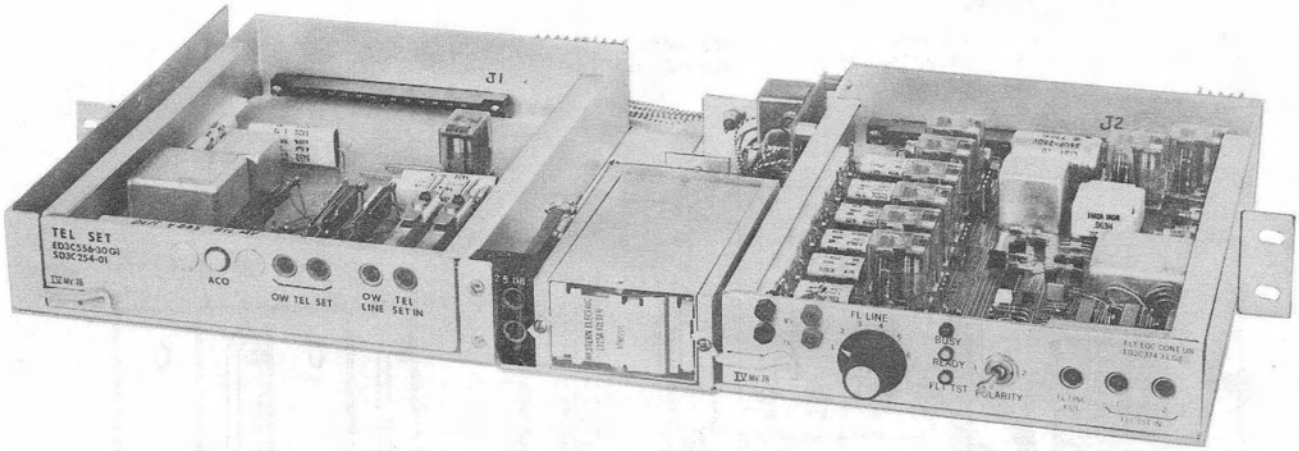


Fig. 5—COT Fault-Locate and Order Wire Panel (J1C141AC-L1)

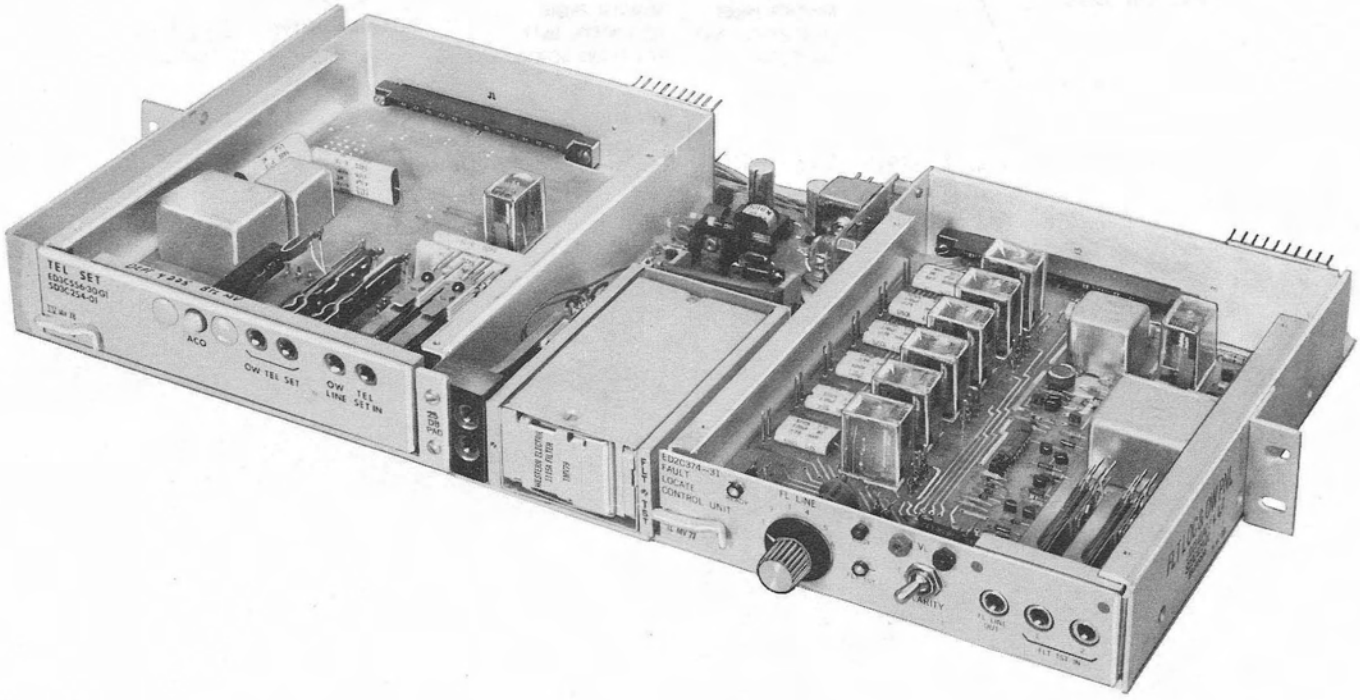


Fig. 6—COT Fault-Locate and Order Wire Panel (J1C141AC-L1, L2)

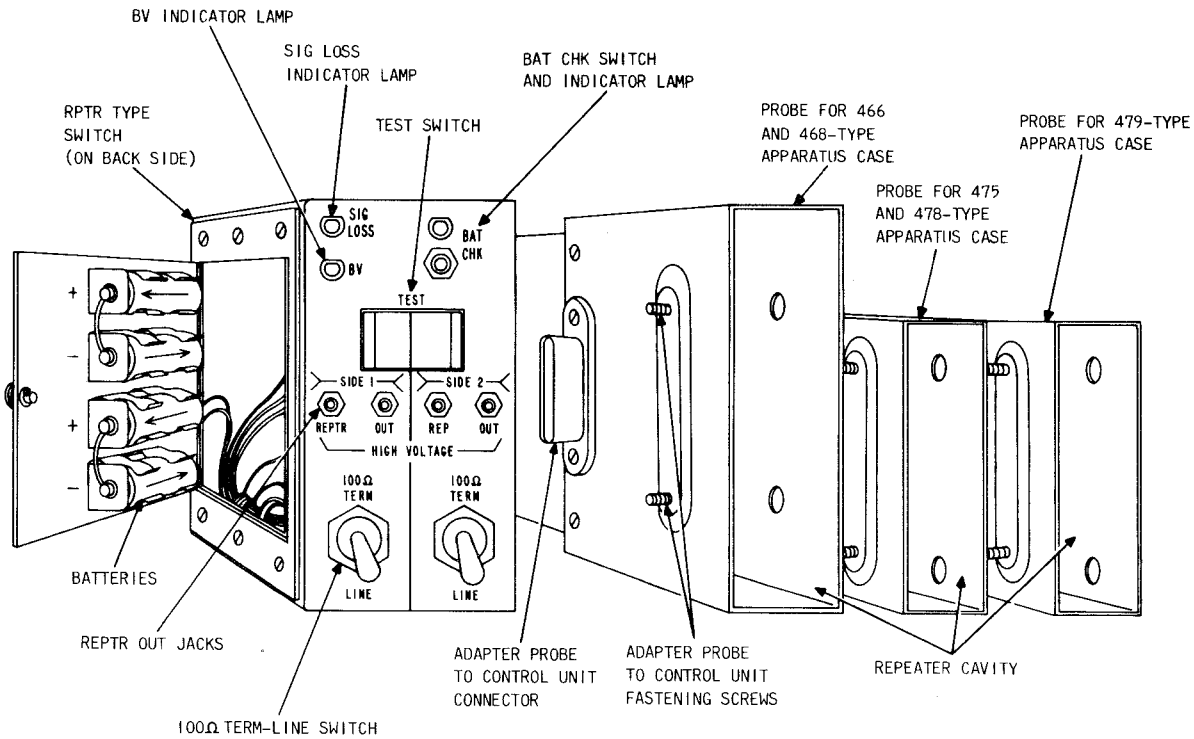


Fig. 7—J98725AB (25AB) Bipolar Violation Detector

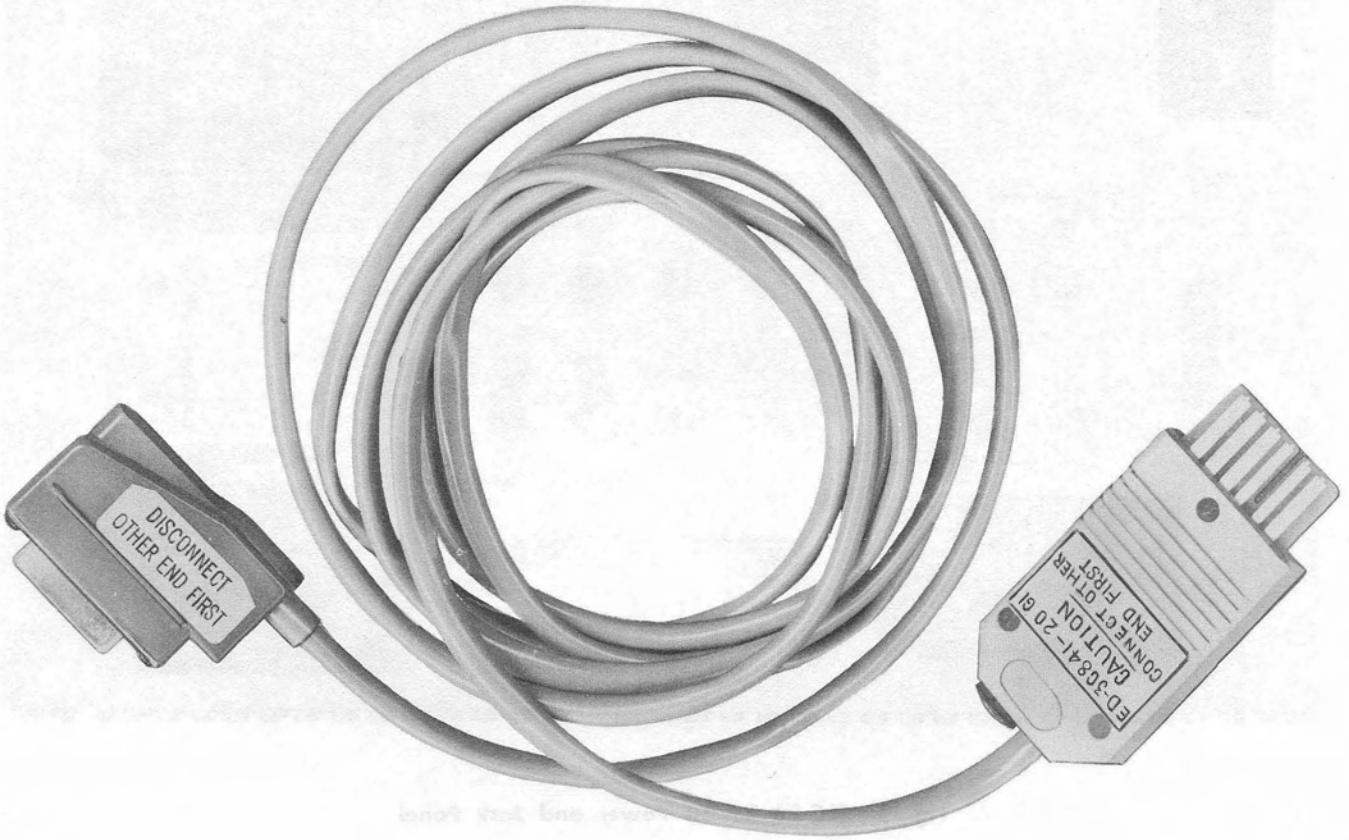


Fig. 8—ED-3C841 LIU Test Cord

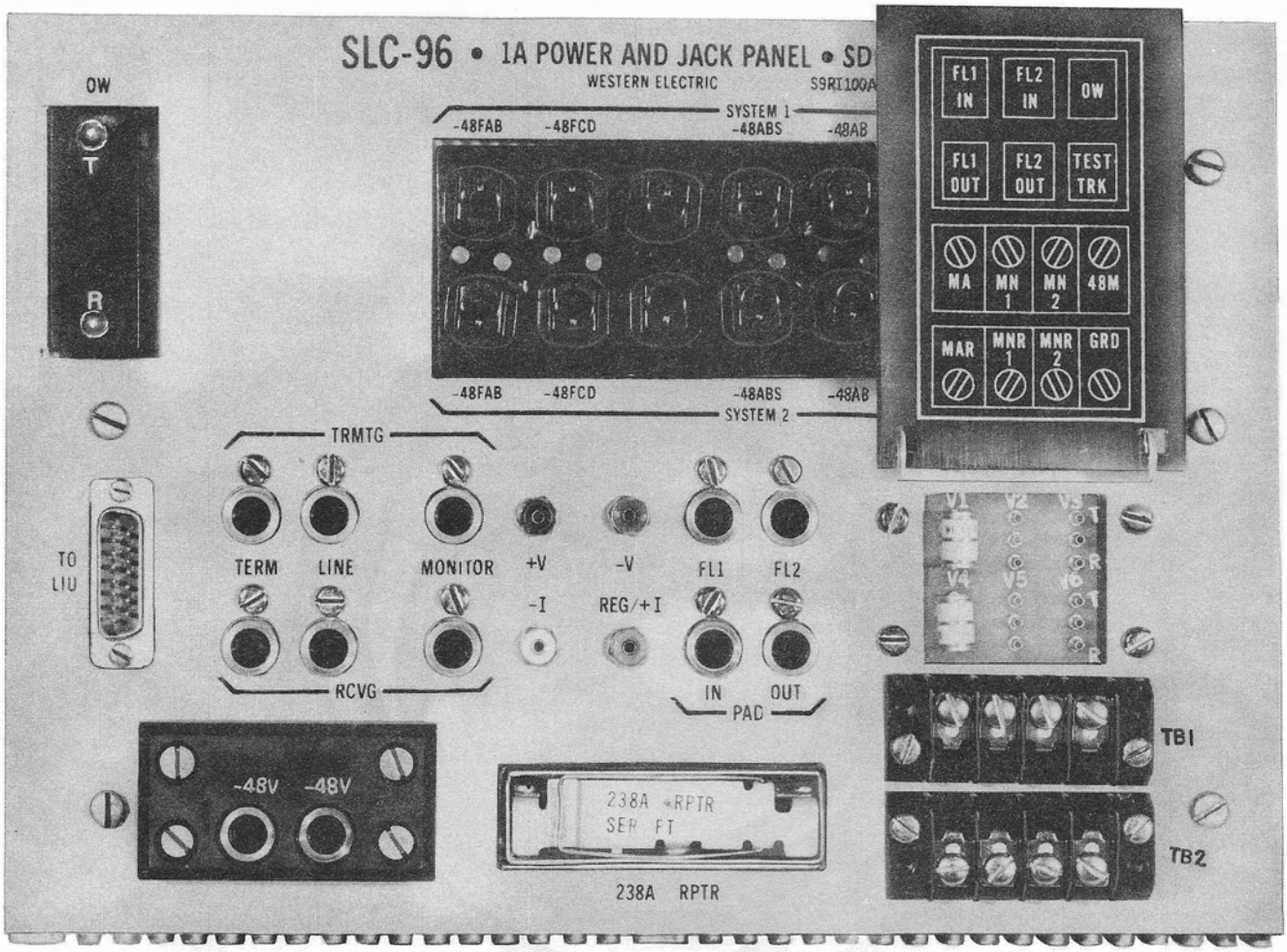


Fig. 9—SLC-96 RT 1A Power and Jack Panel

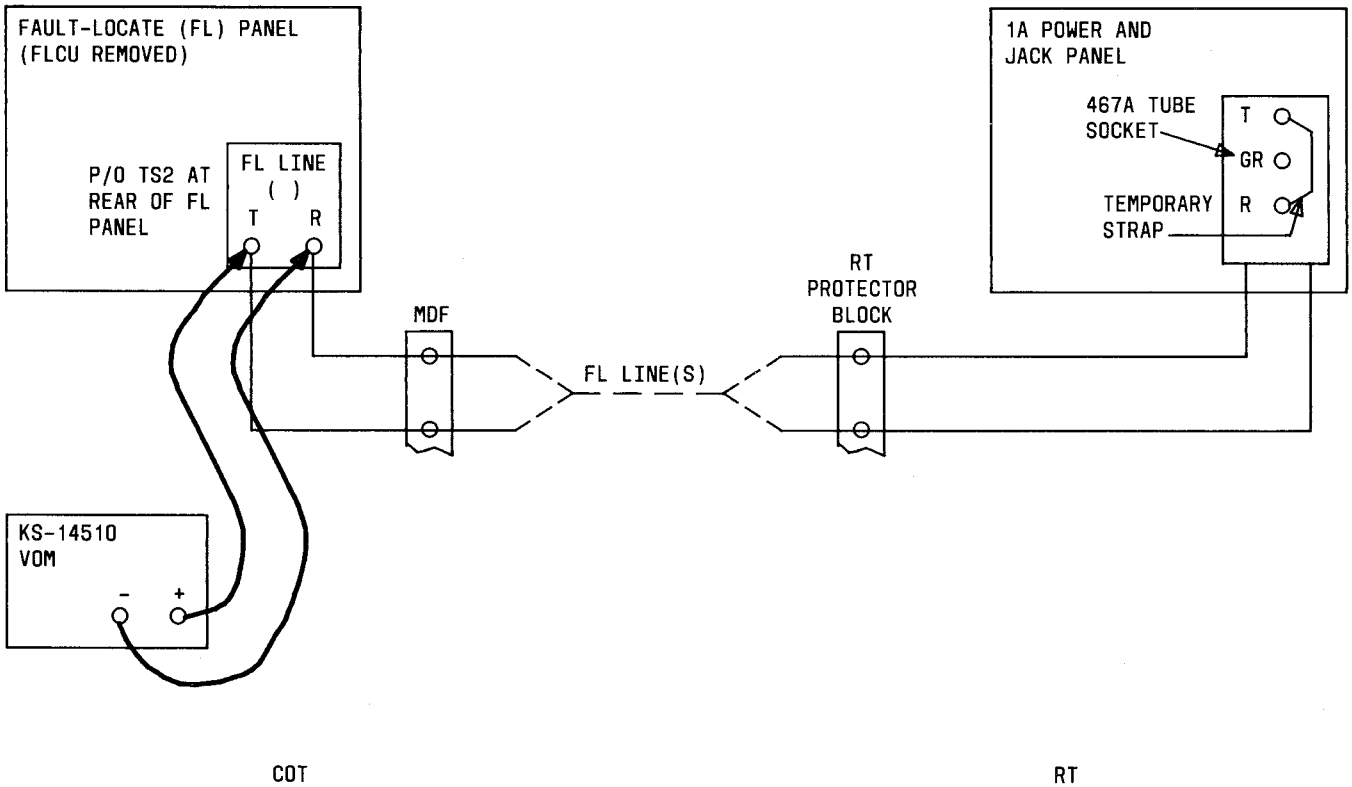


Fig. 10—DC Loop Resistance Test Setup

INITIAL FAULT LINE TESTS

PAGE ___ OF ___

1

ORDER NO.	SYSTEM	COT	RT

ENGINEERED BY	TELEPHONE NO.	DATE ISSUED	NEW ☐ CHANGE ☐

BAY NO.	FL LINE NO.	ACTIVE SW POS	FILTER TYPE	FAULT PAIR ASSIGNMENT CABLE PAIR

TESTER _____ SUPERVISOR _____	TELEPHONE NO.	TEST SET	DATE TESTED	INITIAL ☐ RETEST ☐

ENGINEERED PAIR MAKE-UP

2

GA	KFT	LOOP RES
17		
19		
20		
22		
24		
25		
26		
TOTAL		
KFT	LOOP RES	MEAS RES*

*TIP AND RING STRAPPED AT THE RT

DC TESTS FOR ACTIVE AND PASSIVE FL LINE

3

		ENGR	MEAS
FOREIGN VOLTAGE	T-GRD		
	R-GRD		
LEAKAGE RES	T-GRD		
	R-GRD		
UNTERM RES	T-R		

DC TESTS FOR ACTIVE FL LINE

4

FL LINE VOLTAGE
116 TO 135 VDC
MEAS V_L _____
I_L POLARITY 1____ MA
POLARITY 2____ MA

POWER LOOP TESTS

5

COT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

RT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

* .6 VOLTS EQUALS 60 MA

NOISE AND TONE LEVEL TESTS

6

MEASUREMENT AT COT ☐ RT ☐

NOISE		TONE LEVEL			
BROAD BAND	BIPOLAR (NARROW BAND)				
	POLARITY 1 OR 2	POLARITY 1	POLARITY 1	POLARITY 2	POLARITY 2
FL FILTER SEQ	MEAS	ENGR	MEAS	ENGR	MEAS
	DBM DBRN	DBM DBRN	DBM DBRN	DBM DBRN	DBM DBRN

7

OUTSIDE TEMPERATURE

°F

APPROVAL

8

CRAFT TESTS RESULTS

☐ PASS

☐ FAIL

ENGR _____

Fig. 11—Initial Fault Line Tests (IFLT) Form

SLC-96 FAULT-LOCATING RECORD

TEST LOCATION
☐ COT
☐ RT

FAULT-LOCATE LINE NUMBER _____

FAULT-LOCATE SET
☐ SIERRA 315B
☐ WE 25AD

ROUTE _____
OFFICE _____
FILTER TYPE _____

LINE & SYSTEM _____
TESTER _____
DATE _____

FAULT-LOCATING PAIR TEST
☐ NEW SYSTEM TEST
☐ TROUBLE TEST

BROADBAND NOISE _____ DBRN

RESISTANCE _____ OHMS

POWER LOOP TESTS

COT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

DC TESTS FOR ACTIVE FL LINE

FL LINE VOLTAGE
116 TO 135 VDC
MEAS V_L _____
I_L POLARITY 1__ MA
POLARITY 2__ MA

POWER LOOP TESTS

RT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

ACTIVE POLARITY SW POS_____ TEST DIRECTION ☐ SIDE 1 ☐ SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES

ACTIVE POLARITY SW POS_____ TEST DIRECTION ☐ SIDE 1 ☐ SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES

Fig. 12—Fault-Locating Record (FLR) Form

SLC-96 FAULT-LOCATING RECORD

TEST LOCATION: ☒ COT ☐ RT

FAULT-LOCATE LINE NUMBER #1

FAULT-LOCATE SET: ☒ SIERRA 3158 ☐ WE 25AD

ROUTE MAIN-PARKWAY
OFFICE MAIN
FILTER
TYPE 1068

LINE & SYSTEM #1
TESTER K.E.B.
DATE 2-27-80

FAULT-LOCATING PAIR TEST: ☒ NEW SYSTEM TEST ☐ TROUBLE TEST

BROADBAND NOISE 5 DBRN

RESISTANCE 3600 OHMS

POWER LOOP TESTS

COT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

DC TESTS FOR ACTIVE FL LINE

FL LINE VOLTAGE
116 TO 135 VDC
MEAS V_L ____
I_L POLARITY 1__ MA
POLARITY 2__ MA

POWER LOOP TESTS

RT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

ACTIVE POLARITY SW POS____ TEST DIRECTION ☒ SIDE 1 ☐ SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES
A	208	63.2	57.7	57.6	98	0	0	+.6	+.7	+.9	+1.4	+1.6		
B		62.0	56.0	56.5	97	0	0	0	+.6	+.7	+1.0	+1.1		
C		63.8	57.9	57.0	100	0	0	+.5	+.6	+1.0	+1.3	+1.4		
D		62.5	56.7	56.7	99	0	0	0	+.6	+.9	+1.3	+1.4		
E		61.6	55.7	55.7	95	0	0	0	+.6	+.9	+1.2	+1.3		
F		62.3	56.4	56.4	97	0	0	0	0	+.7	+1.0	+1.1		

ACTIVE POLARITY SW POS____ TEST DIRECTION ☐ SIDE 1 ☐ SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES

Fig. 13—Typical Results of a Good Digital Line Using the 315B Test Set

SLC-96 FAULT-LOCATING RECORD

TEST LOCATION: ☒ COT ☐ RT

FAULT-LOCATE LINE NUMBER 2

FAULT-LOCATE SET: ☒ SIERRA 315B ☐ WE 25AD

ROUTE MAIN-INDIANA
OFFICE MAIN
FILTER TYPE 1068

LINE & SYSTEM #2
TESTER K.E.B.
DATE 2-27-80

FAULT-LOCATING PAIR TEST: ☒ NEW SYSTEM TEST ☐ TROUBLE TEST

BROADBAND NOISE 5 DBRN

RESISTANCE 3500 OHMS

POWER LOOP TESTS

COT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

DC TESTS FOR ACTIVE FL LINE

FL LINE VOLTAGE
116 TO 135 VDC
MEAS V_L ____
I_L POLARITY 1__ MA
POLARITY 2__ MA

POWER LOOP TESTS

RT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

ACTIVE POLARITY SW POS____ TEST DIRECTION ☒ SIDE 1 ☐ SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES
A	208	54.5	41.5	48.6	93	0	0	+.7	+1.0	+1.5	+1.7	+2.1		
B		54.0	48.2	48.2	96	0	0	0	+.8	+1.2	+1.9	+1.8	4	
C		55.0	49.1	49.2	98	0	0	0	+.6	+.9	+1.2	+.9	4	
D		56.0	50.0	50.0	100	0	0	0	+.8	+1.0	+1.1	+.7	4	
E		56.5	50.6	50.7	95	0	0	+.7	+.6	+1.2	+.9	+.3	7	2ND CANDIDATE
F		55.5	49.7	49.5	94	0	0	-.6	0	0	-.7	-.9	8	
G		56.0	50.2	50.2	99	0	+.6	+.9	+1.6	+.7	-.6	-1.3	6	
H		56.2	51.2	51.1	95	-.9	-1.3	-2.6	-3.4	-3.9	-5.6	-9.1	10	← TROUBLE SECTION
J		55.3	50.0	50.2	98	-1.6	-1.7	-1.9	-3.8	-4.5	-8.1	-10.1	10	

ACTIVE POLARITY SW POS____ TEST DIRECTION ☐ SIDE 1 ☐ SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES

Fig. 14—Results of a Digital Line With Marginal Trouble Using the 315B

SLC-96 FAULT-LOCATING RECORD

TEST LOCATION: [X] COT [ ] RT

FAULT-LOCATE LINE NUMBER 1

FAULT-LOCATE SET: [ ] SIERRA 315B [X] WE 25AD

ROUTE MAIN-ANDOVER
OFFICE MAIN
FILTER TYPE 1068

LINE & SYSTEM #3
TESTER K.E.B.
DATE 2-27-80

FAULT-LOCATING PAIR TEST: [X] NEW SYSTEM TEST [ ] TROUBLE TEST

BROADBAND NOISE 6 DBRN

RESISTANCE 3100 OHMS

POWER LOOP TESTS

COT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

DC TESTS FOR ACTIVE FL LINE

FL LINE VOLTAGE
116 TO 135 VDC
MEAS V_L _____
I_L POLARITY 1___ MA
POLARITY 2___ MA

POWER LOOP TESTS

RT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

ACTIVE POLARITY SW POS_____ TEST DIRECTION [X] SIDE 1 [ ] SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES
A	208	52.2	52.2	52.0	93	52	52	52	52	52	52.4	52.4	.4	
B	|	53	53	52.8	98	53	53	53	52.9	53	53.2	53.2	.3	
C	|	53.5	53.8	53.8	93	53.5	53.5	53.5	54	54	54	54	.5	
D	|	57.5	57.5	57.5	96	57.9	57.9	57.9	57.5	57.9	57.9	58	.1	
E	|	58.2	58.2	58.2	98	59	59	58.8	58.8	59	59	59	.2	
F	|	56.5	56.5	56.4	98	56.5	56.5	56	56.5	56.5	56.5	56.5	.5	
G	|	58	58	58	100	58.4	58.4	58.4	58.2	58.2	58.5	58.5	.3	

ACTIVE POLARITY SW POS_____ TEST DIRECTION [ ] SIDE 1 [ ] SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES

Fig. 15—Typical Results of a Good Digital Line Using the 25AD Test Set

SLC-96 FAULT-LOCATING RECORD

TEST LOCATION: ☒ COT ☐ RT

FAULT-LOCATE LINE NUMBER _____

FAULT-LOCATE SET: ☐ SIERRA 315B ☒ WE 25AD

ROUTE MAIN-PARKWAY
OFFICE MAIN
FILTER TYPE 1068

LINE & SYSTEM # 4
TESTER K.E.B.
DATE 2-27-80

FAULT-LOCATING PAIR TEST: ☒ NEW SYSTEM TEST ☐ TROUBLE TEST

BROADBAND NOISE 6 DBRN

RESISTANCE 3200 OHMS

POWER LOOP TESTS

COT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

DC TESTS FOR ACTIVE FL LINE

FL LINE VOLTAGE
116 TO 135 VDC
MEAS V_L _____
I_L
POLARITY 1___ MA
POLARITY 2___ MA

POWER LOOP TESTS

RT	
+V TO -V	V
+V TO -I	V*
REG/+I TO +V	V

*.6 VOLTS EQUALS 60MA

ACTIVE POLARITY SW POS_____ TEST DIRECTION ☒ SIDE 1 ☐ SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES
F	208	57.5	57.5	57.5	96	57.9	57.9	57.9	57.5	57.9	57.9	58	.5	
G	|	58.2	58.2	58	98	59	59	58.8	58.8	59	59	59	.2	
H	|	56.5	56.5	56.5	98	56.5	56.5	56	56.5	56.5	56.5	56.5	.5	
J	|	58	58	58	100	58.4	58.5	58.4	58.2	58.2	58.5	58.5	.3	
K	|	59.8	60	59.8	100	59.8	59.8	58.6	59.5	59.6	60	59.6	1.4	← TROUBLE SECTION
L	|	61.8	62	62.2	100	61.8	61.8	61.5	61.5	61.5	61.8	62	.5	
M	|	61.2	61.8	61.5	99	61.2	61.2	61.2	61	61.2	61.4	61.5	.5	

ACTIVE POLARITY SW POS_____ TEST DIRECTION ☐ SIDE 1 ☐ SIDE 2

FILTER CODE	RPTR CODE	TRANSMISSION TEST MEASURE 1	2	3	(NB NOISE) BIPOLAR	PULSE PERIOD 10	9	8	7	6	5	4	MAX SHIFT	NOTES

Fig. 16—Results of a Digital Line With Marginal Trouble Using the 25AD

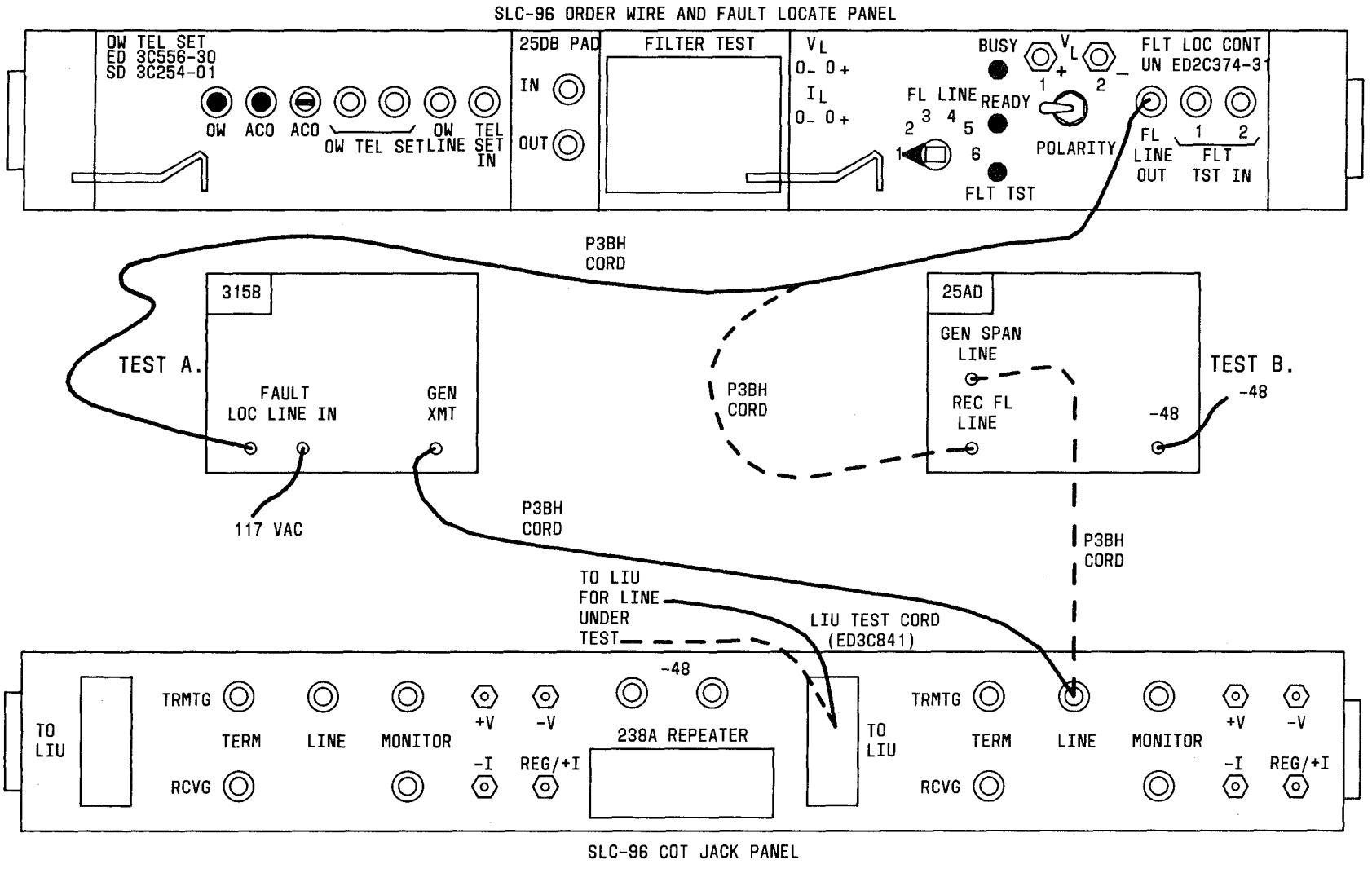


Fig. 17—COT Fault-Locating Configurations

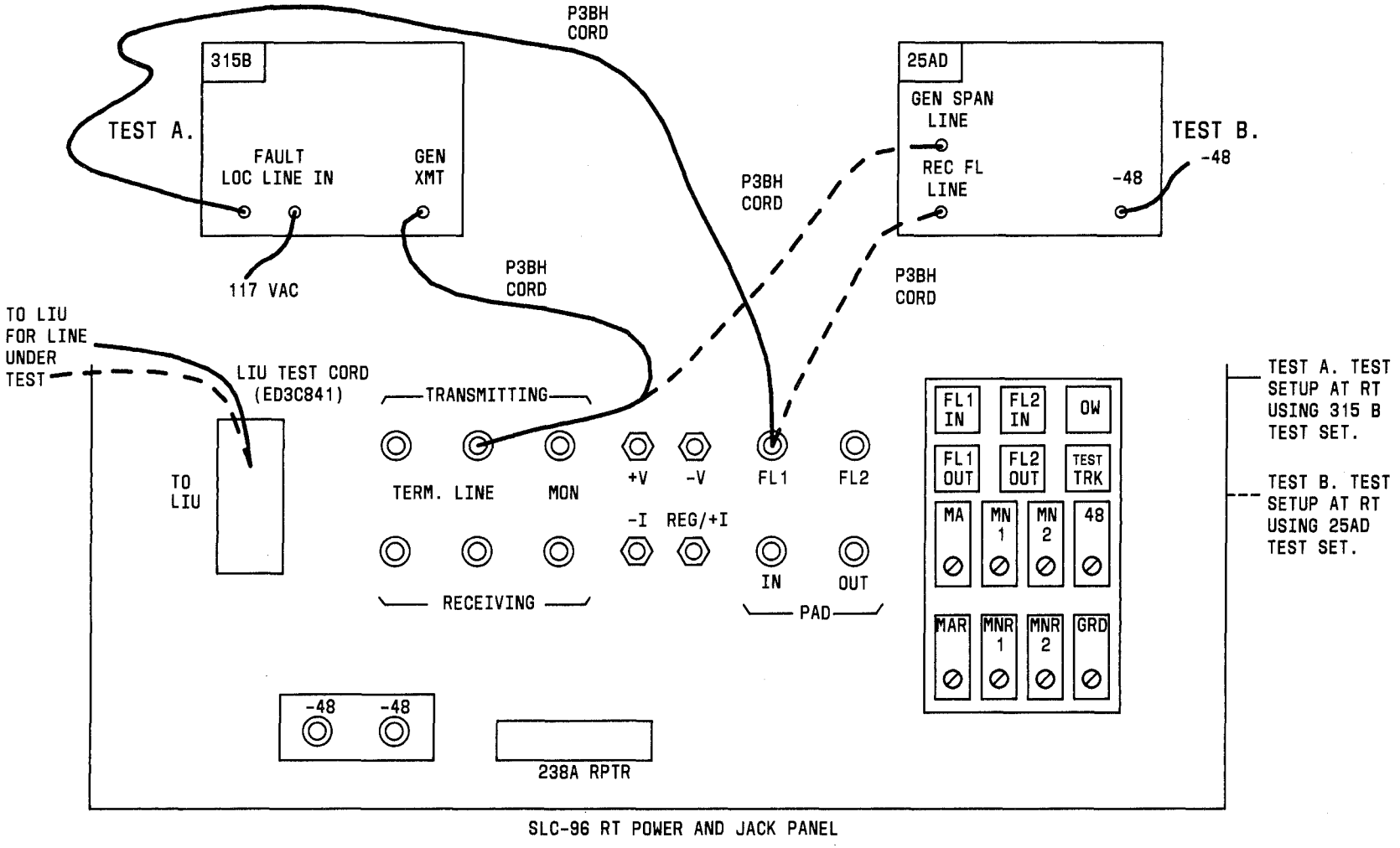


Fig. 18—RT Fault-Locating Configurations