"SLC*"-96 SUBSCRIBER LOOP CARRIER SYSTEM
ACTIVE FAULT-LOCATING AND ORDER WIRE SYSTEMS
FAULT-LOCATING AND ORDER WIRE PANEL INSTALLATION, TURNUP AND TESTS

CONTENTS PAGE

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1. GENERAL

1.01 This section contains the turnup tests for the SLC-96 Fault-Locating (FL) and Order Wire (OW) panel (J1C141AC-L1) and the (J1C141AC-L1, L2), preinstallation test of the 1114 and 1115 (active) type fault-locating filters and initial fault-locating line and system test. This section also contains a system description, the initial test requirements, maintenance considerations, and utilization techniques of the order wire facility associated with the SLC-96 carrier system.

1.02 This section is reissued to revise the Initial Fault-Locating Tests (IFLT) form, the Fault-Locating Record (FLR) form, and to include the J1C141AC-L1, L2 FL and OW panel. 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 SLC-96 Fault-Locating and Order Wire panels.

1.04 Several SLC-96 systems using the same route may share the same FL pair. The FL pair must always be terminated. This is accomplished by maintaining a 262C plug in the FL jack of the remote ter-

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

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minal (RT) most distant from the central office terminal (COT).

1.05 If the FL pair is bridged to more than one RT, the FL pair ***will*** be terminated with 262C plugs (900 ohms) at each RT (Fig. 11). If 1115-type filters are used, the FL line ***may*** be terminated in the last apparatus case in some installations (Fig. 11).

1.06 The complete FL and OW panel (Fig. 1 or 2) consists of an ED2C374-31 Fault-Locate Control Unit (FLCU), one of two order wire plug-in units (ED3C557-30G1) or (ED3C556-30G3) (see Fig. 18). It also contains a 25 dB pad to satisfy the input requirements of the older type of test sets, and also provides a filter test (FLT TST) position for preinstallation testing of the 1114- and 1115-type plug-in fault-locating filters.

1.07 The FL and OW panel provides powering and control of a selected FL pair and access to the pair for reception of the return test tones. It also provides talk battery and access to the OW pair.

1.08 The J1C141AC-L1 FL and OW panel must have +130V and −48V supplied from the CO battery. The J1C141AC-L1, L2 FL and OW panel is designed to be used in an office that has no +130V supply. The J1C141AC-L1, L2 panel contains a dc-to-dc converter that uses a −48V input to supply a + 130V output.

1.09 The order wire is a two-wire voice-frequency system that parallels the SLC-96 system route. The order wire uses an H88 loaded pair in the cable facility with provisions in the 475- and 800-type apparatus cases for building out cable lengths as required. A terminal appearance that will accept the cord test clips of a type 1014A handset is provided on the outside of the apparatus case, making the order wire accessible without opening the apparatus case. The 1A Power and Jack Panel at the remote terminal (RT) is also provided with an order wire terminal appearance (Fig. 12).

2. OPERATION

A. Fault Locate

2.01 Chart 1 provides procedures for turnup and testing of the Active Fault-Locating Circuit. The procedures include selection of options, making cross-connections, and performing limited tests. Chart 2 provides procedures for testing the 1114/1115-type filters prior to their installation in the apparatus cases. These procedures verify that each filter peak output level is proper and that adjacent channel selectivity is acceptable.

2.02 Chart 3 is used to test the cable pair used for fault-locating before the pair is approved for fault-locating SLC-96 digital lines. This chart is used to perform dc resistance tests to ensure proper installation and construction and to ensure tip and ring integrity of the FL pair.

2.03 The digital line must be powered when performing the procedures of Charts 4, 5, and 6. At least part of the digital line is always powered from the central office terminal (COT). On longer lines, power may also be supplied from the remote terminal (RT) or remote power feed terminal (RPFT).

2.04 Chart 4 is used to check the noise level of the FL pair. These procedures are used to guarantee an acceptable received signal level of the fault-locating tones used in fault-locating SLC-96 digital lines. A broadband and narrowband noise level measurement is performed in this chart. If the noise level is higher than the requirements of Chart 4, a different cable pair must be used for the FL pair, or corrective action taken to bring the pair within acceptable limits. In some instances, engineering may specify "special case" situations, in which the noise level may exceed the requirements of the chart. Under these circumstances, the minimum received signal level will be raised to compensate for the noise level, and engineering will note these conditions.

2.05 Charts 5 and 6 are used to ensure that the levels of the returned FL signals are within required limits and to record them for future reference. These charts are used in conjunction with the procedures of this section and Section 363-202-516 to guarantee an acceptable and operational fault-locating system.

2.06 The Initial Fault Line Tests (IFLT) form (Fig. 3) is completed during the tests of this section to record the test data. This form should be supplied by 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 when the procedures of this section are performed. The IFLT form is used to provide a record

of the condition of the FL line during initial tests. The IFLT form and the Fault-Locating Record (FLR) form (Fig. 4) provide a record of each SLC-96 system and each FL line. The information recorded on these forms will be used for future reference and trouble analysis.

2.07 Charts 7 and 8 provide procedures for turnup and testing of the order-wire portion of the J1C141AC FL and OW panel.

2.08 The J1C141AC FL and OW panel provides flexibility of the order-wire system configuration by accepting interchangeable plug-in units (Fig. 18) to satisfy specific system requirements.

(a) The ***order wire and telephone set circuit*** contains all the equipment necessary to establish a call through the central office switching system, to power the line, and to provide a quiet termination mode for communication between repeater locations or repeater locations to the COT and RT.

(b) The ***multiple circuit*** provides the equipment necessary to communicate over any order-wire pair by gaining access to another order wire panel with an OW and TEL SET plug-in unit in the same office.

2.09 The plug-in units provide the circuitry for:

(a) Powering the order-wire line

(b) Obtaining access to the central office switching equipment

(c) Providing system supervisory lamps and alarms

(d) Providing office access to the order-wire line.

The 52-type headset (Fig. 20) is used in conjunction with the plug-in units to respond to audible and visual alarms initiated at a repeater location.

2.10 Standard H88 loaded cable pairs are used for the order wire. Two or more cable pairs can be connected to the same order wire by using 1574-type bridge lifters. The maximum length of the order-wire line is 23 miles when it is powered with 96-volts and using 22-gauge cable.

2.11 Visual inspection of the wiring and panel installation should be performed prior to performing the procedures of this section. Office records must be available to ensure proper completion of the procedures of this section. All tests on the FL panel should be performed first, so that proper operation of the panel is ensured, before filter testing or FL line tests are performed. Charts 2 through 8 should be performed in order.

CHART 1

ACTIVE FAULT-LOCATING PANEL TURNUP

The FL and OW panel (Fig. 1 or 2) provides power to the active filters connected to the FL pair. The FL panel provides a termination for the FL pair and access to the pair for fault-locating. At the rear of the FL panel, on TS2, up to 6 FL pairs may be connected to terminals 1 through 12. In the FL panel, the FL signal from the filters is transformer coupled from the pair to provide a normal fault-locate output at the

CHART 1 (Contd)

FL LINE OUT jack. Office records must be available to determine which pair(s) (1 through 6) is to be selected for testing the desired section of T1 line.

This chart gives procedures for selecting options, making cross-connections, and performing initial tests. The filter testing capability can also be checked using these procedures.

APPARATUS:

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

1—900-Ohm Resistor

1—1 μf (or greater), 200 Vdc Capacitor

1—Sierra 315B or 415A-2 T1 Span and Repeater Test Set (315B) (Fig. 5), or (415A) (Fig. 6), or J98725AD T1C/T1 Fault-Locating Set (25AD) (Fig. 7) (Section 103-494-106). See note.

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

2—Dummy Plugs

Note: The procedures of this chart use the 315B. Use the control settings of Table A if the 25AD is used.

STEP	PROCEDURE
1	Remove the +130V and −48V fuses for the FL panel. These fuses (FL/OW PNL) located in the COT fuse and alarm panel ***also*** serve the order wire portion of the FL and OW panel (J1C141AC-L1). ***Note:*** If office is equipped with a J1C141AC-L1, L2 FL and OW panel, remove the −48V fuse located in the CO fuse and alarm panel (no +130V fuse).
2	Remove the Fault-Locate Control Unit (FLCU) (Fig. 8) and verify that Option X (terminate) is installed. ***Note:*** Clips (straps) installed on CLIP POS TERM pins determine Option X. These clips are normally provided.
3	Insert the FLCU plug-in into the FL panel. Ensure that the FLCU plug-in is seated properly.

CHART 1 (Contd)

STEP	PROCEDURE
4	Determine from office records the required FL cross-connections and obtain the required IFLT form (Fig. 3). ***Note:*** Cross-connections will be required at the MDF.
5	At the rear of the FL panel, use the VOM to measure voltage between each FL LINE tip (T) and ring (R) terminal to ground on terminal strip 2 (TS2) (Fig. 8) that have connections made to them. ***Requirement:*** 0 Volts ***Note 1:*** If the requirement is met ***and*** cross-connections have been made at the MDF, record the meter indication on the IFLT form in the space marked FOREIGN VOLTAGE T-GRD and R-GRD. ***Note 2:*** If the requirement is not met and cross-connections have not been made at the MDF, clear foreign voltage from the TS2 before proceeding. If cross-connections have been made at the MDF, open the pair at the MDF and repeat Step 5. If the requirement is met, notify outside repair personnel of problem on the FL pair. ***Note 3:*** Ensure that there is ***not*** a T and R reversal at this cross-connect.
6	Verify that it is safe for the FL pair to be powered. ***Notify outside plant personnel before powering the FL pair.*** If the FL pair can be powered, proceed to Step 8.
7	If the FL pair may not be powered, open the FL pair at the MDF. Using the 900-ohm resistor ***in series with*** the 1 μF (or greater) capacitor, bridge a test termination across the selected FL pair on the office side of the MDF. Proceed to Step 10.
8	At the MDF, if cross-connections have been made, proceed to Step 10. At the MDF, if cross-connections have ***not*** been made, use VOM to check for foreign voltage between T and R to ground of the outside FL pair. ***Requirement:*** 0 volts ***Note 1:*** Record the meter indication on the IFLT form in the space marked FOREIGN VOLTAGE T-GRD and R-GRD. ***Note 2:*** A different form will be used for each FL pair. ***Note 3:*** If the requirement is not met, clear foreign voltage from the pair before proceeding.
9	At the MDF, make the necessary cross-connections from the outside FL cable pairs to pairs from the FL panel FL LINE pins. Ensure that T and R integrity is maintained.

CHART 1 (Contd)

STEP	PROCEDURE

10 Ensure that no test cords or plugs are connected to the FLCU.

11 At the fuse and alarm panel, locate the FL/OW PNL fuse holders and install the following fuses:

FUSE	CODE
−48 volt	70B Orange (2.0 amp)
+130 volt (if provided)	70E Yellow (0.18 amp)

Requirement: Fuses do not blow.

Note: If the requirement is failed, ensure that the proper type fuse was installed. If the proper fuse was installed, install a new fuse. If the new fuse blows, perform the procedures of Chart 9, Part 3, of this section.

12 On the FLCU, rotate the FL LINE switch through each of the six (6) positions, momentarily stopping at each position.

Requirement: The BUSY, READY, and FLT TST lamps remain extinguished for each position.

Note 1: If the requirement is not met, replace the FLCU plug-in. Repeat Steps 1, 2, 3, 10, and 11.

Note 2: If the FL pairs are cross-connected at the MDF and the BUSY lamp lights on only one switch position, determine if FL procedures are being performed at another location using this FL line. If FL procedures are being performed from another location, delay testing until BUSY lamp extinguishes.

Note 3: The READY lamp may flicker, when the FL LINE switch is repositioned. Any operation of the BUSY lamp may inhibit the READY lamp from lighting for several seconds.

13 On the FLCU, insert a dummy plug into the FL LINE OUT jack.

14 Rotate the FL LINE switch and observe the READY lamp at each position of switch.

Requirement: The READY lamp lights for each position and the BUSY and FLT TST lamps remain extinguished.

Note: If the requirement is not met, replace the FLCU. Repeat Steps 1, 2, 3, and 10 through 14. If a fuse blows, see Chart 9.

CHART 1 (Contd)

STEP	PROCEDURE

15 Insert a dummy plug into the FLCU FLT TST IN-1 jack (dummy plug still in FL LINE OUT jack).

Requirement: The FLT TST lamp lights. The READY lamp is extinguished.

Note: If the requirement is not met, replace the FLCU. Repeat Steps 1, 2, 3, and 10 through 15.

16 Remove the plug from the FLT TST IN-1 jack and insert it into the FLT TST IN-2 jack.

Requirement: The FLT TST lamp extinguishes when the plug is removed and lights when the plug is reinserted into the FLT TST IN-2 jack.

Note: If the requirement is not met, replace the FLCU and repeat Steps 1, 2, 3, and 10 through 16.

17 Set the VOM to the 300 DC VOLTS scale. Connect + lead of the VOM to the $+V_L$ test point on the FLCU and − lead of the VOM to the $-V_L$ test point. Record the value measured on the IFLT form in the space marked FL LINE VOLTAGE MEAS.

Requirement: 116- to 135-volts dc.

Note 1: If the requirement is not met, remove the plug from the FL LINE OUT jack and repeat the voltage measurement. If the requirement is not met, perform the procedures of Chart 10, Part 3, of this section.

Note 2: If the requirement is now met, the trouble is on the outside cable pair. Refer the trouble to the proper work group. Chart 3 of this section contains tests to be made on the FL cable pair.

18 Insert an 1114- or 1115-type filter into the filter test (FLT TST) slot on the FL and OW panel (Fig. 1 or 2).

19 Remove the dummy plug from the FL LINE OUT and FLT TST IN-2 jack, and using P3-type patch cords, connect the 315B as follows:

From: 315B GEN XMT jack

To: FLCU FLT TST IN-2 jack

From: 315B FAULT LOC LINE IN jack

To: FLCU FL LINE OUT jack

CHART 1 (Contd)

STEP	PROCEDURE

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

Requirement: The 315B POWER lamp lights.

21 Set the controls of the 315B as follows:

CONTROL	POSITION
RCV LEVEL	−20
FUNCTION	MEAS 1
PULSE PERIOD	REF 11
LINE FILTER	Set to letter code of filter in FLT TST slot

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

23 On the FLCU, set the POLARITY switch to 2.

24 Set the 315B REC LEVEL control for an on-scale meter reading and note meter indication.

Requirement: −21 to −31 dBm (59 to 69 dBrn)

Note: If the requirement is not met, replace the filter in FLT TST slot. If the requirement is still not met, replace the FLCU and repeat the procedures of this chart for the replacement FLCU.

25 Set the POLARITY switch to 1.

Requirement: The meter reading drops at least 50 dB from that of Step 24, eg, from −31 dBm to −81 dBm.

Note: If the requirement is not met, replace the filter in FLT TST slot.

26 If an 1114-type filter is installed in FLT TST slot, proceed to Step 28. If an 1115-type filter is installed, remove patch plug from the FLT TST IN-2 jack and insert it into the FLT TST IN-1 jack. Read 315B meter indication.

Requirement: ±1 dB from reading obtained in Step 24.

Note: If the requirement is not met, replace the filter and repeat the tests. If the requirement is still failed, replace FLCU and repeat the applicable steps of this chart.

CHART 1 (Contd)

STEP	PROCEDURE
27	Set the POLARITY switch to 2. ***Requirement:*** The meter reading drops at least 50 dB from that of Step 26, eg, from −31 dBm to −81 dBm. ***Note:*** If the requirement is not met, replace the filter in FLT TST slot.
28	Remove the test connections. If a test termination was installed at the MDF in Step 7, remove the termination and restore the MDF to normal.

CHART 2

ACTIVE FILTER (1114/1115-TYPE) PREINSTALLATION TESTS

The 1114/1115-type active FL filters must be tested at the FL panel prior to their installation in the apparatus cases. The filter is installed into the FLT TST slot on the FL panel and accepts test inputs at FLT TST IN-1 and 2 and has its output at FL LINE OUT. Figure 9 is a simplified diagram of the test circuitry of the FL panel.

APPARATUS:

1—Sierra 315B or 415A-2 T1 Span and Repeater Test Set (315B), or (415A), or J98725AD T1C/T1 Fault-Locating Set (25AD) (Section 103-494-106). See Note.

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

Note: For this chart the 315B is used. Use the control settings of Table A if the 25AD is used.

STEP	PROCEDURE
	Prerequisite: The procedures of Chart 1 must be performed first to ensure proper operation of the FL panel.
1	Obtain the filters to be tested.
2	Set the POLARITY switch to 2.
3	Using the P3-type patch cords, connect the 315B as follows. Observe the lamps on FLCU. ***From:*** 315B FAULT LOC LINE IN jack ***To:*** FLCU FL LINE OUT jack ***Requirement:*** The READY lamp lights and the BUSY lamp is extinguished. ***Note 1:*** If the BUSY lamp is lighted, determine if FL procedures are being performed from another location using this FL line. If FL procedures are not being performed, replace the FLCU and perform the procedures of Chart 1. ***Note 2:*** The BUSY lamp may inhibit the READY lamp from lighting for several seconds.
4	Using a P3-type patch cord, connect the 315B GEN XMT jack to the FLCU FLT TST IN-2 jack (Fig. 10). ***Requirement:*** The FLT TST lamp lights.

CHART 2 (Contd)

STEP	PROCEDURE

Note: If the requirement is not met, replace the FLCU and perform the procedures of Chart 1.

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

Requirement: The 315B POWER lamp lights.

6 Insert the filter to be tested into the FLT TST slot of the FL panel.

7 Set the 315B controls as follows:

CONTROL	POSITION
FUNCTION	MEAS 1
PULSE PERIOD	REF 11
LINE FILTER	Set to letter code of filter in FLT TST slot

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

9 Set the FLCU POLARITY switch to 2.

10 Set the 315B REC LEVEL control for an on-scale meter reading and note the meter indication.

Requirement: −21 to −31 dBm (59 to 69 dBrn)

Note: If the requirement is not met, replace the filter and repeat this step.

11 Set the POLARITY switch to 1 and note the meter indication.

Requirement: The meter indication drops at least 50 dB from that of Step 10, eg, from −31 dBm to −81 dBm.

12 If 1114-type filters are being tested, proceed to Step 17.

13 For the 1115-type filters, remove the patch cord plug from the FLT TST IN-2 jack and insert it into the FLT TST IN-1 jack.

14 Note the 315B meter indication.

Requirement: ±1 dB from reading obtained in Step 10.

CHART 2 (Contd)

STEP	PROCEDURE

Note: If the requirement is not met, replace the filter in the FLT TST slot and repeat the procedures from Step4.

15 Set the POLARITY switch to 2 and note the 315B meter indication.

Requirement: The meter indication drops at least 50 dB from that of Step 14, eg, from −31 dBm to −81 dBm.

Note: If the requirement is not met, replace the filter in the FLT TST slot and repeat the procedures from Step 4.

16 Remove the patch cord plug from the FLT TST IN-1 jack and insert it into the FLT TST IN-2.

17 If an 1114A or 1115A is being tested in the FLT TST slot, proceed to Step 21.

18 For the 1114B (1115B) through 1114M (1115M) filter codes, set the 315B LINE FILTER switch to the next lower filter code than the filter installed in the FLT TST slot (see note).

Note: The next lower code for an 1114B filter would be A, for an 1114C would be B, etc.

19 Adjust the 315B REC LEVEL control for an on-scale meter reading. Add the meter reading to the REC LEVEL switch setting.

Requirement: At least 27 dB less than the reading obtained in Step 10.

Note 1: −58 dBm is 27 dB less than −31 dBm.

Note 2: If the requirement is not met, replace the filter being tested and repeat the procedure from Step 4.

20 If an 1114M or 1115M filter is being tested in the FLT TST slot, proceed to Step 23.

21 For the 1114A (1115A) through 1114L (1115L) filter codes, set the 315B LINE FILTER switch to the next higher filter code than the filter installed in the FLT TST slot (see note).

Note: The next higher filter code for an 1115A filter would be B, for B would be C, etc.

22 Set the POLARITY switch to 2 and adjust the 315B REC LEVEL control for an on-scale meter reading. Read the meter indication and combine with the REC LEVEL switch setting.

Requirement: At least 27 dB less than reading obtained in Step 10.

Note: If the requirement is not met, replace the filter and repeat this procedure from Step 4.

CHART 2 (Contd)

STEP	PROCEDURE
23	Remove the filter from the FLT TST slot. If more filters are to be tested, repeat this procedure from Step 6.
24	If all the filters have been tested, remove all the test equipment connections.

CHART 3

FAULT-LOCATING CABLE PAIR TESTS

Note: Failure to meet the requirements of this chart indicates trouble on the FL cable pair. The trouble on this pair must be corrected or another pair selected for use before the pair can be approved for use in fault-locating SLC-96 digital lines. The tests in this chart are designed to ensure that proper installation (construction) has been achieved.

The following procedures require cooperation between COT and RT personnel.

APPARATUS:

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

1—262C Terminating Plug (900-ohm)

1—P3-Type Patch Cord

STEP	PROCEDURE
1	Obtain the required IFLT form (Fig. 3). ***Note:*** For some installations this form may be provided by engineering and contain engineering calculated data for use when performing the following tests. If calculated data is not available, the forms can be reproduced locally and the test results recorded for future reference.
2	Verify that the FL panel has been turned up per Chart 1. Ensure that no plug is installed in the FL panel FL LINE OUT jack.
3	Determine that the pairs associated with the FL system are available and ready for testing. ***Note:*** All outside plant work should be completed on the pairs used for fault-locating and the proper personnel notified before testing is begun. The FL filters should have been tested and installed.
4	At the MDF, if the FL pair cross-connections have been made, proceed to Step 7. If the cross-connections have not been made, proceed to Step 5.
5	At the MDF, use the VOM to measure the voltage between the T and R terminal to ground of the FL pair being tested. ***Requirement:*** 0 volts ***Note 1:*** Record the meter indication on the IFLT form in the space marked FOREIGN VOLTAGE T-GRD and R-GRD.

CHART 3 (Contd)

STEP	PROCEDURE

Note 2: If the requirement is failed, notify outside plant personnel of the problem on the FL pair.

6 At the MDF, make the necessary cross-connections of the FL pair(s) as determined from office records. Ensure that T and R integrity is maintained in the FL pair.

DC Tests (Resistance)

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

8 Determine the test locations.

Note: The tests will be conducted from the COT to the last RT associated with the far end of the FL pair. In installations that have branches on the FL pair (see Fig. 11), each branch will be tested separately. If the FL pair has branches to other locations, ensure that the FL pairs at those locations are terminated with 262C terminating plugs.

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

9 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. 12). Remove the 262C terminating plug from the FL jack.

10 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.

11 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. 13).

12 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.

13 At the RT, remove the temporary strap that was installed in Step 11.

14 At the COT, use the VOM on the X 100 scale to measure the resistance between ***tip*** and ***ground*** and then the ring and ground of the FL pair.

Requirement: Infinite resistance (open circuit). Indicate this reading on the IFLT form in the DC TESTS block, LEAKAGE RES, T-GRD and R-GRD.

STEP	PROCEDURE
15	From the work print, determine if there is an intentional T and R reversal placed on the FL pair. ***Note:*** If 1114-type filters are being used and more than 12 filters are on the FL line, then a T and R reversal is made at some point on the FL pair to separate the filter groups. If 1115-type filters are used, a T and R reversal should ***not*** be present on the FL pair. Steps 16 through 18 check the T and R integrity of the FL pair.
16	At the RT, ground the ***tip*** side of the FL pair. ***Note:*** To ground the ***tip*** side of the line, one end of a test cord is connected to the T pin of the protector socket associated with the FL pair under test. The other end of the test cord is connected to ground.
17	At the COT, connect the VOM, on the X 100 scale, to measure the resistance between ***tip*** and ***ground*** of the FL pair. ***Requirement:*** If there ***is*** a T and R reversal on the FL pair, the meter indicates infinite resistance. If there is ***not*** a T and R reversal, the resistance should be less than that of Step 12.
18	Repeat Steps 16 and 17 for the ***ring*** side of the FL pair. ***Note:*** If there is an ***unintentional*** reversal in the FL pair, it ***must*** be corrected at the ***point*** of the reversal.
19	Remove the VOM at the COT and the ground (test cord) at the RT. Install a terminating plug into the RT FL jack (FL1 or FL2). Replace 467A protectors removed in Step 9. ***Note:*** If any requirement is not met, open the FL pair at the MDF and repeat the tests to isolate the trouble between the CO and the outside pair. If the trouble is in the CO, use office drawings and procedures to locate and correct the trouble. If the trouble is on the outside pair, refer to the proper work group and engineering for correction.
20	Repeat the DC TESTS on all branches of the FL line. When these tests are completed, ensure that a 262C terminating plug is installed in the FL jack of the last RT on each branch of the FL line.

CHART 4

NOISE TESTS

APPARATUS:

1—Sierra 315B or 415A-2 T1 Span and Repeater Test Set (315B), (or 415A) or J98725AD T1C/T1 Fault-Locating Set (25AD) (Section 103-494-106). See note.

1—J94003A (3A) or J94003C (3C) Noise Measuring Set (NMS) (Section 103-611-100 or 103-611-101).

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

1—ED-3C841 LIU Test Cord (Fig. 19).

Note: The procedures of this section use the 315B. Use Table A to determine the corresponding settings for the 25AD.

STEP	PROCEDURE
1	Determine the following from office records: (a) Determine the FL filter type (1114 or 1115) used on the FL line being tested. (b) Determine the test locations. See note. (c) Select a digital line (system) which is ***not*** in service but is monitored by the filter group (branch of fault line) selected. The digital line must be powered in accordance with Section 363-202-215. Check to determine that the proper line fuse and LIU plug-in are installed. (d) Determine the FL LINE designation (1, 2, 3, 4, 5, or 6) on the FL panel that will access the filter group to be tested. (e) Determine the FL panel POLARITY switch setting that will activate the filter group(s). ***Note:*** The tests will be conducted from the COT to the last RT associated with the far end of the FL pair. In installations that have branches on the FL pair, each branch will be tested separately.
	Broadband Noise Test
2	Verify that the FL pair is properly terminated at the RT with a 262C terminating plug (900 ohms). ***Note:*** If the FL pair is bridged to more than one RT, verify that the FL pairs are properly terminated with 262C plugs (900-ohms) at each RT (Fig. 11).
3	At the COT, install the FLCU plug-in into the FL panel if not already installed.

CHART 4 (Contd)

STEP	PROCEDURE

4 Set the FL LINE switch to the number of the FL line being tested.

5 Connect the NMS IN jack to the FL panel FL LINE OUT jack.

6 Set the NMS controls as follows:

DBRN ***to*** 10

FUNCTION ***to*** NM900

DAMP/NORM ***to*** NORM

WTG ***to*** C Message (497A Network)

7 Measure the noise level on the FL pair.

Requirement: 16 dBrnc or less. Record this reading on the IFLT form in the space marked NOISE BROADBAND.

Note 1: If the requirement is failed, perform the procedures of Chart 11.

Note 2: If the requirement is met, perform the NARROWBAND NOISE TESTS.

Narrowband Noise Tests Using the 315B

Caution: 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.

8 At the COT, 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.

9 At the COT, connect the 315B test set as follows (Fig. 14):

From: 315B GEN XMT jack

To: TRMTG LINE jack on the COT jack panel

From: 315B FAULT LOC LINE IN jack

To: FL Panel FL LINE OUT jack (remove NMS connection)

Monitoring headphone ***To:*** 315B PHONE jack

CHART 4 (Contd)

STEP	PROCEDURE

Requirement: The READY lamp lights on the FL panel when a plug is inserted into the FL LINE OUT jack.

Note: The BUSY lamp may inhibit the READY lamp from lighting for several seconds.

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

Requirement: The 315B POWER lamp lights.

11 Set the 315B controls as follows:

FUNCTION ***to*** QRW GEN

NORM ***to*** NORM

12 Set the FL panel FL LINE switch to the required position as determined in Step 1(d).

Note: The READY lamp may flicker when the FL LINE switch is repositioned.

13 If 1114-type filters are installed, set the FL panel POLARITY switch to 2 to activate the ***first*** filter group out from the COT.

If 1115-type filters are installed, set the FL panel POLARITY switch to 1 to activate the ***first*** filter group out from the COT.

14 Set the 315B LINE FILTER switch to the first filter code provided (A) and adjust the 315B REC LEVEL control knob for an on-scale reading.

Requirement: Less than −90 dBm (0 dBrn). Record the meter reading on the IFLT form in the column heading NARROWBAND NOISE for each FL filter code (A through M). If the requirement is not met, perform the procedures of Chart 11, and refer the results to engineering and supervision.

Note: −92 dBm is less than −90 dBm.

15 Repeat Step 14 for all filter codes provided (A through M).

16 If ***1114-type*** filters are installed ***and*** more than 12 filters are on the FL line, set the FL panel POLARITY switch to 1 to activate the second filter group. Repeat Step 14 for all filter codes in the second group.

If ***1115-type*** filters are installed, set the FL panel POLARITY switch to 2 to activate the filter group out from the RT.

STEP	PROCEDURE

17 Insert a KS-19531-L1 pin plug into the F END LP (Far End Loop) jack on the LIU plug-in unit associated with the digital line being used. This will initiate a digital line loopback at the RT or apply QRSS at the RT. Repeat Step 14 for all filter codes.

18 If the filters are 1115-type, proceed to Chart 5.

19 If the filters are 1114-type, continue to Step 20.

Caution: 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.

20 At the RT, using the LIU test cord, connect between an LIU location on the RT jack panel ***first*** and the LIU plug-in unit associated with the digital line to be tested.

21 Using P3BH patch cords, connect the 315B as follows (Fig. 15):

From: 315B FAULT LOC LINE IN jack

To: FL Panel FL LINE OUT jack

From: 315B GEN XMT jack

To: TRMTG LINE jack on the RT jack panel

Monitoring headphone ***To:*** 315B PHONE jack

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

Requirement: The 315B POWER lamp lights.

23 Set the 315B controls as follows:

FUNCTION ***to*** QRW GEN

NORM ***to*** NORM

24 At the COT, ensure the FL panel FL LINE switch is set to the required position as determined in Step 1(d).

25 If more than 12 filters are installed on the FL line, ensure that the FL panel POLARITY switch is set to position 1 to activate the filters closest to the RT. If less than 12 filters are installed, set the POLARITY switch to position 2.

CHART 4 (Contd)

STEP	PROCEDURE
26	Set the 315B LINE FILTER switch to the first filter code (second filter, third, etc) out from the RT and adjust the 315B REC LEVEL control knob for an on-scale reading. ***Requirement:*** Less than −90 dBm (0 dBrn) ***Note 1:*** Record this reading on the IFLT form in the column heading NARROWBAND NOISE for each FL filter code provided (A through M). If the requirement is not met, refer the results to engineering and supervision. ***Note 2:*** A separate IFLT form may have to be used to record test results from the RT.
27	Repeat Step 26 for all filter codes provided (A through M).
28	If more than 12 filters are installed, set the FL panel POLARITY switch to position 2 to activate the filter group closest to the COT. Repeat Step 26 for all filter codes provided (A through M) in this group.
29	At the RT, remove test cord from the LIU plug-in unit ***first*** and then the RT jack panel, remove the patch cords connecting the 315B test set to the RT jack panel. Install a 262C terminating plug into the FL jack. Continue to Chart 6.

CHART 5

FAULT-LOCATING SIGNAL (TONE) LEVEL TESTS FOR 1115-TYPE FILTERS

Note: The purpose of this test is to ensure that the levels of the returned FL signals are within required limits, and to record them for future reference. This test also ensures that the output level of a deactivated filter is low enough not to interfere with other signals..

STEP	PROCEDURE

Prerequisite: The procedures of Chart 4 must have been performed prior to entering this chart. All of the repeaters must be set to the OS option.

Caution: 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 At the COT, 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:

From: 315B GEN XMT jack

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 At the COT, 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 first filter out from COT.

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

6 Determine from office records (or the applicable FL panel designation card, Fig. 16) the required FL panel POLARITY switch position for fault-locating ***out*** from the COT.

Note: POLARITY 1 will activate the 1115 filters transmitting out from the COT and POLARITY 2 will activate the 1115 filters in the receiving direction.

CHART 5 (Contd)

STEP	PROCEDURE
7	Set the POLARITY switch to the POLARITY 1 position for fault-locating OUT from the COT.
8	Set the 315B REC LEVEL control for an on-scale reading. ***Requirement 1:*** Greater than −74 dBm (16 dBrn) and within ±10 dB of that recorded for the previous filter. See Note 1. If engineering has provided calculated tone levels on the IFLT form, the meter indication shall be ±6 dB of the value provided. Record the measured values on the IFLT form in the column labeled TONE LEVEL POLARITY 1 or 2 MEAS ***and*** on the applicable FL LINE label. Also, record the value on the fault-locating record (FLR) form in the space marked TRANSMISSION TEST MEAS 1. ***Note 1:*** −72 dBm is greater than −74 dBm. ***Requirement 2:*** The fault-locating 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) Filter missing, defective, or not connected to the FL pair. (c) Defective repeater. (d) Defective apparatus case FL filter switch (located behind, and operated by, a plugged-in FL-filter). (e) FL pair defective. (f) Digital line cable trouble. (g) Tip and Ring reversal. At the point in which no fault tones are received, set POLARITY switch to other polarity. If fault tones are now received, the pair is reversed in the line section ahead (closer to COT) of this filter location. (h) Check for proper repeater options (OS).
9	Repeat Step 8 for all filter codes (A through M) installed.
10	At the COT, return the 315B LINE FILTER switch to the letter code of the first filter out from the RT.
11	Insert a KS-19531-L1 pin plug into the F END LP (Far End Loop) jack on the LIU plug-in unit associated with the digital line being used. This will loop the digital line back at the RT.

CHART 5 (Contd)

STEP	PROCEDURE
12	At the COT, set the FL panel POLARITY switch to the POLARITY 2 position (for fault-locating transmission from the RT) and set the 315B REC LEVEL control for an on-scale reading. See Note 1. ***Requirement:*** The same as that recorded in Step 8. ***Note 1:*** POLARITY 2 will activate the filters out from the RT. ***Note 2:*** If the requirements in Step 8 were ***not*** met, and the meter reading now indicates greater than −74 dBm (16 dBrnc), a tip and ring reversal exists in the FL pair between the filter location under test and the preceding filter. This ***unintentional*** reversal ***must*** be corrected at the ***point*** of the reversal. Then repeat this procedure from Step 7.
13	Repeat Steps 10, 11, and 12 for all filter codes (A through M) installed. ***Note:*** Record the measured values on the IFLT form in the column labeled TONE LEVEL POLARITY 1 or 2 MEAS. Also, record this value on the FLR form in the space marked TRANSMISSION TEST MEAS 1. If the requirement is not met, see Note 2 in Step 8.
14	If the FL pair being tested has branches to other locations, repeat the tests of Charts 4 and 5 on all branches.
15	When the tests of this section have been completed, perform the fault-locating procedures of Section 363-202-516. ***Note:*** Fault-locating records must be kept for all SLC-96 systems and FL pairs for future reference and trouble analysis. The test connections made in this chart will be the same as for the procedures in Section 363-202-516.

CHART 6

FAULT-LOCATING SIGNAL (TONE) LEVEL TESTS FOR 1114-TYPE FILTERS

Note: The purpose of this test is to ensure that the levels of the returned FL signals are within required limits, and to record them for future reference. This test also ensures that the output level of a deactivated filter is low enough not to interfere with other signals and that there are no unauthorized T and R reversals on the FL pair.

STEP	PROCEDURE

Prerequisite: The procedures of Chart 4 must have been performed prior to entering this chart. All of the repeaters must be set to the STD option.

1 Determine from office records or work prints the location of the authorized T and R reversal (if required) on the FL pair. If no T and R reversal is required (12 or less filters), proceed to Step 3.

2 At the last apparatus case ***out from COT before*** the authorized T and R reversal, terminate the repeater output of the digital line being used for testing.

Note: To terminate the repeater output, remove the correct repeater from its slot and insert it into the J98725AB set or equivalent. Insert the correct probe of the 25AB into the repeater slot and terminate the output with the 100 Ω TERM/LINE switch (Fig. 17).

Caution: 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.

3 At the COT, 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.

4 At the COT, ensure the 315B is connected as follows (Fig. 14):

From: 315B GEN XMT jack

To: TRMTG LINE jack on the COT jack panel

From: 315B FAULT LOC LINE IN jack

To: FL Panel FL LINE OUT jack

5 Ensure the 315B controls are set 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 first filter in a group out from COT.

CHART 6 (Contd)

STEP	PROCEDURE

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

7 Determine from the applicable FL panel designation card (Fig. 16) or office records, the POLARITY switch position to activate the filter selected for test.

Note: POLARITY 2 will activate the 1114 filter group closest to the COT and POLARITY 1 will activate the filter group beyond the ***authorized*** T and R reversal.

8 Set the POLARITY switch to the correct position to activate the filter selected for test.

9 Set the 315B REC LEVEL control for an on-scale reading. Record the measured values on the IFLT form in the column labeled TONE LEVEL POLARITY 1 or 2 MEAS and on the applicable FL panel designation card (Fig. 16). Also, record this value on the FLR form in the space marked TRANSMISSION TEST MEAS 1 (Fig. 4).

Requirement 1: Greater than −74 dBm (16 dBrn) and within ±10 dB of that recorded for the previous filter. See note. If engineering has provided calculated tone levels on the IFLT form, the meter indication shall be ±6 dB of the value provided.

Note 1: −72 dBm is greater than −74 dBm. The meter indication from the filter at the terminated repeater will be approximately 2 dB below normal due to the loading effect of the transformer in the 25AB.

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

Note 2: If the requirement of Step 9 is ***not*** met, change the POLARITY switch to the opposite polarity. If the tone level now meets the requirement, an unintentional tip and ring reversal exists in the fault line between the filter under test and the preceding filter. This ***unintentional*** reversal ***must*** be corrected at the ***point*** of the reversal. Then repeat this procedure from Step 9.

Note 3: Failure to meet these requirements may be caused by one or more of the following:

(a) Test equipment or connections faulty

(b) Filter missing, defective, or not connected to the FL pair

(c) Defective repeater

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

(e) FL pair defective or an unauthorized tip and ring reversal

CHART 6 (Contd)

STEP	PROCEDURE

(f) Digital line cable trouble

(g) Tip and Ring reversal

(h) Check for proper repeater options (STD).

10 On the FLCU, set the POLARITY switch to deactivate the selected filter (change polarity).

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

Requirement: The meter indication drops at least 30 dB from that of Step 8 (eg, from −40 dBm to −70 dBm).

Note: If the requirement is not met, see Note 3 in Step 9.

12 If all filters in this group have not been tested, set the 315B LINE FILTER switch to the next filter out (second filter, third, etc) and repeat Steps 8 through 11. If no unauthorized T and R reversal is on the FL pair, proceed to Step 18 after all filters have been tested.

Note: Any trouble found in the first filter group should be cleared before testing the second filter group.

13 At the terminated repeater location, remove the 25AB and restore the repeater to its normal operating condition.

14 At the FL panel, ensure the POLARITY switch is set to activate the filters between the authorized T and R reversal and the RT.

15 Set the 315B LINE FILTER switch to the code letter of the filter to be tested and repeat Step 9 for each filter, in order, from the authorized T and R reversal to the RT.

16 At the last apparatus case ***out from the RT before*** the authorized T and R reversal, terminate the repeater output of the digital line being used for testing. See note in Step 2.

Caution: 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.

17 At the RT, using the LIU test cord, connect between an LIU location on the RT jack panel ***first*** and the LIU plug-in unit associated with the digital line to be tested.

18 Using P3-type patch cords, connect the 315B as follows (Fig. 15):

From: 315B GEN XMT jack

CHART 6 (Contd)

STEP	PROCEDURE

To: RT jack panel TRANSMITTING LINE jack

From: 315B FAULT LOC LINE IN jack

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

Connect the monitoring headphone to the 315B PHONE jack.

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.

19 At the COT, remove all patch cords from the FL panel.

20 At the RT, 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 filter closest to RT.

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

22 At the COT, ensure the FLCU POLARITY switch is set to the position to activate the group of filters between the authorized T and R reversal and the RT. If no T and R reversal is required, set the POLARITY switch to the same as in Steps 7 and 8 to activate the filters being tested. Insert a 262C terminating plug into the FL LINE OUT jack on the fault locate panel.

23 At the RT, set the 315B LINE FILTER switch to the code letter of the filter to be tested from the RT.

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

Requirement 1: Greater than −74 dBm (16 dBrn). See Notes 2 and 4. If engineering has provided calculated tone levels on the IFLT form, the meter indication shall be ±6 dB of value provided.

Note 1: −72 dBm is greater than −74 dBm.

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

CHART 6 (Contd)

STEP	PROCEDURE

Note 2: If the requirements in Step 24 were ***not*** met, and the meter reading now indicates greater than −74 dBm (16 dBrn), a tip and ring reversal exists in the FL pair between the filter location under test and the preceding filter. This ***unintentional*** reversal ***must*** be corrected at the ***point*** of the reversal. Then repeat this procedure from Step 24.

Note 3: Record the measured values on the IFLT form (Fig. 3) in the column labeled TONE LEVEL POLARITY 1 or 2 MEAS and on the applicable FL LINE label, if provided. Also record this value on the FLR form in the space marked TRANSMISSION TEST MEAS 1.

Note 4: 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) Defective apparatus case wiring

(d) Digital line cable trouble

(e) Tip and Ring reversal

(f) Check for proper repeater options (STD).

25 On the FLCU, set the POLARITY switch to deactivate the selected filter.

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

Requirement: The meter indication drops at least 30 dB from that of Step 24 (eg, from −40 dBm to −70 dBm).

Note: If the requirement is not met, see Notes 2 and 4 in Step 24.

27 If all filters in this group have not been tested, set the 315B LINE FILTER switch to the next filter out from the RT (second filter, third, etc) and repeat Steps 24 through 26. If ***no*** T and R reversal is on the FL pair, proceed to Step 31.

28 At the terminated repeater location, remove the 25AB and restore the repeater to its normal operating condition.

29 At the COT, set the FLCU POLARITY switch to activate the group of filters between the COT and the authorized T and R reversal.

30 At the RT, repeat Step 24 for all filters between the COT and the authorized T and R reversal.

CHART 6 (Contd)

STEP	PROCEDURE
31	If the FL pair being tested has branches to other locations, repeat the tests of this chart on all branches.
32	When the tests of this chart have been completed, perform the fault-locating procedures of Section 363-202-516. ***Note:*** Fault-Locating Records must be kept for all SLC-96 systems and FL pairs for future reference and trouble analysis. The test connections made in this chart will be the same for the procedures in Section 363-202-516.

B. Order Wire

CHART 7

ORDER WIRE PANEL TURNUP

This chart gives procedures for turning up the order-wire portion of the J1C141AC FL and OW panel or for making an addition to an existing FL and OW panel. This involves option selections, cross-connections, fusing, and operation tests. Fig. 18 shows the order-wire plug-ins.

The OW and TEL SET plug-in [ED-3C556-( ) GP3] is normally provided in the SLC-96 FL and OW panel for communicating over an order wire between the COT and RT(s) and each intermediate repeater location. However, if the SLC-96 system follows the same route as another system which is already served by an order wire, both systems may share this order wire. The SLC-96 COT FL and OW panel will in this case, require a MULTIPLE CIRCUIT plug-in unit [ED-3C557-( ) GP1] with office wiring between it and the existing OW panel (equipped with an OW and TEL SET plug-in).

APPARATUS:

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

1—1014A Handset Equipped with 2W37A Cord or 1013A Handset

2—52-Type Headsets (Fig. 20)

STEP	PROCEDURE
	Preparation
1	Determine from the office records the OW PNL position(s) to be equipped and the code(s) of the OW plug-in(s) required.
2	Determine that the required order-wire lines are connected to the FL and OW PNL. Also determine that the required lines are ready for powering or service.
3	Remove the OW/FL PNL fuses from the fuse and alarm panel.
4	Determine the required OW cross-connections, if any. Check the points to be cross-connected for presence of voltage; clear voltage if present. Make the required cross-connections.
	Option Selection
5a	For OW & TEL SET plug-ins only, determine from the office records the OW power required for the OW PNL. Option W is for 48 volts, and option U is for 96 volts.
5b	For MULTIPLE CIRCUIT plug-ins, go to Step 9.

STEP	PROCEDURE
6a	For 48-volt OW powering (option W normally provided), ensure that a strap is in place on TS3 between terminals 1 and 2, at the rear of the FL and OW panel.
6b	For 96-volt OW powering (option U), remove strap between terminals 1 and 2, on TS3 and place a strap between terminals 1 and 3, at the rear of the FL and OW panel.
7	Determine if option V for office service alarms not accepting loop closures is needed.
8a	If option V is necessary, install straps between the TS1-16, -18, and -19 terminals at rear of the FL and OW PNL.
8b	If option V is not needed, ensure that no straps are in place between the TS1-16, -18, and -19 terminals at the rear of the FL and OW PNL.
	Plug-In Installation
9	Install the plug-in in the proper FL and OW PNL slot (J1).
	Fusing
10	Insert type 70B (2.0 amp) fuses into the OW/FL PNL fuse block(s) on the fuse and alarm panel. ***Requirement:*** Fuses must not operate (blow). If the requirement is not met, refer to the OW fusing trouble chart (Chart 12).
11a	Use the 60-volt dc scale on the VOM to measure the OW PNL input voltage between the TS1-20 (−48V) and −19 (GRD) terminals. ***Requirement:*** Normal voltage range, 45 to 50 volts.
11b	For 96-volt powering, use the 300-volt dc scale on the VOM to measure the OW PNL input voltage between the TS2-20 (+130 volts) and the TS2-18 (GRD) terminals. ***Requirement:*** Normal voltage range, 125 to 135 volts. ***Note:*** The 96-volt OW powering is developed from +130 volts and ground by the use of diodes CR1 and CR2 in the +130 volt lead (see SD-3C423-01).
12	Applicable steps for testing each plug-in are listed below. See note.

CHART 7 (Contd)

STEP	PROCEDURE

OW PLUG-IN	APPLICABLE STEPS
OW & TEL SET	13 through 21
MULTIPLE CIRCUIT	22 through 30

Note: Only one plug-in is provided for any application.

OW & TEL SET

13 On the DF, determine the locations of the OW pairs associated with the OW & TEL SET position. Also determine if a subscriber line is provided at the OW & TEL SET position.

OW & TEL SET Communication and Plug-In Test

14 Ensure that the OW & TEL SET plug-in ACO key is in the horizontal position (nonoperated). Also ensure that no cords, plugs, or headsets are connected to the OW & TEL SET.

15 Obtain a 1014A handset with a 2W37A cord. Set MON-TALK switch to MON. Bridge across the OW pair on the bay side of the DF.

16a If the OW & TEL SET has not been provided a subscriber line, go to Step 17.

16b If the OW & TEL SET is connected to a subscriber line, move MON-TALK switch (on 1014A handset) to TALK. A dial tone should be heard. Dial the testboard and make a communication check. To disconnect, move the switch to MON.

Requirement: The call is completed. If the requirement is not met, attempt to clear the trouble by referring to Table B.

Note: If no test board is available, call the office phone for communication check.

17 Momentarily move the 1014A MON-TALK switch to TALK. ***Return switch to MON for at least 5 seconds but no more than 15 seconds,*** then move permanently to TALK. Quiet condition should be heard in the handset. There should be sidetone but no dial tone.

Note: If the switch is not moved from MON after the required amount of time, the quiet termination will not be achieved and another try will be necessary.

18 If connected, the office service alarms will operate. The OW lamp will light on the OW & TEL SET plug-in. Turn ACO key; the audible service alarm should silence and the ACO lamp should light.

19 Restore ACO key to normal; the ACO lamp will be extinguished and an audible alarm will sound. Patch the 52-type headset (Fig. 20) into the OW & TEL SET jacks; the ACO lamp will light and the audible alarm will be silenced. Make a communication check with the DF.

CHART 7 (Contd)

STEP	PROCEDURE

Requirement: Quiet termination and lamp test should pass. If any portions of Steps 17 through 19 fail, replace the OW plug-in.

20 Remove the 52-type headset. On the 1014A handset, move switch to MON; then remove the 1014A handset from the DF or protector panel.

OW & TEL SET Test Complete

21a If another plug-in for the OW PNL needs to be tested, return to Step 12.

21b If the required plug-in for the OW PNL has been tested, go to Step 31.

MULTIPLE CIRCUIT PLUG-IN TEST

22 Determine that the OW cabling connections between the COT FL and OW panel and the other office order wire panel are completed.

23a The communication test can be deferred until powering on the cabling can be completed or until after the OW system test of Chart 8. Go to Step 28 for the plug-in tests.

23b If the OW powering and cabling is completed, determine which terminals on the DF for the OW pair are connected to the MULTIPLE CIRCUIT PLUG-IN or the COT (via the existing office order wire panel).

Communication Test

24 Obtain a 1014A handset (yellow) with a 2W37A cord. Set the MON-TALK switch to MON. Bridge across the OW pair at the DF.

25 Momentarily move the 1014A MON-TALK to TALK. Return the switch to MON for at least 5 seconds but no more than 15 seconds, then move permanently to TALK. Quiet condition should be heard in the handset.

26 Patch the 52-type headset into the OW TEL SET jacks on the MULTIPLE CIRCUIT plug-in. Make a communication check with the DF.

27 Remove the 52-type headset. On the 1014A handset move the switch to MON; then remove the 1014A handset from the DF.

Plug-In Test

28 Ensure that no cords, plugs, or headsets are connected to the MULTIPLE CIRCUIT plug-in.

CHART 7 (Contd)

STEP	PROCEDURE
29	Patch the 52-type headset to the OW TEL SET jacks on the MULTIPLE CIRCUIT plug-in. The ACO lamp should light. Then remove the 52-type headset. The ACO lamp should extinguish.
	Test Complete
30a	If another plug-in is to be tested, return to Step 12.
30b	If the plug-ins in the FL and OW PNL have been tested, go to Step 31.
	OW PNL Turnup and Tests Complete
31	The OW PNL turnup and tests have been completed on this bay. These tests can be done on a single-bay basis.

CHART 8

ORDER WIRE SYSTEM TEST

The procedures in this chart are used to test the OW connections between offices. The OW must provide sufficient speech volume at a low enough noise level to permit communication with the offices at the other end of the system.

APPARATUS:

1—52-type headset (Fig. 20)

1—1014A handset with 2W37A cord

STEP	PROCEDURE
1	In the local office, determine the slots of the OW PNL which require testing. (Only slots with newly added OW & TEL SET or MULTIPLE CIRCUIT plug-ins require testing.) Determine the OW lines to which the plug-ins are connected.
2	A craft person will be required at the RT to assist in completing the following tests. ***Note:*** If a crew is to be sent to the unattended office, advise the crew supervisor to establish contact when they arrive. (This task is one of several tasks to be performed.)
3	Prior to test time, determine the following: • That outside plant has turned over the OW circuit • That protection units are installed at the DF or protector panel • That the OW PNL turnup and plug-in installation has been completed.
	Communication Check
4	At the RT, connect the 1014A handset to the OW terminals on the 1A power and jack panel and obtain a "quiet termination" (see Step 17, Chart 7). ***Requirement:*** Obtaining a quiet termination will cause an order wire alarm at the CO. Insertion of the 52-type headset in the OW TEL SET jack at the COT FL and OW panel will silence the alarm and communication should be established between the COT and RT.
5	After the offices have made OW contact, make a communication check. The COT offices will evaluate the communication. ***Requirement:*** The quality of the talk circuit should have sufficient speech volume and a low enough noise level for clear communications. If the requirement is not met, see Table B.

CHART 8 (Contd)

STEP	PROCEDURE
	Test Complete
6	If the talk circuit is satisfactory, remove the 52-type headset. This OW is now considered ready for use as a maintenance aid. If other OWs in the local office require testing, return to Step 1.

3. TROUBLE LOCATION

3.01 The following charts provide procedures for locating some types of trouble detected during the tests of this section. Chart 9 provides procedures for locating trouble causing blown fuses for the FL panel. Chart 10 provides procedures to isolate FL panel powering problems. Chart 11 contains procedures to isolate the cause of a noisy FL pair.

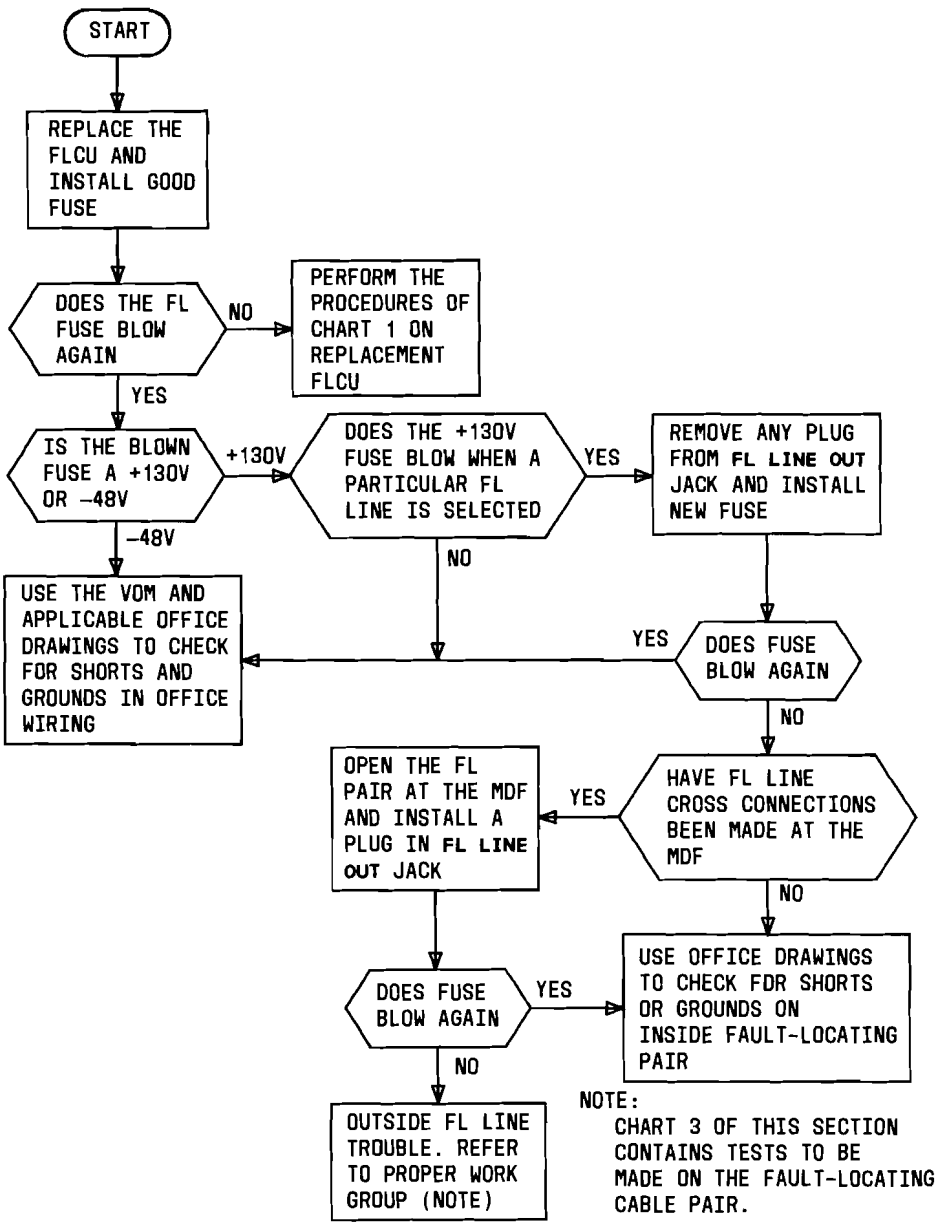


Chart 9—Blown FL Fuse Trouble

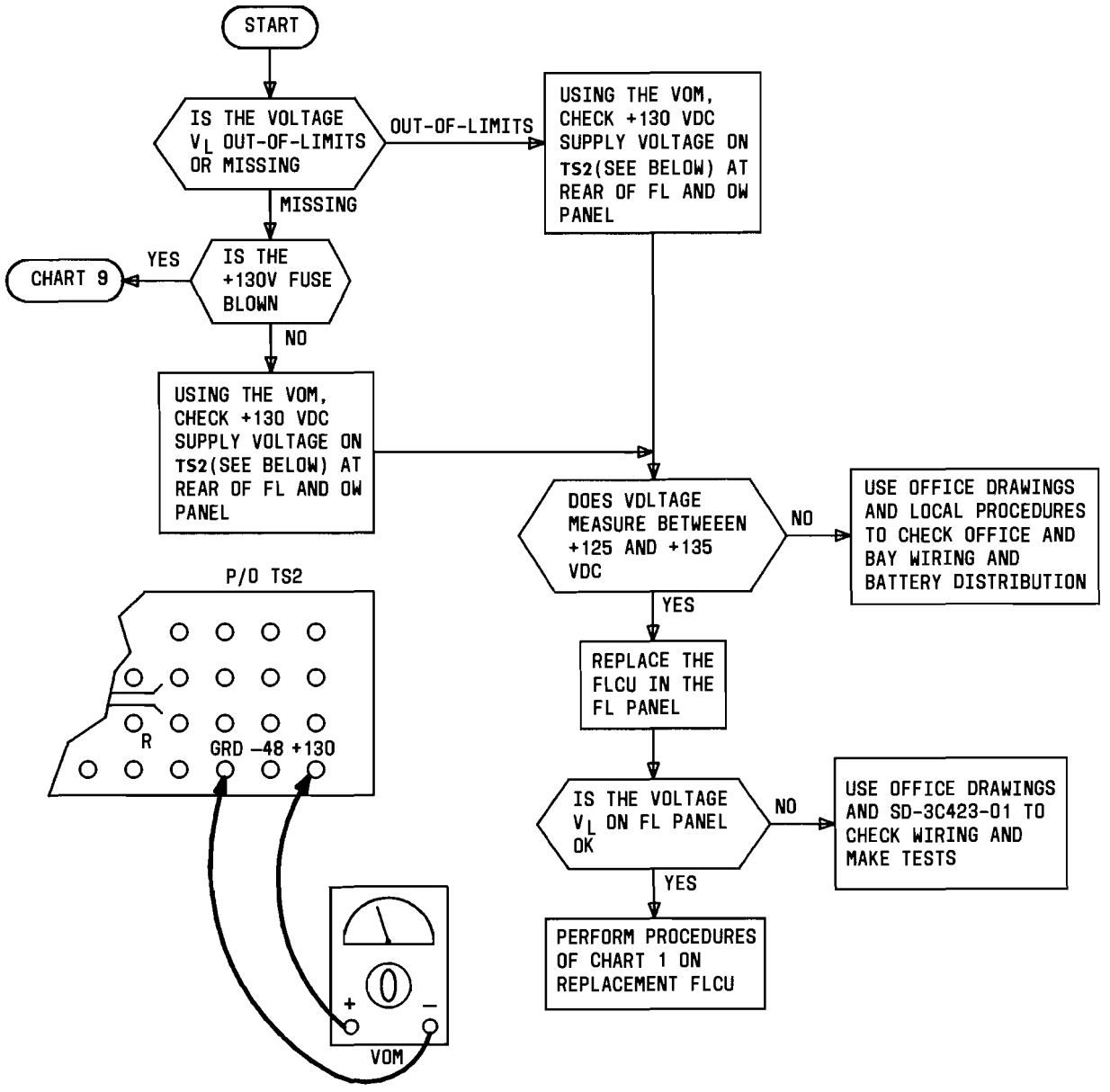


Chart 10—FL Panel Powering (V_L)Trouble

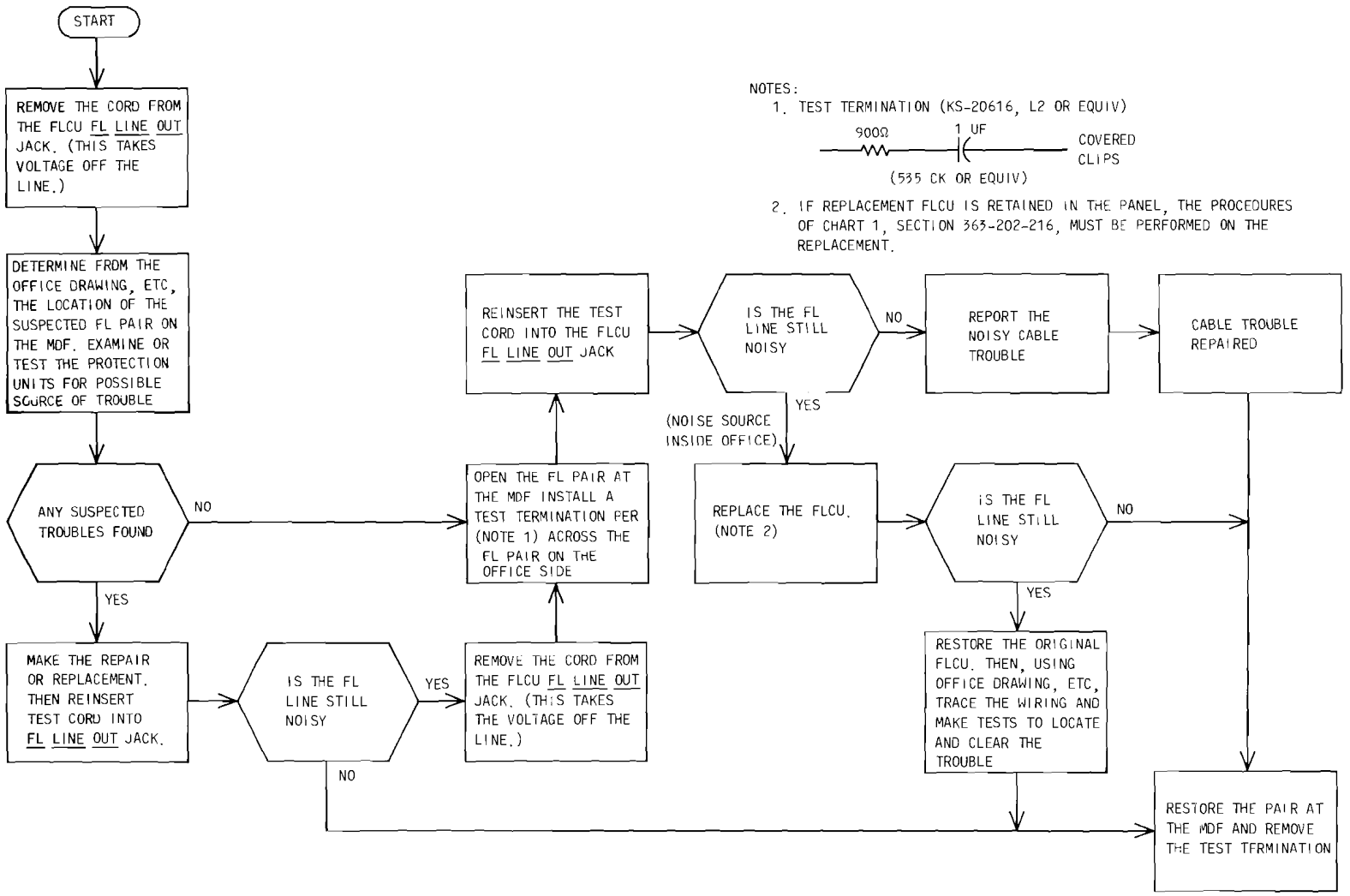


Chart 11—Noisy FL Pair Trouble

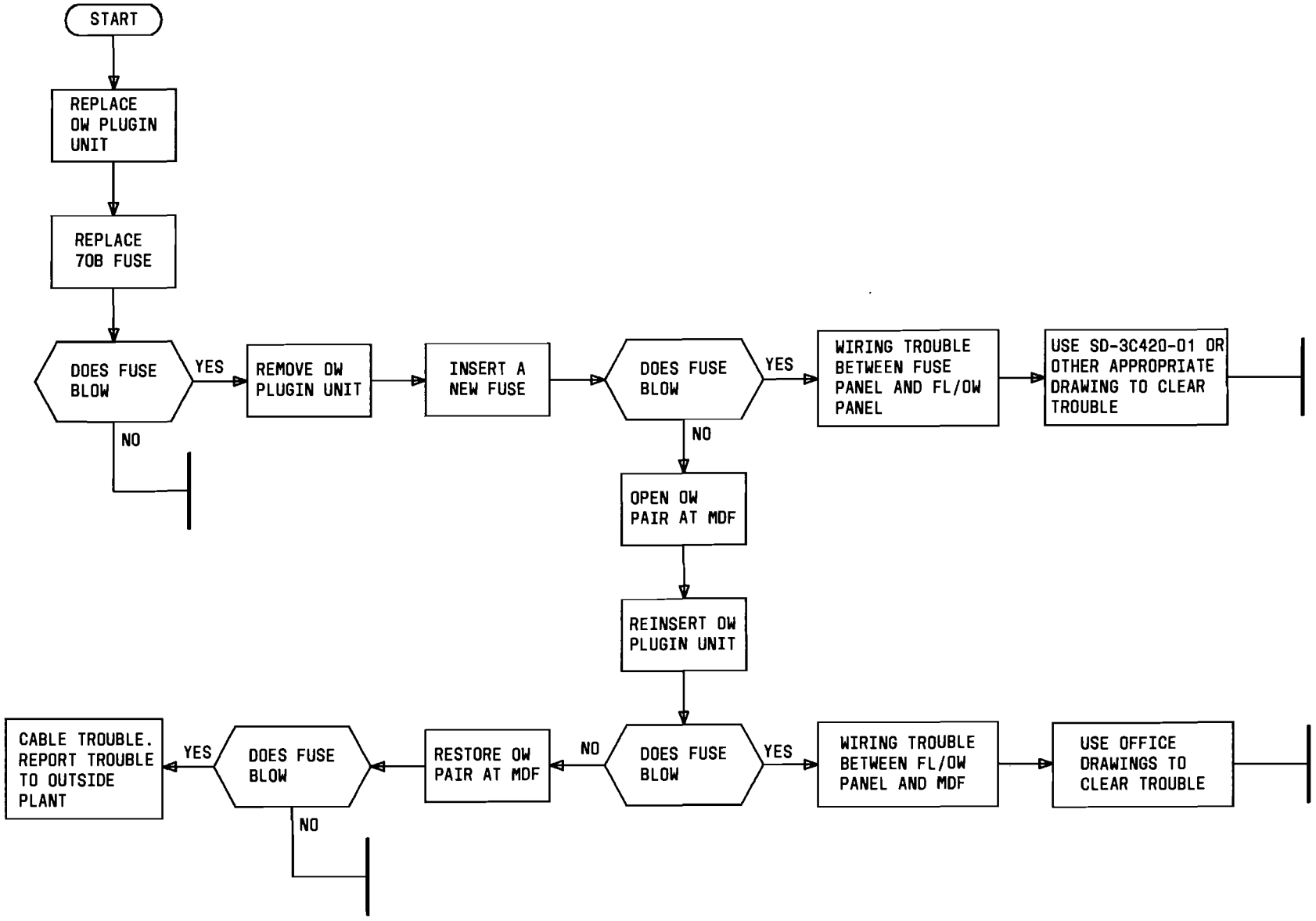


Chart 12—Blown Order Wire Fuse Trouble

TABLE A

25AD PREINSTALLATION CONTROL SETTINGS

CONNECTIONS		25AD CONTROL SETTINGS	
FROM –25AD FL TEST SET	TO FLCU (NOTE 1)	CONTROL	POSITION
GEN SPAN LINE	FLT TST IN	CLOCK RATE	T1
		FUNCTION	Note 2
RCV FL LINE	FL LINE OUT	PULSE DENSITY	11 REF
		RECEIVER SENSITIVITY	On-scale reading
		FILTER	Code letter of filter

Note 1: The FLCU FLT TST IN-1 and 2 jacks are used for filter preinstallation tests.

Note 2: If the 315B setting is QRW GEN, the 25AD FUNCTION switch setting would be on BIPOLAR SIGNAL. If the 315B setting is MEAS 1, 2, or 3, the 25AD FUNCTION switch setting would be the same.

TABLE B

OW TROUBLE TABLE

TEST	REQUIREMENTS	REQUIREMENTS NOT MET
Toward Cable		
Leakage resistance from Tip to Grd	Greater than 30,000 ohms	Cable trouble — notify outside plant
Leakage resistance from Ring to Grd	Greater than 30,000 ohms	Cable trouble — notify outside plant
Loop resistance	Greater than 30,000 ohms	Cable trouble — notify outside plant
Foreign potential	None	Contact outside plant and engineering
Toward Office		
Voltage Tip to Grd	+45 ±5 Vdc (96-volt powering) or Grd continuity (−48 volt powering only)	Office troubles — wiring, resistance lamp, plug-in or fuse. Remove FL/OW PNL fuses (+130, −48), then use SD-3C423-01 & SD-3C420-01 to clear trouble.
Voltage Ring to Grd	−48V ±5 Vdc	Same as above

Note 1: The OW can be checked using a test desk or local test cabinet by connecting test leads to the OW at the MDF. The test position will test toward the cable and then toward the office. See Note 2.

Note 2: The MDF must be restored after this testing.

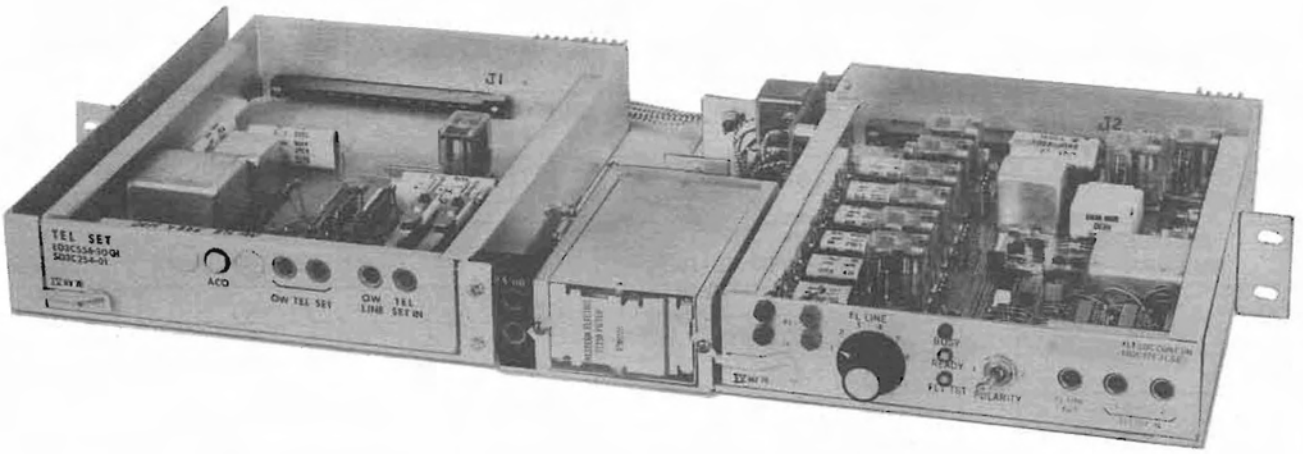


Fig. 1—SLC-96 Fault-Locate and Order Wire Panel (J1C141AC-L1)

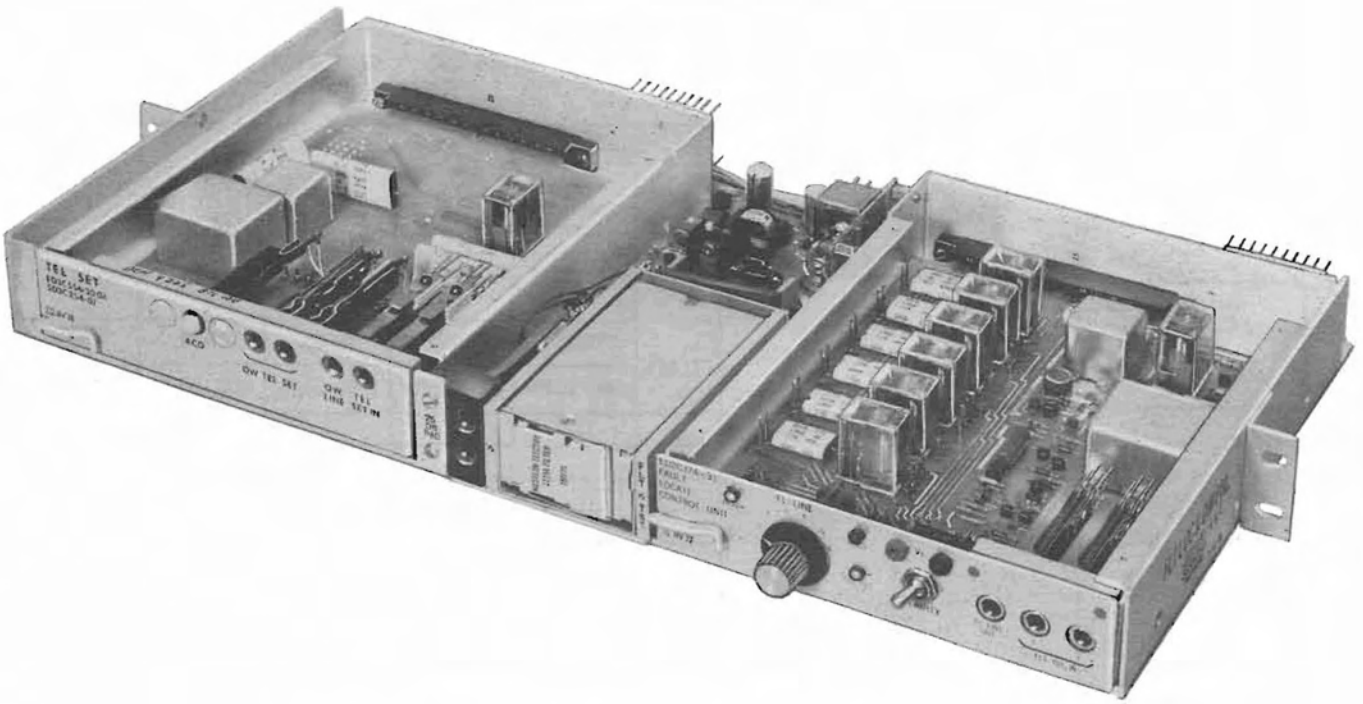


Fig. 2—SLC-96 Fault-Locate and Order Wire Panel (J1C141AC-L1, L2)

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
PDLARITY 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. 3—Initial Fault Line Tests (IFLT) Form

SLC-96 FAULT-LOCATING RECORD

TEST LOCATION
☐ COT
☐ RT

FAULT-LOCATE LINE NUMBER _____

FAULT-LOCATE SET
☐ SIERRA 3158
☐ 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. 4—Fault-Locating Record (FLR) Form

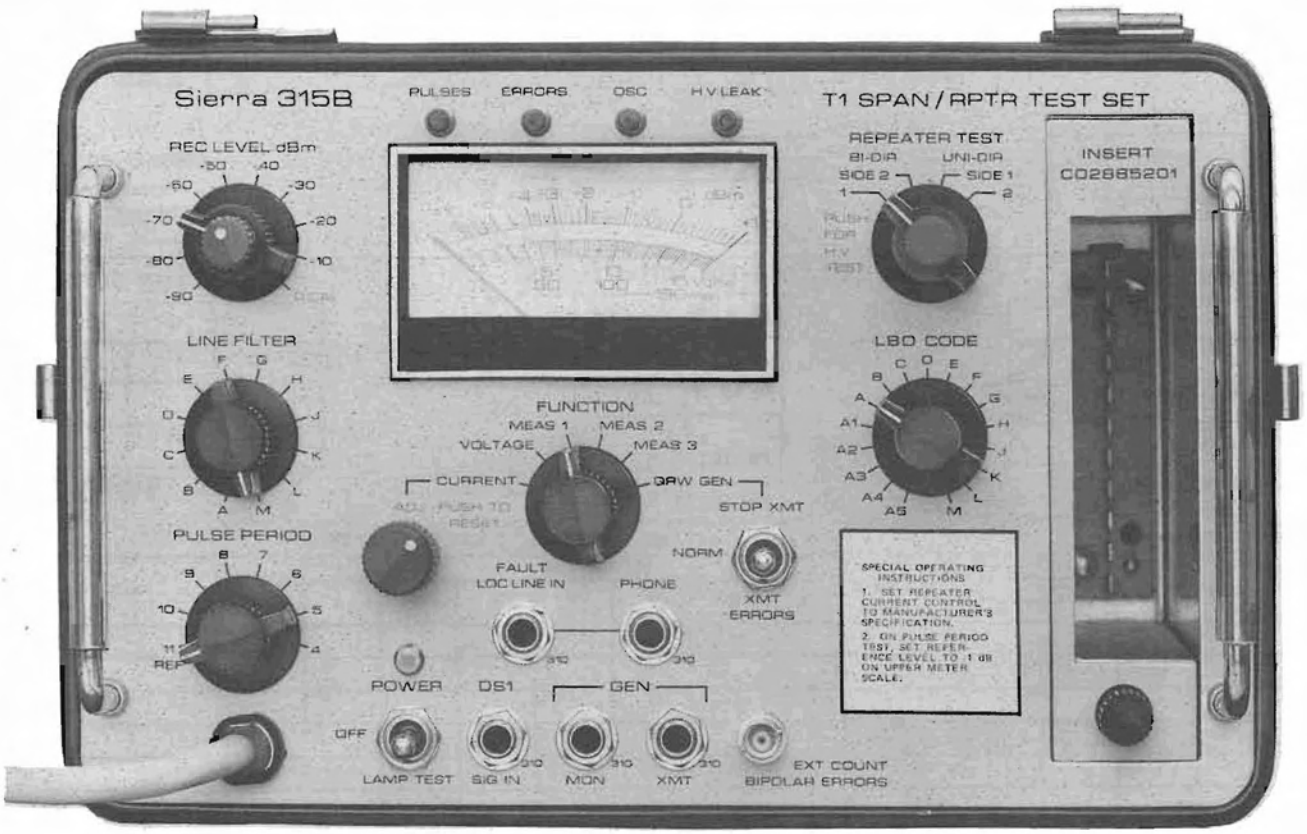


Fig. 5—Sierra 315B T1 Span and Repeater Test Set

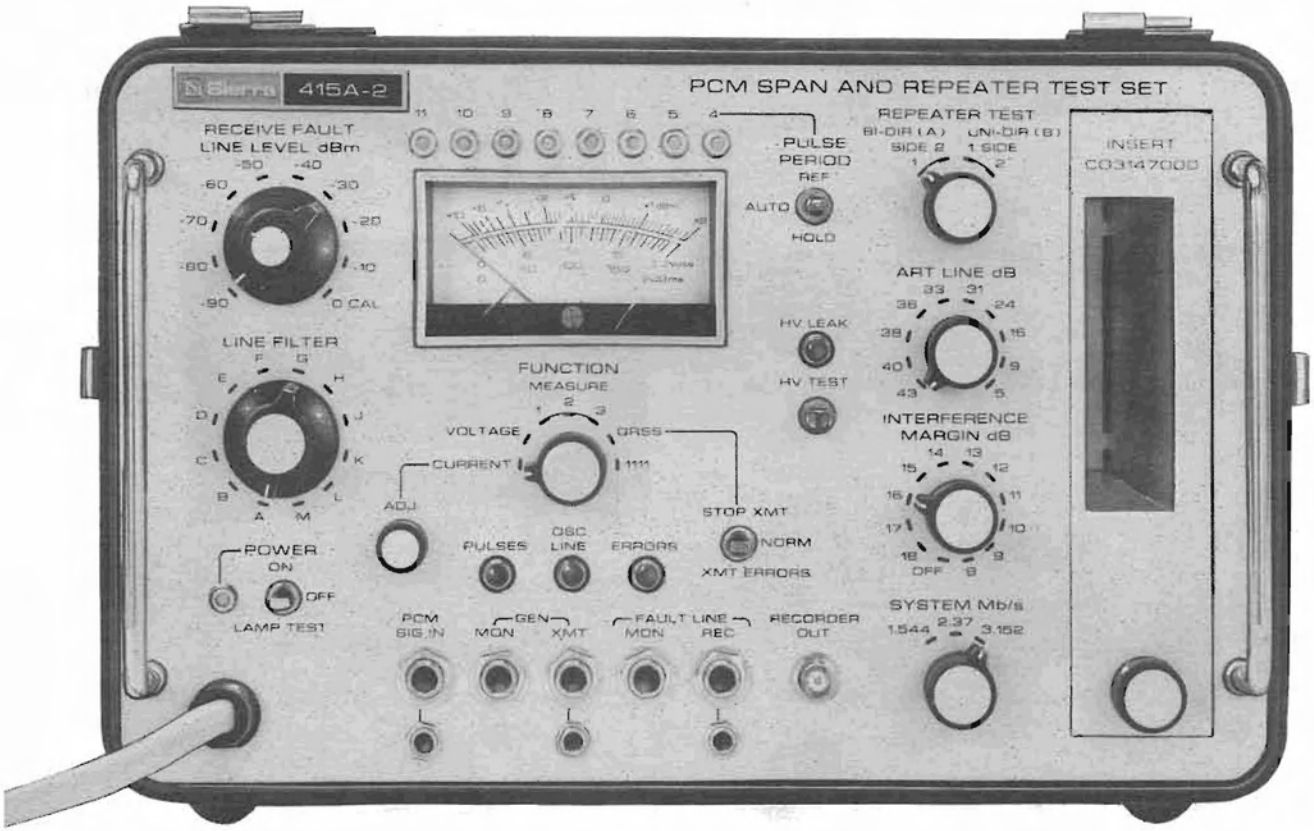
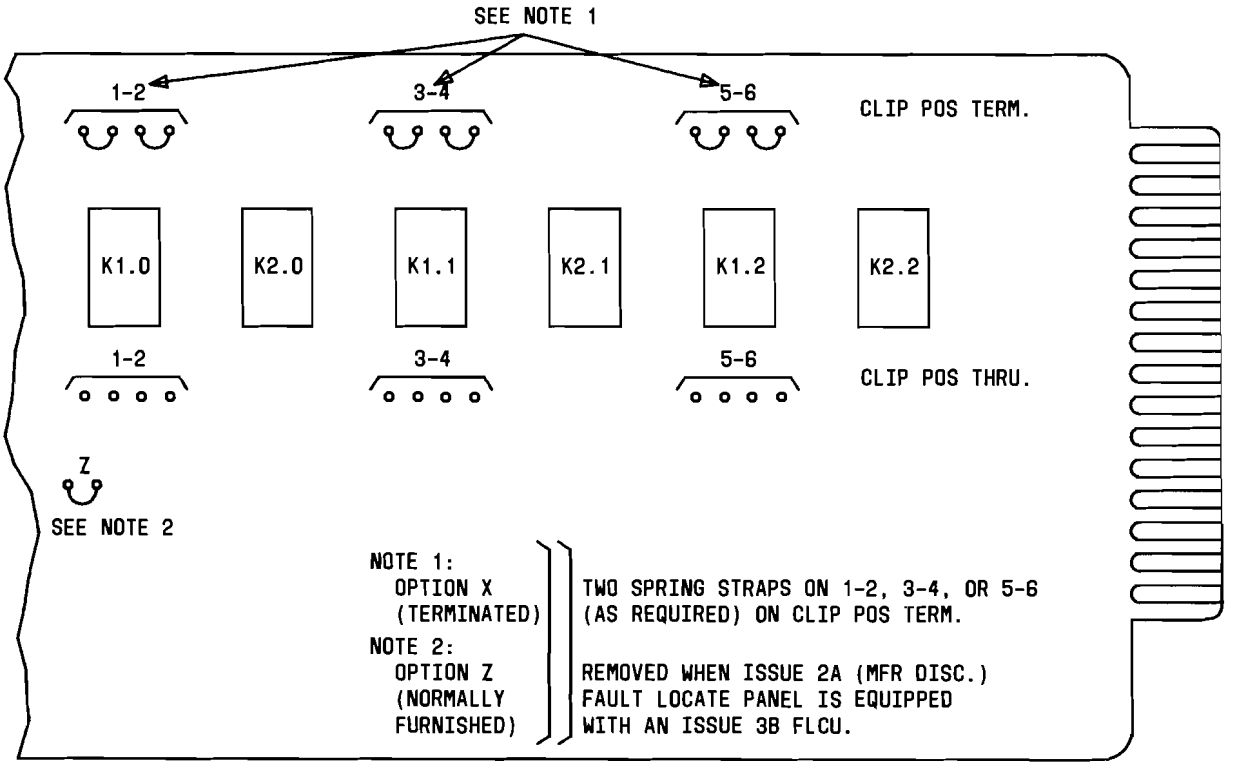
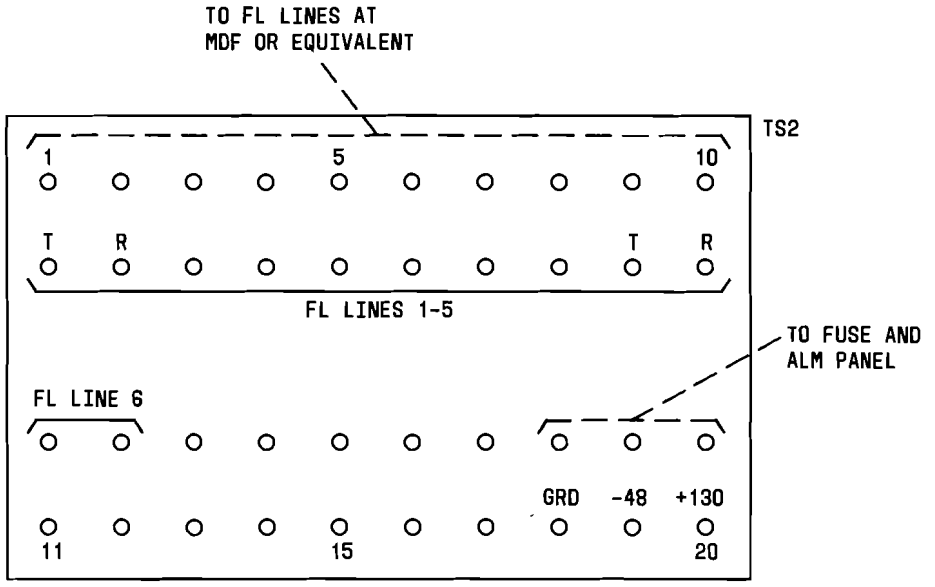


Fig. 6—Sierra 415A-2 PCM Span and Repeater Test Set

Fig. 7—J98725AD T1C/T1 Fault-Locate Test Set



A. FLCU OPTIONS



B. TS2 WIRING AT REAR OF FL PANEL

Fig. 8—Fault-Locate Control Unit (FLCU) Options and TS2 Wiring

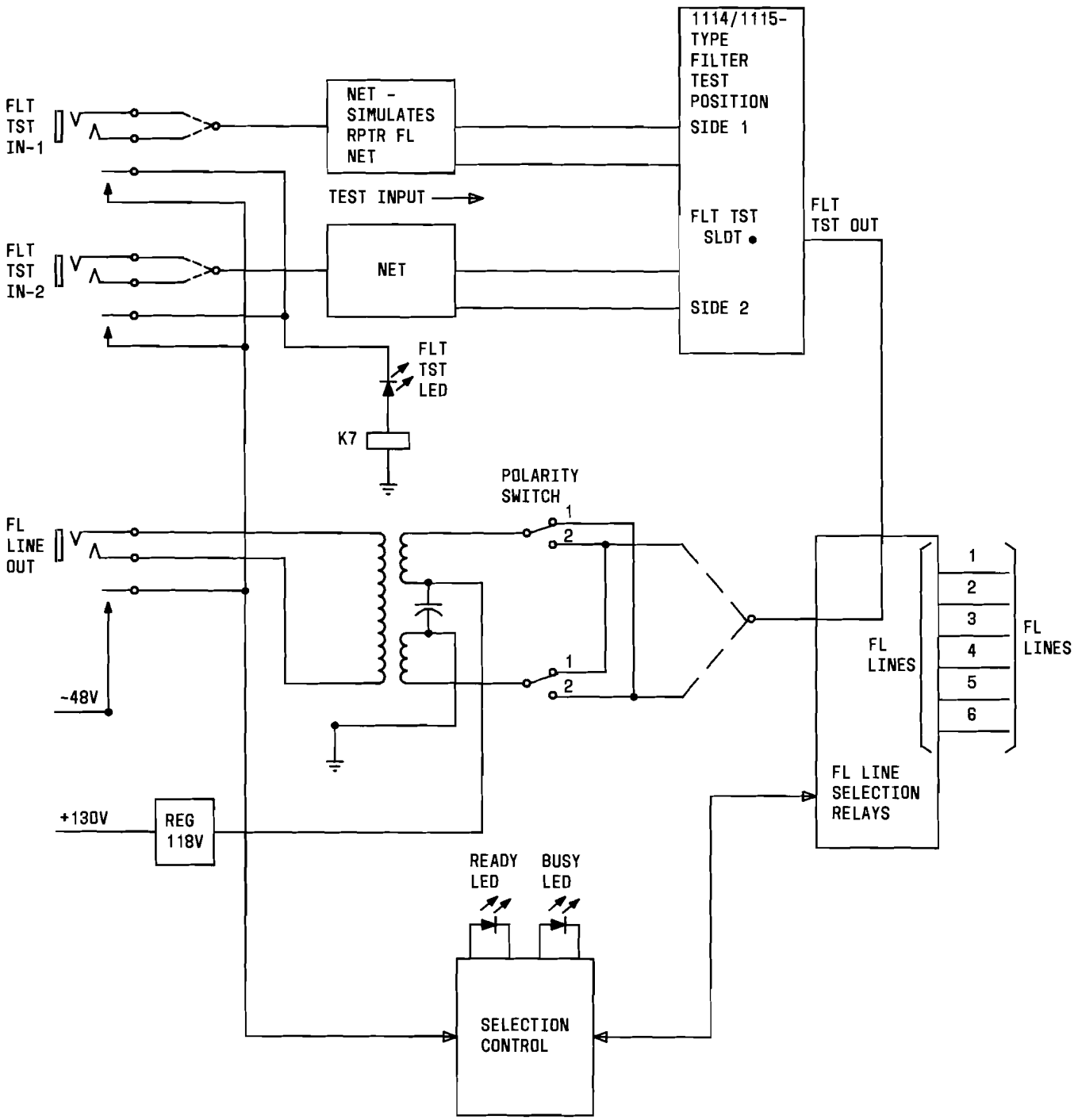


Fig. 9—Simplified Diagram of the Fault-Locate Test Position

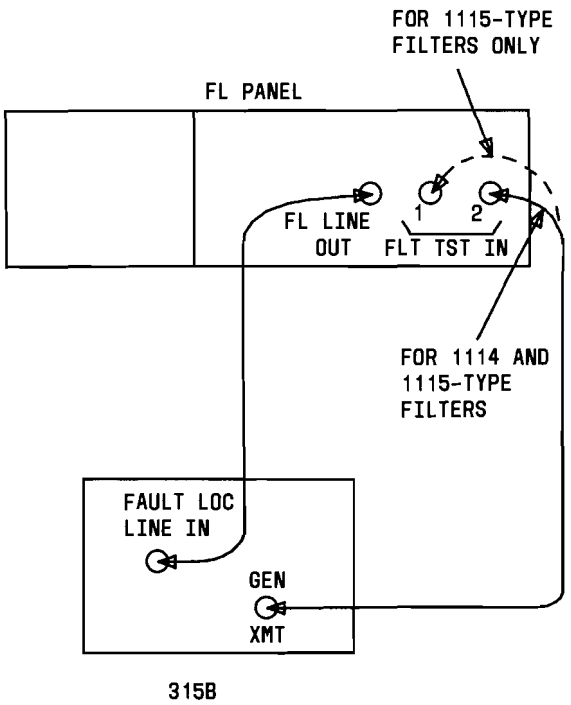
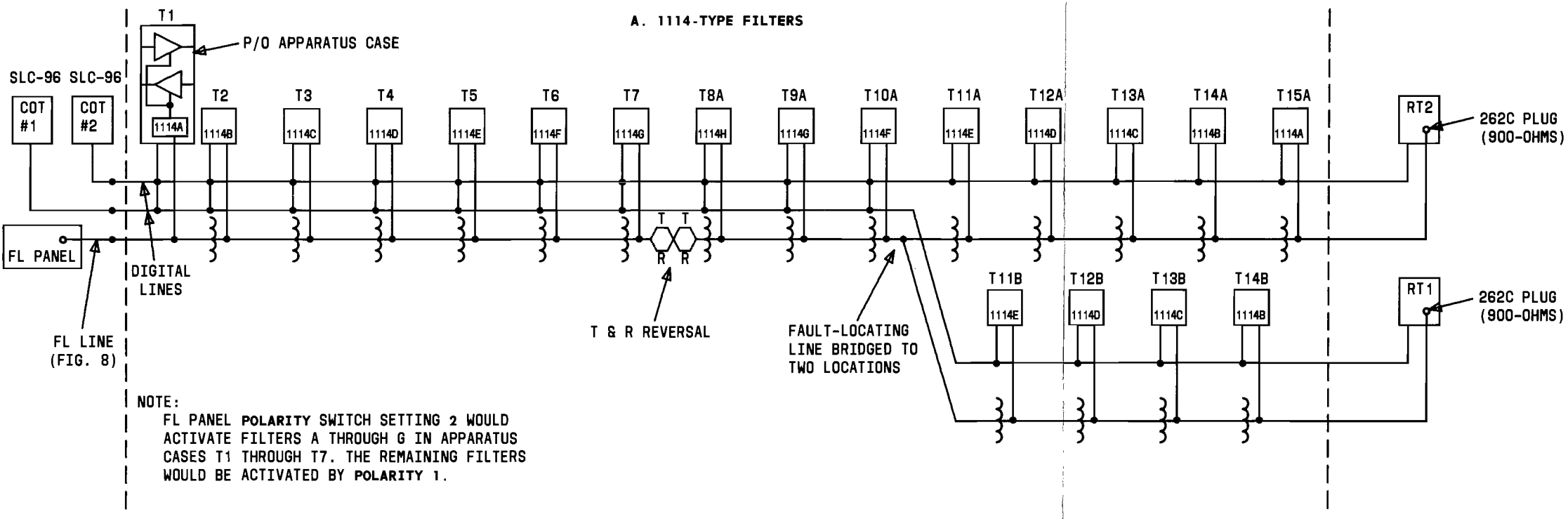


Fig. 10—Filter Preinstallation Test Connections



NOTE:
FL PANEL **POLARITY** SWITCH SETTING 2 WOULD ACTIVATE FILTERS A THROUGH G IN APPARATUS CASES T1 THROUGH T7. THE REMAINING FILTERS WOULD BE ACTIVATED BY **POLARITY** 1.

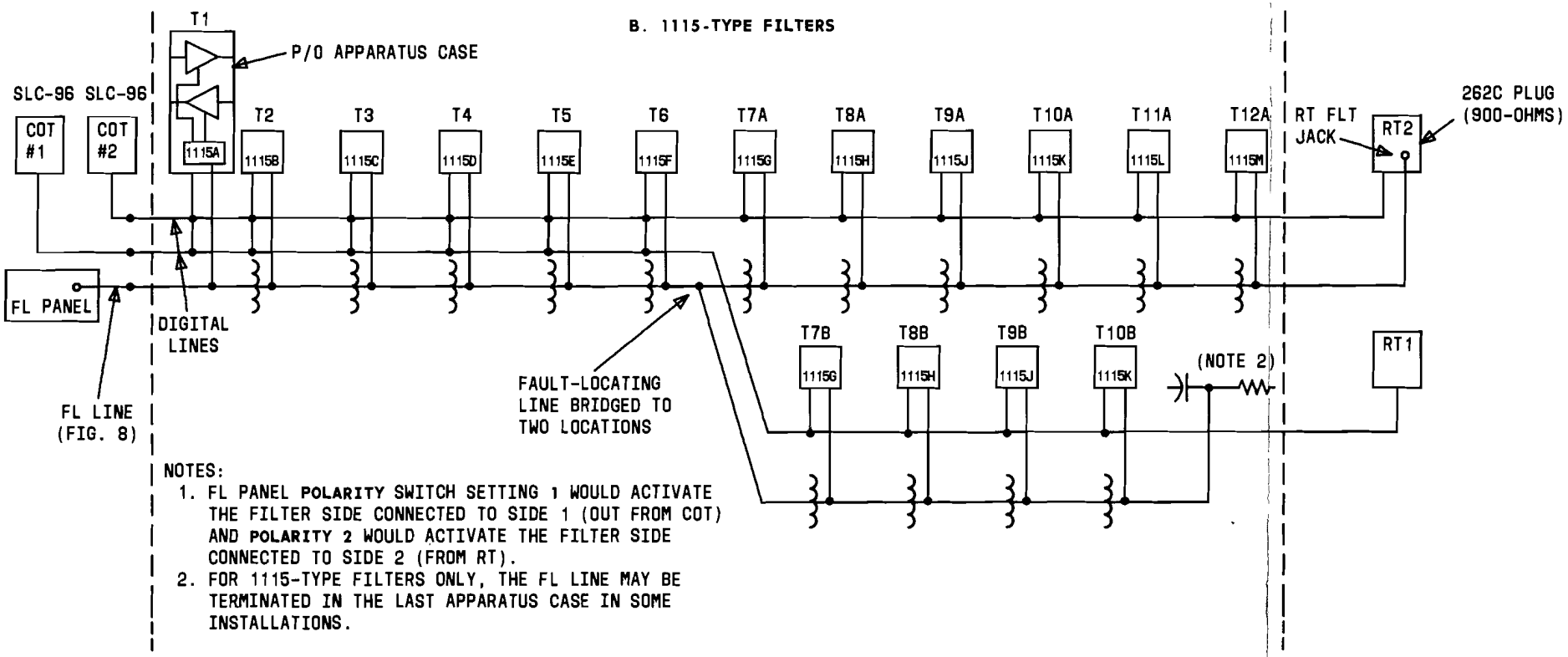


Fig. 11—Fault-Locating Line Configurations (Example)

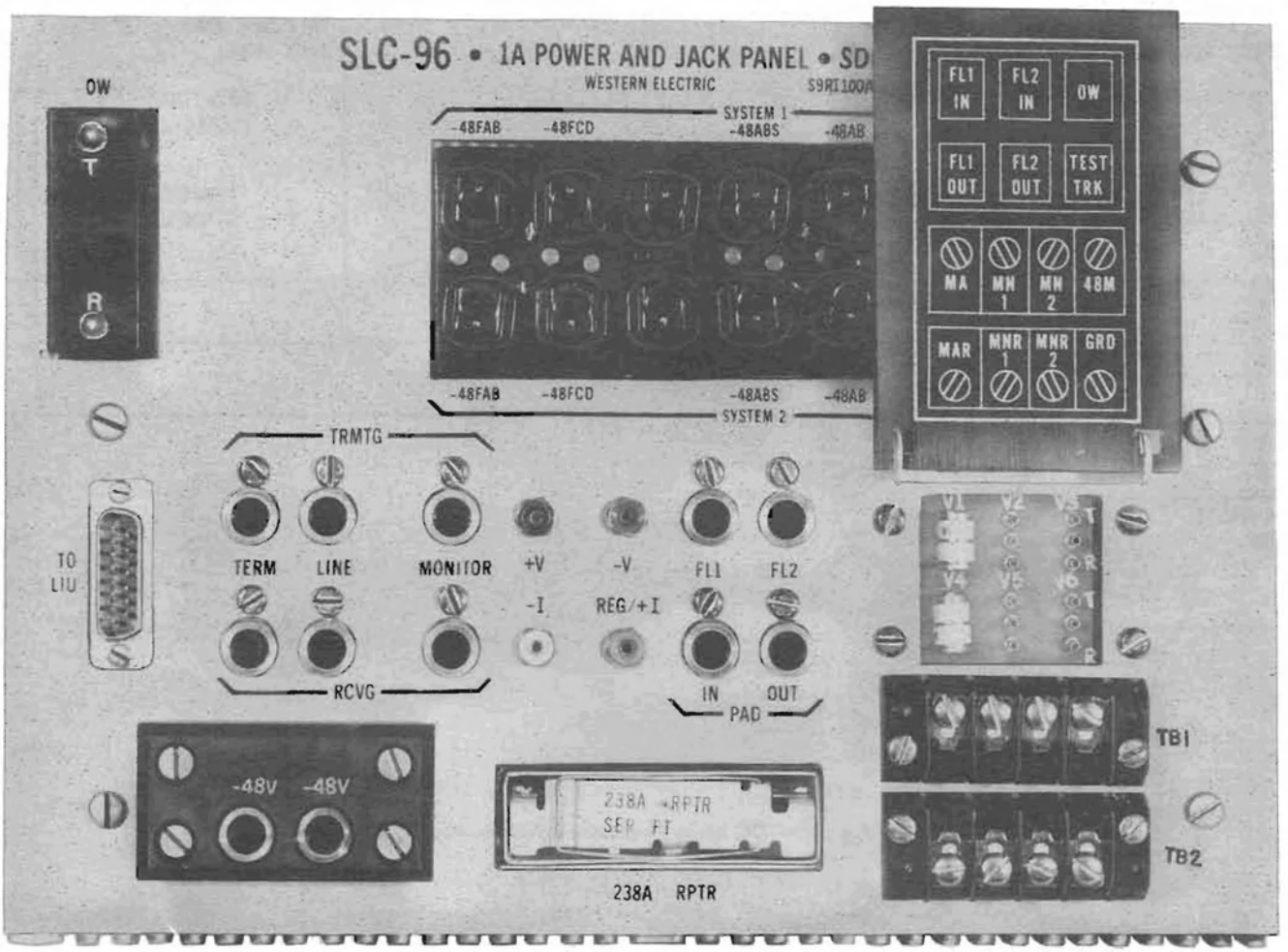


Fig. 12—SLC-96 RT 1A Power and Jack Panel

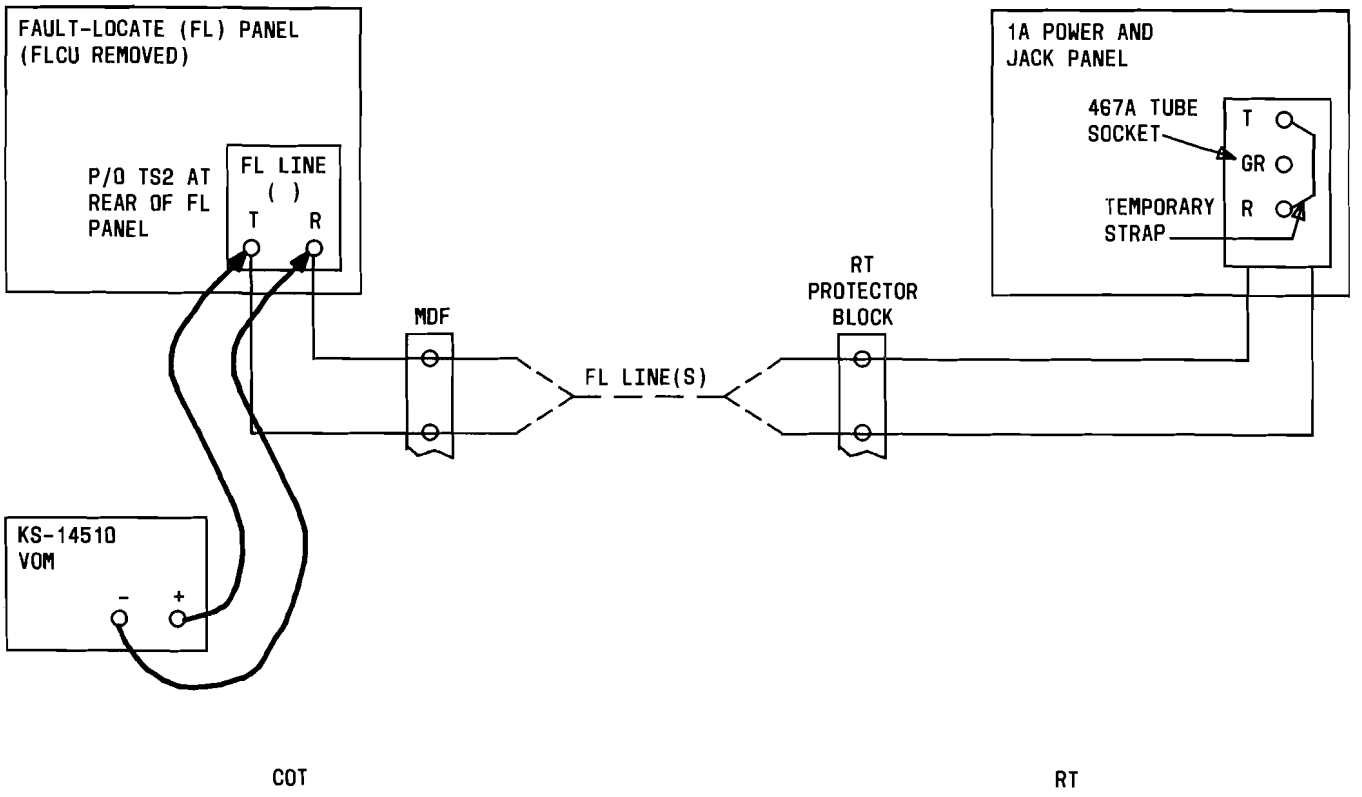


Fig. 13—DC Loop Resistance Test Setup

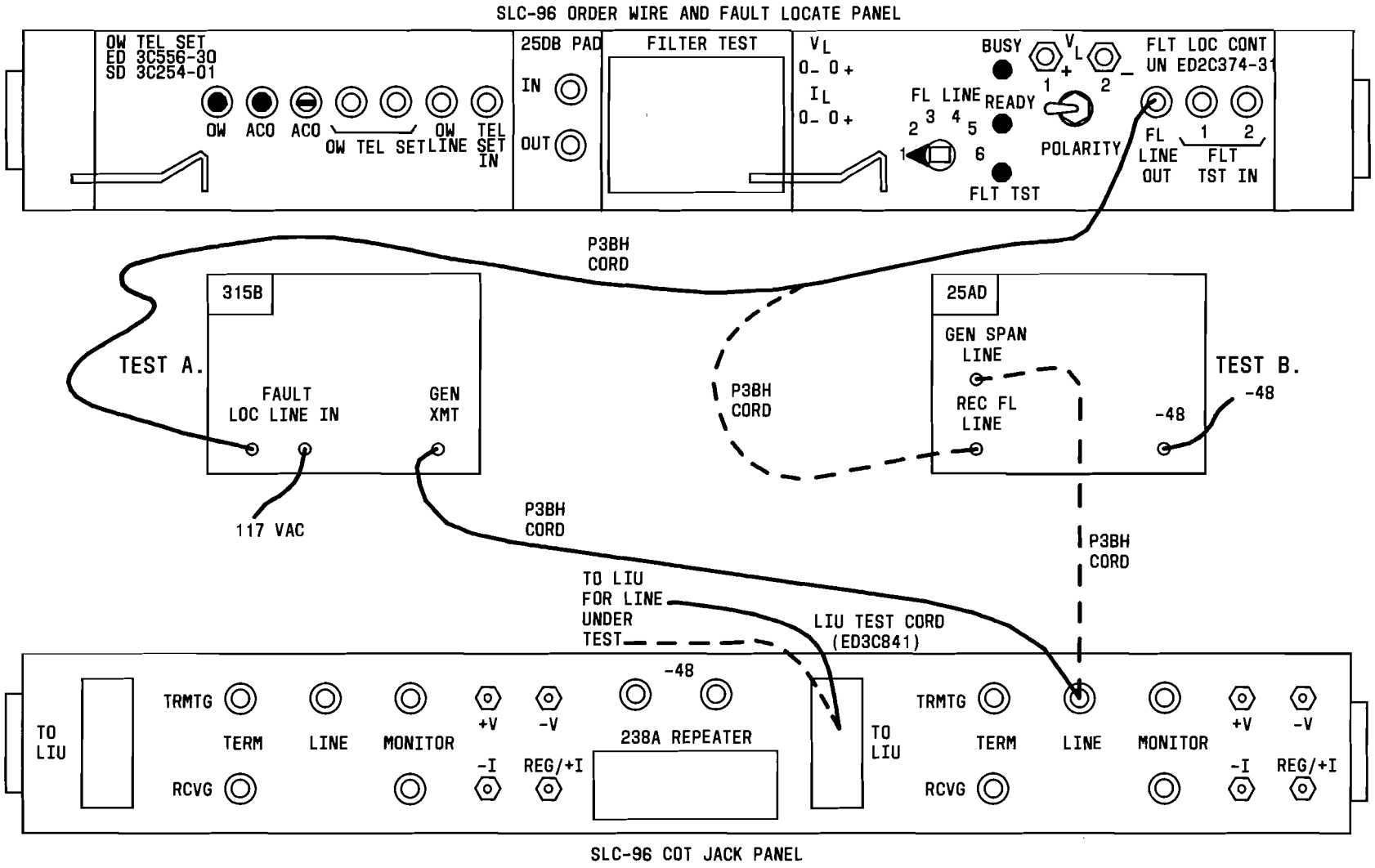


Fig. 14—COT Fault-Locating Configurations

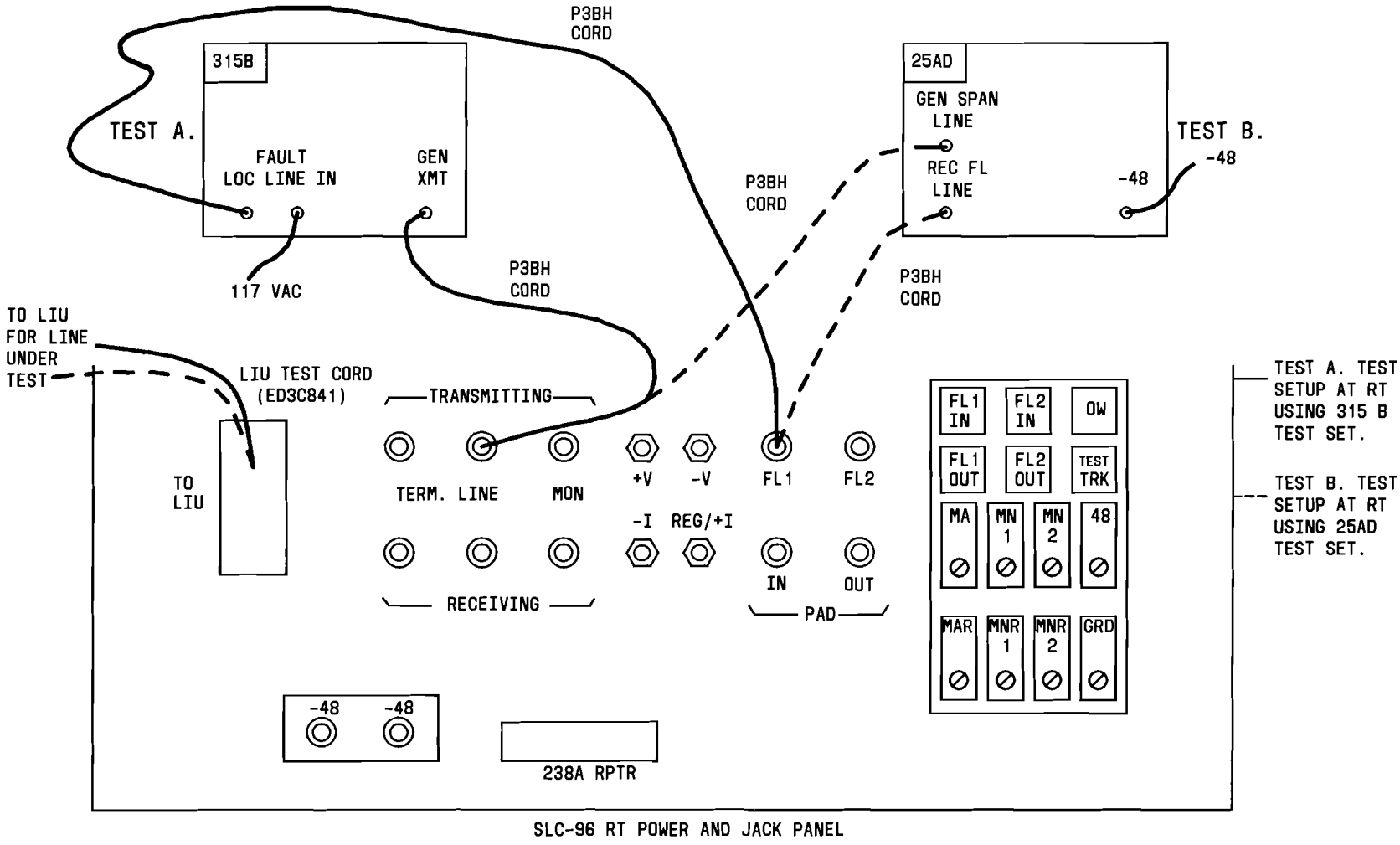


Fig. 15—RT Fault-Locating Configurations

FL LINE NO. ____

FILTER GROUP LOC.

POLARITY 1		FLT	POLARITY 2	
LEV	LOC		LOC	LEV
		A		
		B		
		C		
		D		
		E		
		F		
		G		
		H		
		J		
		K		
		L		
		M		

Fig. 16—Fault-Locate Panel Designation Card

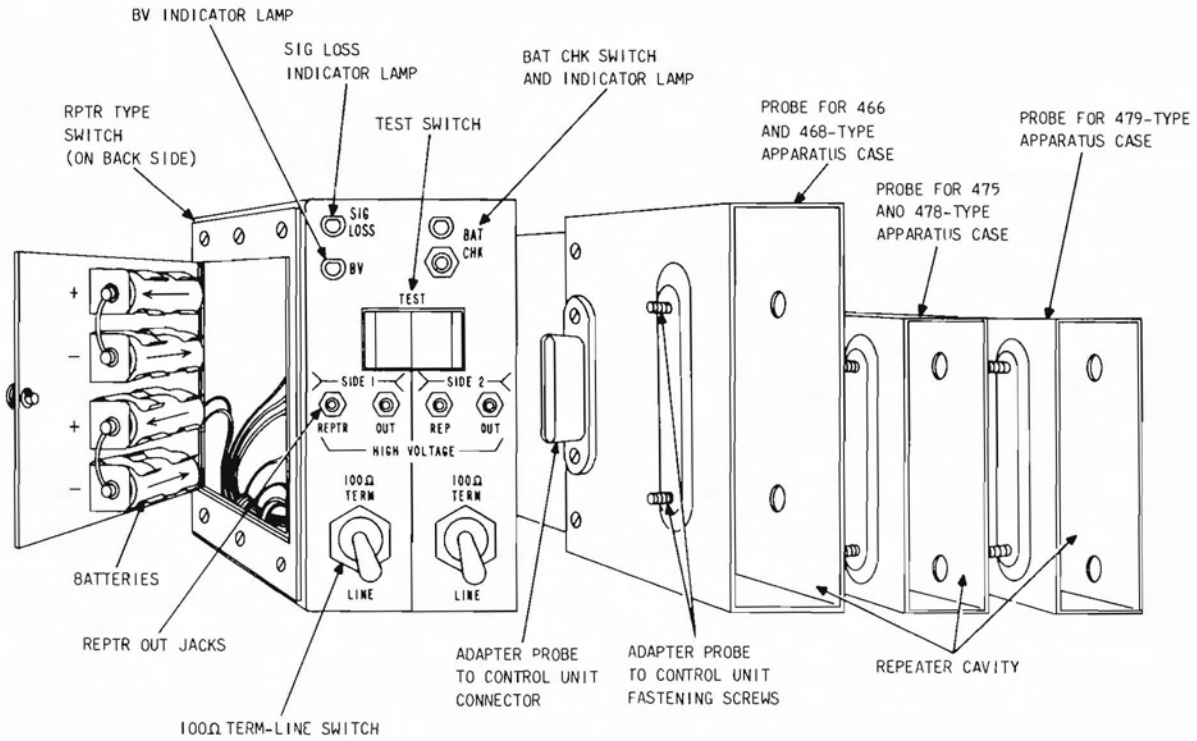


Fig. 17—J98725AB Bipolar Violation Detector

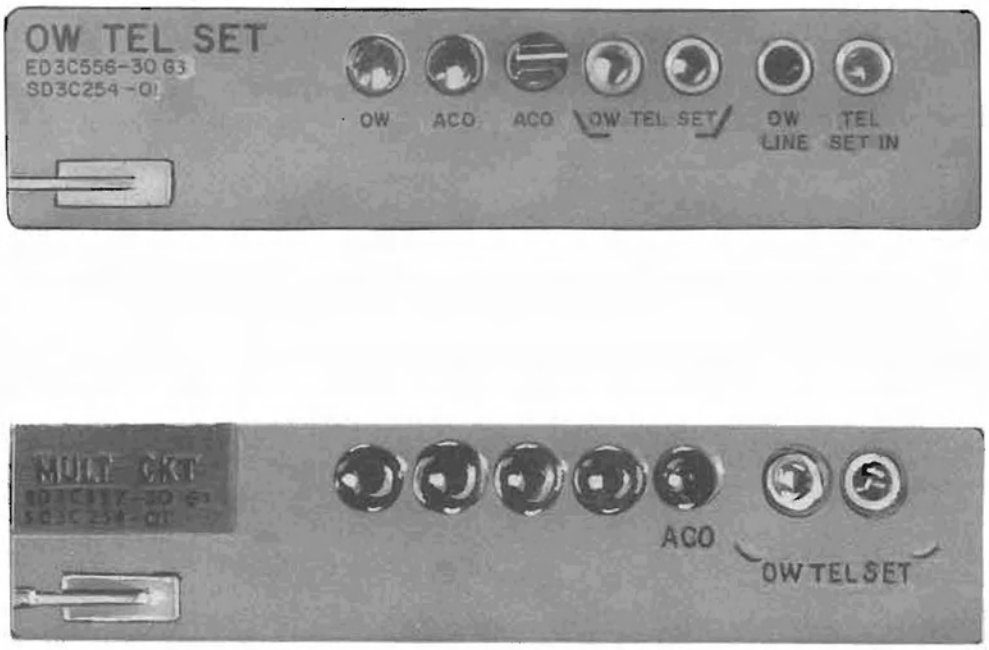


Fig. 18—Order Wire Plug-in Units

Fig. 19—ED-3C841 LIU Test Cord

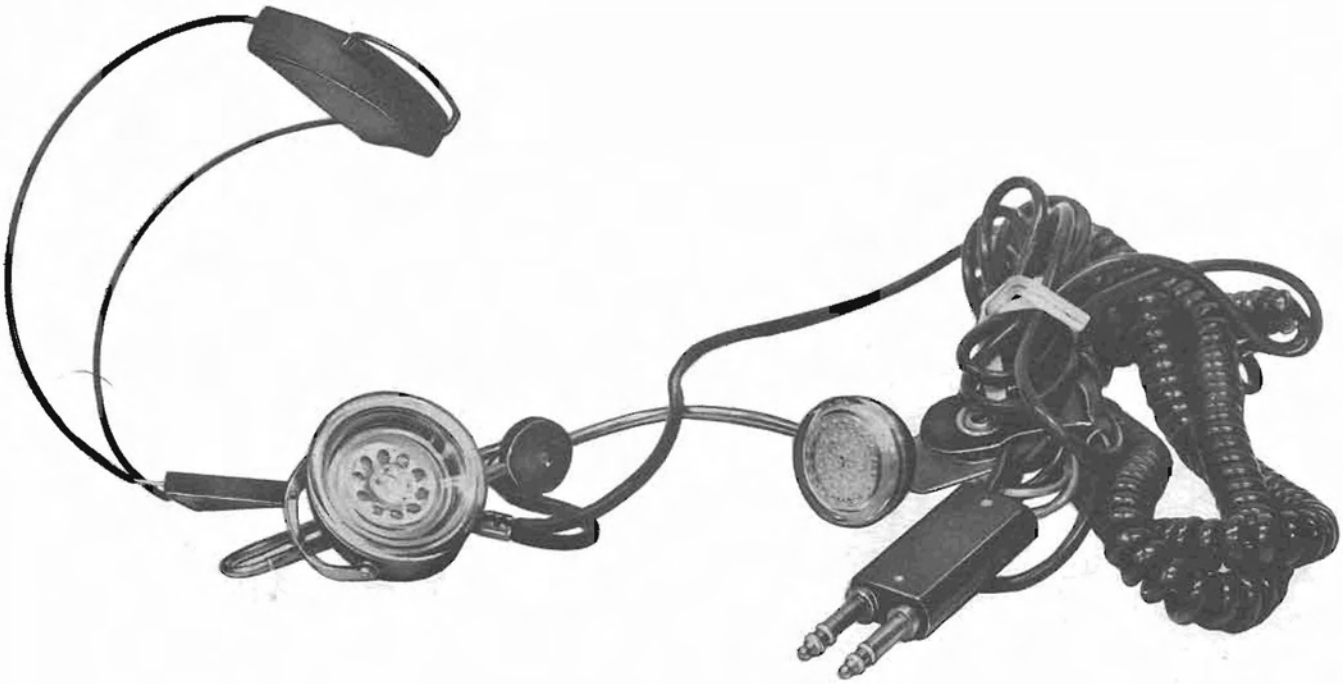


Fig. 20—Head Telephone Set (No. 52 Type)