

**T1 OUTSTATE
LINE AND SYSTEM MAINTENANCE
CONSIDERATIONS AND TESTS
DIGITAL TRANSMISSION SYSTEMS**

| CONTENTS | PAGE |
|--|------|
| 1. GENERAL | 1 |
| 2. PREVENTIVE MAINTENANCE | 1 |
| 3. CORRECTIVE MAINTENANCE | 2 |
| A. Automatic Restoral | 2 |
| B. Remote Office Fault (Status) Reporting | 2 |
| C. Control of the APS Automatic Features | 2 |
| D. Two-Direction Fault-Locating Feature . | 2 |
| E. Test Equipment | 2 |
| F. Diagnostic Aid—Flow Charts | 3 |
| G. Remote Location—Test Equipment and Plug-In Inventory | 3 |
| H. List of Trouble Flow Charts | 4 |

1. GENERAL

1.01 This section provides information on the preventive maintenance (periodic tests) and corrective maintenance (troubleshooting of detected troubles) for the T1 Outstate (T1/OS) Digital Transmission System.

1.02 The reason for reissuing this section is to include information on the items listed below. Since this issue covers a general revision, arrows ordinarily used to indicate changes have been omitted. This reissue does *not* affect the Equipment Test List.

- (a) D4 Channel Banks
- (b) Telemetry Interface
- (c) Fault Line Powering Module
- (d) New Bay Configurations
- (e) KS-20599 Digital Multimeter
- (f) New Protector Panel
- (g) Improved Order Wire.

2. PREVENTIVE MAINTENANCE

2.01 In general, the preventive maintenance will be minimal for two reasons. First, the T1/OS System and its parts are comprehensively tested during the T1/OS System Turnup Tests, Section 365-224-600. Second, the quality of the transmission is constantly monitored via the automatic protection switches (APS) and reported via the status reporting and control (SRC) or telemetry interface (TI) system through the office alarms.

2.02 Recommendations for periodic tests are as follows:

NOTICE

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

SECTION 365-200-410

| EQUIPMENT | RECOMMEN- DATION | REASONS |
|-------------------------|------------------------------------|---|
| T1/OS Span Line | None | Automatically monitored |
| APS | None | Automatically monitored |
| End-to-End Transmission | None | Monitored by the collective APS and D bank alarm circuits |
| SRC | None | Each remote SRC is automatically monitored for a response |
| D3 Banks (if equipped) | Yearly, single channel maintenance | Per Section 365-150-505 |
| D4 Banks (if equipped) | None | Not required |
| FL System | None | Preparatory tests prior to use and general use |
| OW System | None | General usage |

2.03 When the T1/OS System is connected in tandem with other digital transmission systems (T1, T2, etc), the portions which are not T1/OS may require periodic tests as prescribed in the Digital Transmission System Equipment Test List, Section 365-001-011.

3. CORRECTIVE MAINTENANCE

3.01 The T1/OS System has several features which aid in maintaining the integrity of transmission in the rural environment of unattended offices and extended distances. The features are intended to provide one-person fault locating and repair.

A. Automatic Restoral

3.02 The APS provides span line failure detection and the immediate and automatic restoral of a service line (SL) on a protection line (PL). When the fault clears, service will automatically be reset to the original service line (if not in manual reset off).

3.03 Since only the T1/OS lines are protected by the APS, signal restoration of a malfunctioning

terminal (D bank, etc) is not automatic. However, the APS will detect any loss of signal from a terminal and will insert an all 1s signal on the affected T1/OS line to prevent false line switching.

B. Remote Office Fault (Status) Reporting

3.04 The status reporting and control (SRC) system uses a master SRC in an attended designated control office to monitor the remote office alarms via SRC units. When an APS fault is detected in a remote office, a status report (a major, service disruption, or minor alarm) is sent via remote SRC to the master SRC, which alerts the control office personnel by activating the office alarm. The control office personnel can then use the master SRC to identify the remote location that is reporting the fault. A craftperson would be dispatched to the office at either end of the affected maintenance span (APS system) and would fault locate from there for a failed repeater. Fault locating through the APS switch units is not possible. Optionally, a telemetry interface (TI) unit may be used to perform the same functions plus additional functions. The telemetry system which connects to the TI must be provided separately.

C. Control of the APS Automatic Features

3.05 The master SRC or TI can control the automatic features of an APS. The SRC AUX function, if optioned for transfer off, will enable or inhibit (lamp on) the automatic restoral of a failing SL by completely defeating the APS system. The SRC RESET OFF function will enable or inhibit (lamp on) the automatic reset of service to the original SL after a fault is cleared. Inhibiting an APS feature is usually done only during fault clearing or testing activities.

D. Two-Direction Fault-Locating Feature

3.06 The APS can loop back a fault-locating signal so a fault can be isolated in the incoming transmission path as well as the conventional outgoing path from one location at either end of the maintenance span.

E. Test Equipment

3.07 The features provided by the APS require a KS-20775, L2 error rate test set (ERTS) to test the APS and isolate troubles to an APS plug-in. The test set is also used as a pulses and bipolar violation or errors detector for line performance testing.

3.08 The other test equipments necessary are of the T1C/T1 generation (J98725-type), or

equivalent. These include the fault-locate test set, the pair loss measuring set, the office and manhole bipolar violation detectors, and the repeater tester. Also required is a KS-20599 Digital Multimeter (DMM) and the J98725AJ Fault Line Powering Module.

F. Diagnostic Aid—Flow Charts

3.09 The approach to trouble isolation and correction within the T1/OS System will be done by the craft, aided by a series of flow diagrams. Table A and Fig. 1 describe the type of tests and the system test points which will be used in later flow charts to isolate transmission troubles. Table B is an aid for understanding the symbols within the flow charts. Fig. 2 is the first chart (entry point) of a series of linked flow charts used to locate and resolve all troubles within the T1/OS System. Fig. 2 differentiates between transmission alarms and power or fuse alarms, then branches to other charts for further analysis. The origination of the alarms analyses by flow charts is shown below.

| SUBJECT | FIGURE |
|---|--------------------------------|
| Initial Alarm Analysis | 2 |
| Primary Power Fuse Alarms | 14, 15, 17, 18 |
| D Bank, APS/SRC Transmission Alarm Analysis | 3-13 |
| D Bank Alarm Analysis | 3, 4, 5, 11, 12 |
| Office Repeater, APS/SRC, OW, FL Fuse Alarm Analysis and Power Troubles | 16, 19, 20, 21, 23, 27 |
| Repeater Transmission Trouble, Fault-Locating Procedure, and Unit Replacement | 28-34, 35-45, 49, 58 |
| APS/SRC Transmission Trouble and Unit Replacement | 45, 46, 47, 48, 51, 52, 53, 54 |
| Order-Wire Transmission Trouble and Unit Replacement | 22, 59, 60, 61 |
| Fault-Locate System Trouble and Unit Replacement | 24, 25, 26, 45, 50, 55, 56, 57 |
| Telemetry Interface Unit Replacement | 63 |

3.10 To illustrate the approach to corrective maintenance, a summary of activities contained within the flow charts follows:

- (1) A control office alarm occurs (the first indication of trouble). The control office bay alarms and indications are analyzed to determine if the alarm is local or remote.
- (2) If not a local control office trouble, the master SRC indications are used to identify the remote location reporting trouble.
- (3) Craft personnel are dispatched to the remote office location.
- (4) At the remote location, the bay alarms are analyzed for more trouble details.
- (5) Tests are then conducted, if necessary, to isolate the trouble to the office equipment at either end of the maintenance span, or the line.
- (6) If the line is identified, the fault-locating procedure will be performed.
- (7) As a result of the fault-locating procedures, a repair activity will be performed. If necessary, a follow-up test will be performed to confirm that the trouble has been cleared or, if at an outside repair location, the control office will be contacted to restore normal control to the APS, thus allowing the APS fault-monitoring circuits to confirm that the alarm has cleared.
- (8) If certain plug-ins are replaced in the office, additional tests may be necessary to ensure that the replacement is operating properly.
- (9) End of procedure.

G. Remote Location—Test Equipment and Plug-In Inventory

3.11 Since the craft personnel will be dispatched to remote locations, the test equipment, other test apparatus (cords, plugs, etc), and replacement plug-ins must be transported to the remote location or stored at the remote location as dictated by local practices.

SECTION 365-200-410

H. List of Trouble Flow Charts

- Fig. 1—Transmission Isolation Test Points
- Fig. 2—Office Alarm (Entry Point)
- Fig. 3—Fuse and Alarm Panel MJ ALM
- Fig. 4—APS Alarm Determination
- Fig. 5—D Bank and APS Alarm Determination
- Fig. 6—APS Alarm Only
- Fig. 7—APS MINOR Alarm at the Maintenance Span
- Fig. 8—APS MAJOR Alarm at the Maintenance Span
- Fig. 9—OFFICE L.O.S. Indication
- Fig. 10—LINE TR Indication
- Fig. 11 & 12—Remote D Bank or Transmission System Fault
- Fig. 13—Subtle Transmission Trouble Chart
- Fig. 14—Blown STM Fuse Trouble Chart
- Fig. 15—Blown FL Fuse Trouble Chart
- Fig. 16—Blown Repeater Fuse Trouble Chart
- Fig. 17—Blown OW & TEL Fuse Trouble Chart
- Fig. 18—Bay Input Power Trouble Chart
- Fig. 19—STM Input Voltage Trouble Chart
- Fig. 20—FL Panel Input Voltage Trouble Chart
- Fig. 21—OW PNL Input Voltage Trouble Chart
- Fig. 22—Unable to Complete Local Call From OW
- Fig. 23—Fault-Locate Powering VL Trouble Chart
- Fig. 24—FL Panel READY/BUSY Lamp Trouble Chart
- Fig. 25—FL Line Trouble Chart
- Fig. 26—Remote Location Activity for FL Line Trouble Chart
- Fig. 27—Power Source Option Trouble Chart
- Fig. 28-30—Line Current and/or Regulator Trouble Chart
- Fig. 31-32—Line Voltage Eight Percent Requirement Trouble Chart
- Fig. 33-34—Powering Schemes
- Fig. 35-44—Fault-Locating Procedure
- Fig. 45-50—Option Selection on Replacement Plug-ins
- Fig. 51-61—Replacement Plug-in (Span Switch, Office Repeater, FLCU, and OW) Tests
- Fig. 62—Ringing Power Trouble Chart
- Fig. 63—Telemetry Interface Plug-In Options

TABLE A
PULSES, BIPOLAR VIOLATION RATE, AND ALL 1s MEASUREMENT TEST SETUP

Note: KS-20775,L2 Error Rate Test Set (ERTS) used for the three measurements. Set the ERTS as follows:

| CONTROL | POSITION |
|--|---|
| MODE ERROR BLOCK COUNT INTERVAL DISPLAY INTERVAL Other Controls POWER | VIOLATIONS IN 10^8 Midrange or HOLD (RESET/RESYNC will start a new count) Not Applicable ON |

MEASUREMENTS: ERTS DS-1 INPUT jack patched to the applicable test points on Fig. 1 using a P3BH cord.

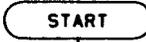
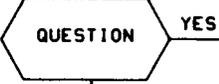
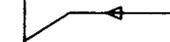
MEASUREMENT RESULTS are as follows:

| MEASUREMENT | OBSERVE | RESULTS | |
|---|--|--|---|
| | | YES | NO |
| PULSES ACCEPTABLE BIPOLAR VIOLATION RATE (See Note 1) ALL 1s (See Note 2) | NO DATA lamp only DISPLAY ALL 1s lamp only | extinguished less than 60 count lighted | lighted greater than 60 count extinguished |

Note 1: The results shown are for a maintenance trouble activity. However, if the trouble is a result of Turnup Tests, Section 365-224-600, the results must be no errors at the 10^8 setting, or if errors exist, 35 or less at a 10^9 setting (10 minute interval).

Note 2: The ALL 1s signal will be present on a service or protection line when there is no office signal incoming to the APS.

TABLE B

| SYMBOL | EXPLANATION |
|---|--|
|  | <p>START - USED TO IDENTIFY THE INPUT CONDITION OR SEQUENCE CONTAINED IN THE FIGURE</p> |
| <p>FROM FIG. XX</p> | <p>LINKING INFORMATION FROM A PREVIOUS FIGURE</p> |
|  | <p>USED TO DESCRIBE ACTION TO BE TAKEN OR PROVIDE INFORMATION NEEDED AT THIS TIME</p> |
|  | <p>A DECISION OR DETERMINATION IS NECESSARY TO THE QUESTION</p> |
| <p>ANSWER</p>  | |
|  | <p>CONNECTORS - USED TO CONNECT TWO POINTS WHEN A CONNECTING LINE IS NOT APPROPRIATE</p> |
|  | <p>MERGE - USED TO CONSOLIDATE SEVERAL INPUTS TO THE NEXT SYMBOL</p> |
|  | <p>USED TO IDENTIFY AN OUTPUT CONDITION OR TROUBLESHOOTING SEQUENCE TO BE USED IN A LINKING FIGURE</p> |
| <p>TO FIG. XX</p>  | <p>LINKING INFORMATION TO THE NEXT FIGURE</p> |
|  | <p>END OF TEST OR SEQUENCE</p> |

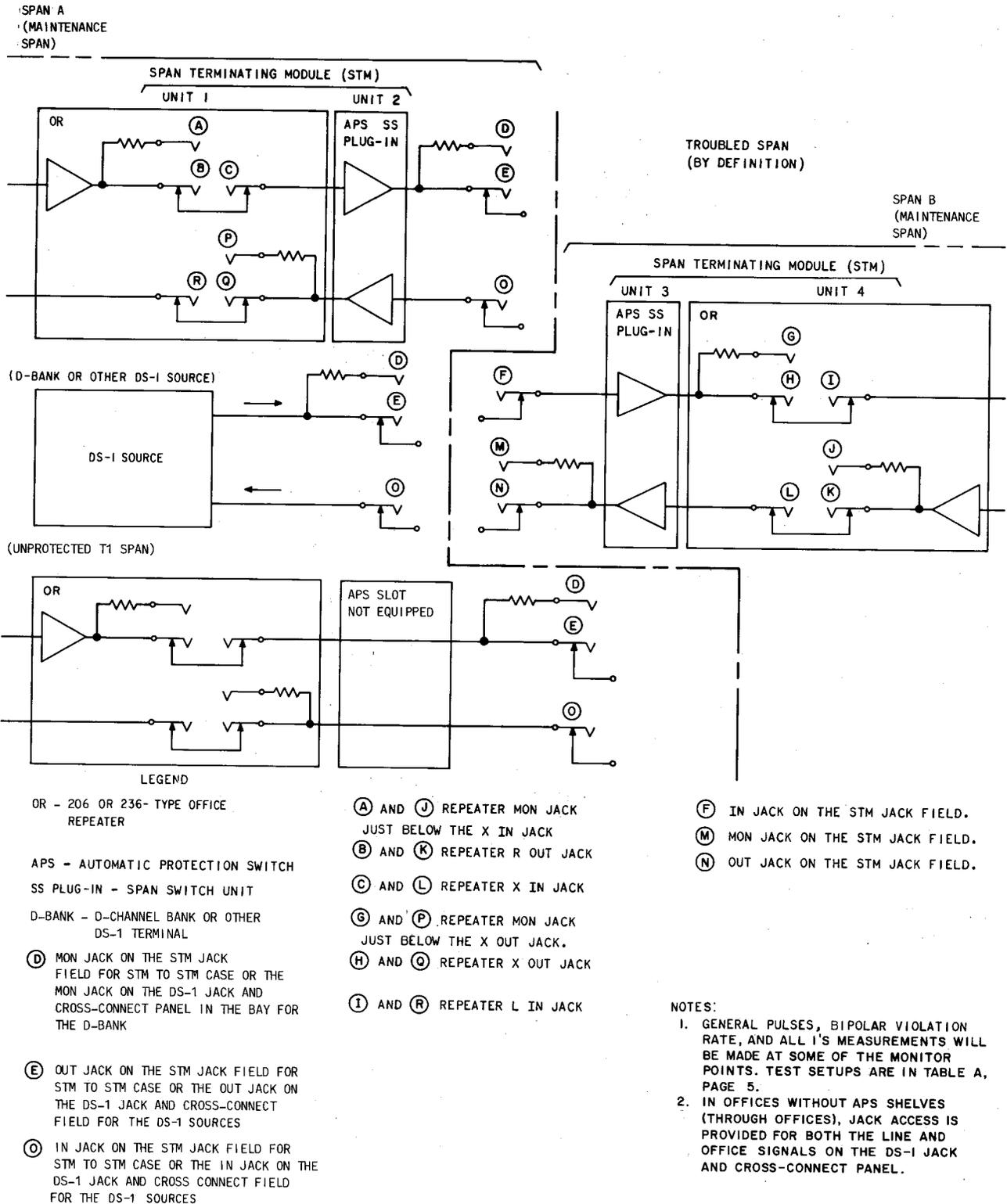
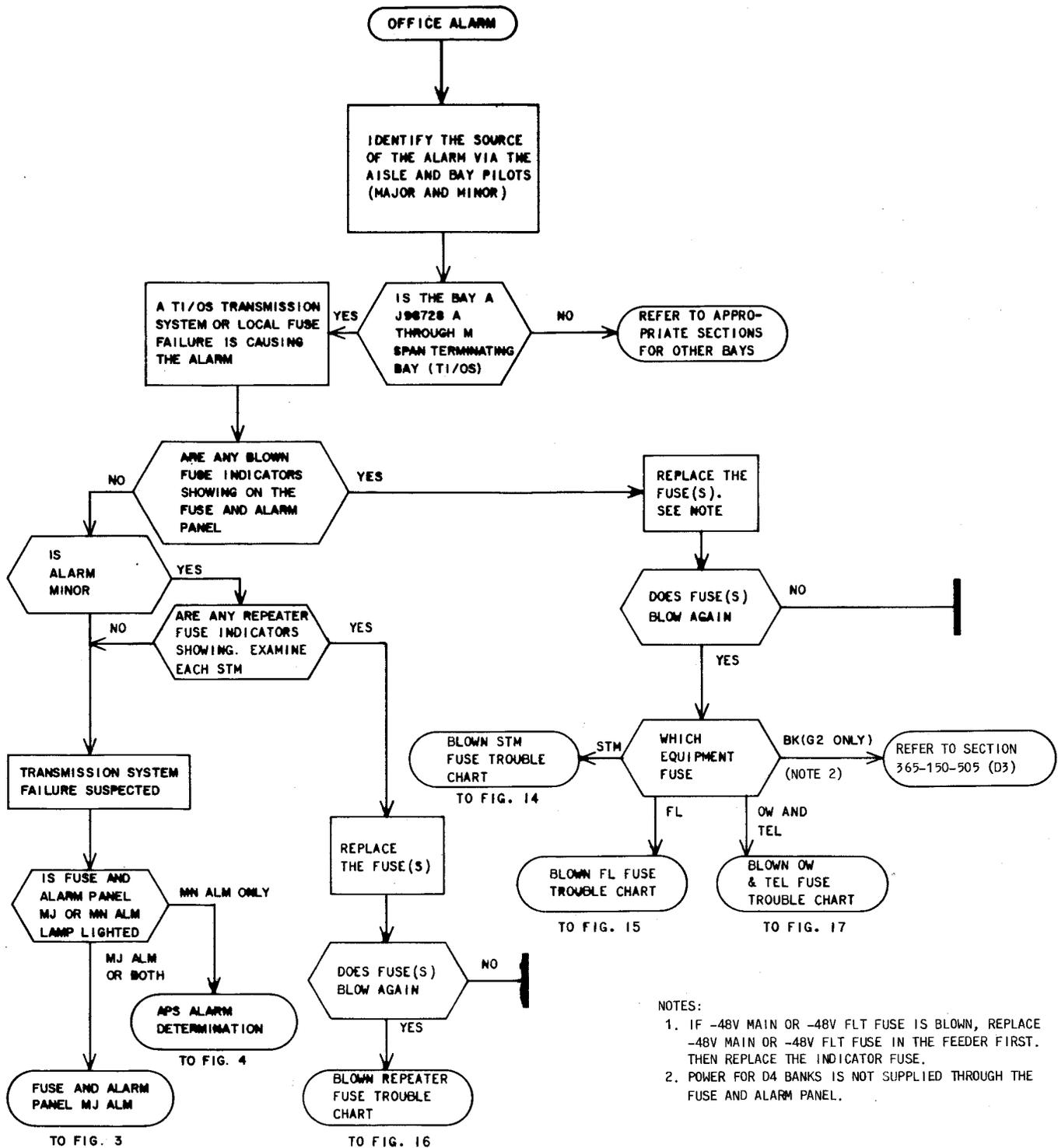


Fig. 1—Transmission Isolation Test Points



- NOTES:
1. IF -48V MAIN OR -48V FLT FUSE IS BLOWN, REPLACE -48V MAIN OR -48V FLT FUSE IN THE FEEDER FIRST. THEN REPLACE THE INDICATOR FUSE.
 2. POWER FOR D4 BANKS IS NOT SUPPLIED THROUGH THE FUSE AND ALARM PANEL.

Fig. 2—Office Alarm

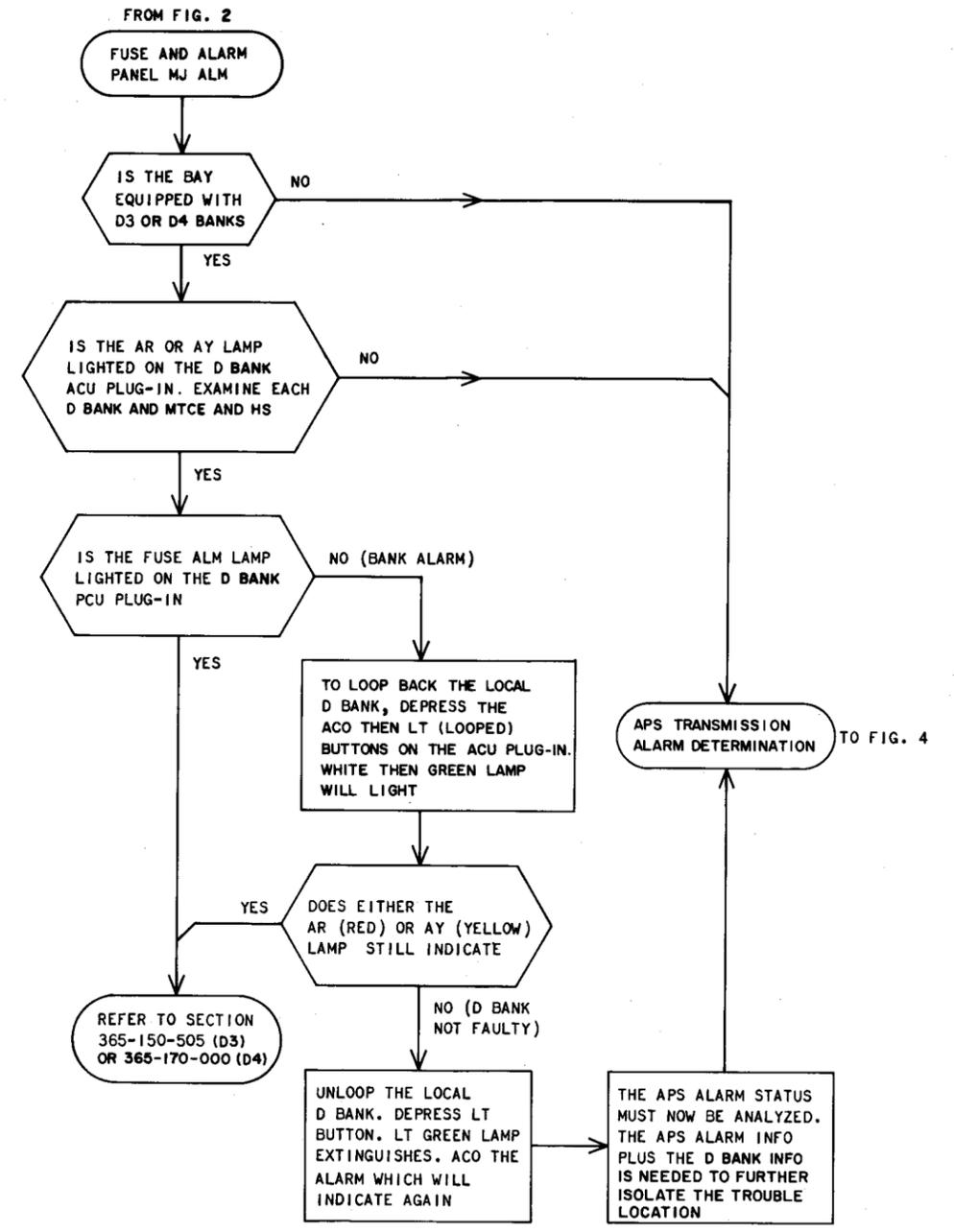


Fig. 3—Fuse and Alarm Panel MJ ALM

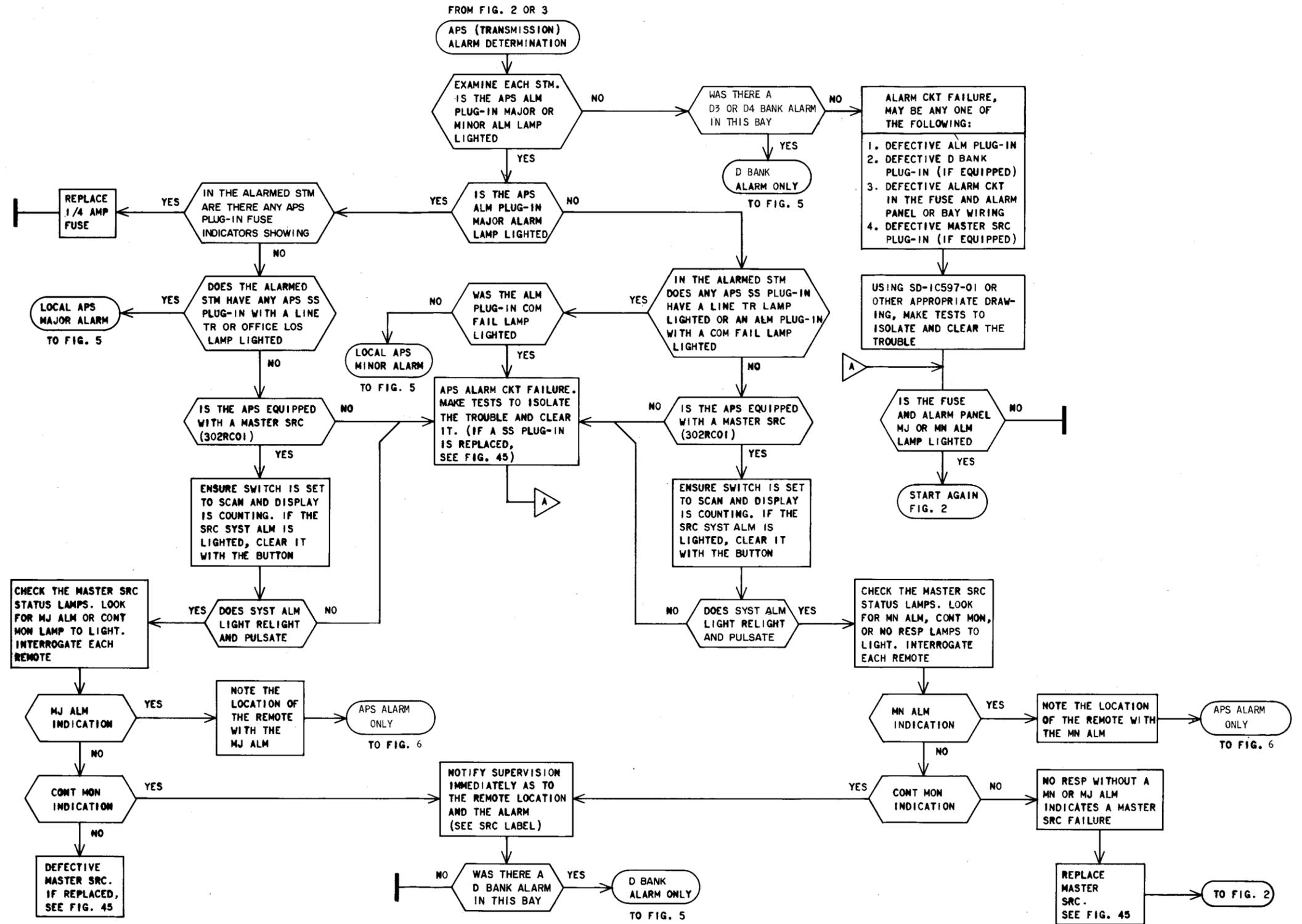
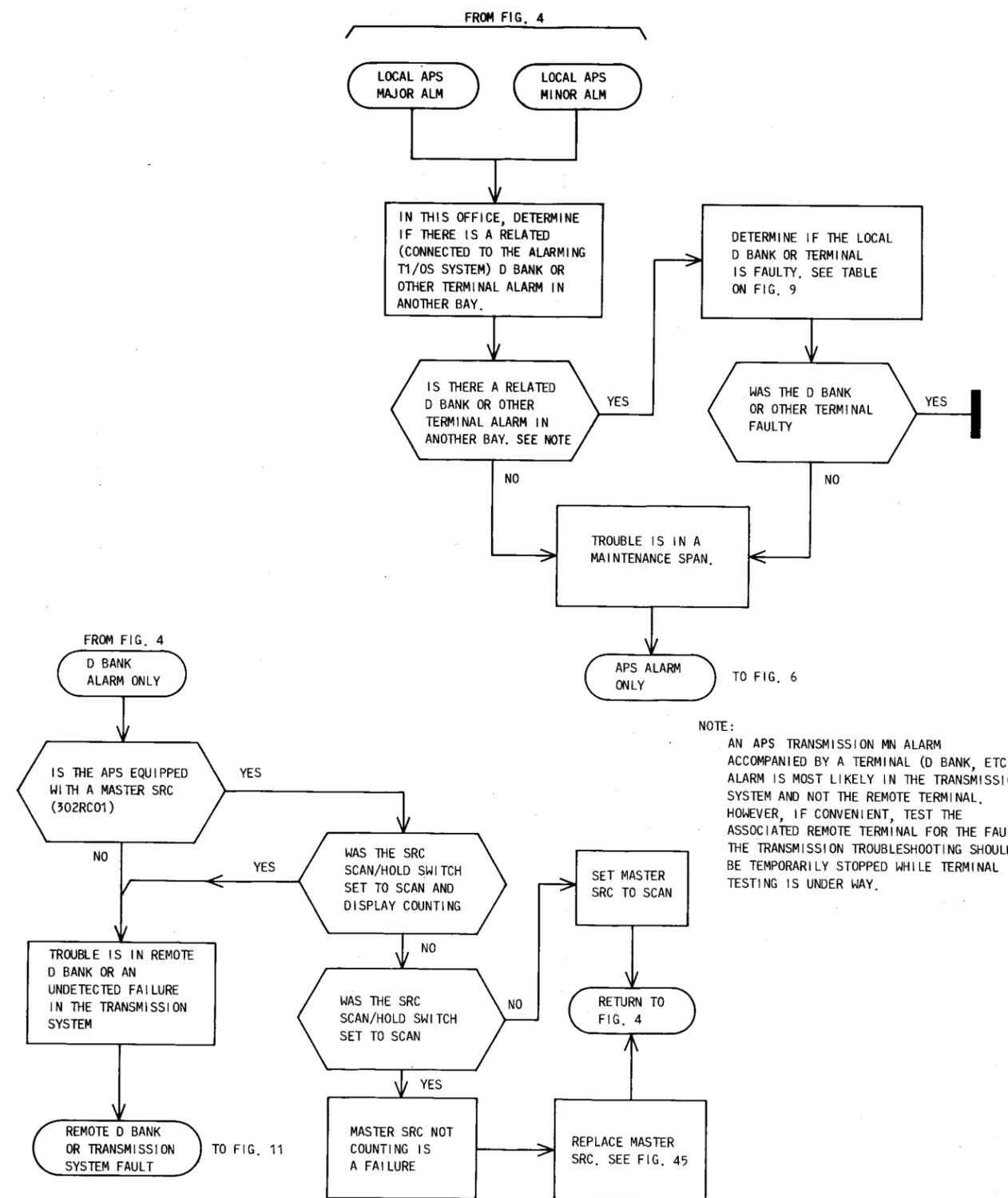


Fig. 4—APS Alarm Determination



NOTE:
 AN APS TRANSMISSION MN ALARM ACCOMPANIED BY A TERMINAL (D BANK, ETC.) ALARM IS MOST LIKELY IN THE TRANSMISSION SYSTEM AND NOT THE REMOTE TERMINAL. HOWEVER, IF CONVENIENT, TEST THE ASSOCIATED REMOTE TERMINAL FOR THE FAULT. THE TRANSMISSION TROUBLESHOOTING SHOULD BE TEMPORARILY STOPPED WHILE TERMINAL TESTING IS UNDER WAY.

Fig. 5—D Bank and APS Alarm Determination

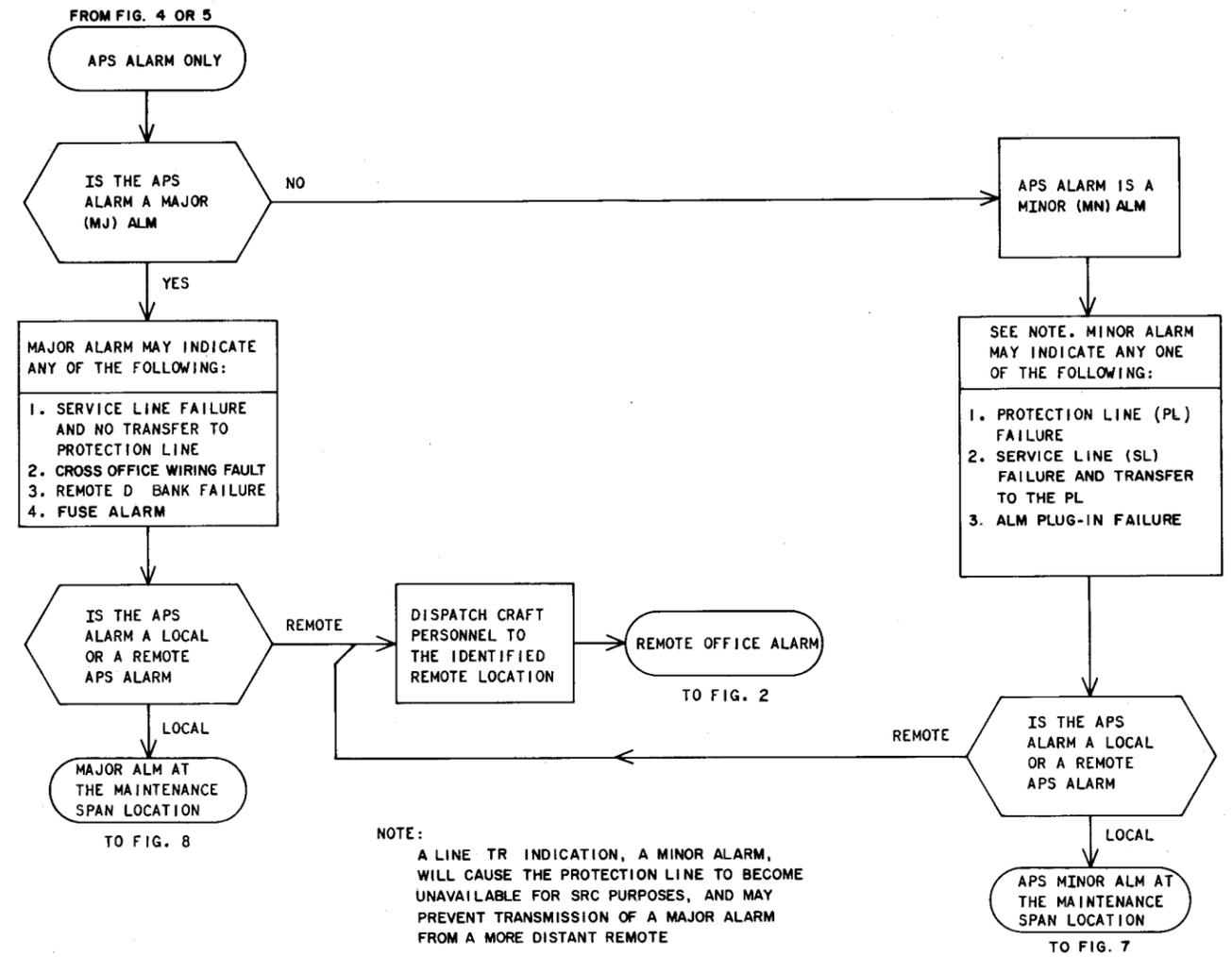


Fig. 6—APS Alarm Only

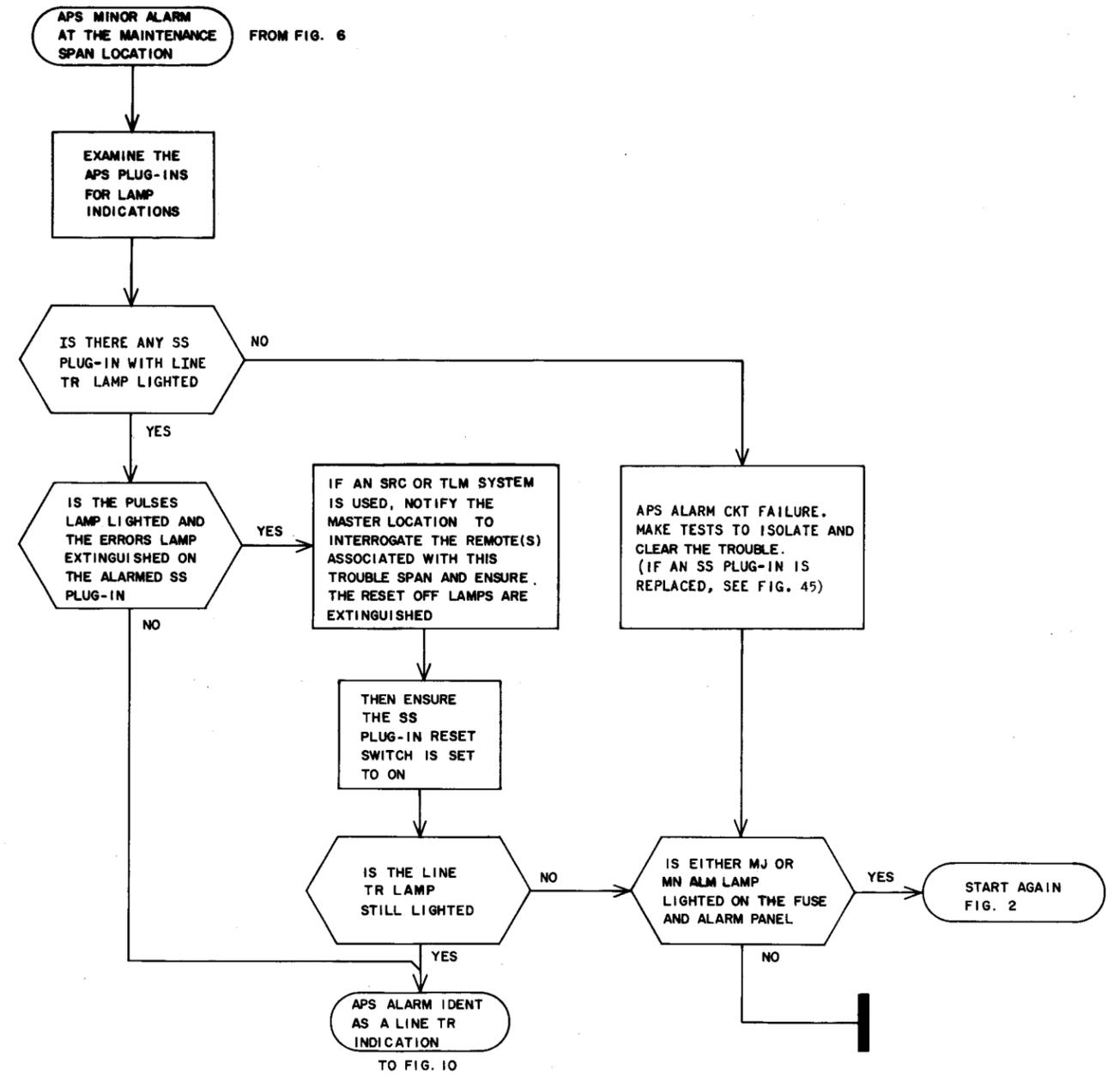


Fig. 7—APS MINOR Alarm at the Maintenance Span

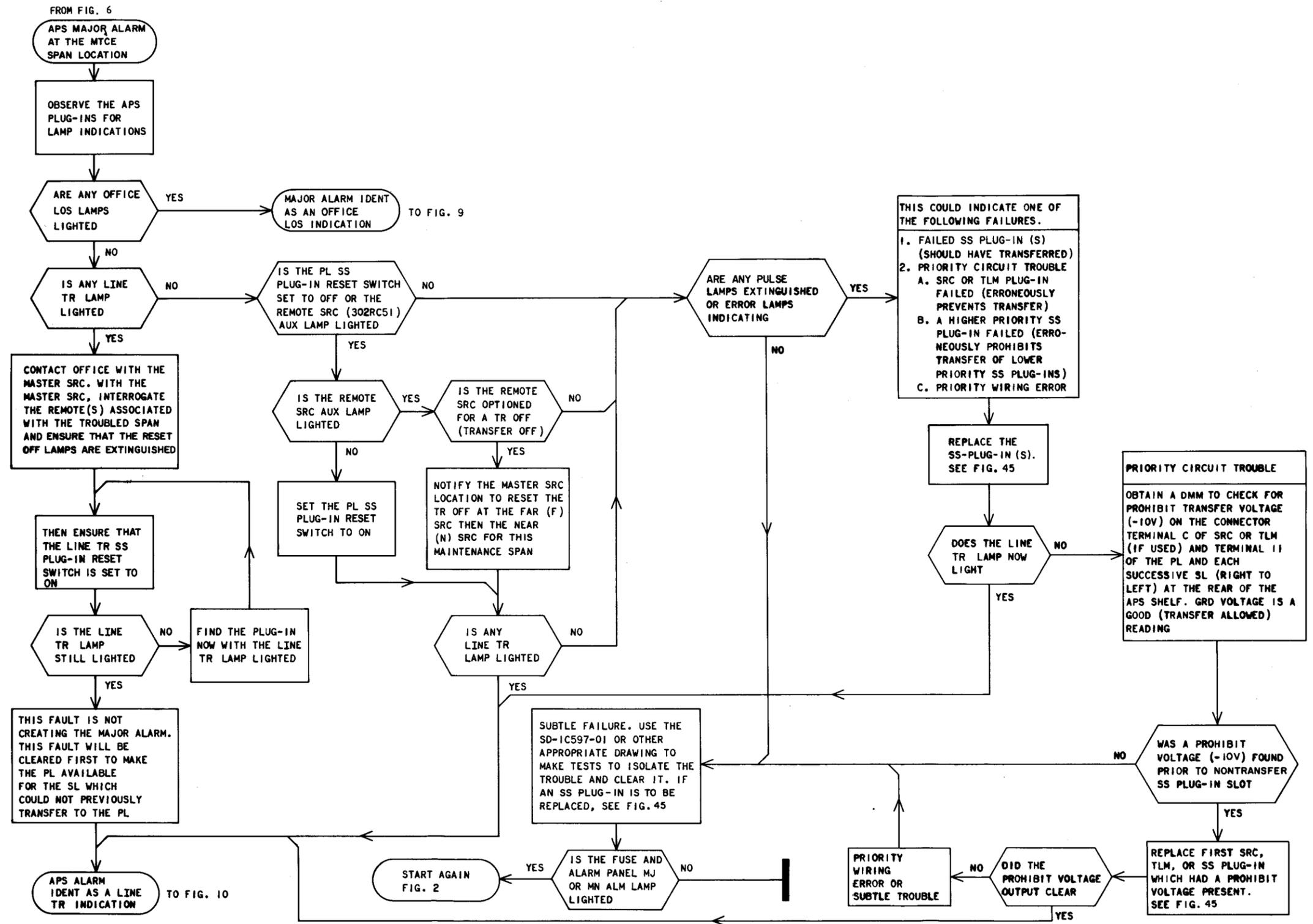


Fig. 8—APS MAJOR Alarm at the Maintenance Span

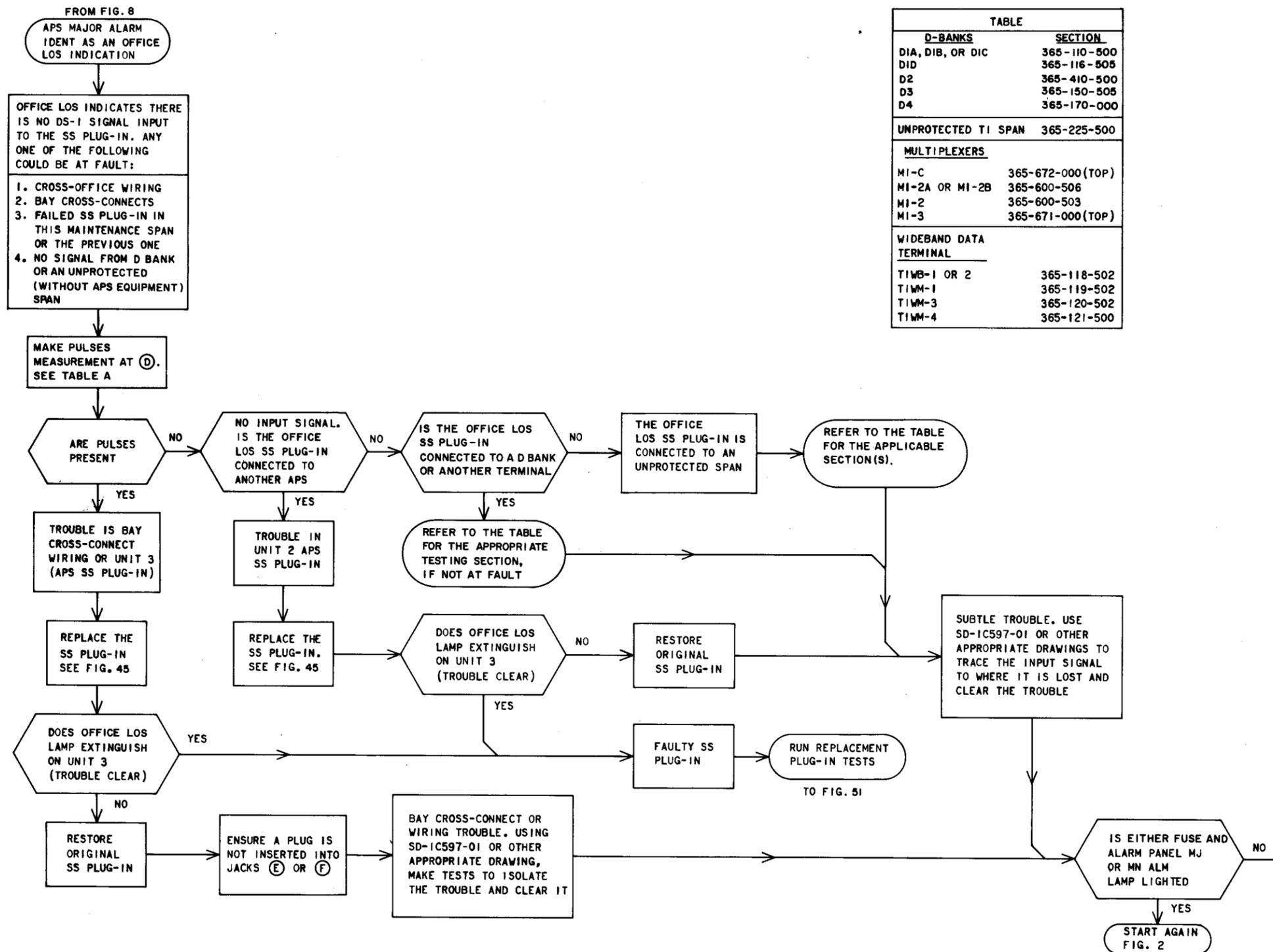


Fig. 9—OFFICE L.O.S. Indication

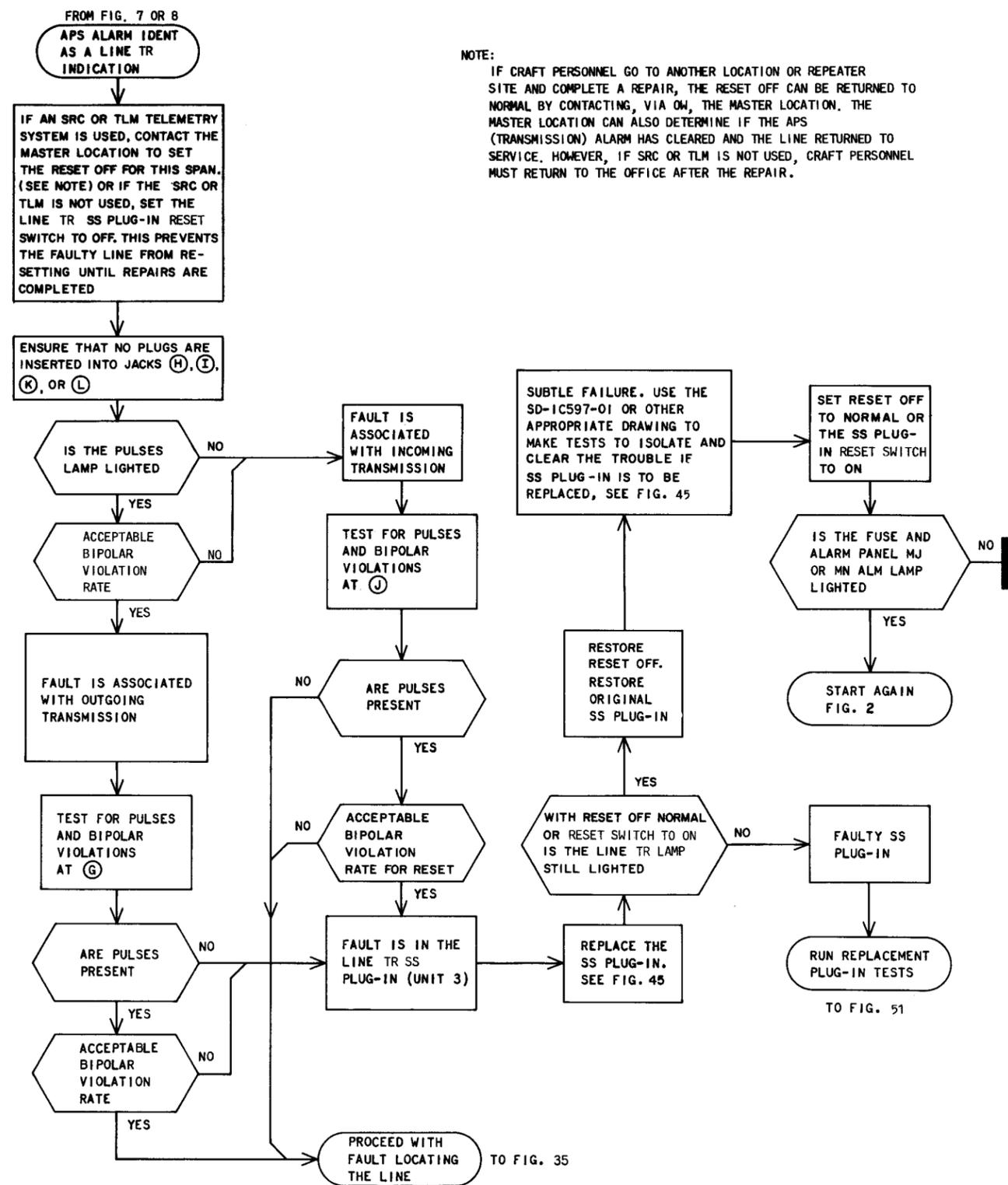


Fig. 10—LINE TR Indication

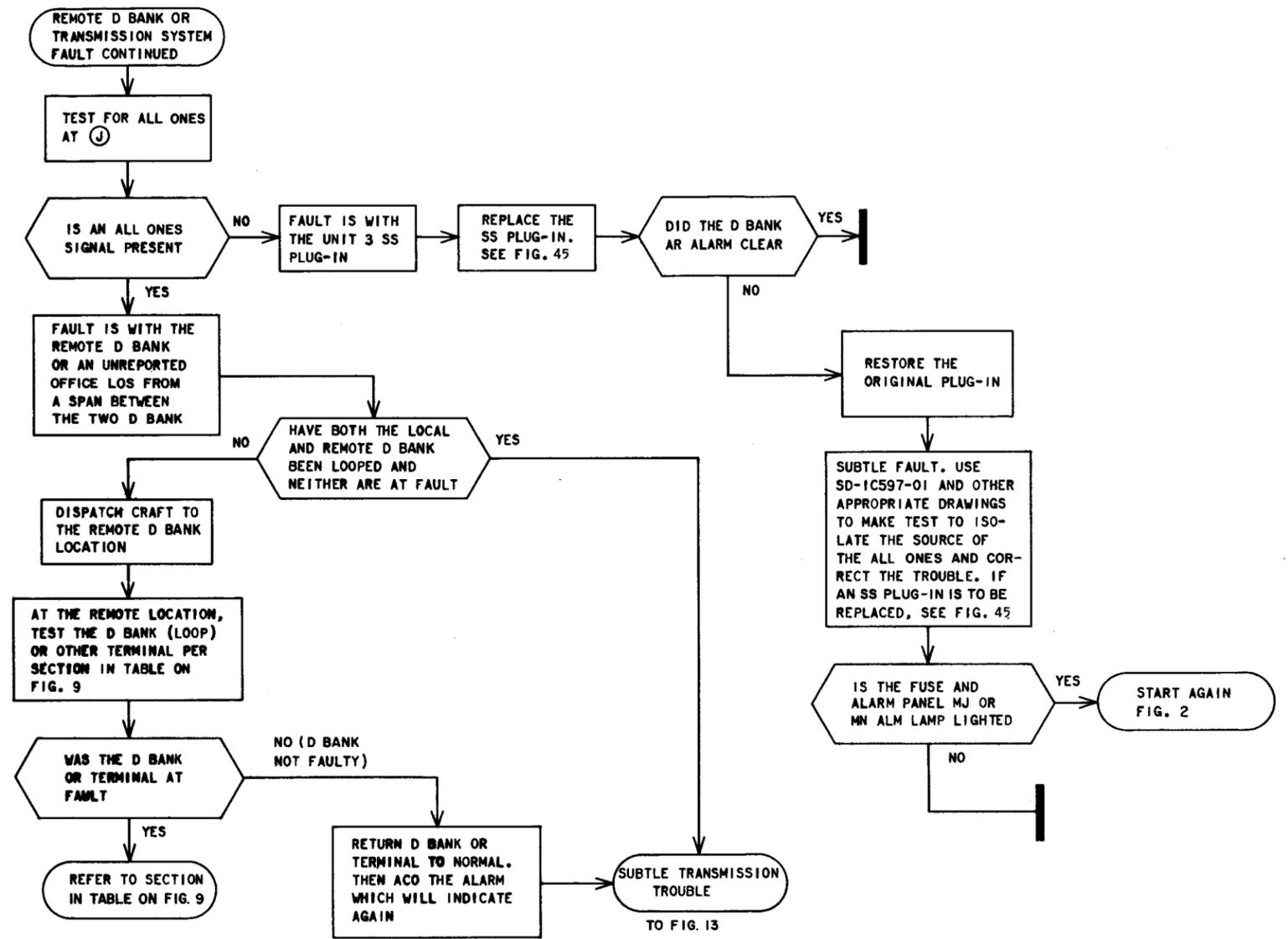
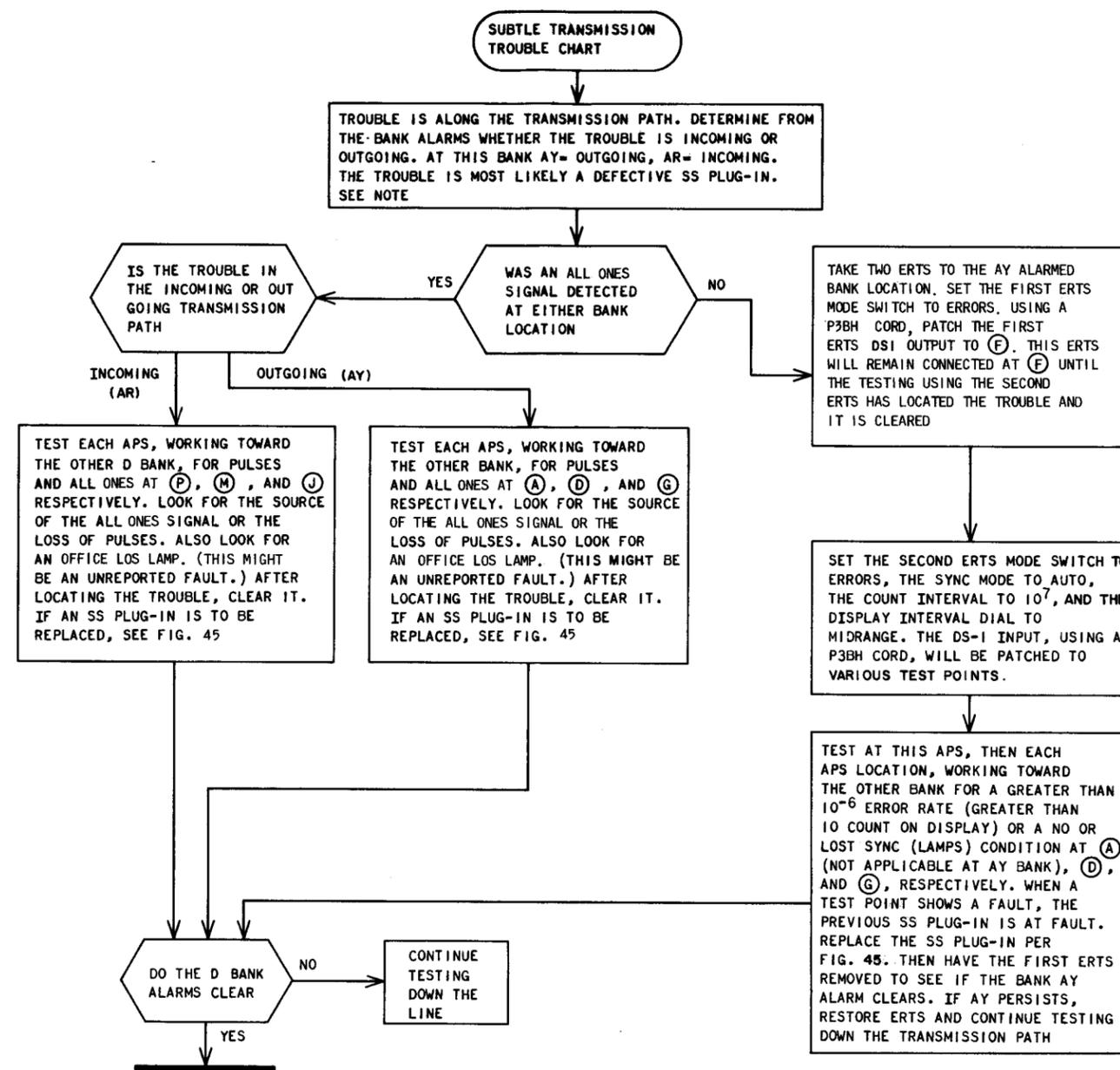
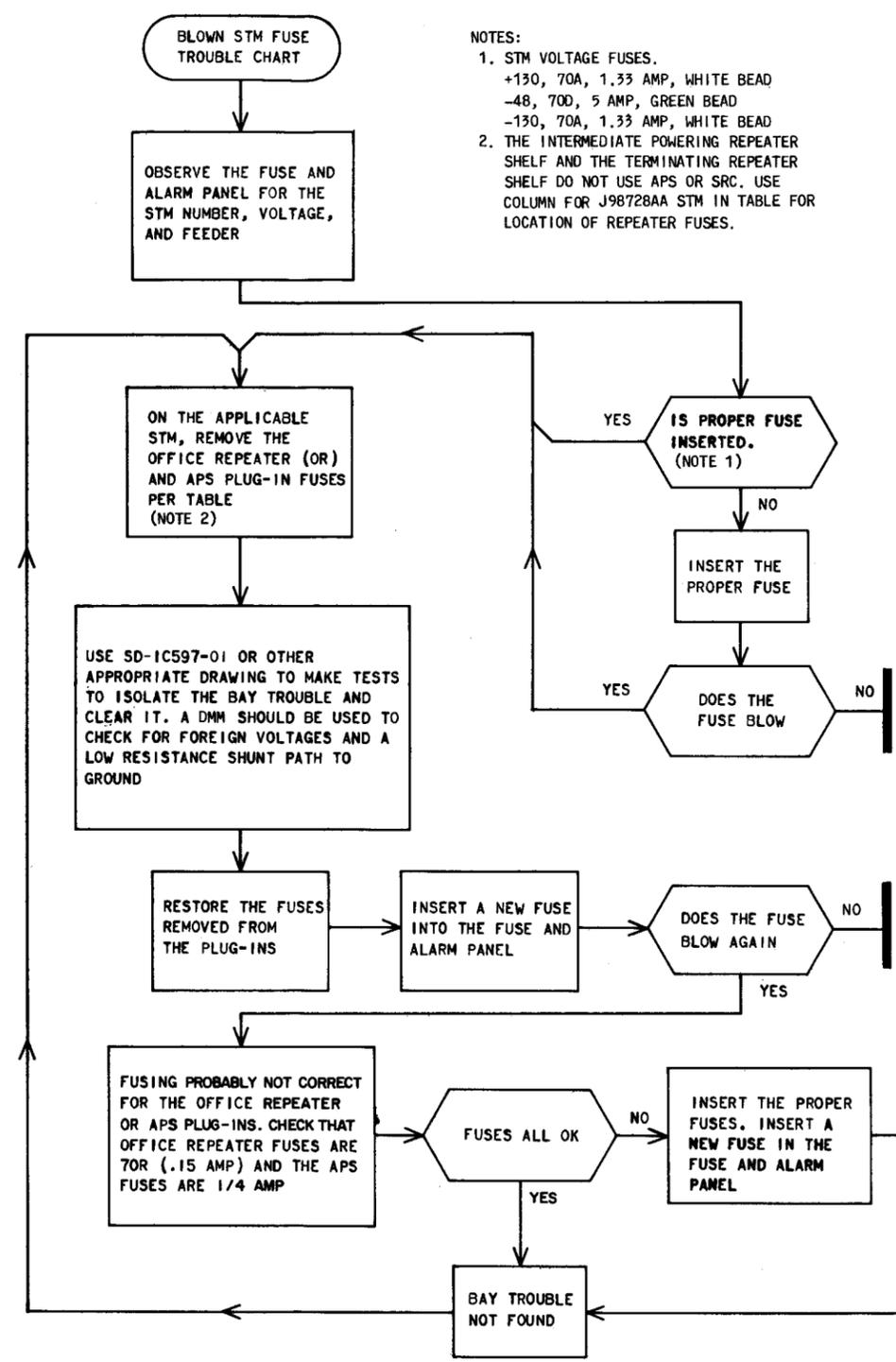


Fig. 12—Remote D Bank or Transmission System Fault (Cont)



NOTE:
 WHEN TESTING AT EACH OFFICE,
 IT IS DESIRABLE TO CORRECT ANY FAULTS
 ENCOUNTERED IN THE BAY WHETHER MINOR
 OR MAJOR BECAUSE IT IS IMPOSSIBLE FOR
 THIS CHART TO ISOLATE ALL FAILURES OR
 COMBINATION OF FAILURES
 THAT MIGHT OCCUR

Fig. 13—Subtle Transmission Trouble Chart



NOTES:
 1. STM VOLTAGE FUSES.
 +130, 70A, 1.33 AMP, WHITE BEAD
 -48, 70D, 5 AMP, GREEN BEAD
 -130, 70A, 1.33 AMP, WHITE BEAD
 2. THE INTERMEDIATE POWERING REPEATER SHELF AND THE TERMINATING REPEATER SHELF DO NOT USE APS OR SRC. USE COLUMN FOR J98728AA STM IN TABLE FOR LOCATION OF REPEATER FUSES.

| TABLE | | | | |
|--------------|--------|---|---|---|
| FUSE VOLTAGE | FEEDER | REMOVE IF PROVIDED | | |
| | | J98728AA STM | J98728AB STM | J98728AC ESTM |
| + 130 | A | + FUSES FROM ORS IN SLOTS 1, 3, 5, 7, 9, AND 11 | + FUSES FROM ORS IN SLOTS 1, 3, 5, 7, 9, AND 11 | + FUSES FROM ORS IN SLOTS 13, 15, 17, 19, 21, 23, AND 25 |
| + 130 | B | + FUSES FROM ORS IN SLOTS 2, 4, 6, 8, 10, AND 12 | + FUSES FROM ORS IN SLOTS 2, 4, 6, 8, 10, AND 12 | + FUSCS FROM ORS IN SLOTS 14, 16, 18, 20, 22, AND 24 |
| - 130 | A | - FUSES FROM ORS IN SLOTS 1, 3, 5, 7, 9, AND 11 | - FUSES FROM ORS IN SLOTS 1, 3, 5, 7, 9, AND 11 | - FUSES FROM ORS IN SLOTS 13, 15, 17, 19, 21, 23, AND 25 |
| - 130 | B | - FUSES FROM ORS IN SLOTS 2, 4, 6, 8, 10, AND 12 | - FUSES FROM ORS IN SLOTS 2, 4, 6, 8, 10, AND 12 | - FUSES FROM ORS IN SLOTS 14, 16, 18, 20, 22, AND 24 |
| - 48 | A | - FUSES FROM ORS IN SLOTS 1, 3, 5, 7, 9, 11, AND BRIDGING RPTR IN SLOT 13; FUSE FROM APS SRC; AND FUSES FROM APS SS PLUG-INS IN SLOTS 1, 3, 5, 7, 9, AND 11 | - FUSES FROM ORS IN SLOTS 1, 3, 5, 7, 9, 11, AND BRIDGING RPTR IN SLOT 13; FUSES FROM APS SRC IN PG-L AND PG-R; AND FUSES FROM APS SS PLUG-INS IN SLOTS 1, 3, 5, 7, 9, AND 11 | - FUSES FROM ORS IN SLOTS 13, 15, 17, 19, 21, AND 23; FUSES FROM APS SS PLUG-INS IN SLOTS 13, 15, 17, 19, 21, 23, AND 25 |
| - 48 | B | - FUSES FROM ORS IN SLOTS 2, 4, 6, 8, 10, AND 12; FUSES FROM APS ALM AND TLM; AND FUSES FROM APS SS PLUG-INS IN SLOTS 2, 4, 6, 8, 10, AND 12 | - FUSES FROM ORS IN SLOTS 2, 4, 6, 8, 10, AND 12; FUSES FROM APS ALM AND TLM; AND FUSES FROM APS SS PLUG-INS IN SLOTS 2, 4, 6, 8, 10, AND 12 | - FUSES FROM ORS IN SLOTS 14, 16, 18, 20, 22, AND 24; FUSE FROM APS TLM AND SS PLUG-INS IN SLOTS 14, 16, 18, 20, 22, AND 24 |

Fig. 14—Blown STM Fuse Trouble Chart

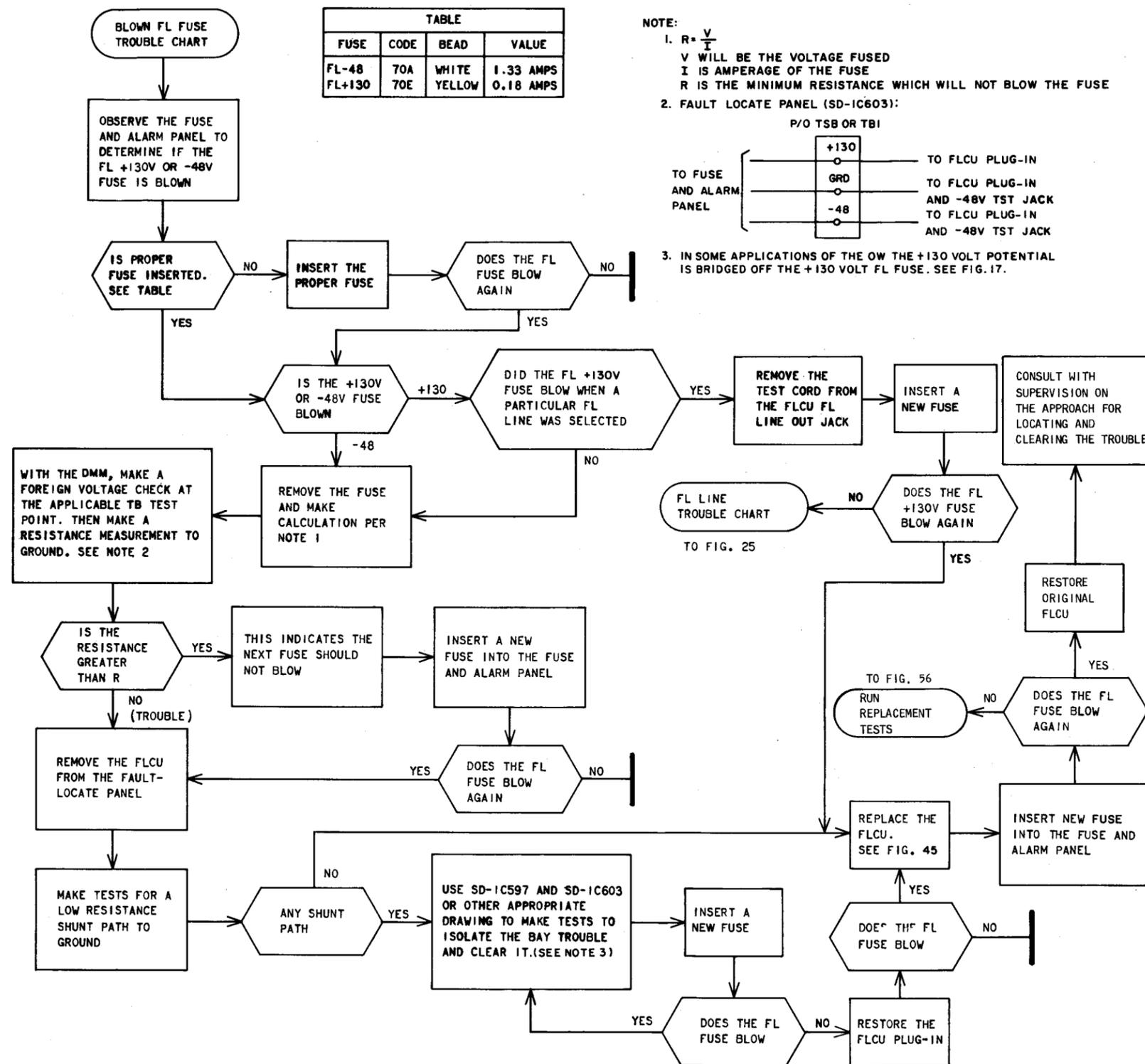
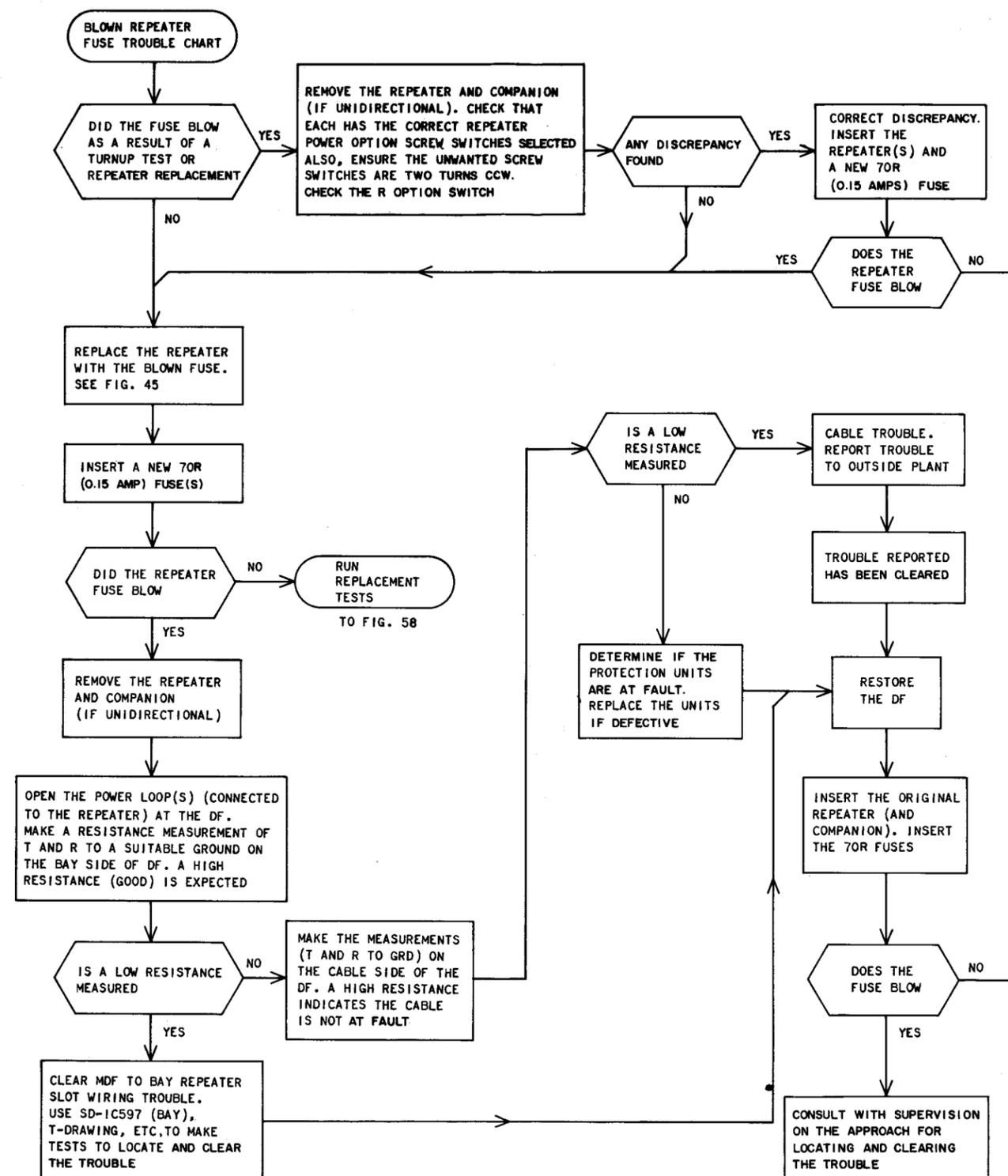


Fig. 15—Blown FL Fuse Trouble Chart



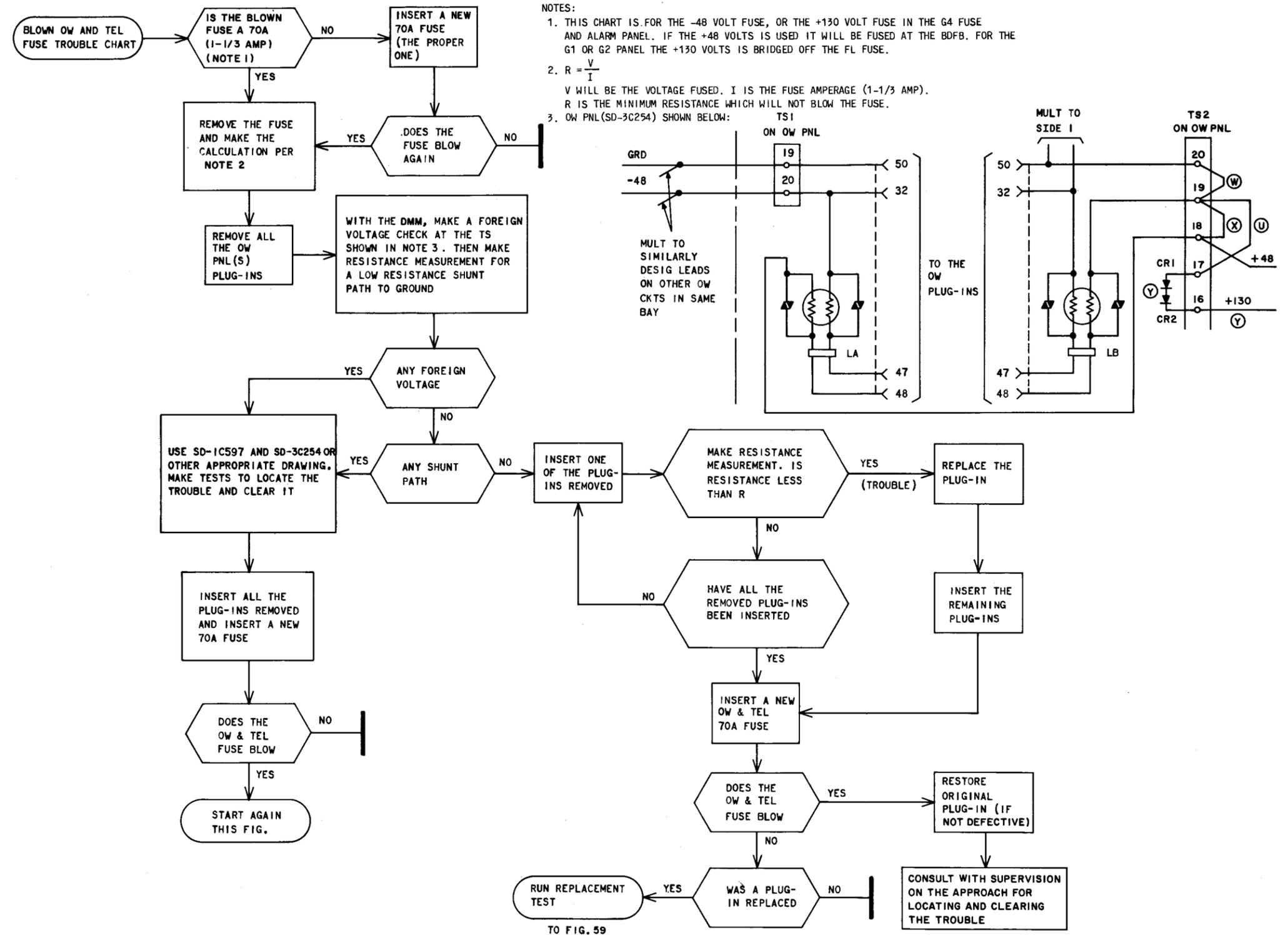


Fig. 17—Blown OW & TEL Fuse Trouble Chart

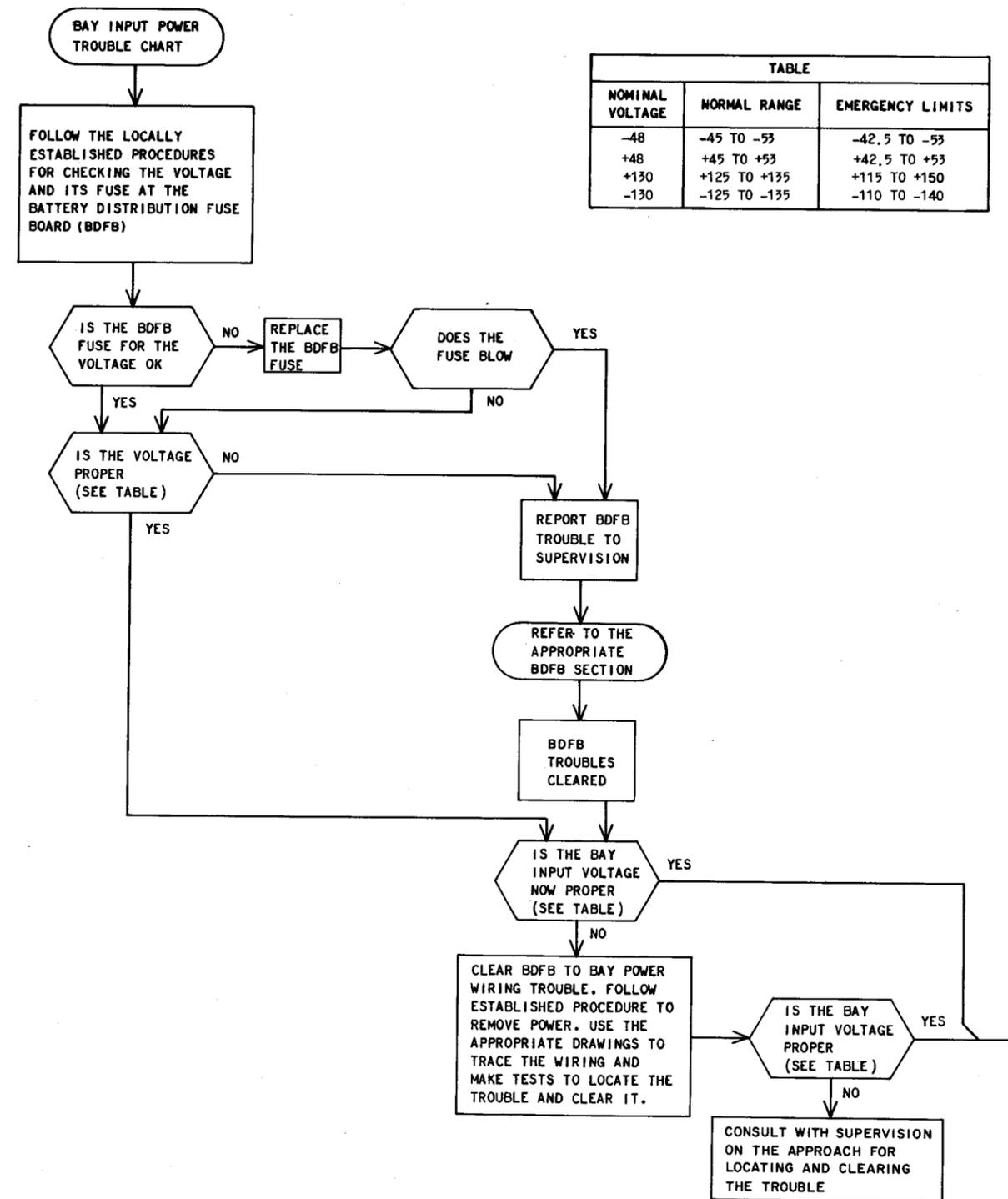
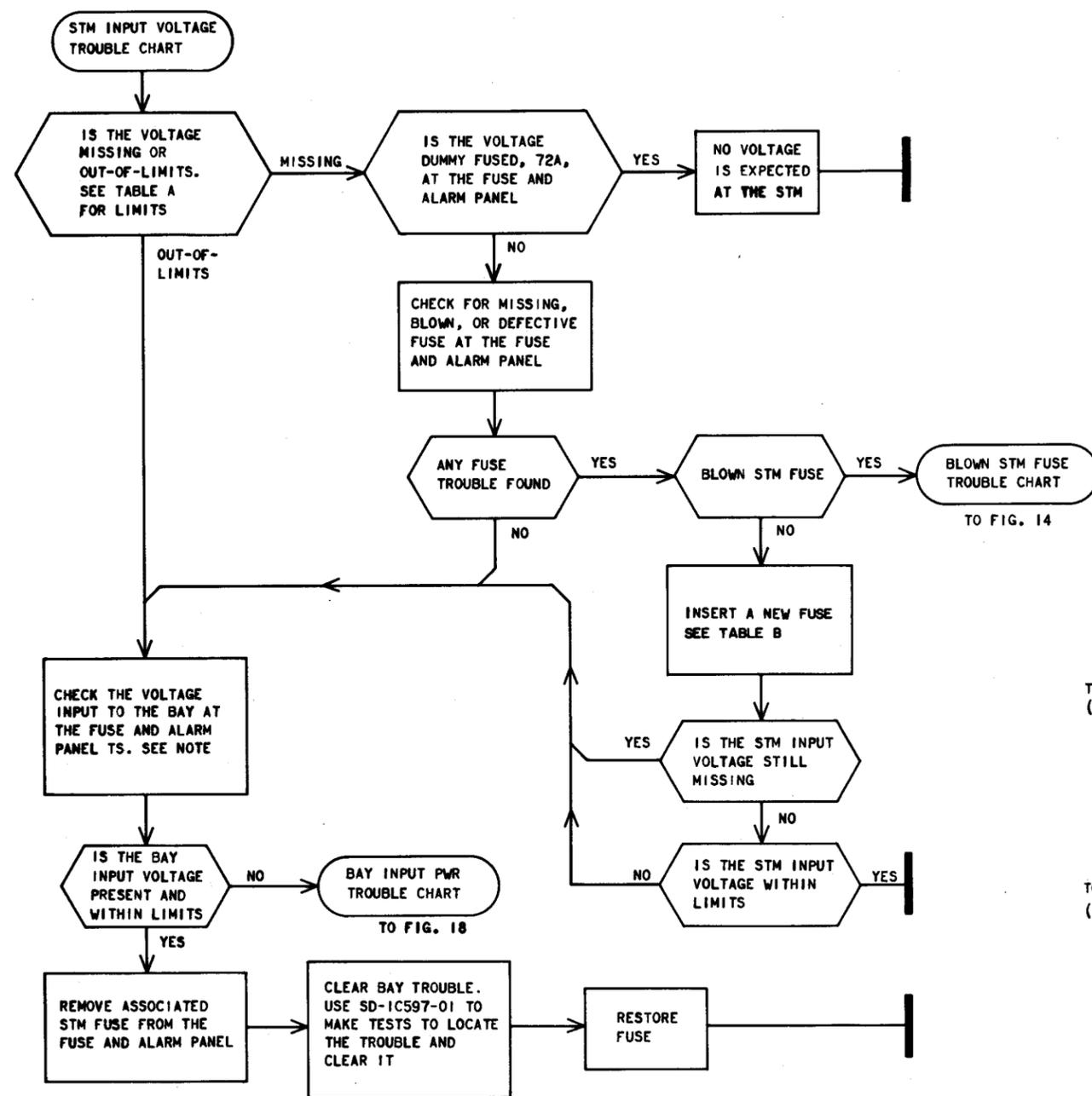


Fig. 18—Bay Input Power Trouble Chart



| TABLE A | | |
|-----------------|--------------|------------------|
| NOMINAL VOLTAGE | NORMAL RANGE | EMERGENCY LIMITS |
| -48 | -45 TO -53 | -42.5 TO -53 |
| -130 | -125 TO -135 | -110 TO -140 |
| +130 | +125 TO +135 | +115 TO +150 |

REPORT EMERGENCY CONDITIONS TO SUPERVISION

| TABLE B | | | |
|-------------------------------|------|-------|-----------|
| STM FUSES (IF NOT DUMMY, 72A) | | | |
| FUSE | CODE | BEAD | VALUE |
| -48 | 70D | GREEN | 5 AMPS |
| -130 | 70A | WHITE | 1.33 AMPS |
| +130 | 70A | WHITE | 1.33 AMPS |

NOTE:
 BAY POWER INPUT TO FUSE AND ALARM PANELS (ED-2C373-30 G1, G2 AND G4). DESIGNATIONS IN PARENTHESES ARE FOR G4.

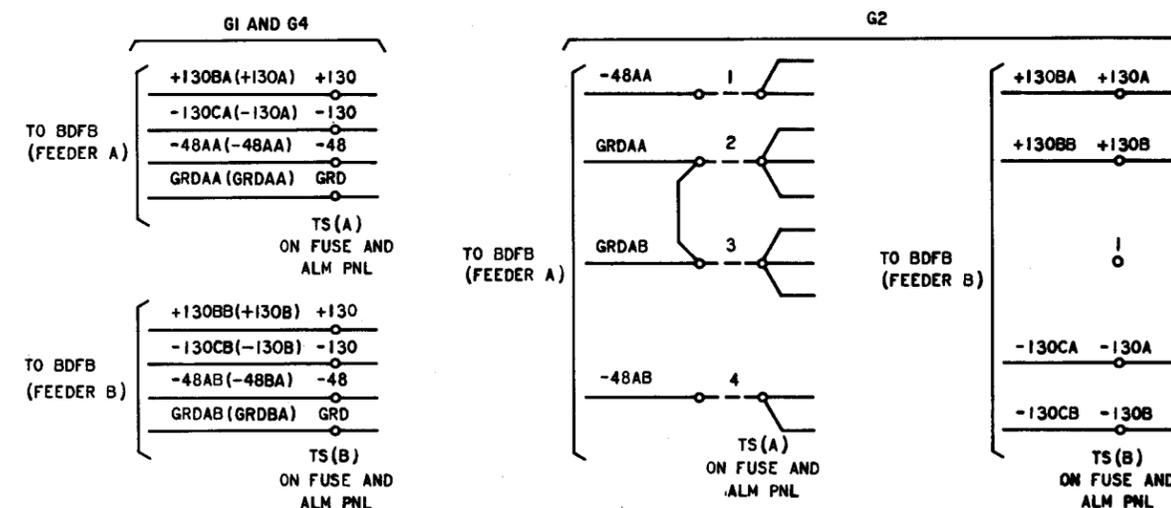
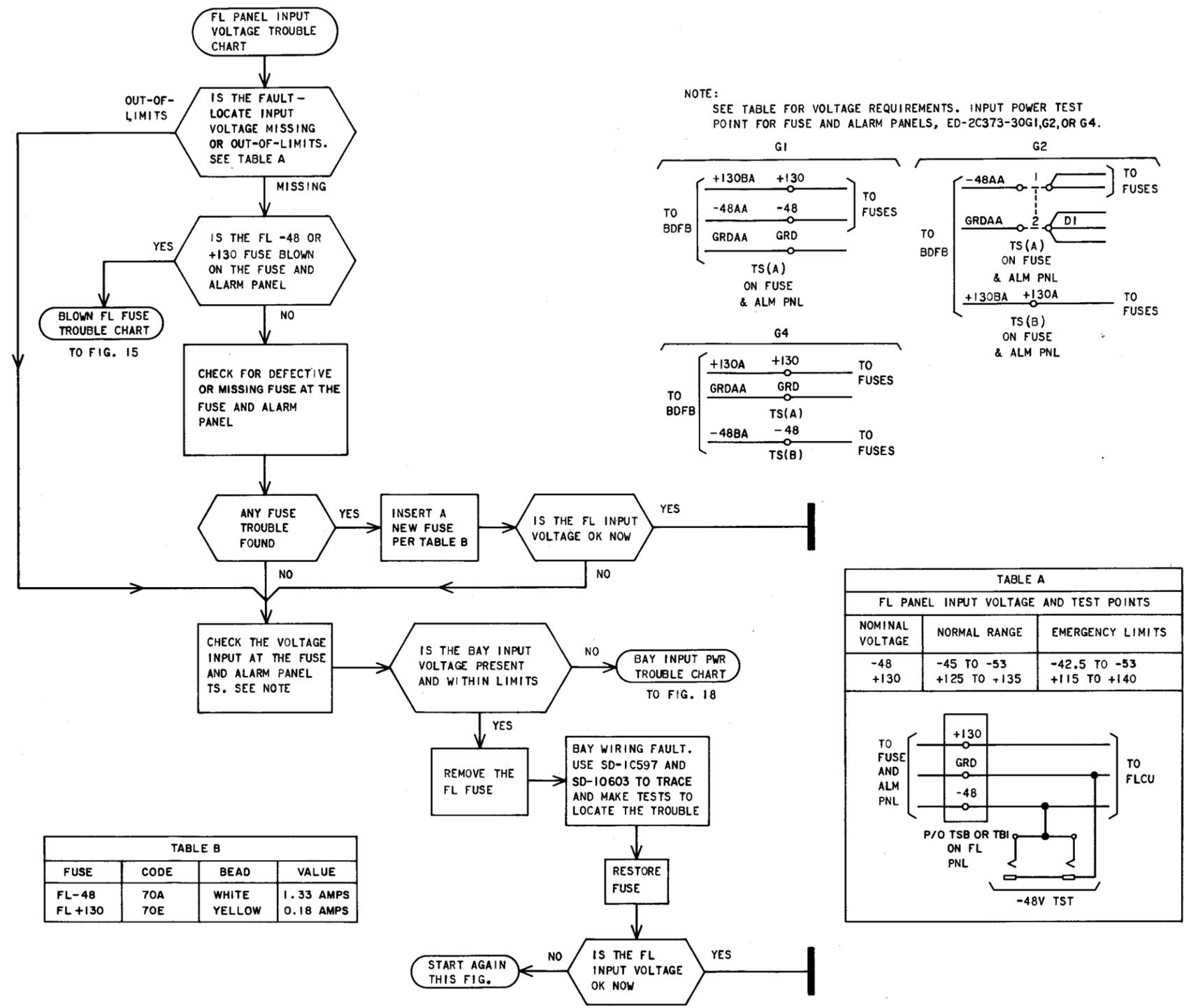
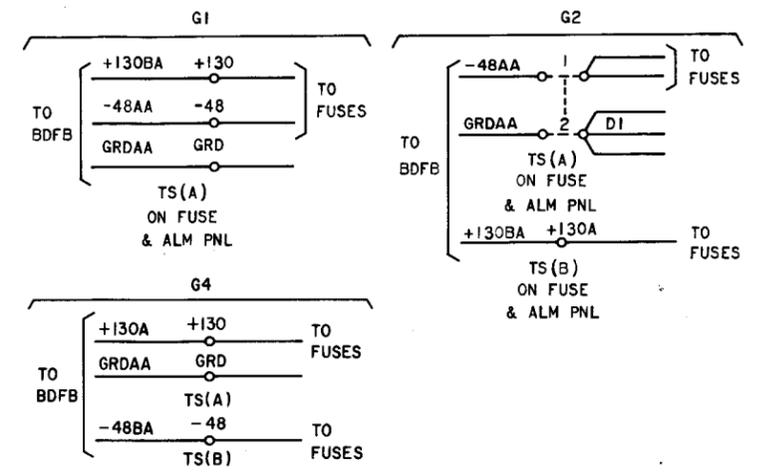


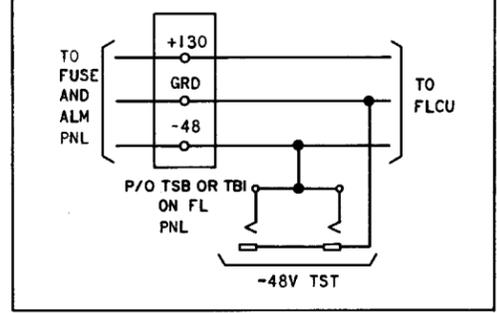
Fig. 19—STM Input Voltage Trouble Chart



NOTE:
SEE TABLE FOR VOLTAGE REQUIREMENTS. INPUT POWER TEST POINT FOR FUSE AND ALARM PANELS, ED-2C373-30G1,G2, OR G4.

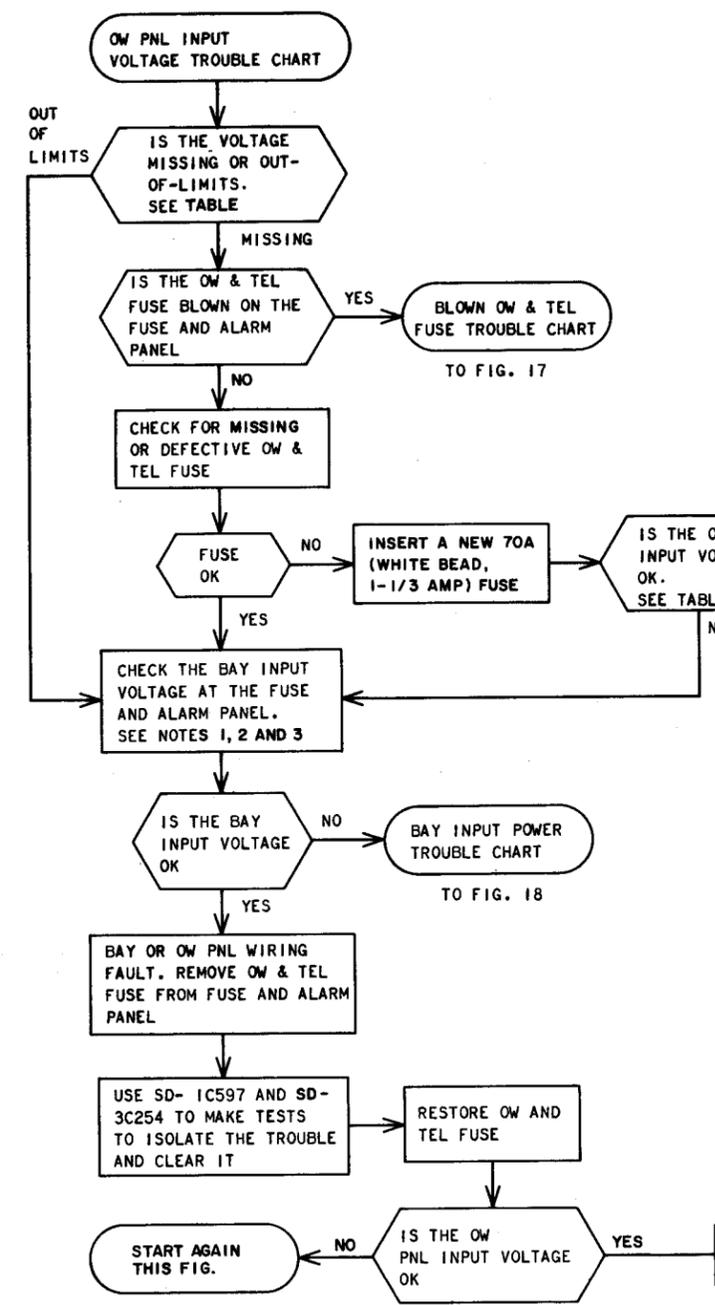


| TABLE A | | |
|--|--------------|------------------|
| FL PANEL INPUT VOLTAGE AND TEST POINTS | | |
| NOMINAL VOLTAGE | NORMAL RANGE | EMERGENCY LIMITS |
| -48 | -45 TO -53 | -42.5 TO -53 |
| +130 | +125 TO +135 | +115 TO +140 |



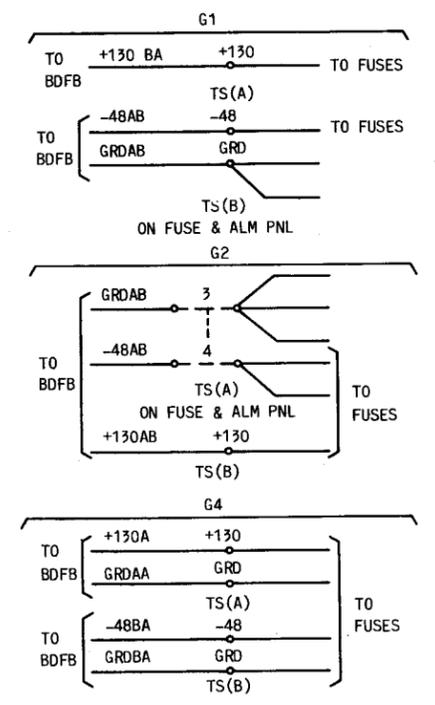
| TABLE B | | | |
|---------|------|--------|-----------|
| FUSE | CODE | BEAD | VALUE |
| FL-48 | 70A | WHITE | 1.33 AMPS |
| FL+130 | 70E | YELLOW | 0.18 AMPS |

Fig. 20—FL Panel Input Voltage Trouble Chart



| OW PNL | | |
|-----------------|--------------|------------------|
| NOMINAL VOLTAGE | NORMAL RANGE | EMERGENCY LIMITS |
| -48 | -45 TO -53 | -42.5 TO -53 |
| +48 | +45 TO +53 | +42.5 TO +53 |
| +130 | +125 TO +135 | +115 TO +140 |

NOTES:
 1. BAY POWER INPUT TO FUSE AND ALARM PANELS (ED-2C373-30)



3. WHEN TESTING OW INPUT VOLTAGES, IT IS IMPORTANT TO TEST THE INDICATED TSA OR TSB. ALTHOUGH ALL POTENTIALS APPEAR ON BOTH TSA AND TSB, THE OUTPUT TO THE PARTICULAR CIRCUIT BEING TESTED APPEARS ON ONLY ONE OR THE OTHER.

2. THE +48V SOURCE IS NOT FUSED AT THE BAY FUSE AND ALARM PANEL. ITS ORIGIN MUST BE DETERMINED FROM THE OFFICE RECORDS AND CHECKED ELSEWHERE. THE +130V SOURCE, IN THE -G1 AND -G2 FUSE AND ALARM PANELS ONLY, IS A BRIDGE OFF THE FL FEEDER A FUSE. THE REMAINDER OF THE CHART IS NOT APPLICABLE FOR -48V OR +130V TROUBLES IN THE -G1 AND -G2 PANELS.

Fig. 21—OW Panel Input Voltage Trouble Chart

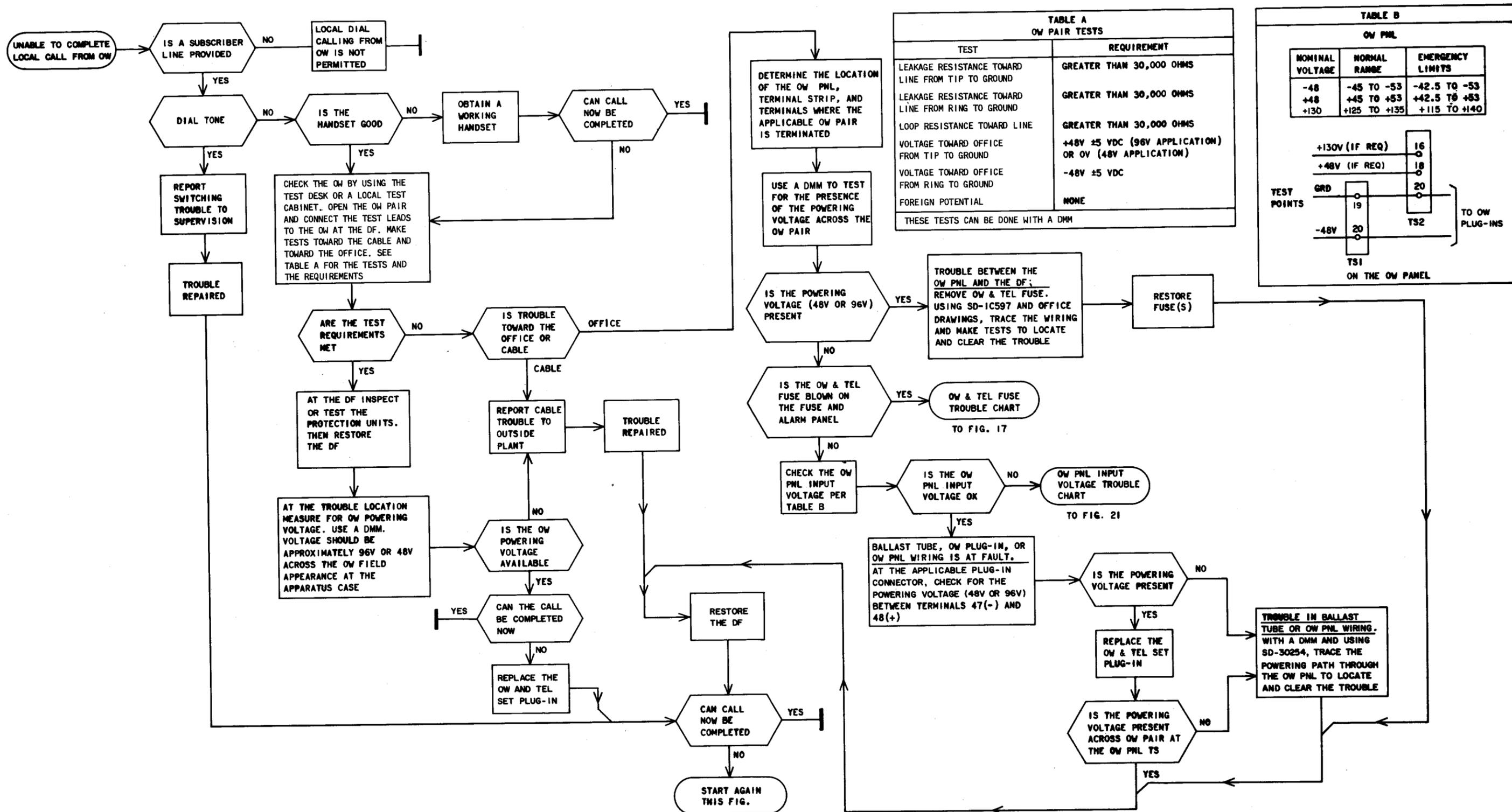


Fig. 22—Unable to Complete Local Call From OW

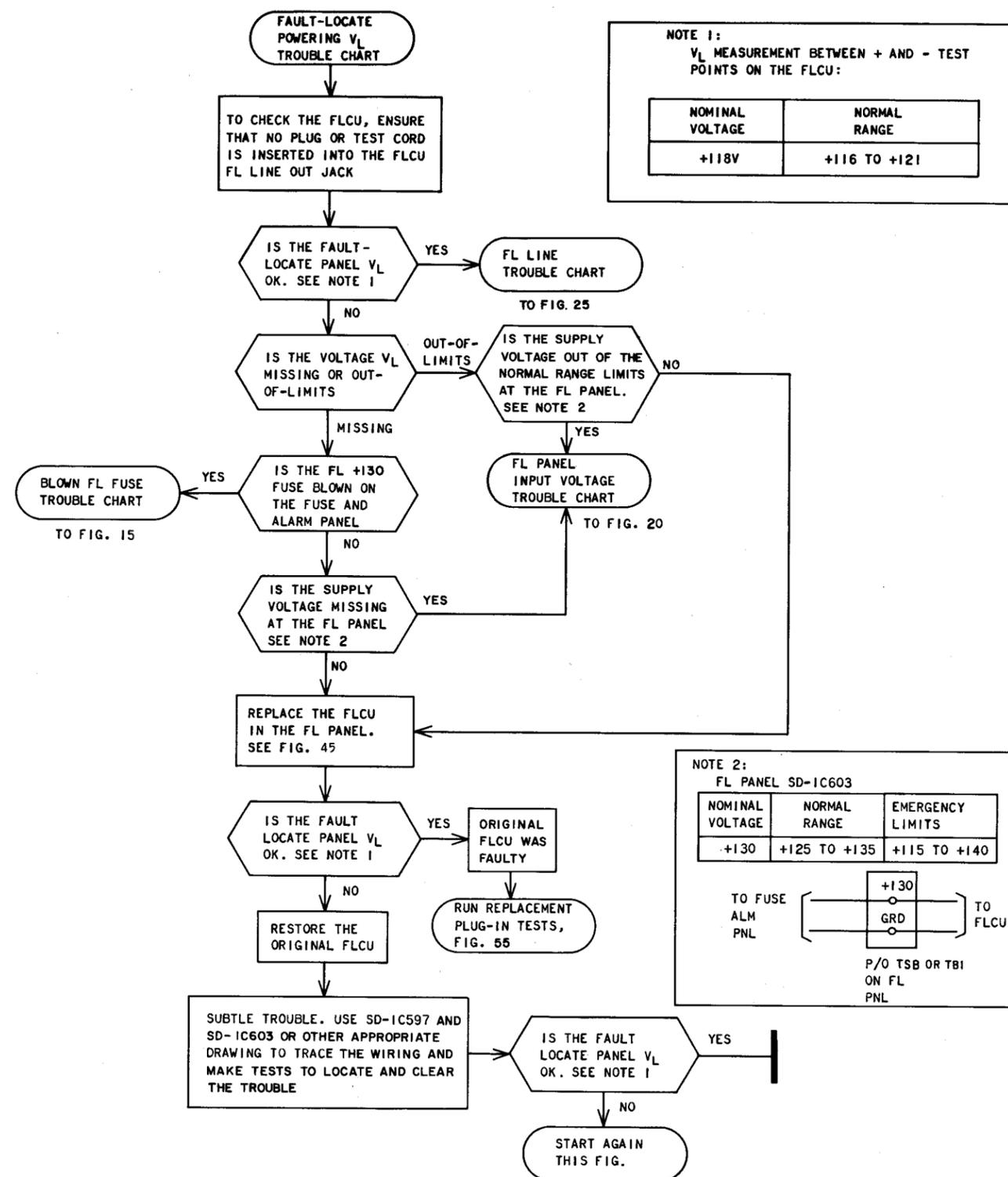


Fig. 23—Fault-Locate Powering V_L Trouble Chart

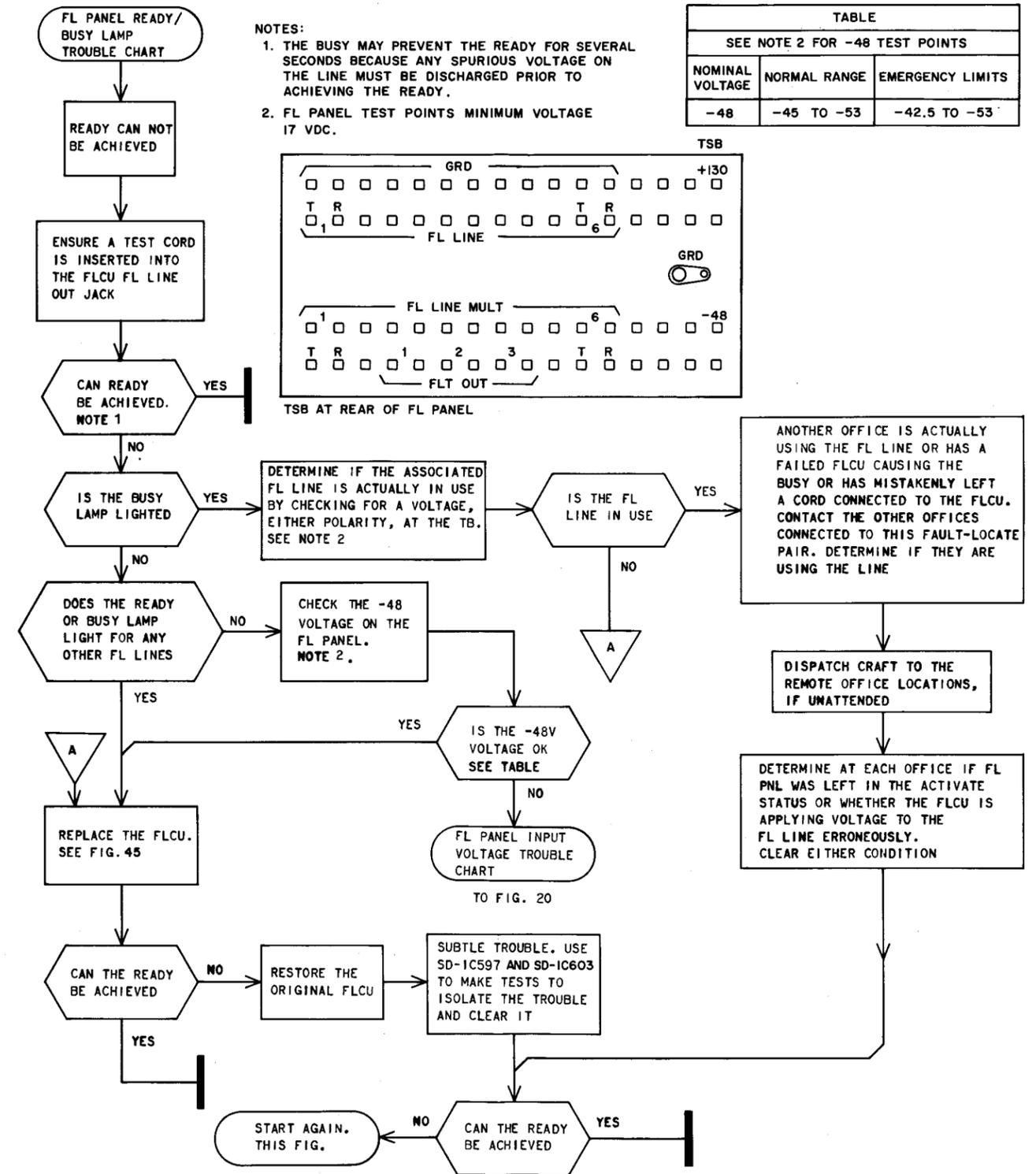
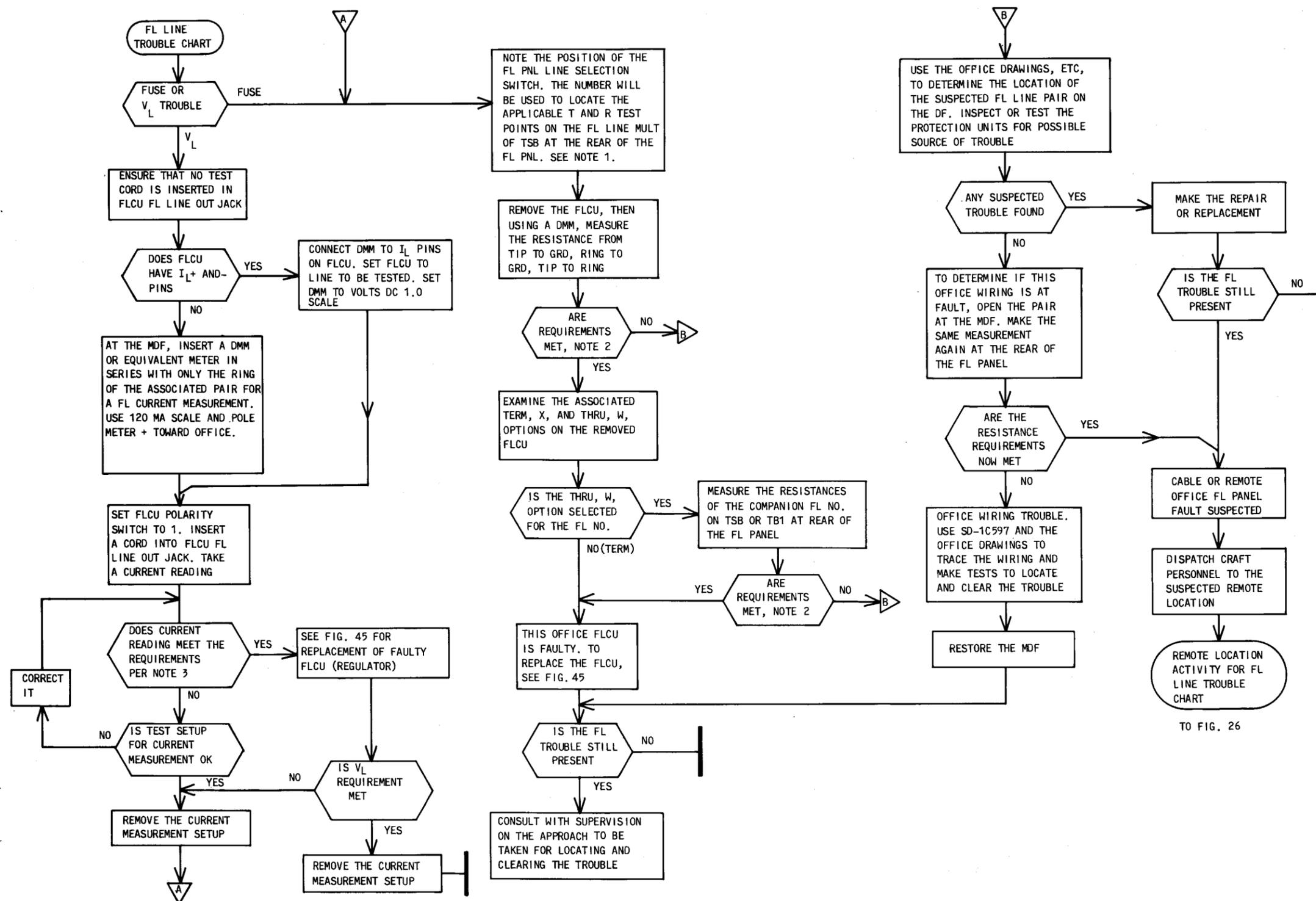


Fig. 24—FL Panel READY/BUSY Lamp Trouble Chart



NOTES:

- FL PANEL TEST POINTS 1 THRU 6 ON FL LINE MULT CORRESPOND TO FL PNL LINE SELECTION.

TSB OR TB1 AT REAR OF PHL (TSB)

| | | | | | | | | | | | | | | | | | | | | | | | |
|---------|---|--|--|--|--|--|--|--|--|--|--|------|---|--|--|--|--|--|--|--|--|--|--|
| GRD | | | | | | | | | | | | +130 | | | | | | | | | | | |
| T | R | | | | | | | | | | | T | R | | | | | | | | | | |
| 1 | | | | | | | | | | | | 6 | | | | | | | | | | | |
| FL LINE | | | | | | | | | | | | 1GRD | | | | | | | | | | | |

FL LINE MULT

| | | | | | | | | | | | | | | | | | | | | | | | |
|---------|---|--|--|--|--|--|--|--|--|--|--|------|---|---|--|--|--|--|--|--|--|--|--|
| 1 | | | | | | | | | | | | 6 | | | | | | | | | | | |
| T | R | | | | | | | | | | | 1 | 2 | 3 | | | | | | | | | |
| FLT OUT | | | | | | | | | | | | 1-48 | | | | | | | | | | | |

- RESISTANCE OF T OR R TO GRD MUST BE GREATER THAN 1 MEGOHM
RESISTANCE OF T TO R MUST BE GREATER THAN $\frac{100K}{N}$ OHMS
MEASURED ON X1,000 SCALE ONLY (X10,000 SCALE 30V BATTERY WILL BEGIN TO ACTIVATE FILTERS AND CAUSE AN ERRONEOUS MEASUREMENT)
N = NUMBER OF ACTIVE FILTERS CONNECTED TO THIS FL LINE
- FOR CURRENT REQUIREMENT COMPARE READING TO INITIAL READING ON FORM E6988, BLOCK 5

Fig. 25—FL Line Trouble Chart

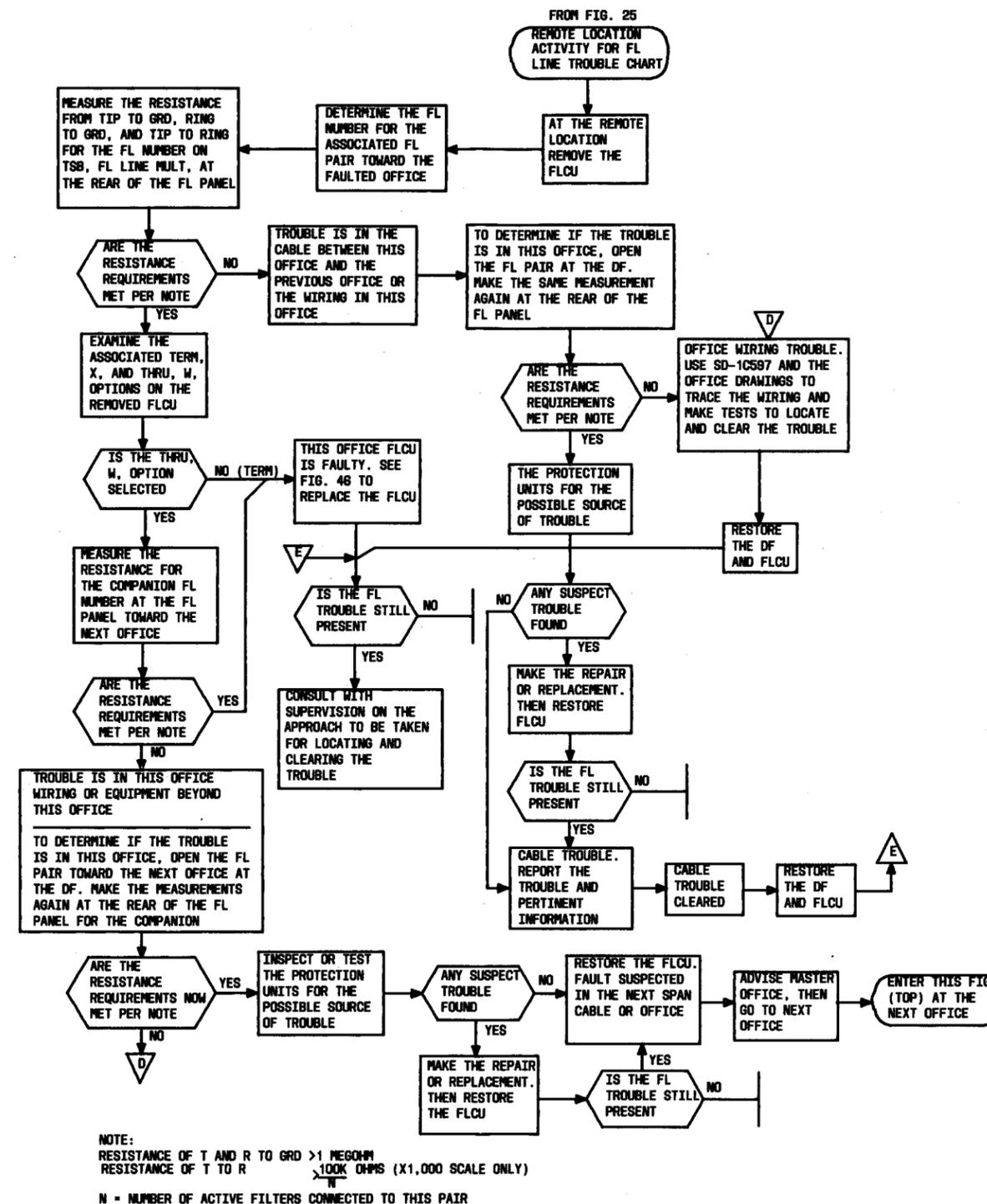
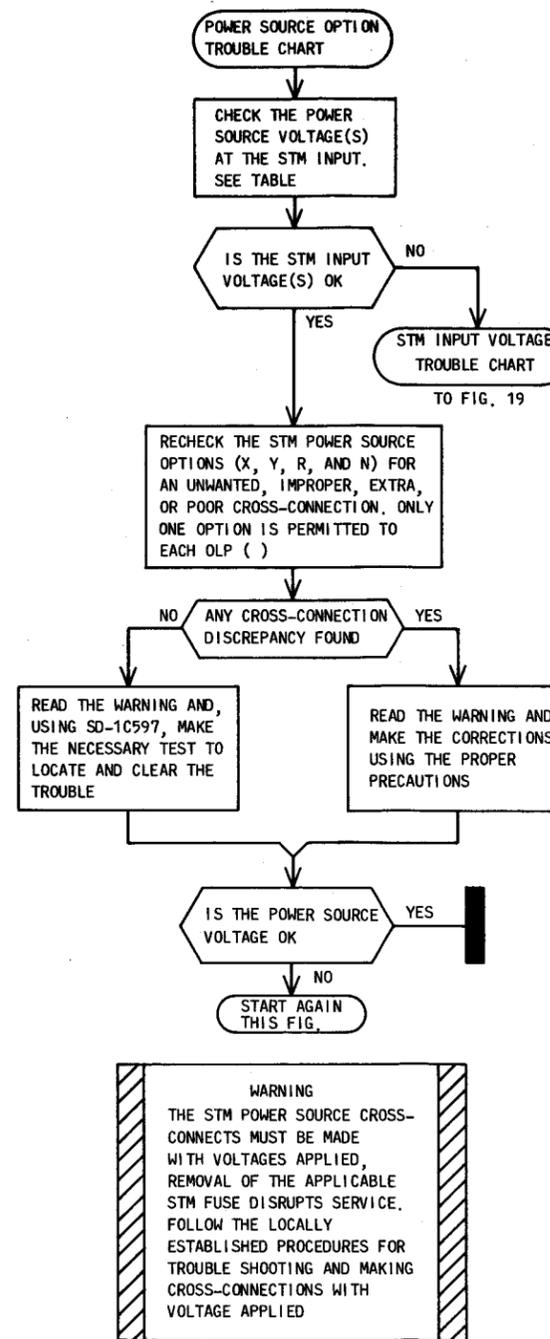


Fig. 26—Remote Location Activity For FL Line Trouble Chart



WARNING
 THE STM POWER SOURCE CROSS-CONNECTS MUST BE MADE WITH VOLTAGES APPLIED, REMOVAL OF THE APPLICABLE STM FUSE DISRUPTS SERVICE. FOLLOW THE LOCALLY ESTABLISHED PROCEDURES FOR TROUBLE SHOOTING AND MAKING CROSS-CONNECTIONS WITH VOLTAGE APPLIED

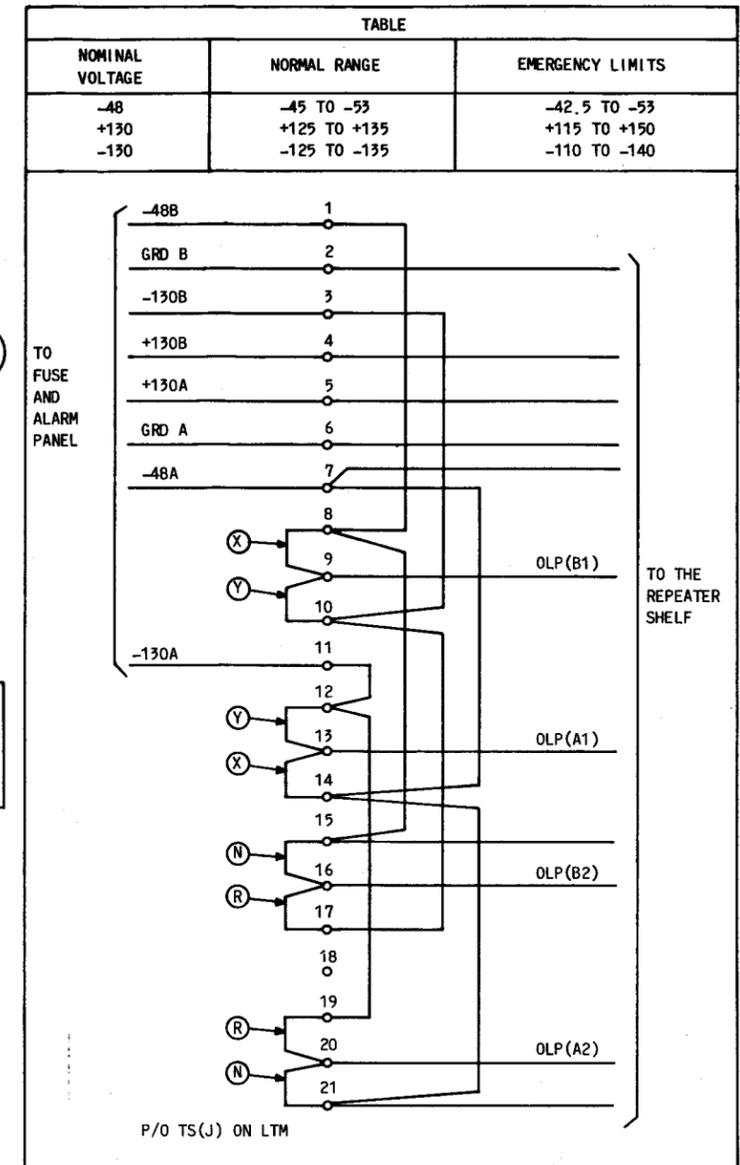
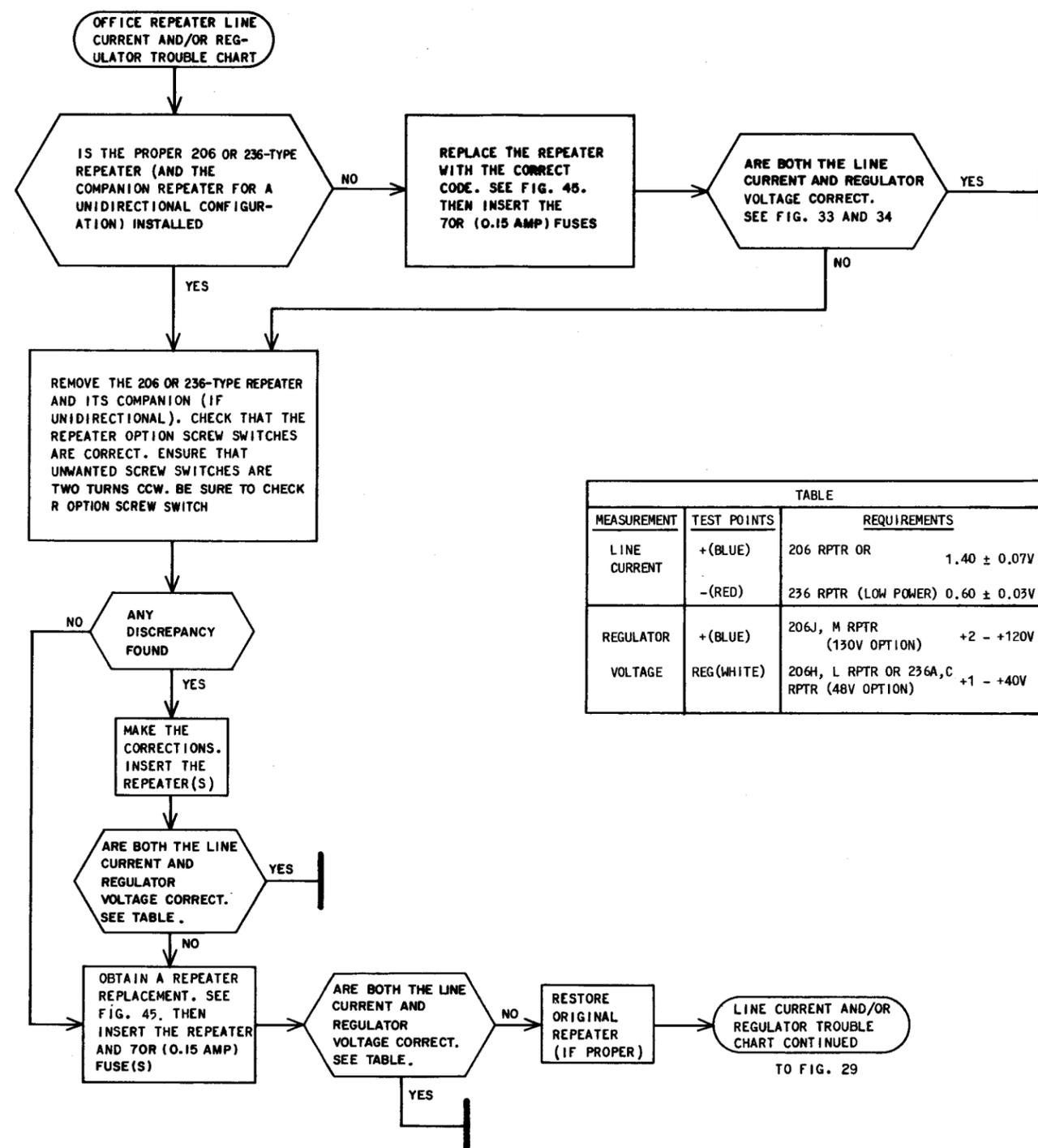


Fig. 27—Power Source Option Trouble Chart



| TABLE | | |
|-------------------|-------------|--|
| MEASUREMENT | TEST POINTS | REQUIREMENTS |
| LINE CURRENT | +(BLUE) | 206 RPTR OR 1.40 ± 0.07V |
| | -(RED) | 236 RPTR (LOW POWER) 0.60 ± 0.03V |
| REGULATOR VOLTAGE | +(BLUE) | 206J, M RPTR (130V OPTION) +2 - +120V |
| | REG(WHITE) | 206H, L RPTR OR 236A,C RPTR (48V OPTION) +1 - +40V |

Fig. 28—Line Current and/or Regulator Trouble Chart

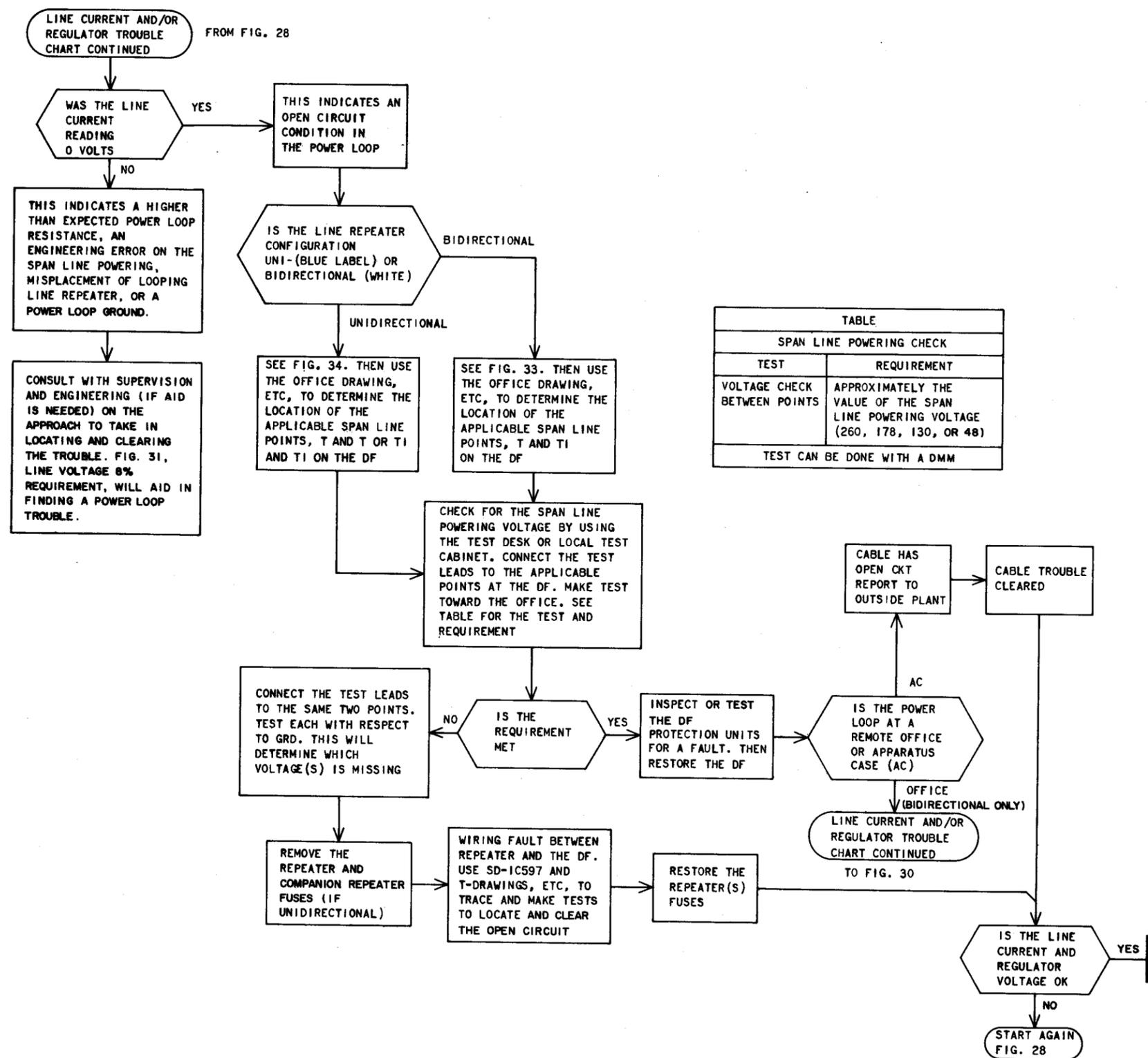


Fig. 29—Line Current and/or Regulator Trouble Chart (Cont)

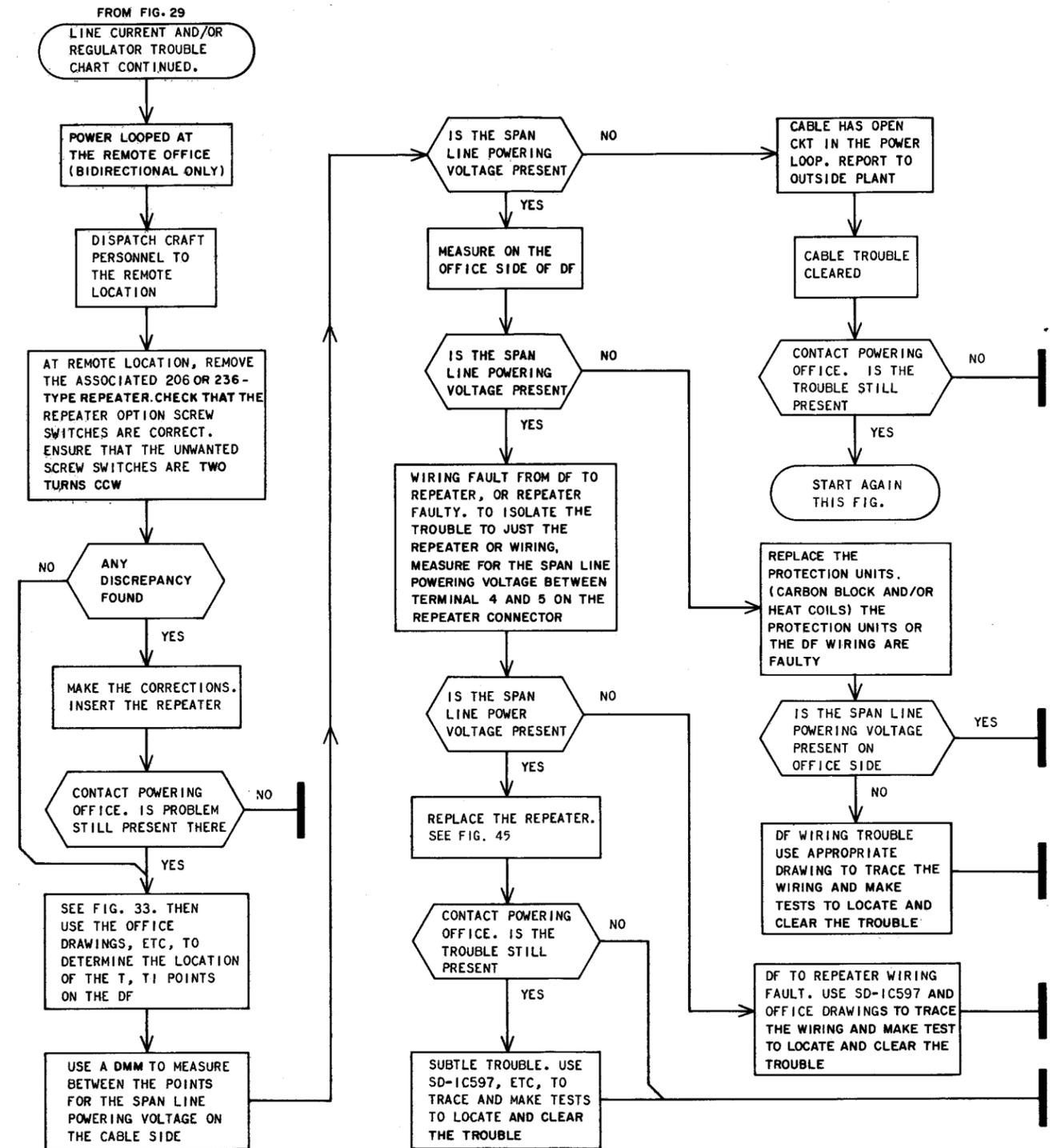


Fig. 30—Line Current and/or Regulator Trouble Chart (Cont)

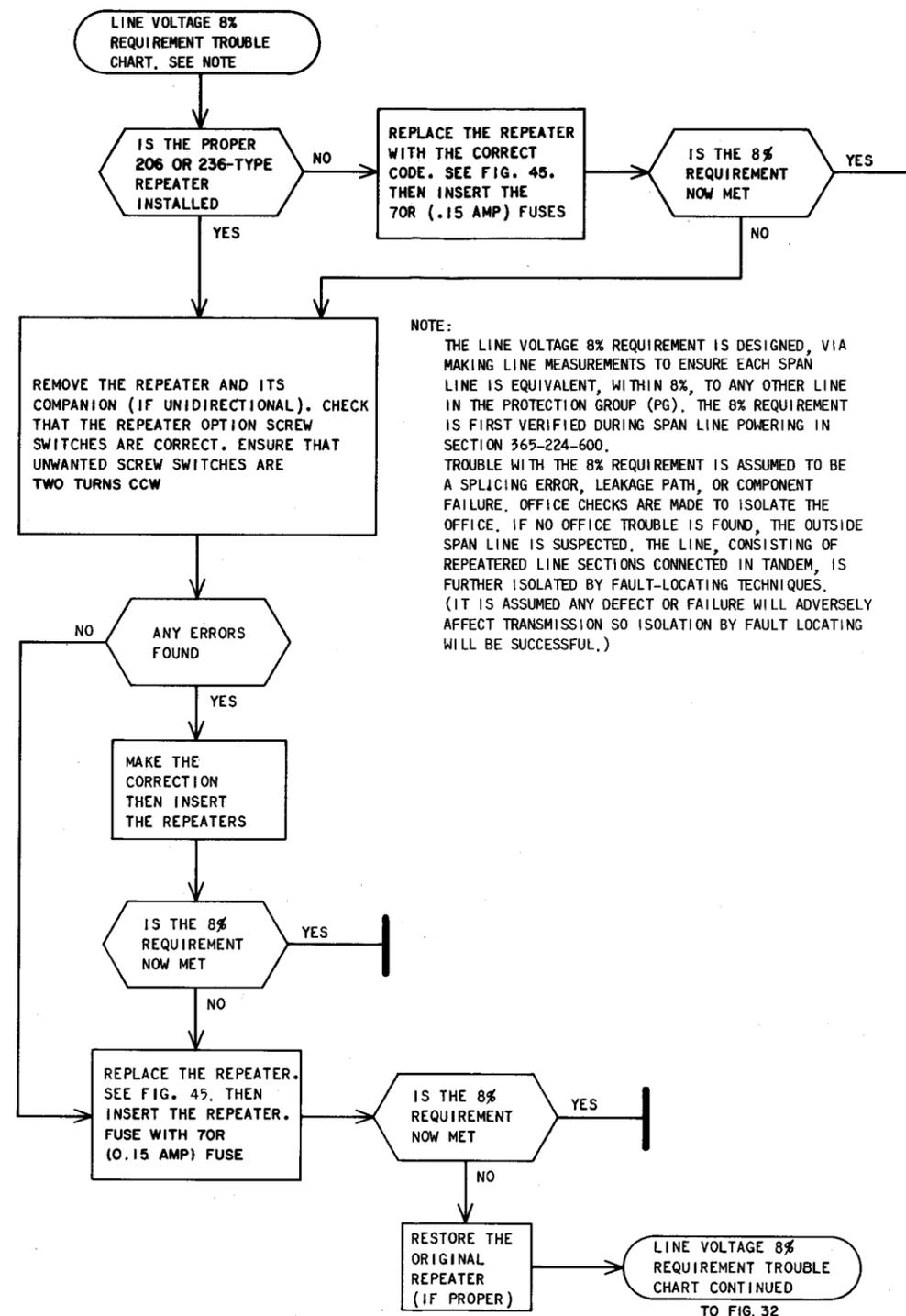


Fig. 31—Line Voltage 8% Requirement Trouble Chart

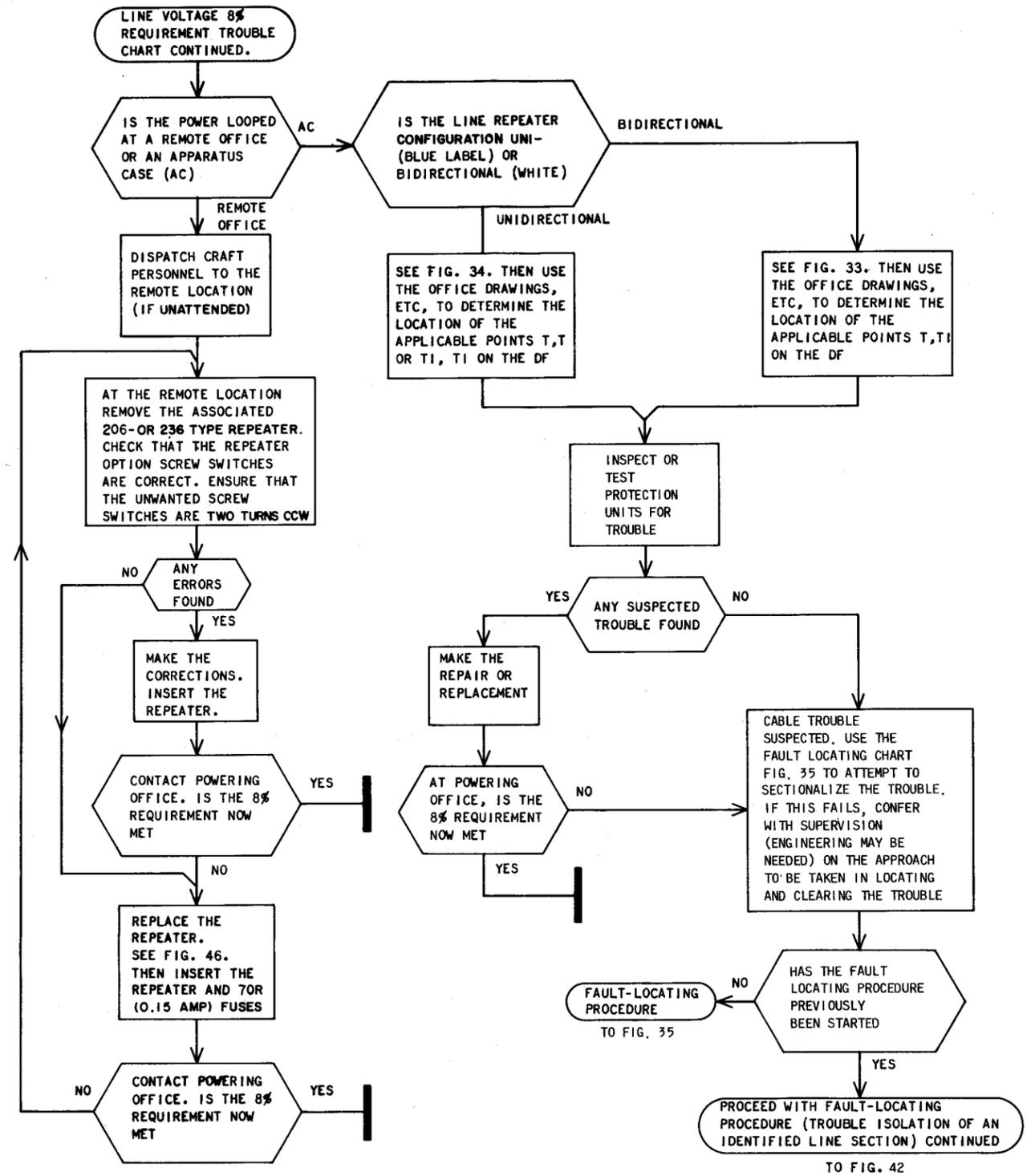
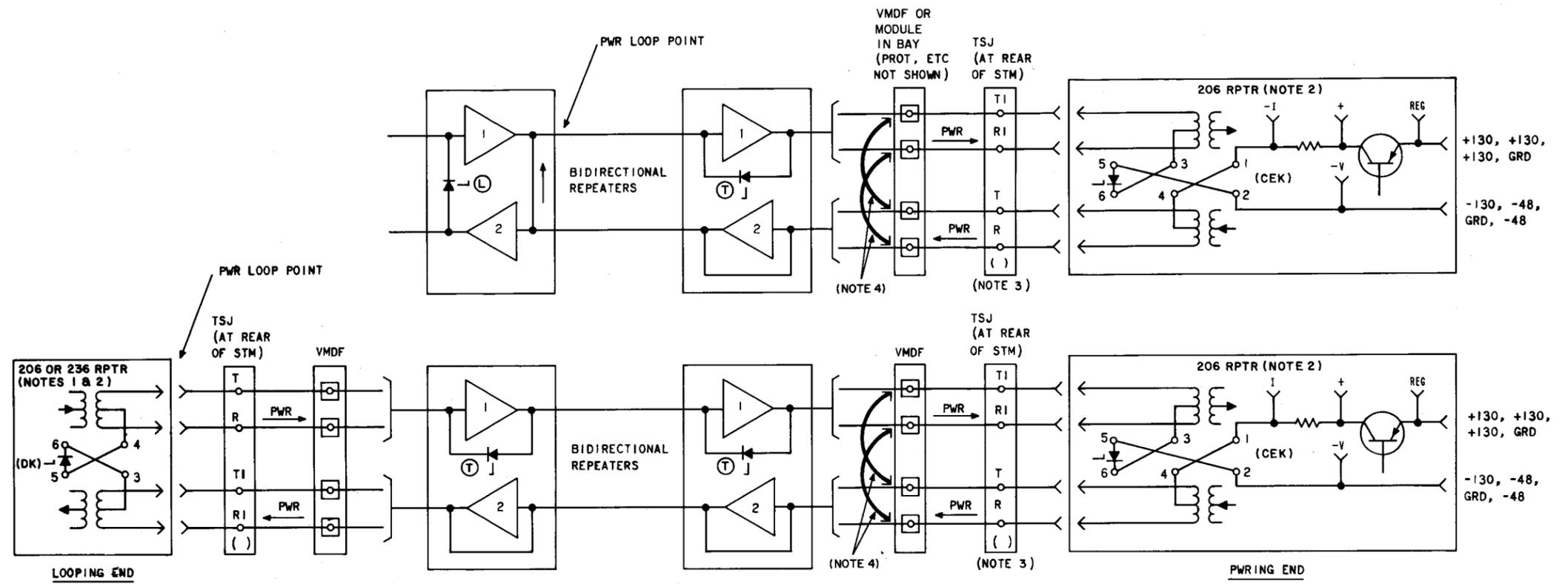
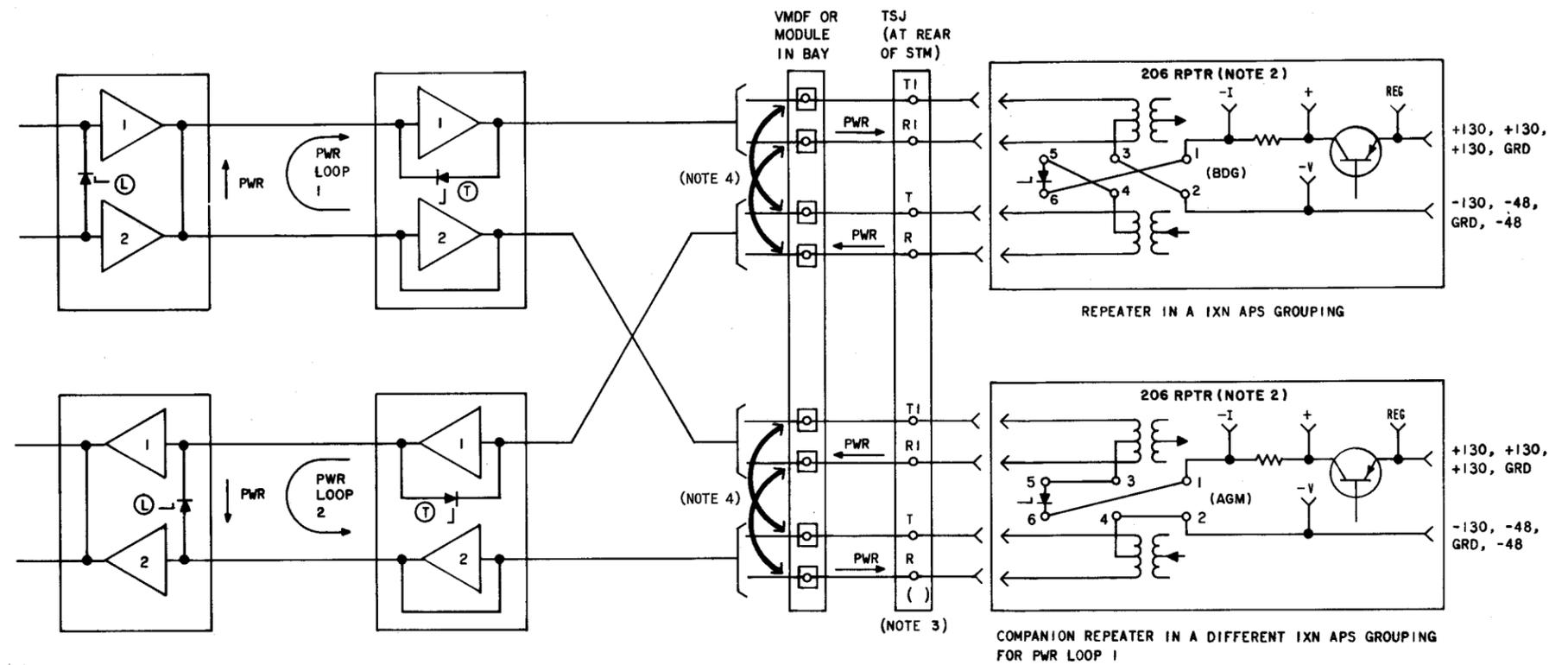


Fig. 32—Line Voltage 8% Requirement Trouble Chart (Cont)



- NOTES:
1. 206H OR L REPEATER HAS A 48-VOLT REGULATOR, 206J OR M REPEATER HAS A 130-VOLT REGULATOR, 206K OR N REPEATER HAS NO REGULATOR - USED ONLY TO LOOP POWER.
 2. SIMILAR CONFIGURATIONS ARE ASSUMED FOR 236 REPEATERS. 236AA AND AC REPEATERS HAVE 48V AND 130V REGULATORS SELECTED BY OPTION. 236AB AND AD REPEATERS HAVE NO REGULATOR AND ARE USED TO LOOP POWER.
 3. () WILL CONTAIN APPLICABLE REPEATER SLOT DESIGNATION.
 - L INDICATES POWER IS LOOPED BY PROVIDING PROPER CODE OF 208/209 REPEATERS, OR PROPER OPTION OF 238/239 REPEATERS.
 - T INDICATES POWER IS FEED THROUGH BY PROVIDING PROPER CODE OF 208/209 REPEATERS, OR PROPER OPTION OF 238/239 REPEATERS.
 4. THESE PATCHES TO BE USED FOR INITIAL TESTING OF STM PLUG-INS PER CHART 5. USE 463A PLUGS WITH JUMPERS FOR 303 CONNECTORS, OR SHIELDED CROSS-CONNECTS FOR C-TYPE CONNECTORS.

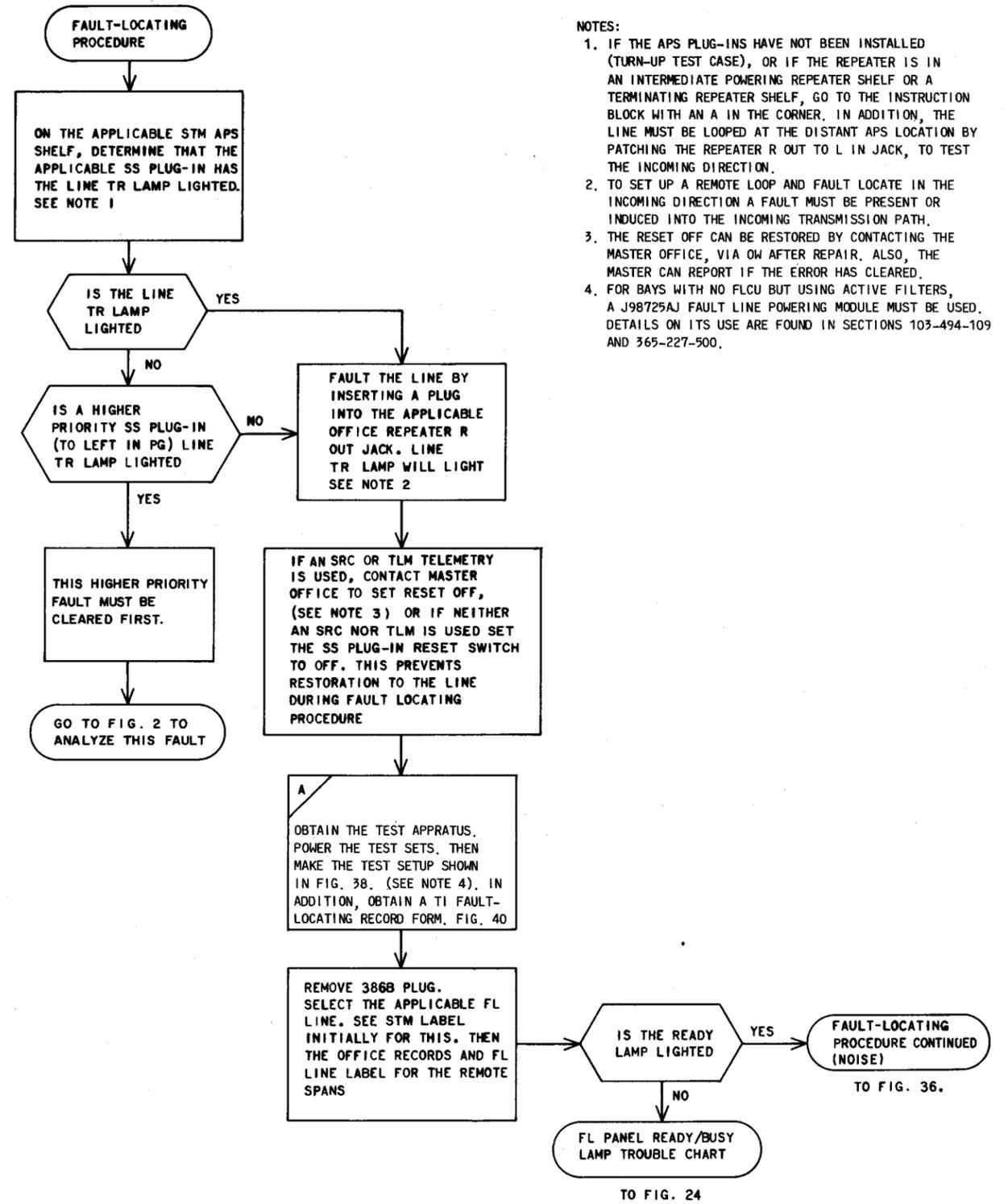
Fig. 33—Bidirectional Powering Scheme Showing the 206-Type Repeater Test Points



NOTES:

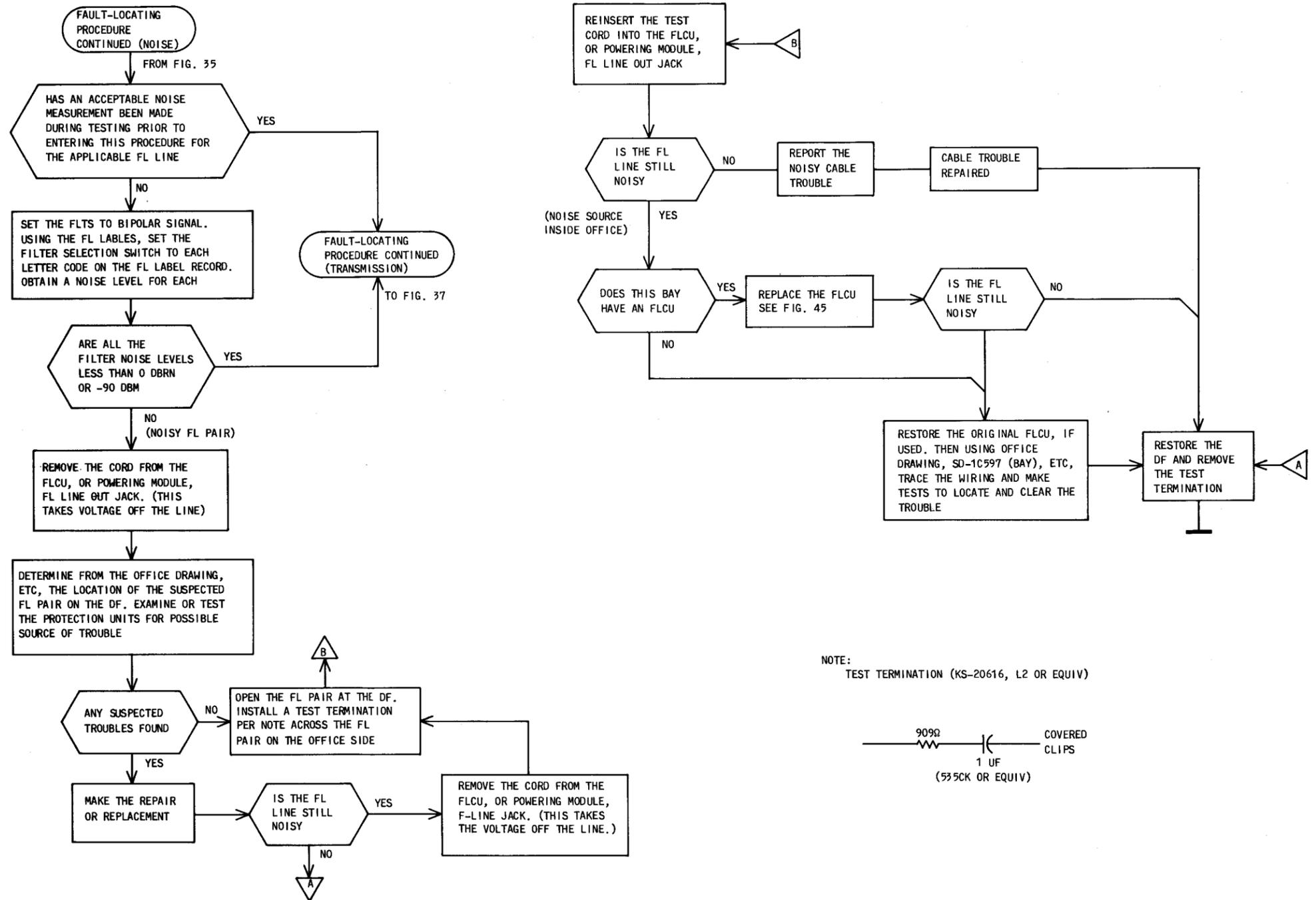
1. 206H OR L REPEATER HAS A 48-VOLT REGULATOR, 206J OR M REPEATER HAS A 130-VOLT REGULATOR, 206K OR N REPEATER HAS NO REGULATOR - USED ONLY TO LOOP POWER.
2. SIMILAR CONFIGURATIONS ARE ASSUMED FOR 236 REPEATERS. 236AA AND AC REPEATERS HAVE 48V AND 130V REGULATORS, SELECTED BY OPTION. 236AB AND AD REPEATERS HAVE NO REGULATOR AND ARE USED TO LOOP POWER.
3. () WILL CONTAIN APPLICABLE REPEATER SLOT DESIGNATION.
- L INDICATES POWER IS LOOPED BY PROVIDING PROPER CODE OF 208/209 REPEATER, OR PROPER OPTION OF 238/239 REPEATER.
- T INDICATES POWER IS FEED THROUGH BY PROVIDING PROPER CODE OF 208/209 REPEATER, OR PROPER OPTION OF 238/239 REPEATER.
4. THESE PATCHES TO BE USED FOR INITIAL TESTING OF STM PLUG-INS PER CHART 5. USE 463A PLUGS WITH JUMPERS FOR 303 CONNECTORS, OR SHIELDED CROSS-CONNECTS FOR C-TYPE CONNECTORS.

Fig. 34—Unidirectional Powering Scheme Showing the 206-Type Repeater Test Points



- NOTES:
1. IF THE APS PLUG-INS HAVE NOT BEEN INSTALLED (TURN-UP TEST CASE), OR IF THE REPEATER IS IN AN INTERMEDIATE POWERING REPEATER SHELF OR A TERMINATING REPEATER SHELF, GO TO THE INSTRUCTION BLOCK WITH AN A IN THE CORNER. IN ADDITION, THE LINE MUST BE LOOPED AT THE DISTANT APS LOCATION BY PATCHING THE REPEATER R OUT TO L IN JACK, TO TEST THE INCOMING DIRECTION.
 2. TO SET UP A REMOTE LOOP AND FAULT LOCATE IN THE INCOMING DIRECTION A FAULT MUST BE PRESENT OR INDUCED INTO THE INCOMING TRANSMISSION PATH.
 3. THE RESET OFF CAN BE RESTORED BY CONTACTING THE MASTER OFFICE, VIA OM AFTER REPAIR. ALSO, THE MASTER CAN REPORT IF THE ERROR HAS CLEARED.
 4. FOR BAYS WITH NO FLCU BUT USING ACTIVE FILTERS, A J98725AJ FAULT LINE POWERING MODULE MUST BE USED. DETAILS ON ITS USE ARE FOUND IN SECTIONS 103-494-109 AND 365-227-500.

Fig. 35—Fault-Locating Procedure



NOTE:
TEST TERMINATION (KS-20616, L2 OR EQUIV)

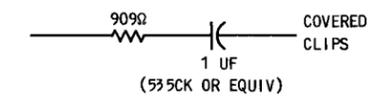


Fig. 36—Fault-Locating Procedure (Noise)

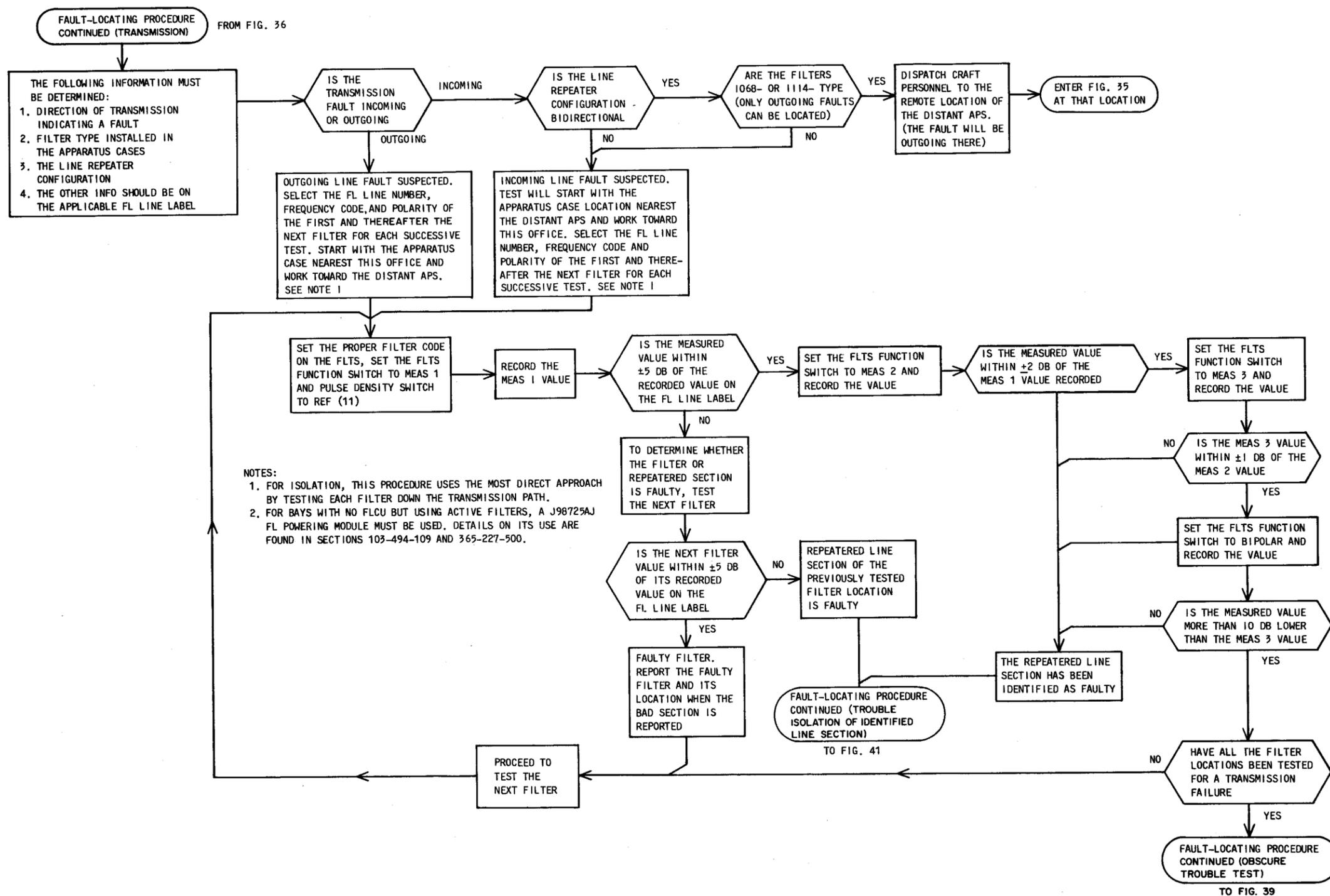


Fig. 37—Fault-Locating Procedure (Transmission)

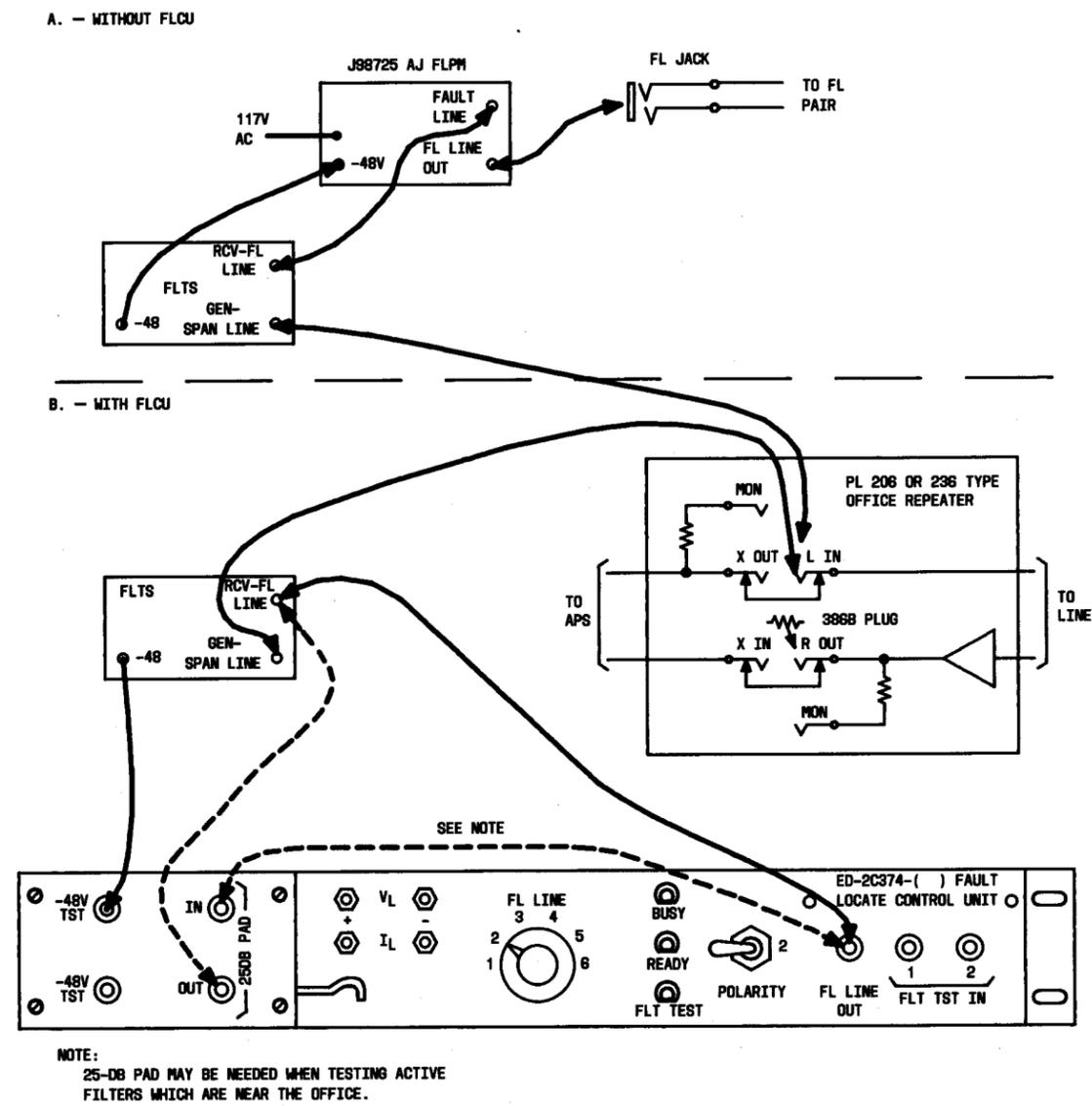


Fig. 38—Test Setup For Fault-Locating Procedure

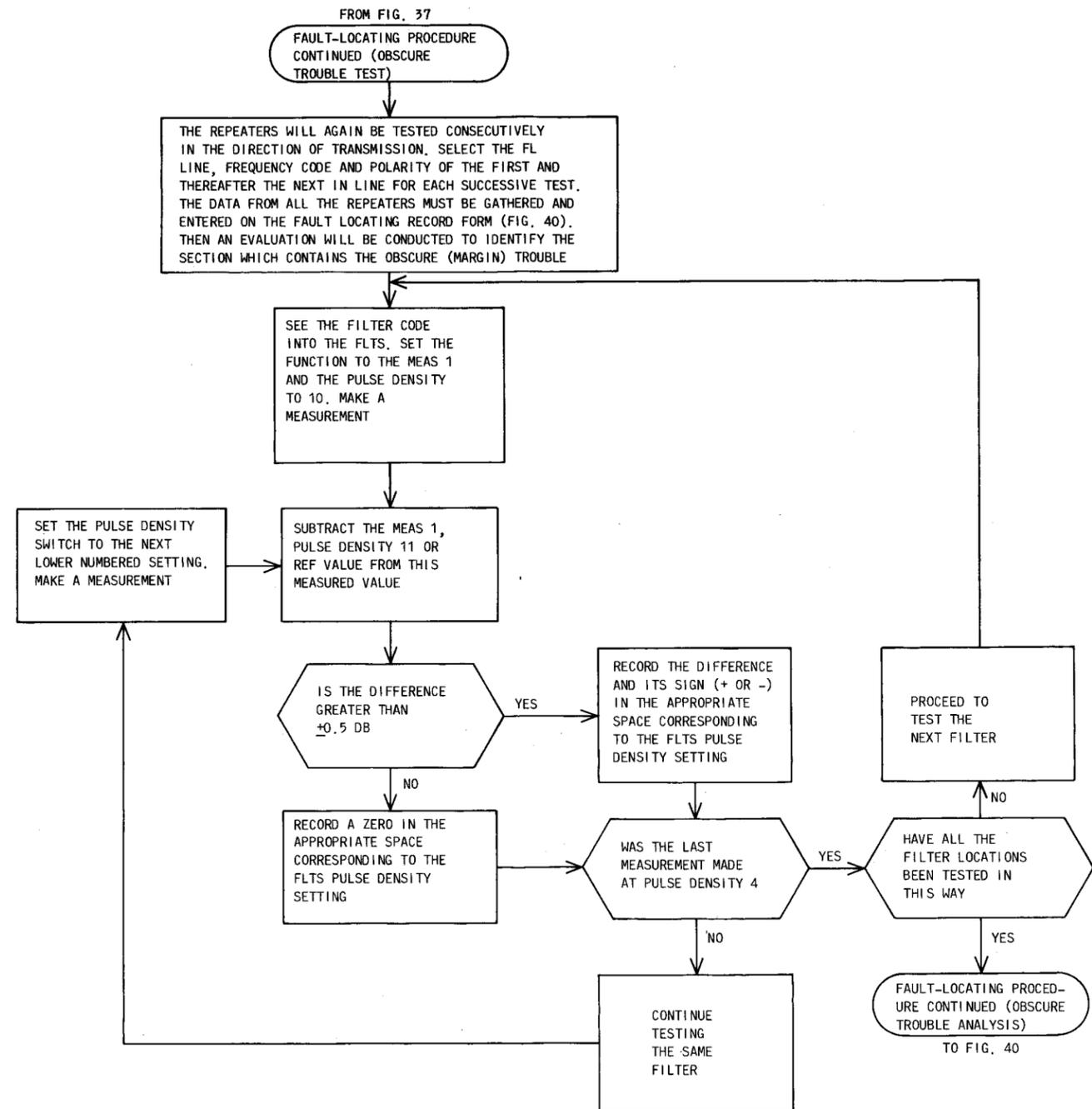
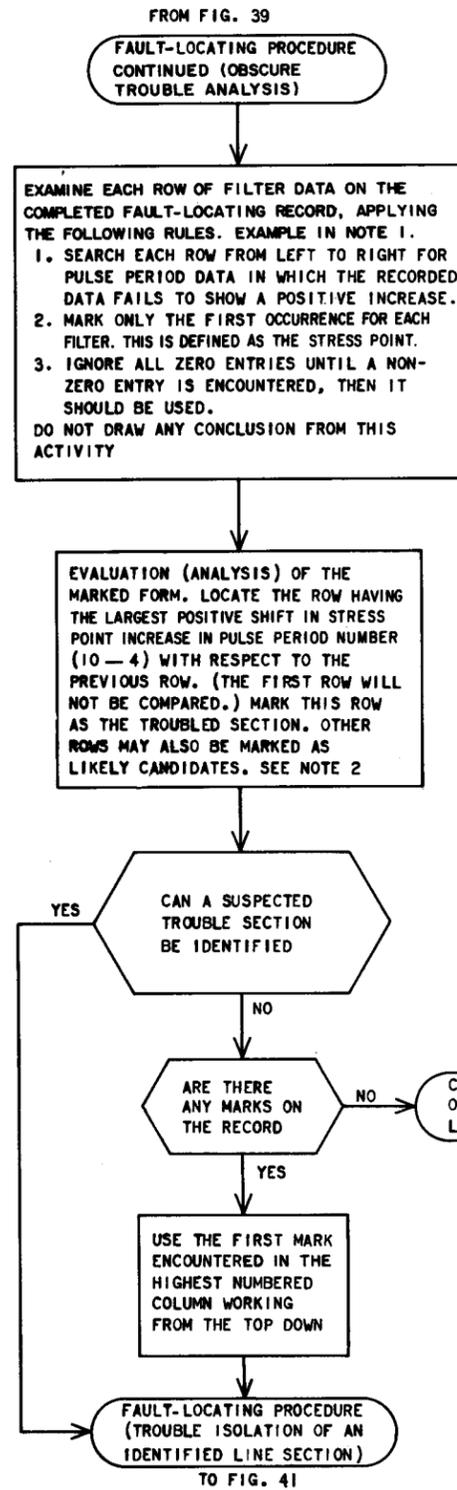


Fig. 39—Fault-Locating Procedure (Obscure Trouble Test)



NOTES:

1. MARKED EXAMPLE

BSP 365-200-410 BSP 365-227-500 BSP 365-271-000

E-6880 (11-76)

TEST SET USED J98725AD

FAULT LOCATING RECORD

| FILTER CODE | RPTR CODE | TRANSMISSION TEST | | | | OBSCURE TROUBLE TEST-PULSE PERIOD | | | | | | | | | | REMARKS | | |
|-------------|-----------|-------------------|------|------|---------|-----------------------------------|----|------|------|------|------|------|------|-------|-----------|---------|--|--|
| | | MEASURE | | | BIPOLAR | *TEST PASSED | | | | | | | | | | | | |
| | | 1 | 2 | 3 | | YES | NO | 10 | 9 | 8 | 7 | 6 | 5 | 4 | MAX SHIFT | | | |
| A | 208E | 51.3 | 45.2 | 46.0 | | ✓ | | 0 | 0 | +7 | +1.0 | +1.5 | +1.7 | +2.1 | | | | |
| B | | 50.9 | 46.0 | 44.5 | | ✓ | | 0 | 0 | 0 | +8 | +1.2 | +1.9 | +1.8 | | | | |
| C | | 50.6 | 44.5 | 44.8 | | ✓ | | 0 | 0 | 0 | +6 | +9 | +1.2 | +9 | | | | |
| D | ↓ | 51.7 | 46.6 | 47.6 | | ✓ | | 0 | 0 | 0 | +8 | +1.0 | +1.1 | +7 | | | | |
| E | 208F | 50.6 | 43.8 | 44.2 | | ✓ | | 0 | 0 | +7 | +6 | +1.2 | +9 | +3 | | | | |
| D | 208E | 50.2 | 45.1 | 45.7 | | ✓ | | 0 | 0 | -6 | 0 | 0 | -7 | -9 | | | | |
| C | | 49.7 | 43.8 | 44.2 | | ✓ | | 0 | +6 | +9 | +1.6 | +7 | -6 | -1.3 | | | | |
| B | | 49.0 | 44.6 | 43.7 | | ✓ | | -9 | -1.3 | -2.6 | -3.4 | -3.9 | -5.6 | -9.1 | | | | |
| A | ↓ | 48.3 | 43.4 | 43.6 | | ✓ | | -1.6 | -1.7 | -1.9 | -3.8 | -4.5 | -8.1 | -10.1 | | | | |

*STOP IF "NO" RECORDED FOR 2 CONSECUTIVE READINGS. TROUBLE AT LOCATION ASSOCIATED WITH FIRST "NO".

LOG

2. ANALYSIS OF MARKED EXAMPLE

BSP 365-200-410 BSP 365-227-500 BSP 365-271-000

E-6880 (11-76)

TEST SET USED J98725AD

FAULT LOCATING RECORD

| FILTER CODE | RPTR CODE | TRANSMISSION TEST | | | | OBSCURE TROUBLE TEST-PULSE PERIOD | | | | | | | | | | REMARKS | | |
|-------------|-----------|-------------------|------|------|---------|-----------------------------------|----|------|------|------|------|------|------|-------|-----------|----------------------|--|--|
| | | MEASURE | | | BIPOLAR | *TEST PASSED | | | | | | | | | | | | |
| | | 1 | 2 | 3 | | YES | NO | 10 | 9 | 8 | 7 | 6 | 5 | 4 | MAX SHIFT | | | |
| A | 208E | 51.3 | 45.2 | 46.0 | | ✓ | | 0 | 0 | +7 | +1.0 | +1.5 | +1.7 | +2.1 | | | | |
| B | | 50.9 | 46.0 | 44.5 | | ✓ | | 0 | 0 | 0 | +8 | +1.2 | +1.9 | +1.8 | | | | |
| C | | 50.6 | 44.5 | 44.8 | | ✓ | | 0 | 0 | 0 | +6 | +9 | +1.2 | +9 | | | | |
| D | ↓ | 51.7 | 46.6 | 47.6 | | ✓ | | 0 | 0 | 0 | +8 | +1.0 | +1.1 | +7 | | | | |
| E | 208F | 50.6 | 43.8 | 44.2 | | ✓ | | 0 | 0 | +7 | +6 | +1.2 | +9 | +3 | | Likely 2nd Candidate | | |
| D | 208E | 50.2 | 45.1 | 45.7 | | ✓ | | 0 | 0 | -6 | 0 | 0 | -7 | -9 | | | | |
| C | | 49.7 | 43.8 | 44.2 | | ✓ | | 0 | +6 | +9 | +1.6 | +7 | -6 | -1.3 | | | | |
| B | | 49.0 | 44.6 | 43.7 | | ✓ | | -9 | -1.3 | -2.6 | -3.4 | -3.9 | -5.6 | -9.1 | ✓ | Trouble Section | | |
| A | ↓ | 48.3 | 43.4 | 43.6 | | ✓ | | -1.6 | -1.7 | -1.9 | -3.8 | -4.5 | -8.1 | -10.1 | | | | |

*STOP IF "NO" RECORDED FOR 2 CONSECUTIVE READINGS. TROUBLE AT LOCATION ASSOCIATED WITH FIRST "NO".

LOG

Fig. 40—Fault-Locating Procedure (Obscure Trouble Analysis)

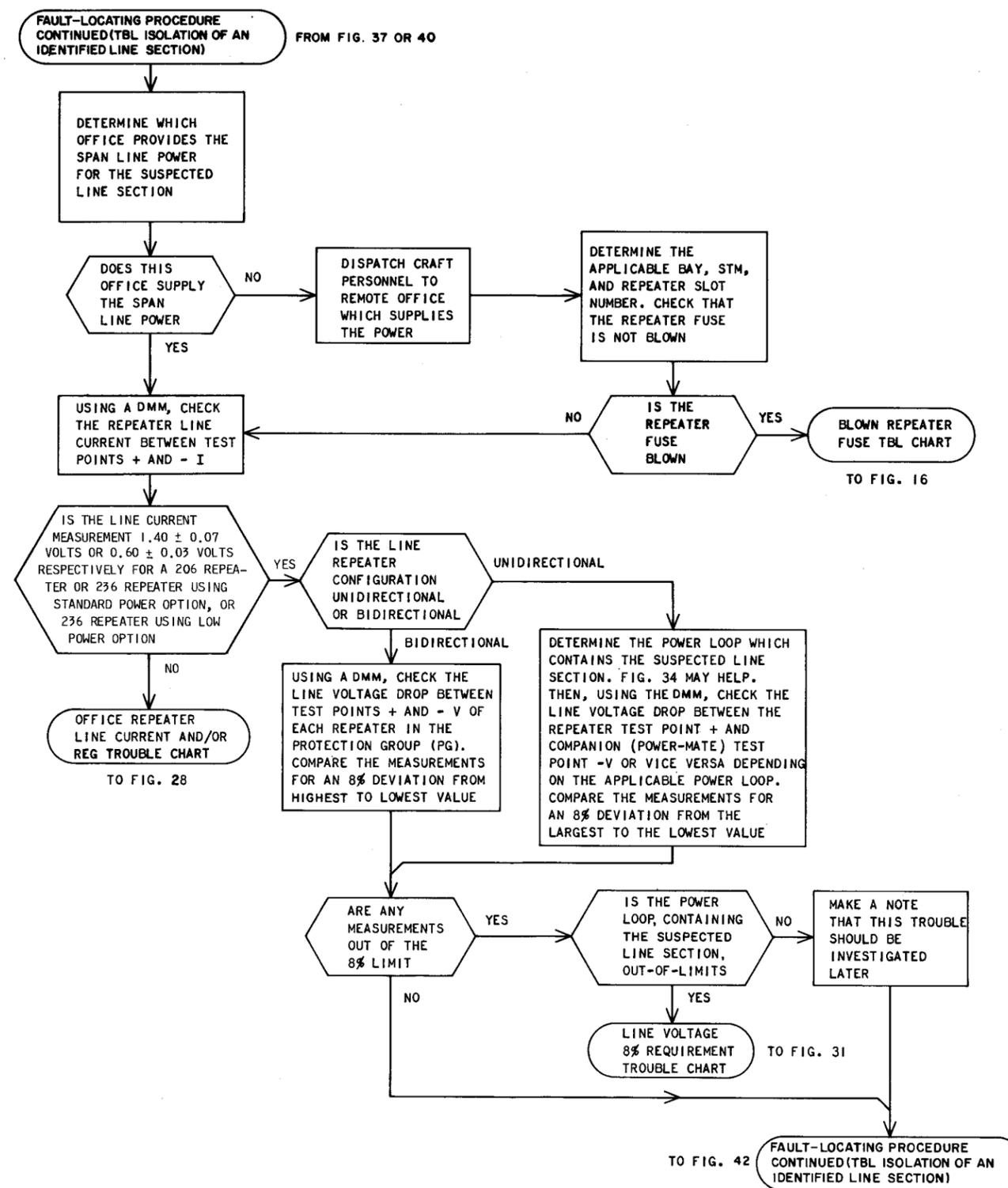


Fig. 41—Fault Locating Procedure (Trouble Isolation of an Identified Line Section)

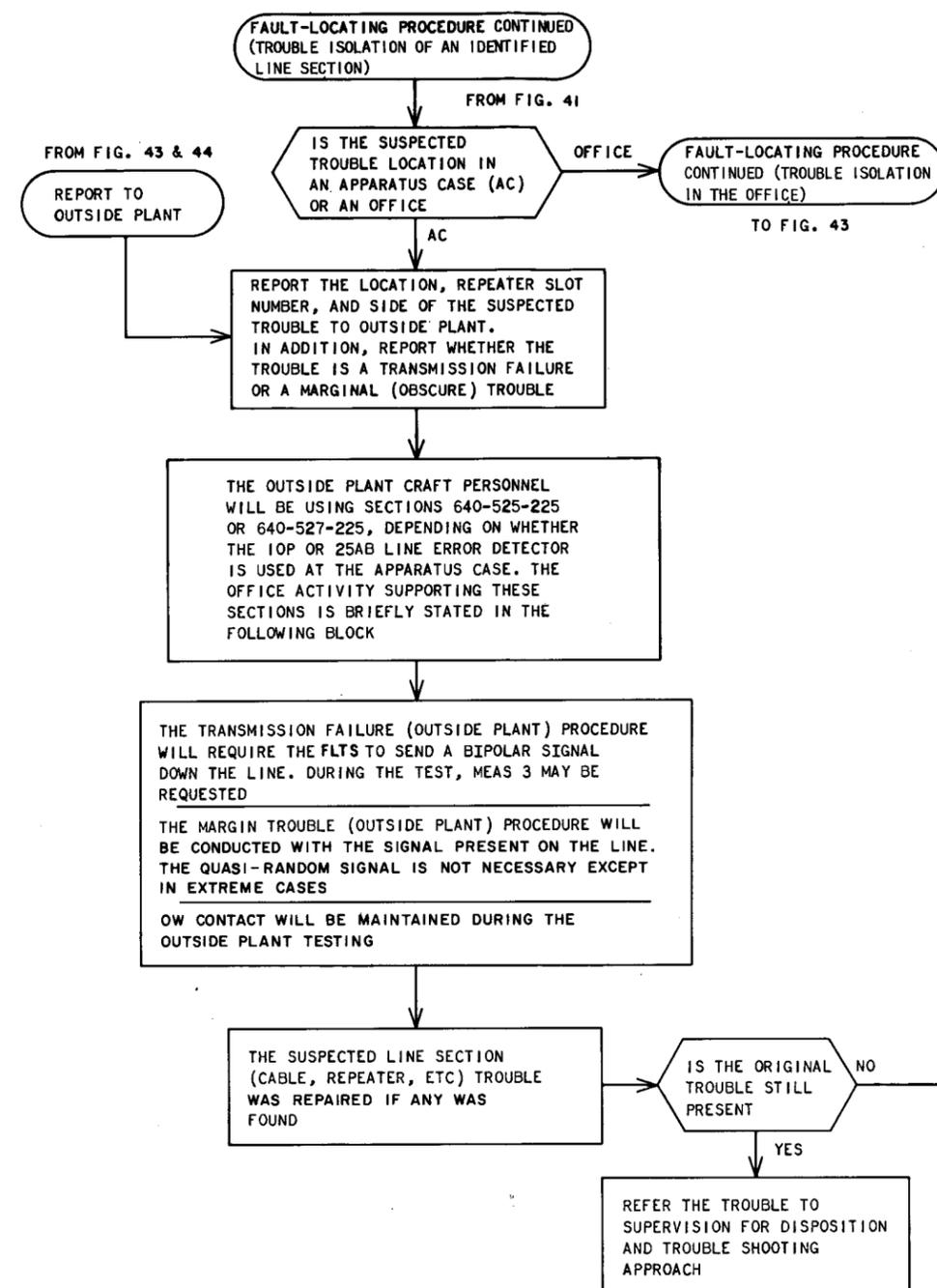


Fig. 42—Fault-Locating Procedure (Trouble Isolation of an Identified Line Section) (Cont)

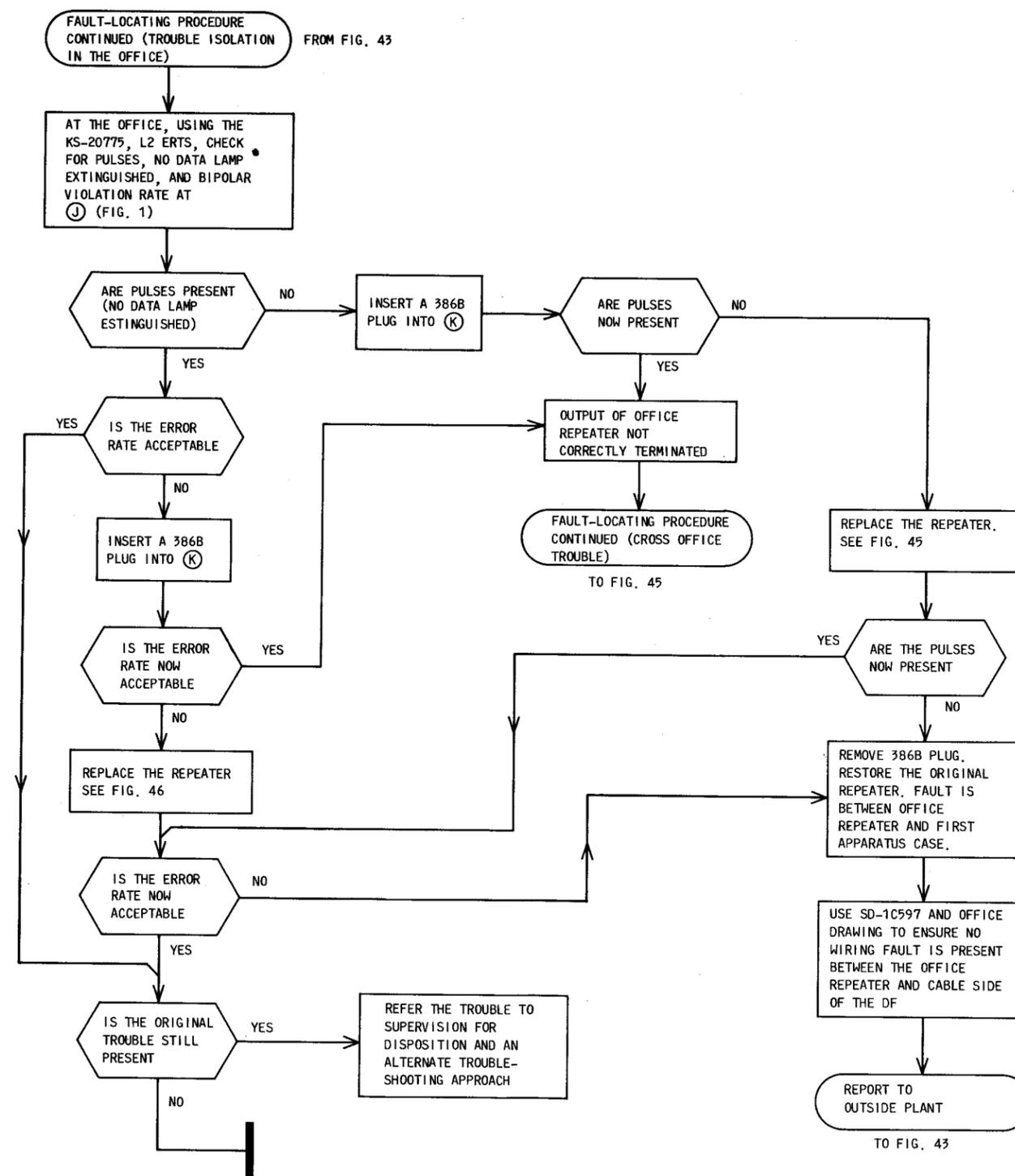


Fig. 43—Fault-Locating Procedure (Trouble Isolation in the Office)

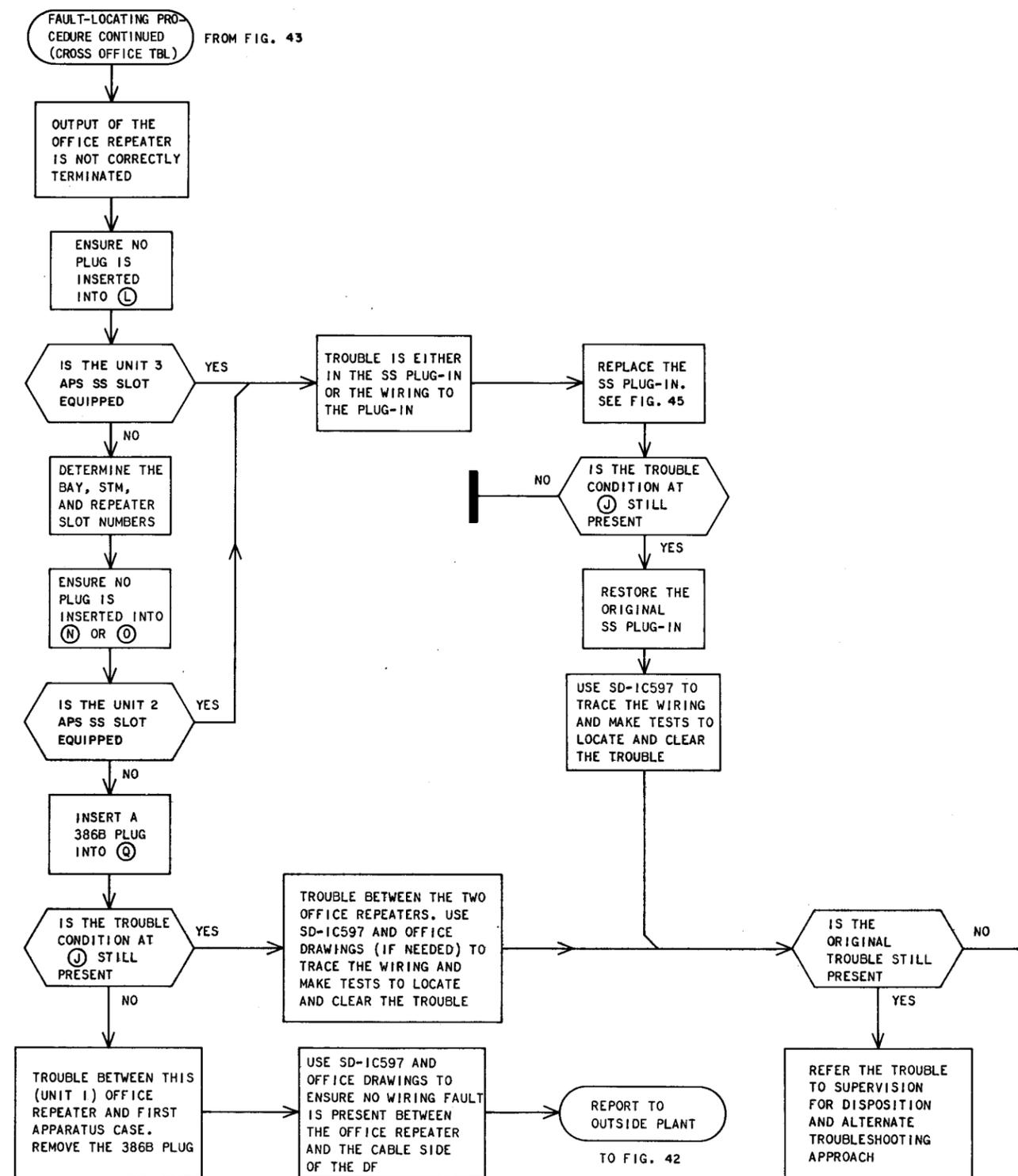


Fig. 44—Fault-Locating Procedure (Cross-Office Trouble)

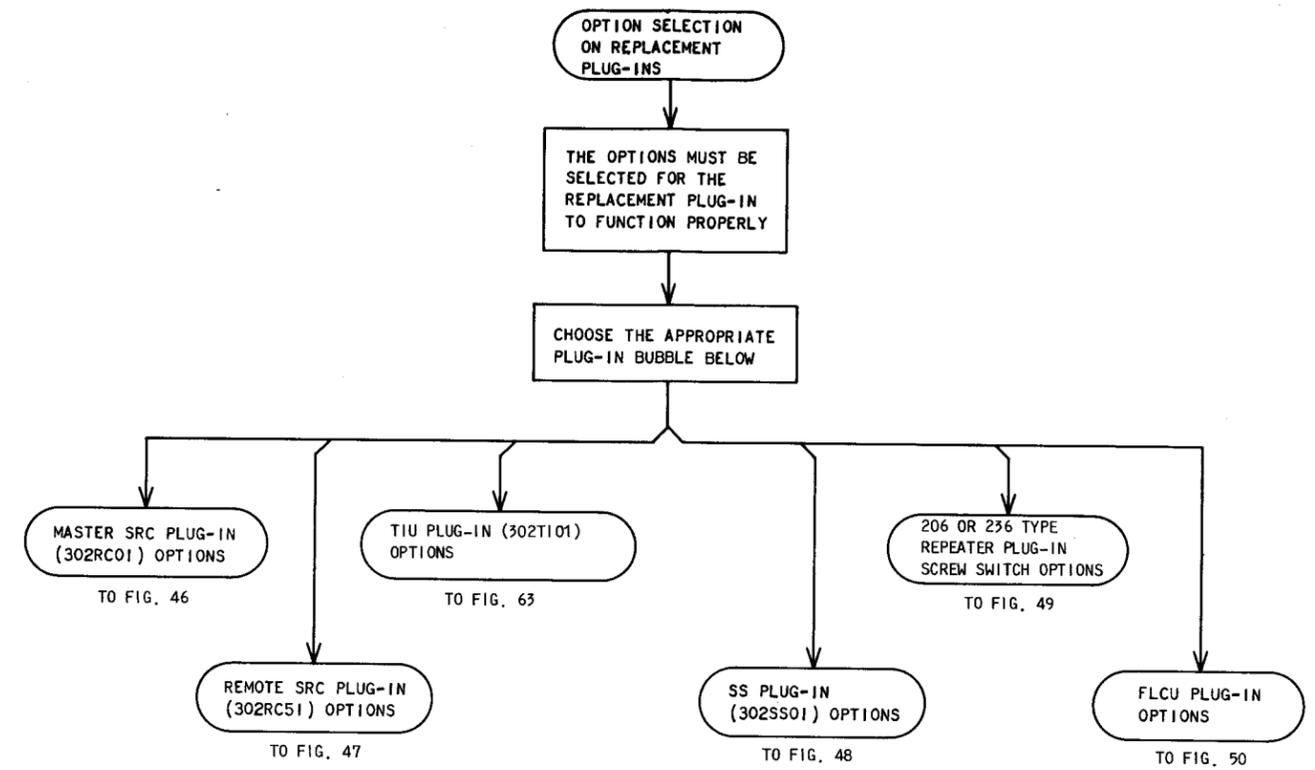
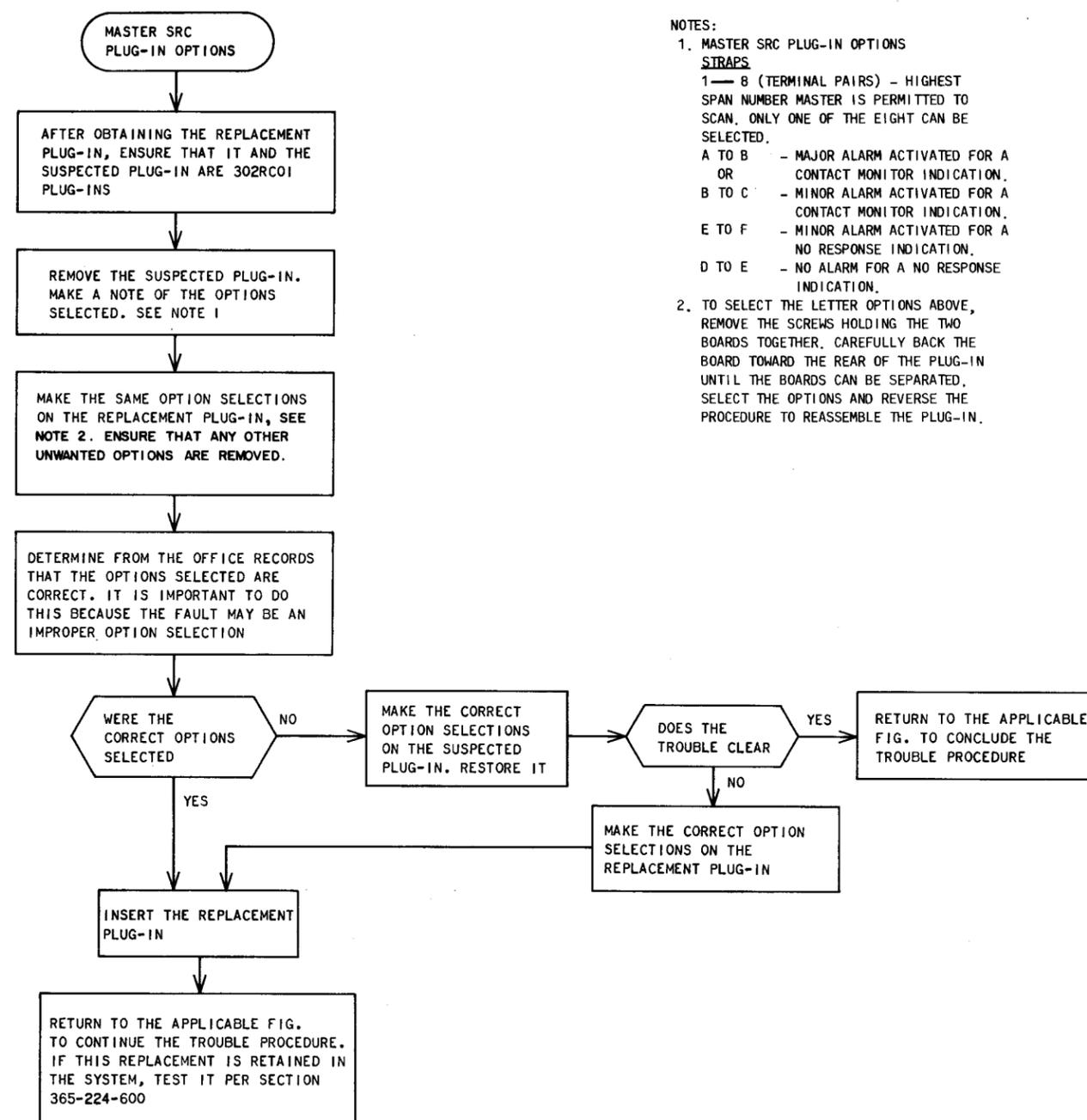
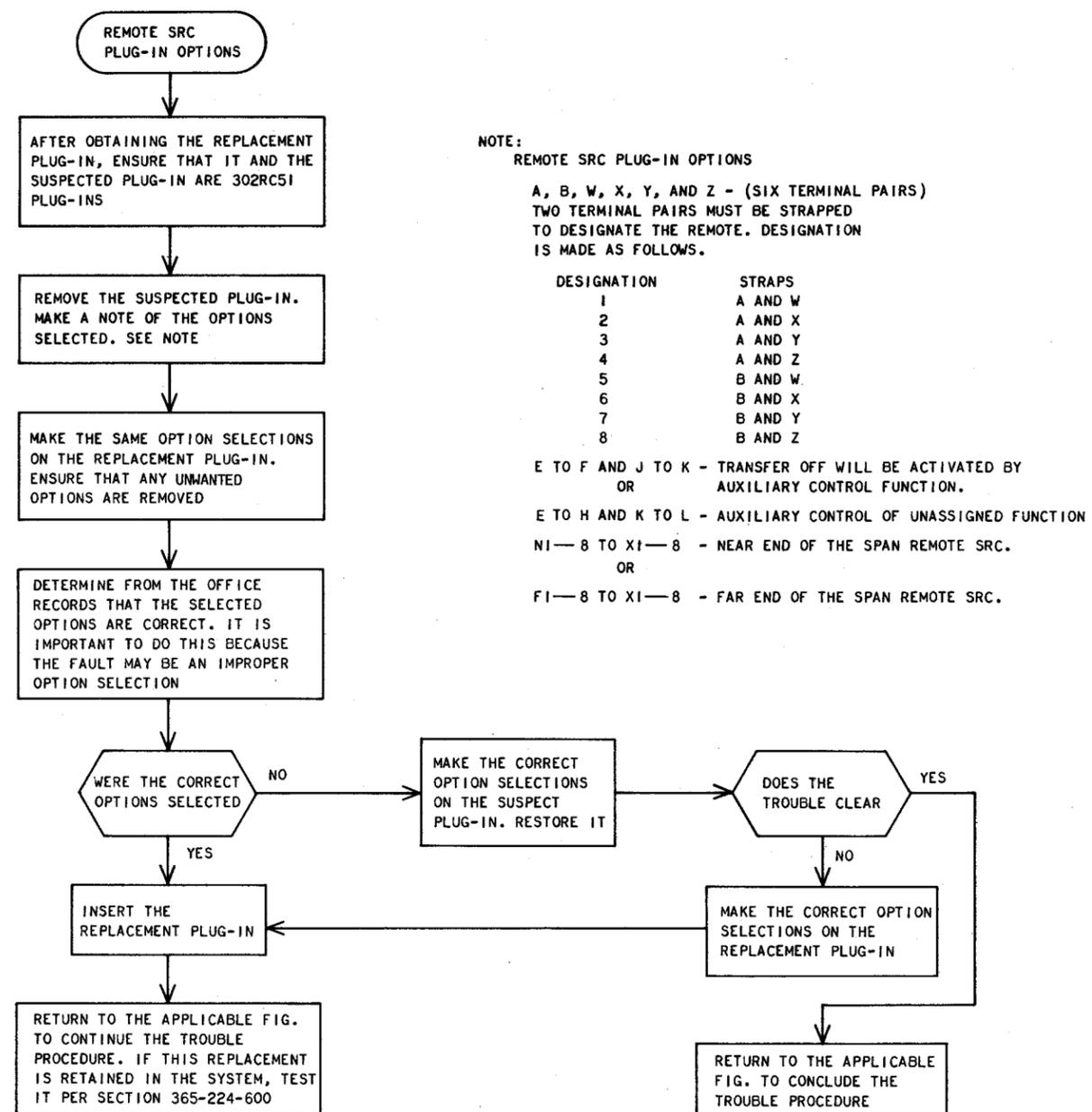


Fig. 45—Option Selection on Replacement Plug-Ins



- NOTES:
1. MASTER SRC PLUG-IN OPTIONS
STRAPS
 1 — 8 (TERMINAL PAIRS) — HIGHEST SPAN NUMBER MASTER IS PERMITTED TO SCAN. ONLY ONE OF THE EIGHT CAN BE SELECTED.
 A TO B — MAJOR ALARM ACTIVATED FOR A CONTACT MONITOR INDICATION.
 B TO C — MINOR ALARM ACTIVATED FOR A CONTACT MONITOR INDICATION.
 E TO F — MINOR ALARM ACTIVATED FOR A NO RESPONSE INDICATION.
 D TO E — NO ALARM FOR A NO RESPONSE INDICATION.
 2. TO SELECT THE LETTER OPTIONS ABOVE, REMOVE THE SCREWS HOLDING THE TWO BOARDS TOGETHER. CAREFULLY BACK THE BOARD TOWARD THE REAR OF THE PLUG-IN UNTIL THE BOARDS CAN BE SEPARATED. SELECT THE OPTIONS AND REVERSE THE PROCEDURE TO REASSEMBLE THE PLUG-IN.

Fig. 46—Master SRC Plug-in Options



NOTE:
 REMOTE SRC PLUG-IN OPTIONS

A, B, W, X, Y, AND Z - (SIX TERMINAL PAIRS)
 TWO TERMINAL PAIRS MUST BE STRAPPED TO DESIGNATE THE REMOTE. DESIGNATION IS MADE AS FOLLOWS.

| DESIGNATION | STRAPS |
|-------------|---------|
| 1 | A AND W |
| 2 | A AND X |
| 3 | A AND Y |
| 4 | A AND Z |
| 5 | B AND W |
| 6 | B AND X |
| 7 | B AND Y |
| 8 | B AND Z |

E TO F AND J TO K - TRANSFER OFF WILL BE ACTIVATED BY AUXILIARY CONTROL FUNCTION.
 OR

E TO H AND K TO L - AUXILIARY CONTROL OF UNASSIGNED FUNCTION

NI—8 TO XI—8 - NEAR END OF THE SPAN REMOTE SRC.
 OR

FI—8 TO XI—8 - FAR END OF THE SPAN REMOTE SRC.

Fig. 47—Remote SRC Plug-in Options

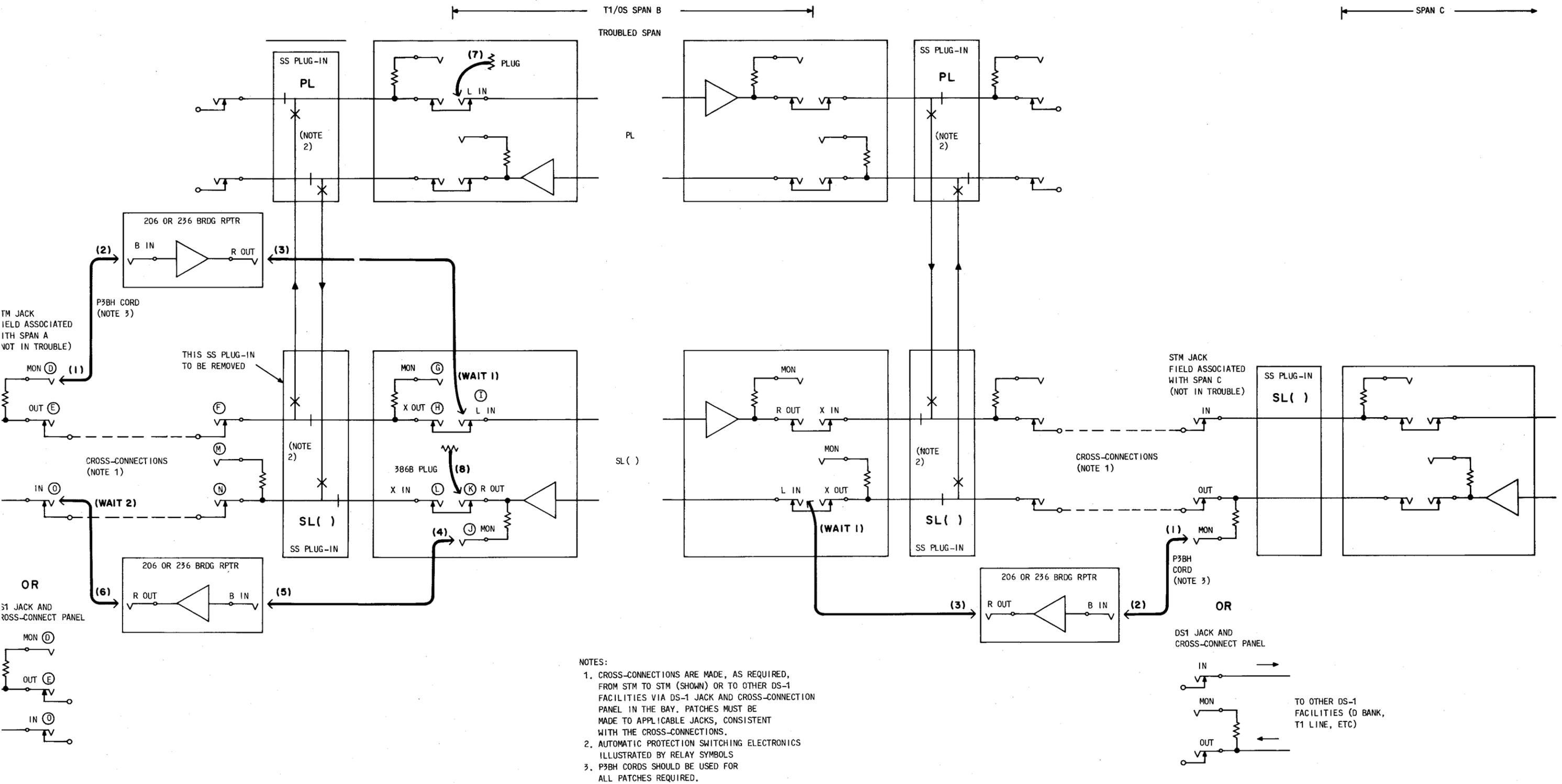
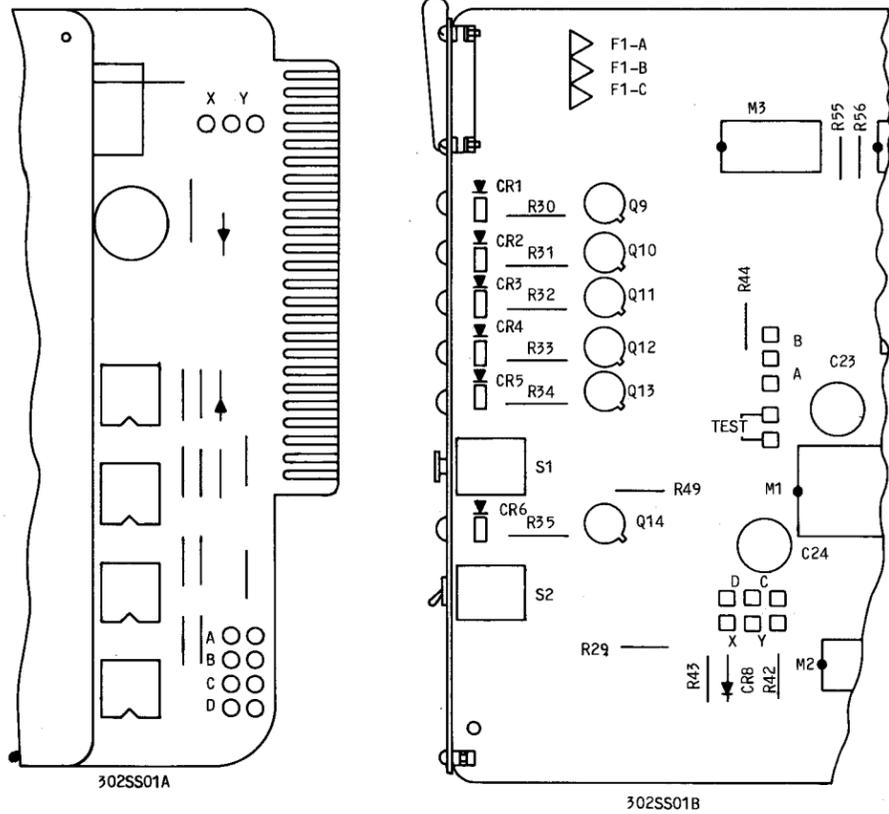


Fig. 48—SS Plug-In Options

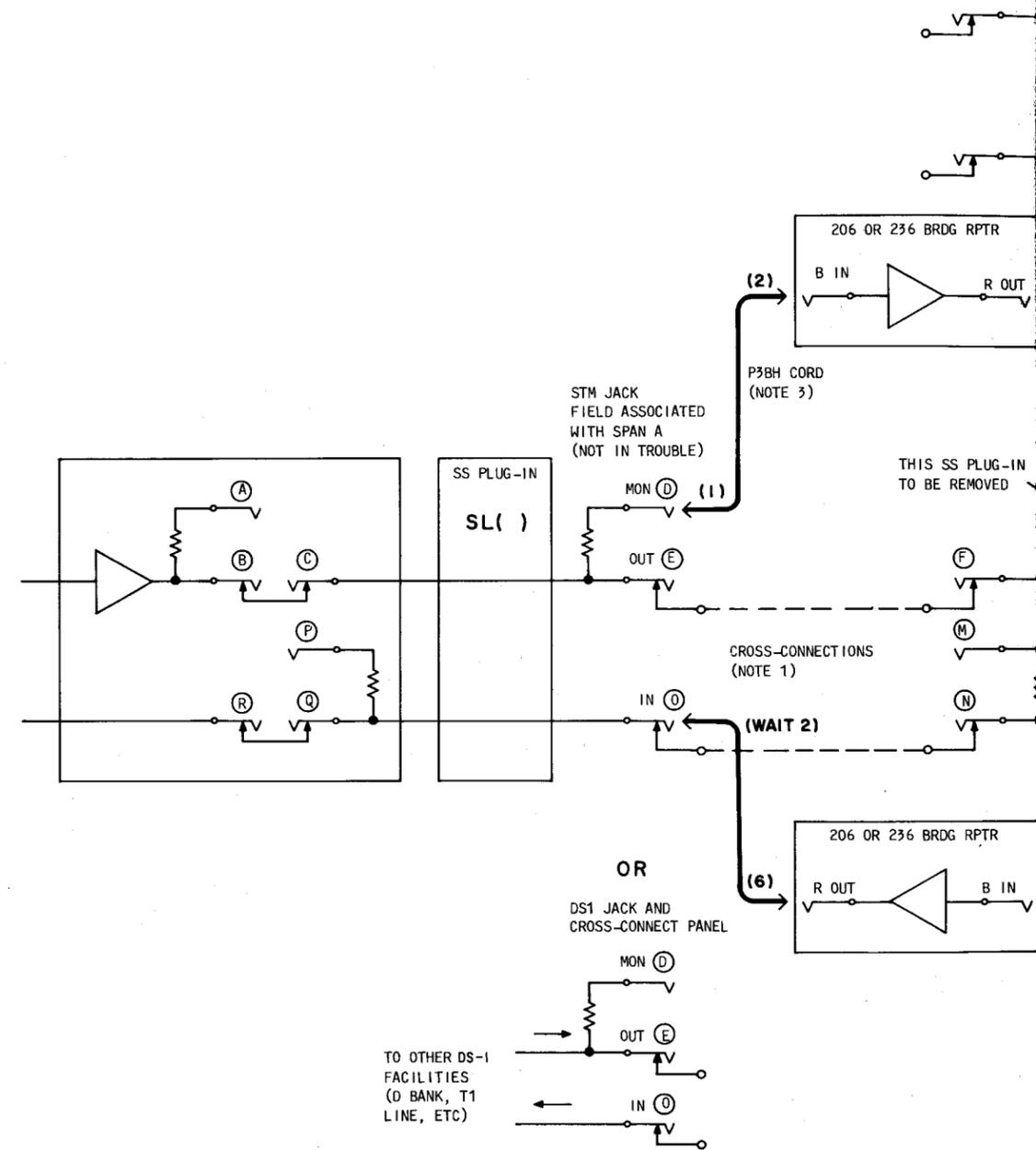
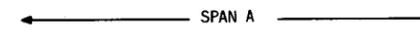
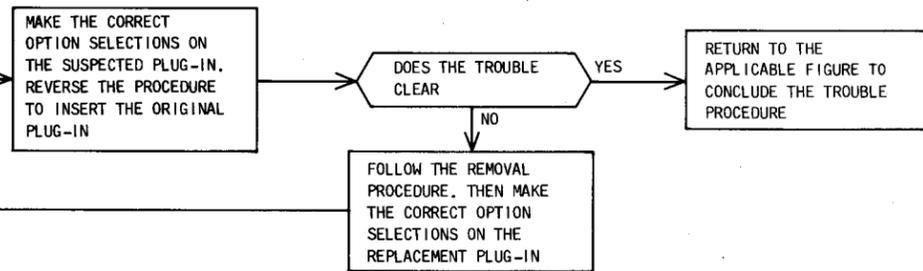
SS PLUG-IN OPTIONS



| SS PLUG-IN REMOVAL PROCEDURE | | |
|--|--|-----------------------------|
| SL () TRANSFERRED OR PL AFFECTING SERVICE | IN SERVICE SL () NOT TRANSFERRED TO PL | PL OR SL () NOT IN SERVICE |
| 1. THE SPAN LINE MUST BE PROVEN GOOD. | | |
| 2. CHOOSE AN APPLICABLE COLUMN BELOW (EXACT SEQUENCE MUST BE FOLLOWED) | | |
| 3. EACH END OF THE TROUBLED SPAN MUST BE ATTENDED | ONLY THE TROUBLED END NEED BE ATTENDED | REMOVE SS PLUG-IN |
| 4. AT EACH END, INSERT CORD PLUGS 1, 2, 3, AND THEN WAIT 1. (SHOWN AT RIGHT) | TROUBLED END ONLY. INSERT CORDS 1, 2, 3, 4, 5 AND 6. DO NOT INSERT WAIT 1 AND WAIT 2 PLUGS YET | |
| 5. AT TROUBLED END ONLY. INSERT CORD PLUGS 4, 5, 6 AND THEN WAIT 2 | FAULT PL BY INSERTING PLUG (7) | |
| 6. FAULT PL BY INSERTING PLUG (7) | INSERT WAIT 1 AND WAIT 2 PLUGS, SIMULTANEOUSLY | |
| 7. INSERT TERMINATION PLUG (8) | INSERT TERMINATION PLUG (8) | |
| 8. REMOVE THE SS PLUG-IN | REMOVE THE SS PLUG-IN | |
| 9. REVERSE PROCEDURE EXACTLY TO INSERT A NEW SS PLUG-IN | REVERSE PROCEDURE TO INSERT A NEW PLUG-IN | INSERT SS PLUG-IN |

NOTES:

- OPTIONS FOR 302SS01A
 X PERMITS FAULT-LOCATE LOOPING
 Y INHIBITS FAULT-LOCATE LOOPING
 A SELECTS BIPOLAR VIOLATION RATE OF 10^{-3} (NOT USED)
 B SELECTS BIPOLAR VIOLATION RATE OF 10^{-4} (VOICE)
 C SELECTS BIPOLAR VIOLATION RATE OF 10^{-5} (NOT USED)
 D SELECTS BIPOLAR VIOLATION RATE OF 10^{-6} (DATA)
 P SELECTS RESET THRESHOLD FOR 10^{-4} BIPOLAR VIOLATION RATE
 Q SELECTS RESET THRESHOLD FOR 10^{-6} BIPOLAR VIOLATION RATE
- OPTIONS P AND Q ARE LOCATED BETWEEN THE TWO BOARDS, TO SELECT THE P OR Q OPTION; REMOVE THE THREE SCREWS, BACK THE SHORTER BOARD OUT, AND SEPARATE THE BOARDS TO EXPOSE THE P AND Q OPTIONS. REVERSE THE PROCEDURE TO REASSEMBLE THE PLUG-IN.
- OPTIONS FOR 302SS01B
 X PERMITS FAULT-LOCATE LOOPING
 Y INHIBITS FAULT-LOCATE LOOPING
 B&D SELECTS BIPOLAR VIOLATION RATE OF 10^{-3} (NOT USED)
 A&D SELECTS BIPOLAR VIOLATION RATE OF 10^{-4} (VOICE)
 B&C SELECTS BIPOLAR VIOLATION RATE OF 10^{-5} (NOT USED)
 A&C SELECTS BIPOLAR VIOLATION RATE OF 10^{-6} (DATA)
 P&Q ARE NOT AVAILABLE



SS PLUG-IN OPTIONS

FOLLOW THE SS PLUG-IN REMOVAL PROCEDURE AT THE RIGHT. FAILURE TO FOLLOW THE PROCEDURE WILL RESULT IN SERVICE INTERRUPTIONS

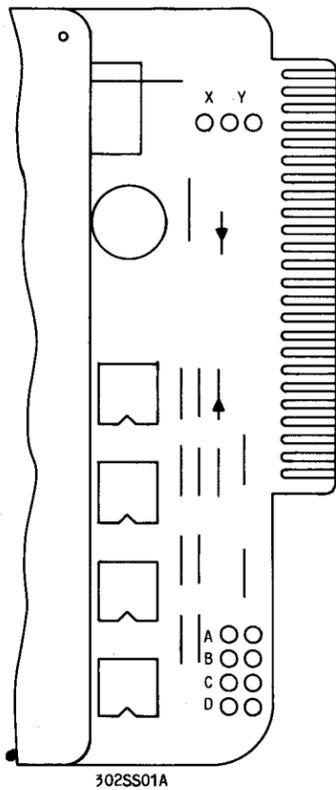
AFTER OBTAINING THE REPLACEMENT, ENSURE THAT IT AND THE SUSPECTED PLUG-IN ARE 302SS01 PLUG-INS

REMOVE THE SUSPECTED PLUG-IN. MAKE A NOTE OF THE OPTIONS SELECTED. SEE FIGURE

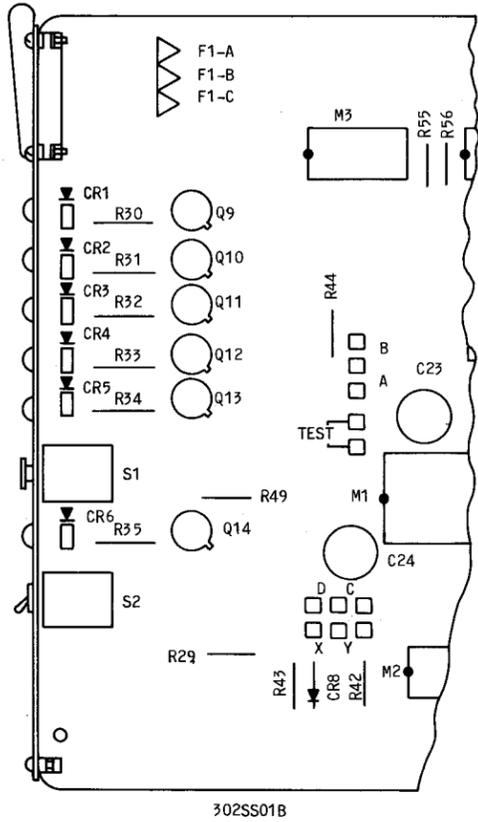
MAKE THE SAME OPTION SELECTIONS ON THE REPLACEMENT PLUG-IN. ENSURE THAT UNWANTED OPTIONS ARE REMOVED

DETERMINE FROM THE OFFICE RECORDS THAT THE OPTIONS SELECTED ARE CORRECT. IT IS IMPORTANT TO DO THIS, BECAUSE THE FAULT MAY BE AN IMPROPER OPTION SELECTION

WERE THE CORRECT OPTIONS SELECTED



SS PLUG-IN OPTIONS



MAKE THE CORRECT OPTION SELECTIONS ON THE SUSPECTED PLUG-IN. REVERSE THE PROCEDURE TO INSERT THE ORIGINAL PLUG-IN

DOES THE TROUBLE CLEAR

RETURN TO THE APPLICABLE FIGURE TO CONCLUDE THE TROUBLE PROCEDURE

FOLLOW THE REMOVAL PROCEDURE. THEN MAKE THE CORRECT OPTION SELECTIONS ON THE REPLACEMENT PLUG-IN

REVERSE THE PROCEDURE TO INSERT THE REPLACEMENT PLUG-IN

RETURN TO THE APPLICABLE FIGURE TO CONTINUE THE TROUBLE PROCEDURE. IF THIS REPLACEMENT IS RETAINED IN THE SYSTEM, TEST IT PER FIG. 51 AFTER TROUBLE PROCEDURE HAS BEEN CONCLUDED

SS PLUG-IN REMOVAL PROCEDURE

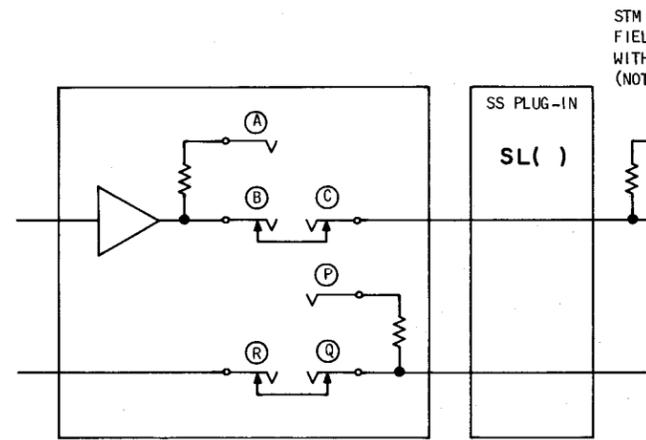
1. THE SPAN LINE MUST BE PROVEN GOOD.
2. CHOOSE AN APPLICABLE COLUMN BELOW (EXACT SEQUENCE MUST BE FOLLOWED)

| SL () TRANSFERRED OR PL AFFECTING SERVICE | IN SERVICE SL () NOT TRANSFERRED TO PL | PL OR SL () NOT IN SERVICE |
|--|--|-----------------------------|
| 3. EACH END OF THE TROUBLED SPAN MUST BE ATTENDED | ONLY THE TROUBLED END NEED BE ATTENDED | REMOVE SS PLUG-IN |
| 4. AT EACH END, INSERT CORD PLUGS 1, 2, 3, AND THEN WAIT 1. (SHOWN AT RIGHT) | TROUBLED END ONLY. INSERT CORDS 1, 2, 3, 4, 5 AND 6. DO NOT INSERT WAIT 1 AND WAIT 2 PLUGS YET | |
| 5. AT TROUBLED END ONLY. INSERT CORD PLUGS 4, 5, 6 AND THEN WAIT 2 | FAULT PL BY INSERTING PLUG (7) | |
| 6. FAULT PL BY INSERTING PLUG (7) | INSERT WAIT 1 AND WAIT 2 PLUGS, SIMULTANEOUSLY | |
| 7. INSERT TERMINATION PLUG (8) | INSERT TERMINATION PLUG (8) | |
| 8. REMOVE THE SS PLUG-IN | REMOVE THE SS PLUG-IN | |
| 9. REVERSE PROCEDURE EXACTLY TO INSERT A NEW SS PLUG-IN | REVERSE PROCEDURE TO INSERT A NEW PLUG-IN | INSERT SS PLUG-IN |

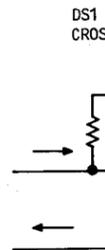
NOTES:

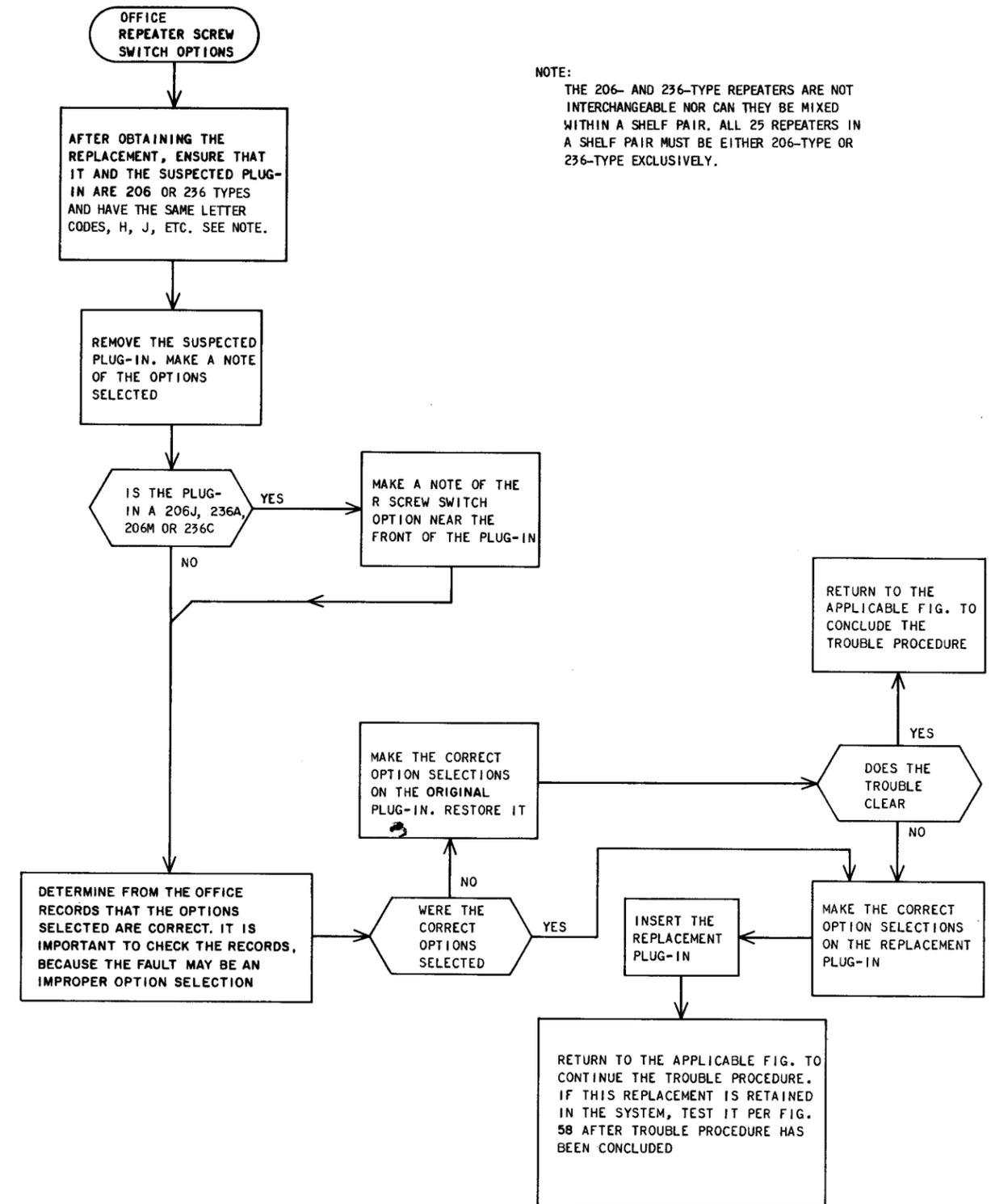
1. OPTIONS FOR 302SS01A
 - X PERMITS FAULT-LOCATE LOOPING
 - Y INHIBITS FAULT-LOCATE LOOPING
 - A SELECTS BIPOLAR VIOLATION RATE OF 10^{-3} (NOT USED)
 - B SELECTS BIPOLAR VIOLATION RATE OF 10^{-4} (VOICE)
 - C SELECTS BIPOLAR VIOLATION RATE OF 10^{-5} (NOT USED)
 - D SELECTS BIPOLAR VIOLATION RATE OF 10^{-6} (DATA)
 - P SELECTS RESET THRESHOLD FOR 10^{-4} BIPOLAR VIOLATION RATE
 - Q SELECTS RESET THRESHOLD FOR 10^{-6} BIPOLAR VIOLATION RATE
2. OPTIONS P AND Q ARE LOCATED BETWEEN THE TWO BOARDS, TO SELECT THE P OR Q OPTION; REMOVE THE THREE SCREWS, BACK THE SHORTER BOARD OUT, AND SEPARATE THE BOARDS TO EXPOSE THE P AND Q OPTIONS. REVERSE THE PROCEDURE TO REASSEMBLE THE PLUG-IN.
3. OPTIONS FOR 302SS01B
 - X PERMITS FAULT-LOCATE LOOPING
 - Y INHIBITS FAULT-LOCATE LOOPING
 - B&D SELECTS BIPOLAR VIOLATION RATE OF 10^{-3} (NOT USED)
 - A&D SELECTS BIPOLAR VIOLATION RATE OF 10^{-4} (VOICE)
 - B&C SELECTS BIPOLAR VIOLATION RATE OF 10^{-5} (NOT USED)
 - A&C SELECTS BIPOLAR VIOLATION RATE OF 10^{-6} (DATA)
 - P&Q ARE NOT AVAILABLE

← SPAN A →



TO OTHER DS-I FACILITIES (D BANK, T1 LINE, ETC)





NOTE:
 THE 206- AND 236-TYPE REPEATERS ARE NOT INTERCHANGEABLE NOR CAN THEY BE MIXED WITHIN A SHELF PAIR. ALL 25 REPEATERS IN A SHELF PAIR MUST BE EITHER 206-TYPE OR 236-TYPE EXCLUSIVELY.

Fig. 49—Office Repeater Screw Switch Options

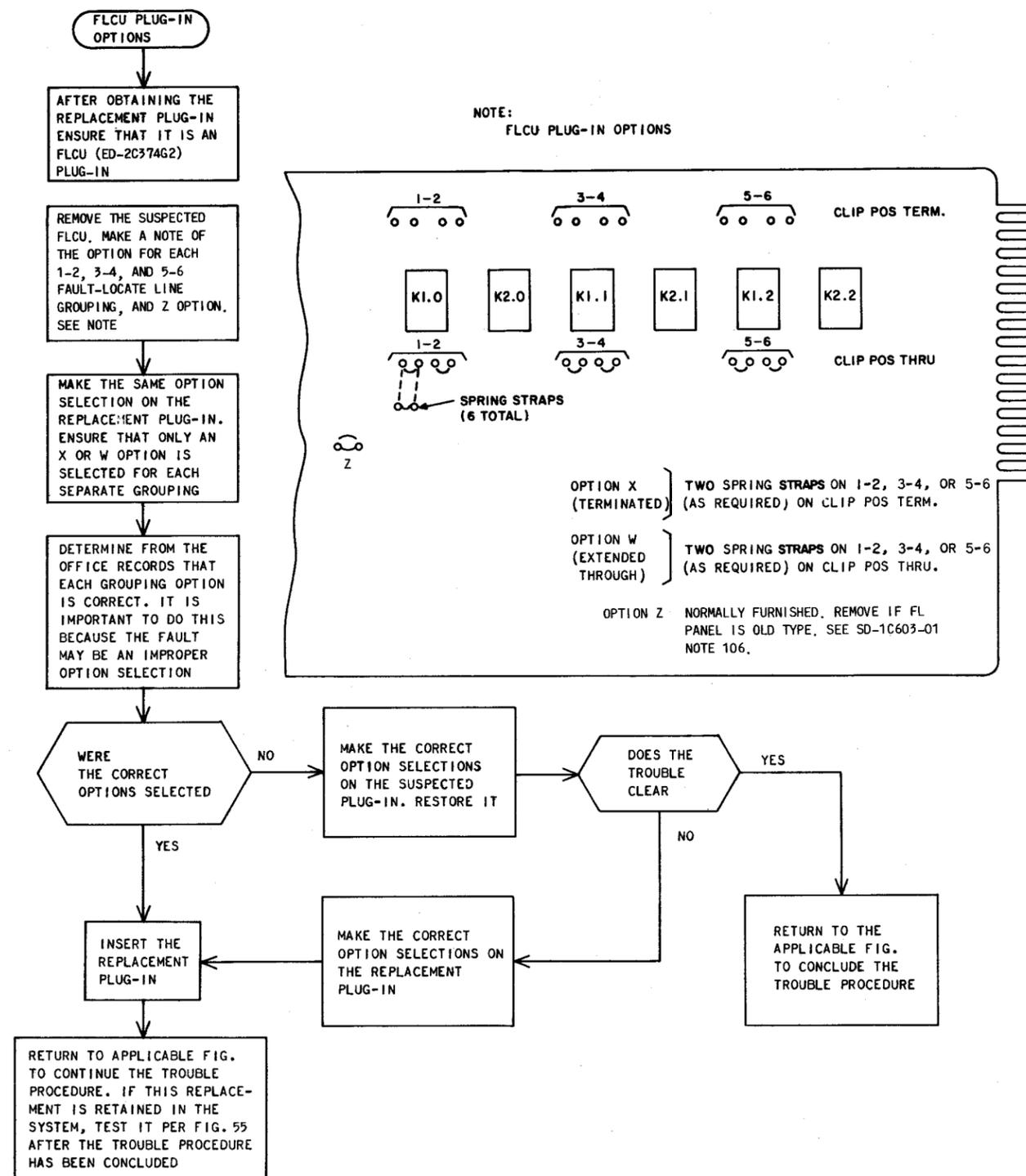


Fig. 50—FLCU Plug-in Options

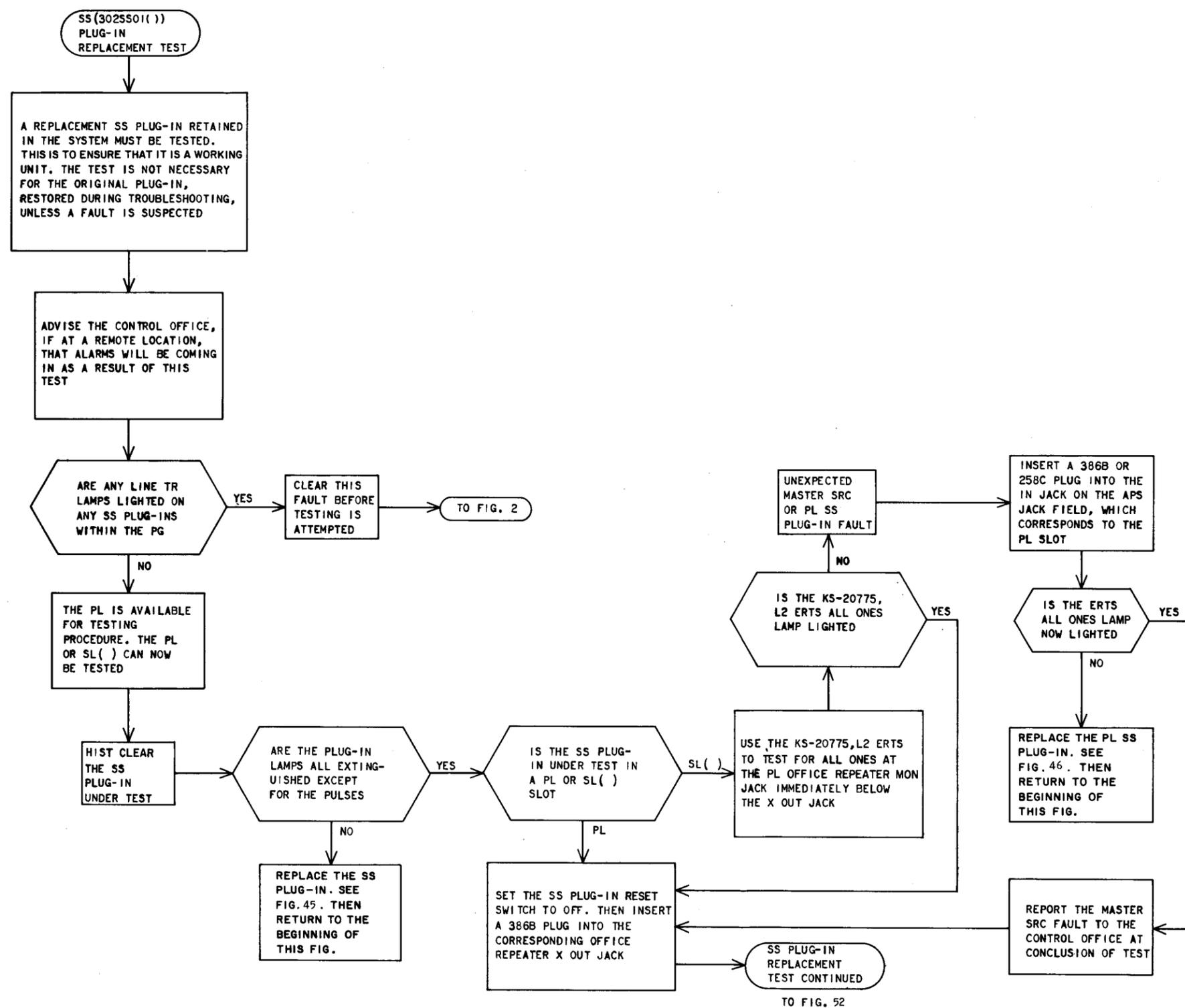


Fig. 51—SS (302SS01) Plug-In Replacement Tests

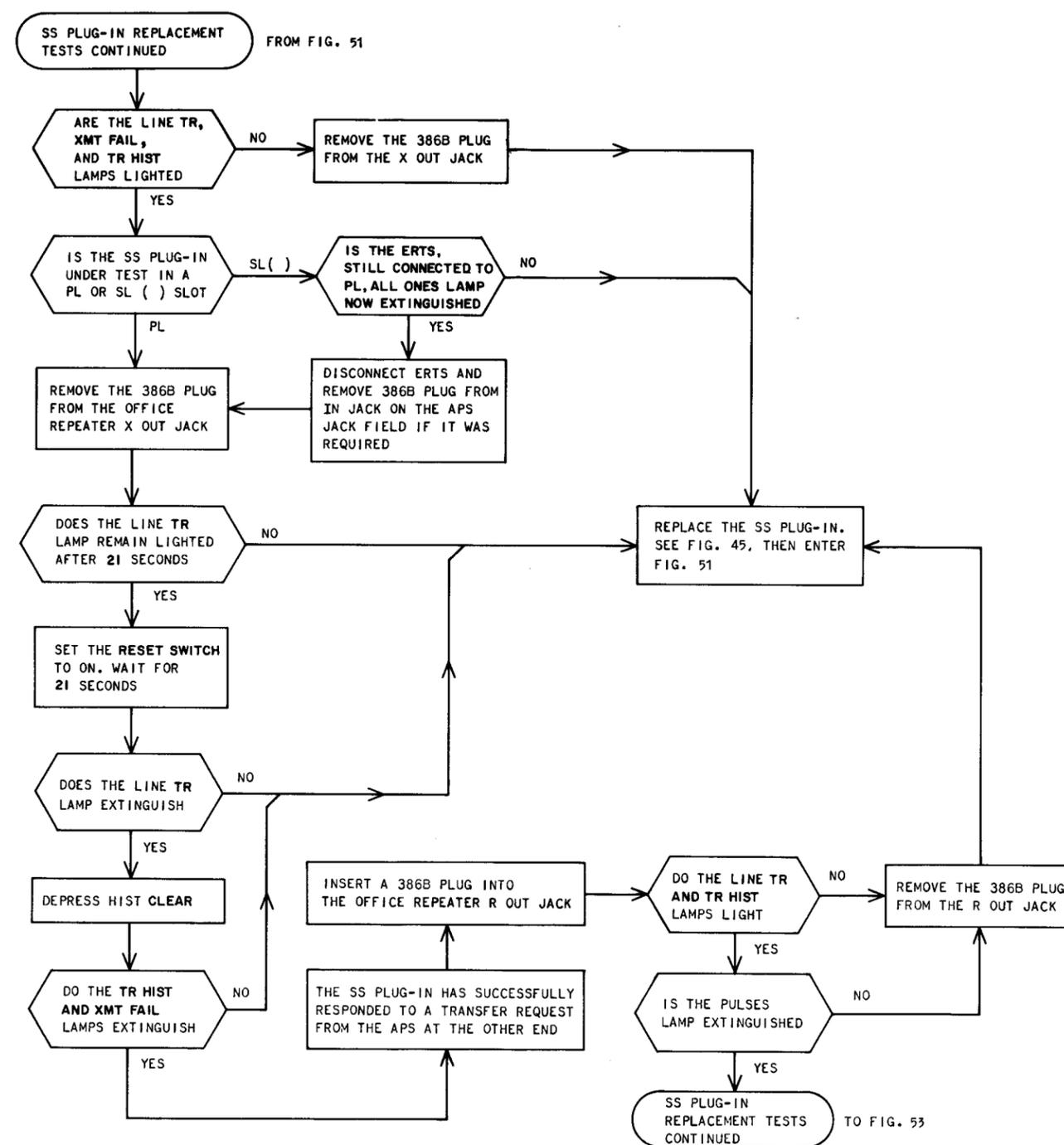


Fig. 52—SS Plug-in Replacement Tests

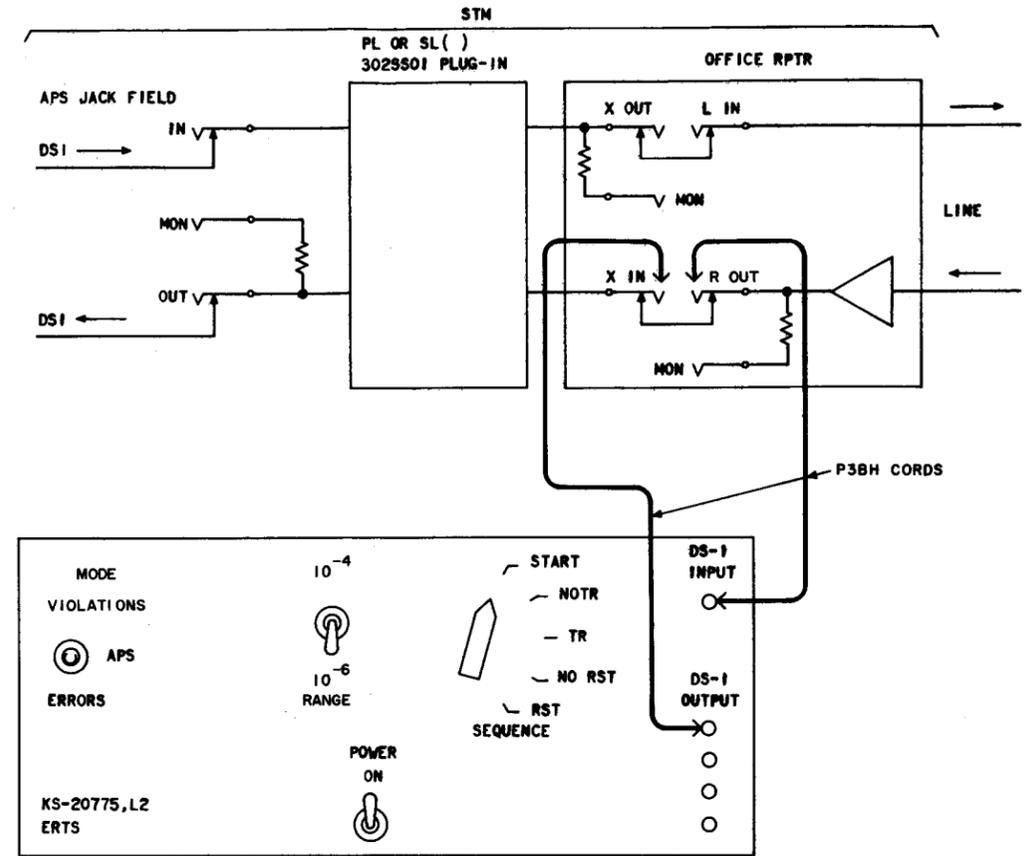
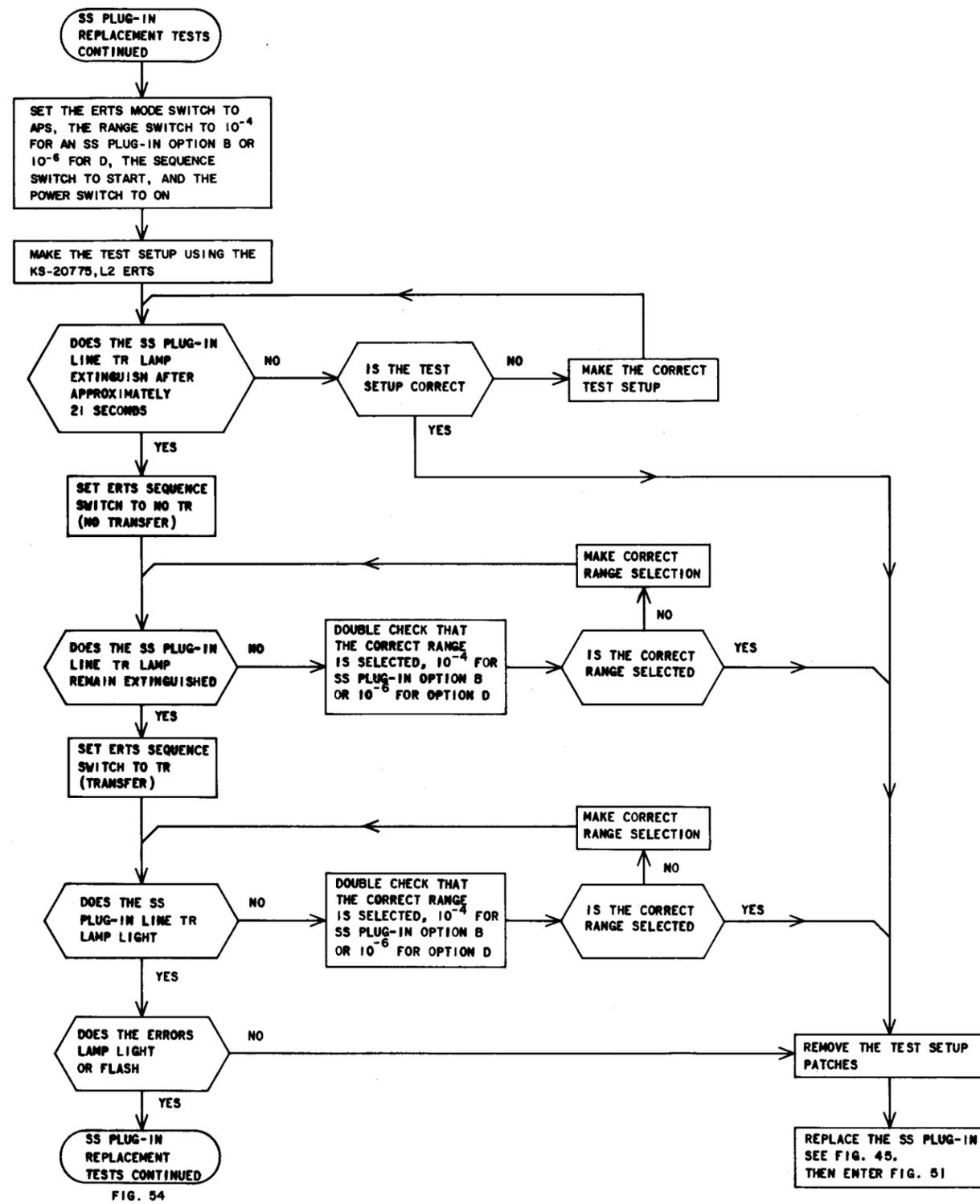


Fig. 53—SS Plug-In Replacement Tests (Cont)

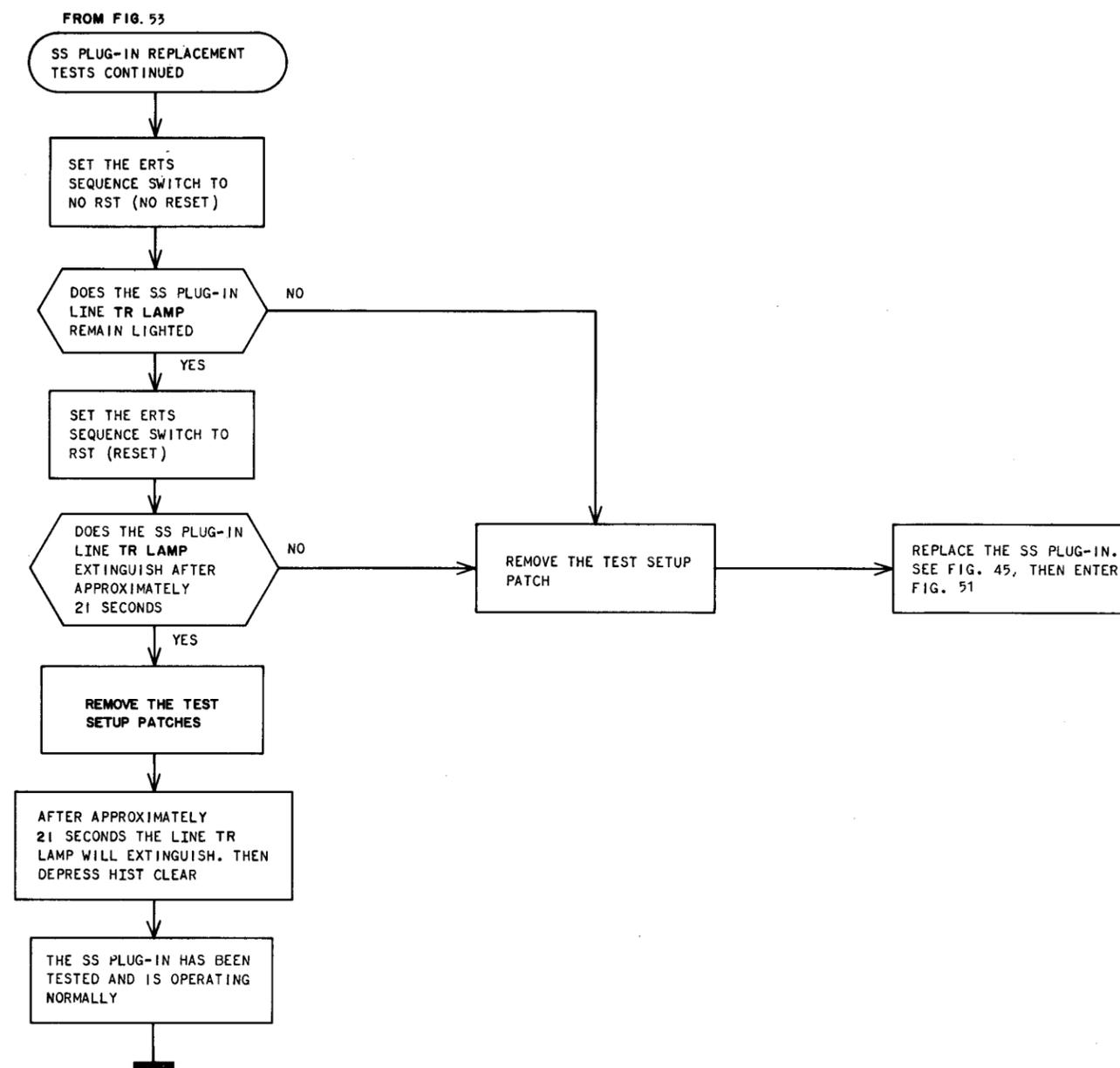


Fig. 54—SS Plug-in Replacement Tests (Cont)

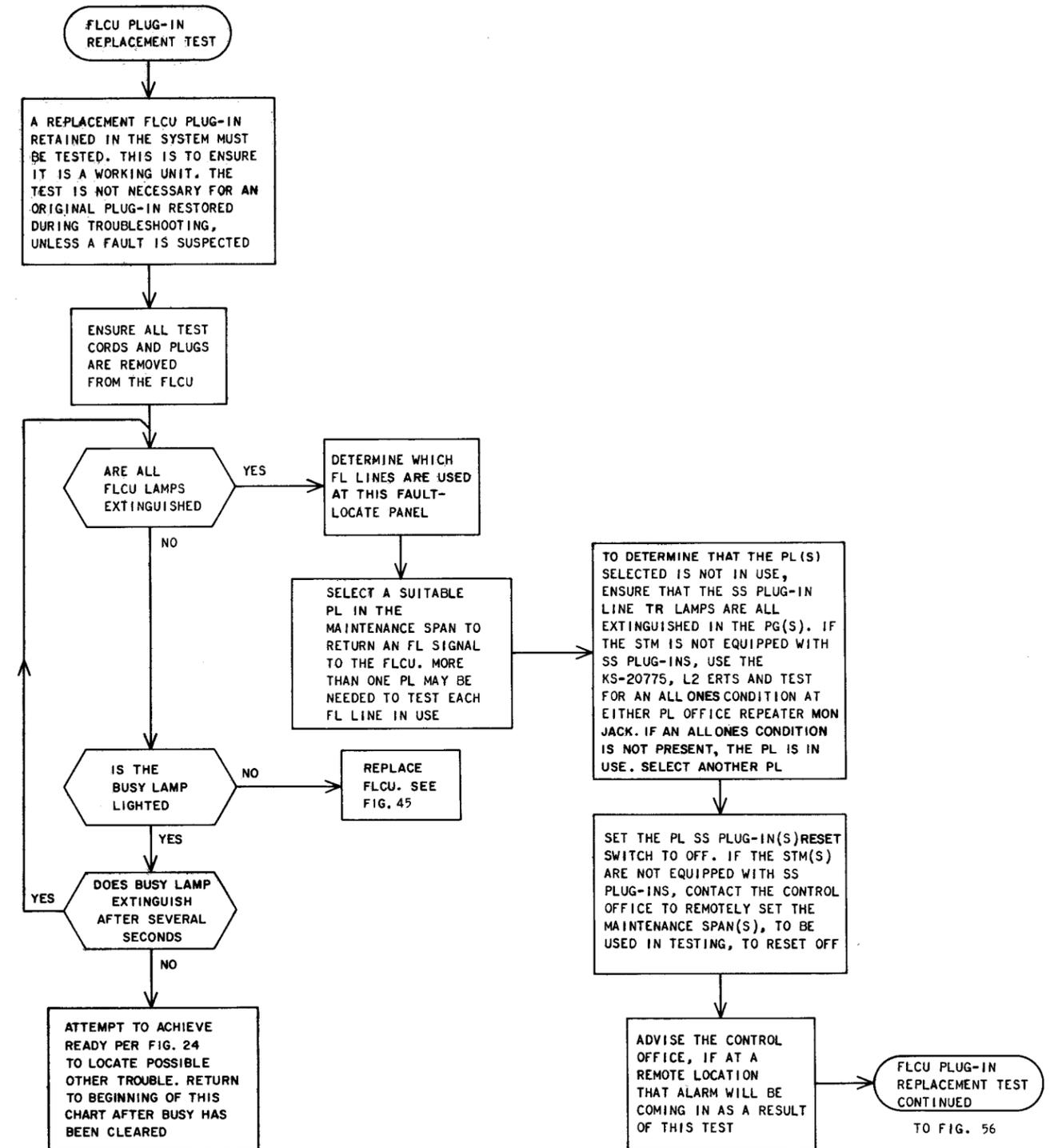


Fig. 55—FLCU Plug-in Replacement Tests

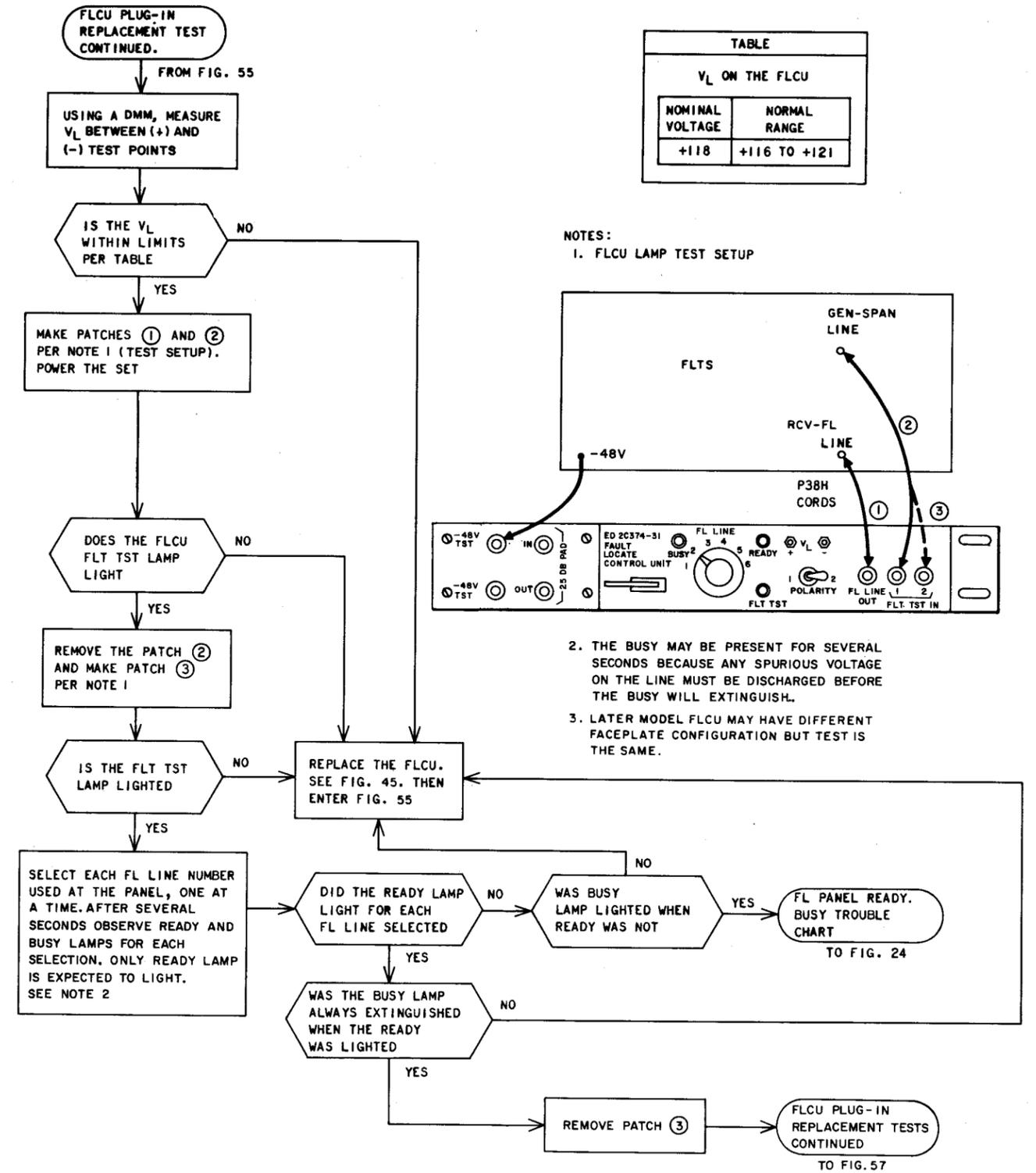


Fig. 56—FLCU Plug-in Replacement Tests (Cont)

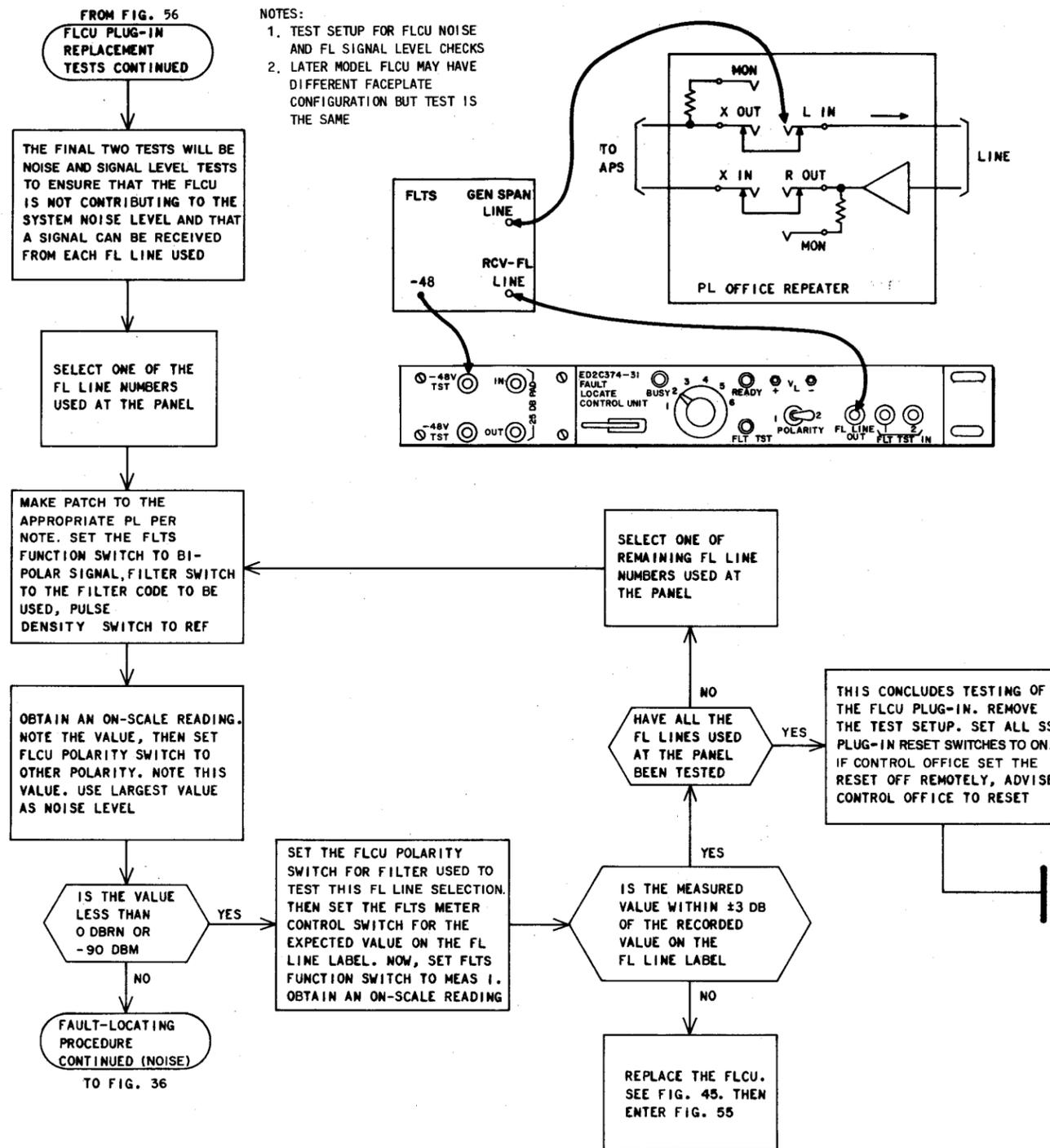


Fig. 57—FLCU Plug-in Replacement Tests (Cont)

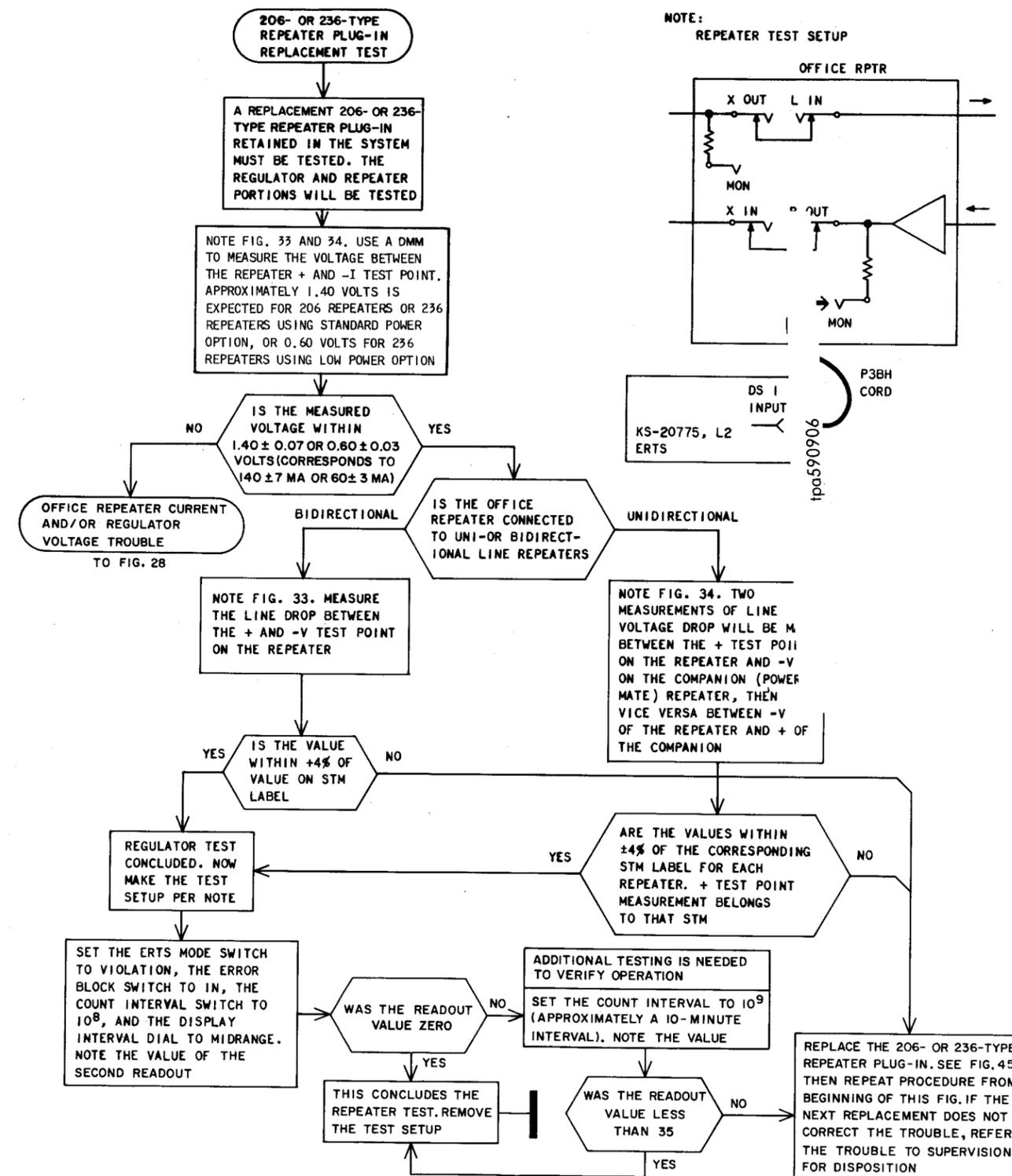


Fig. 58—Repeater Plug-in Replacement Tests

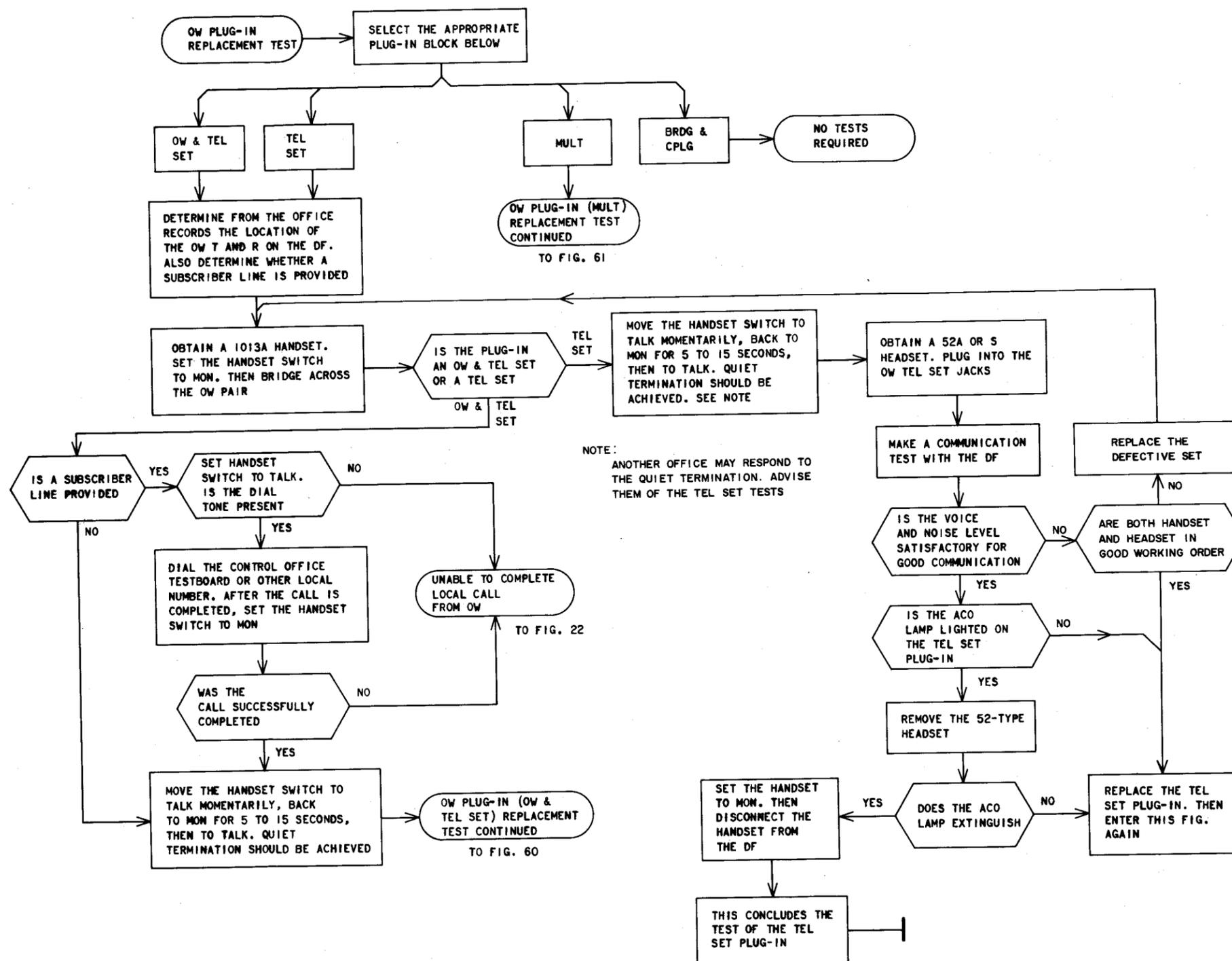


Fig. 59—OW Plug-In Replacement Test

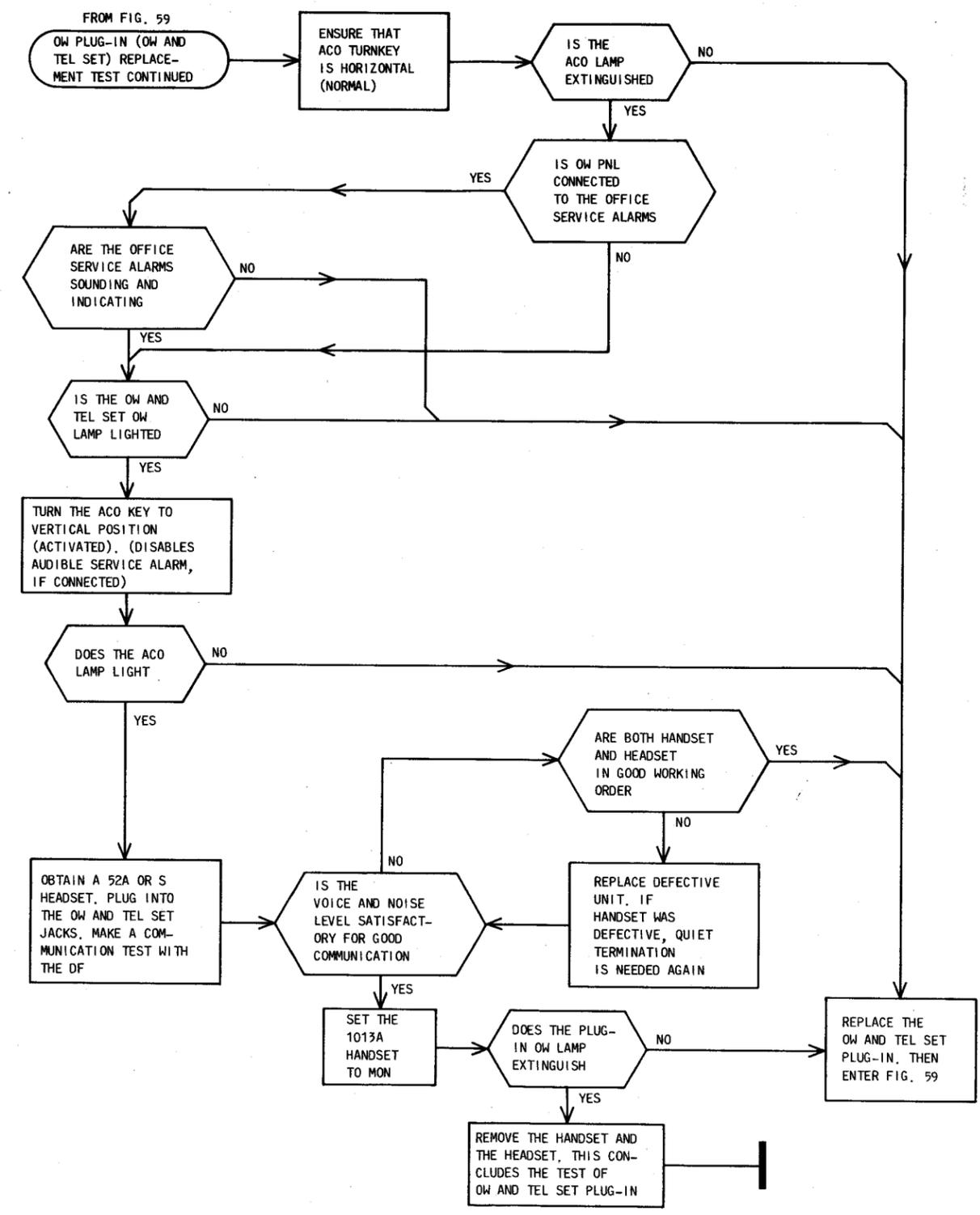


Fig. 60—OW Plug-in (OW & TEL SET) Replacement Test

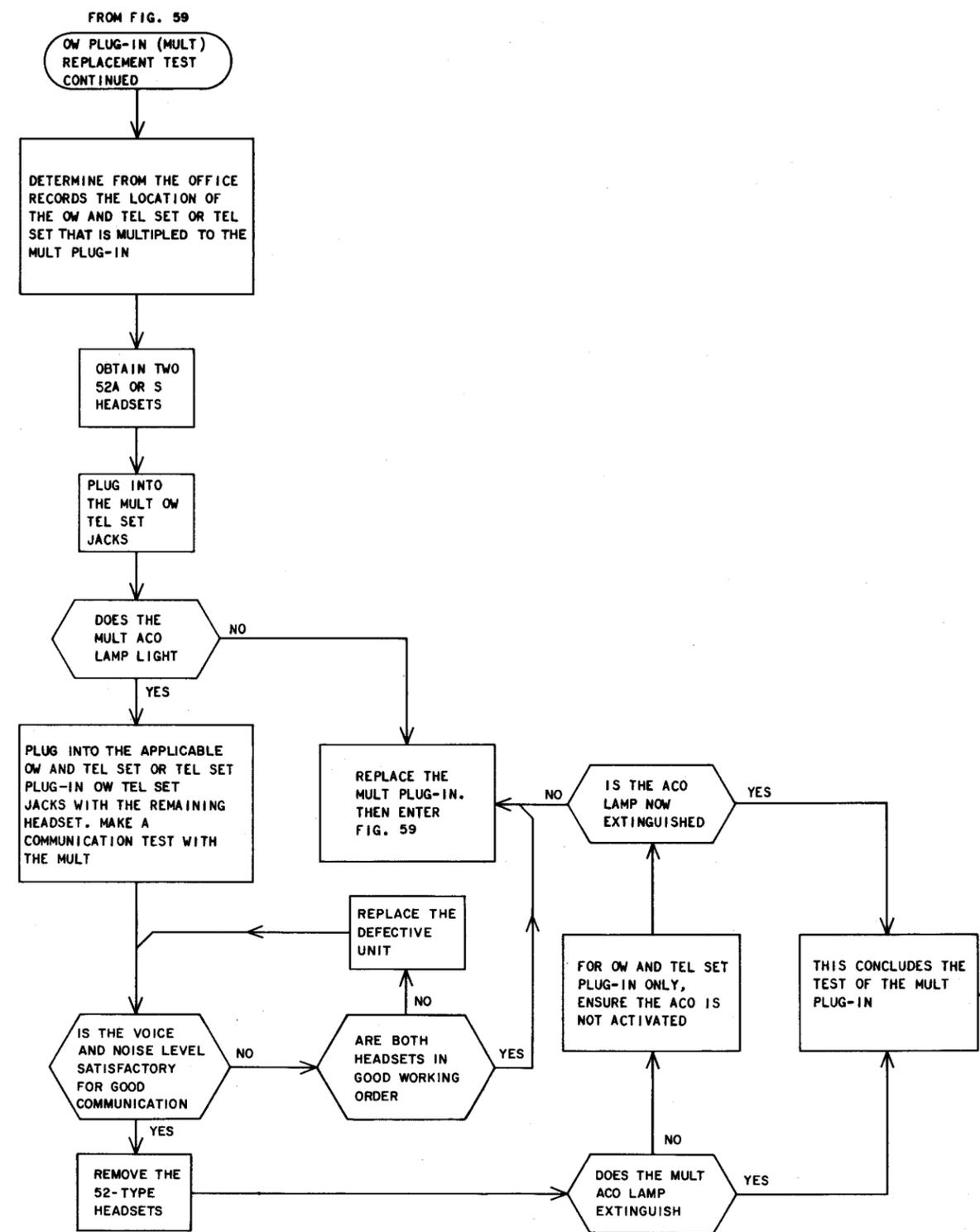


Fig. 61—OW Plug-in (MULT) Replacement Test

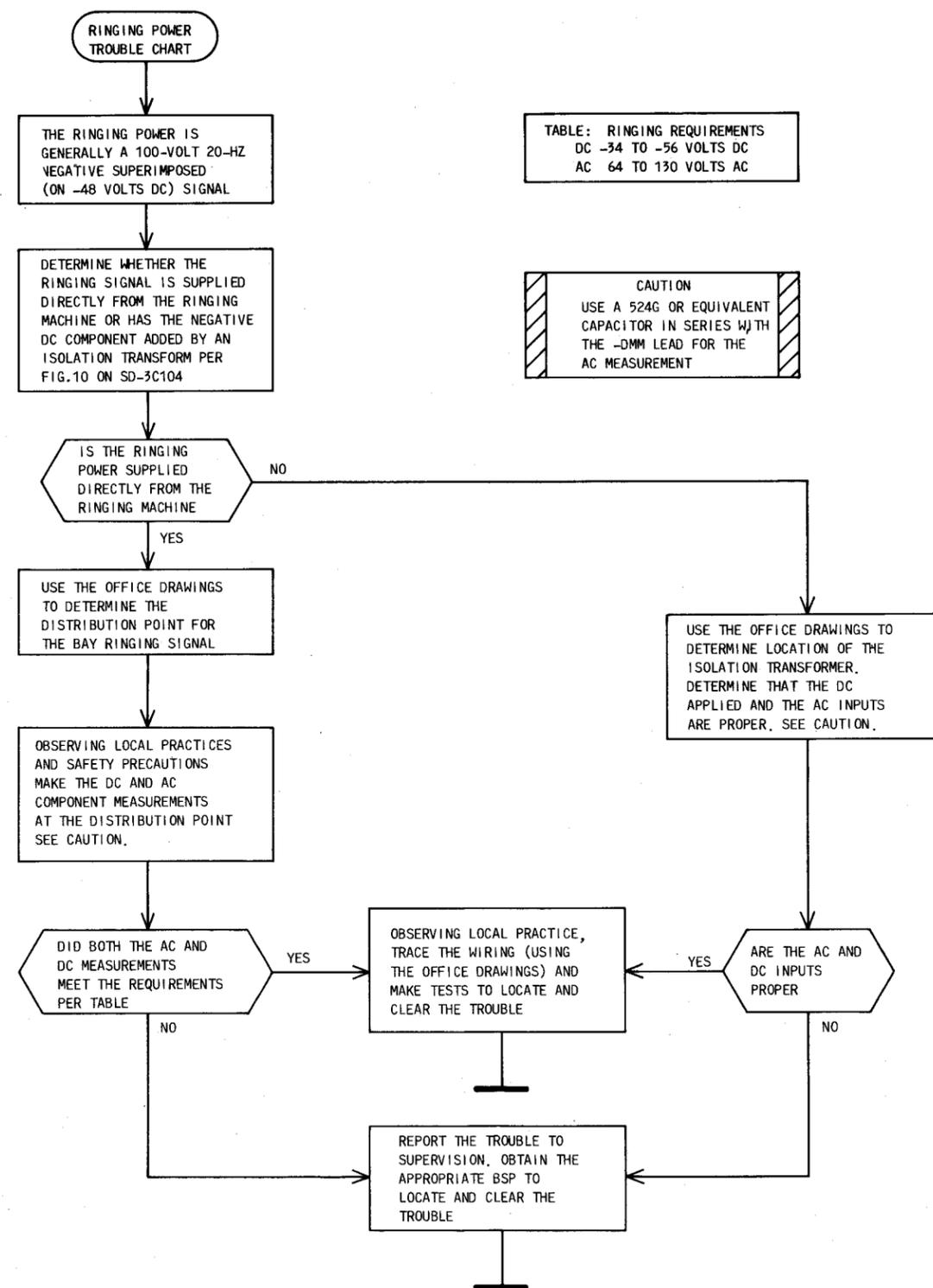
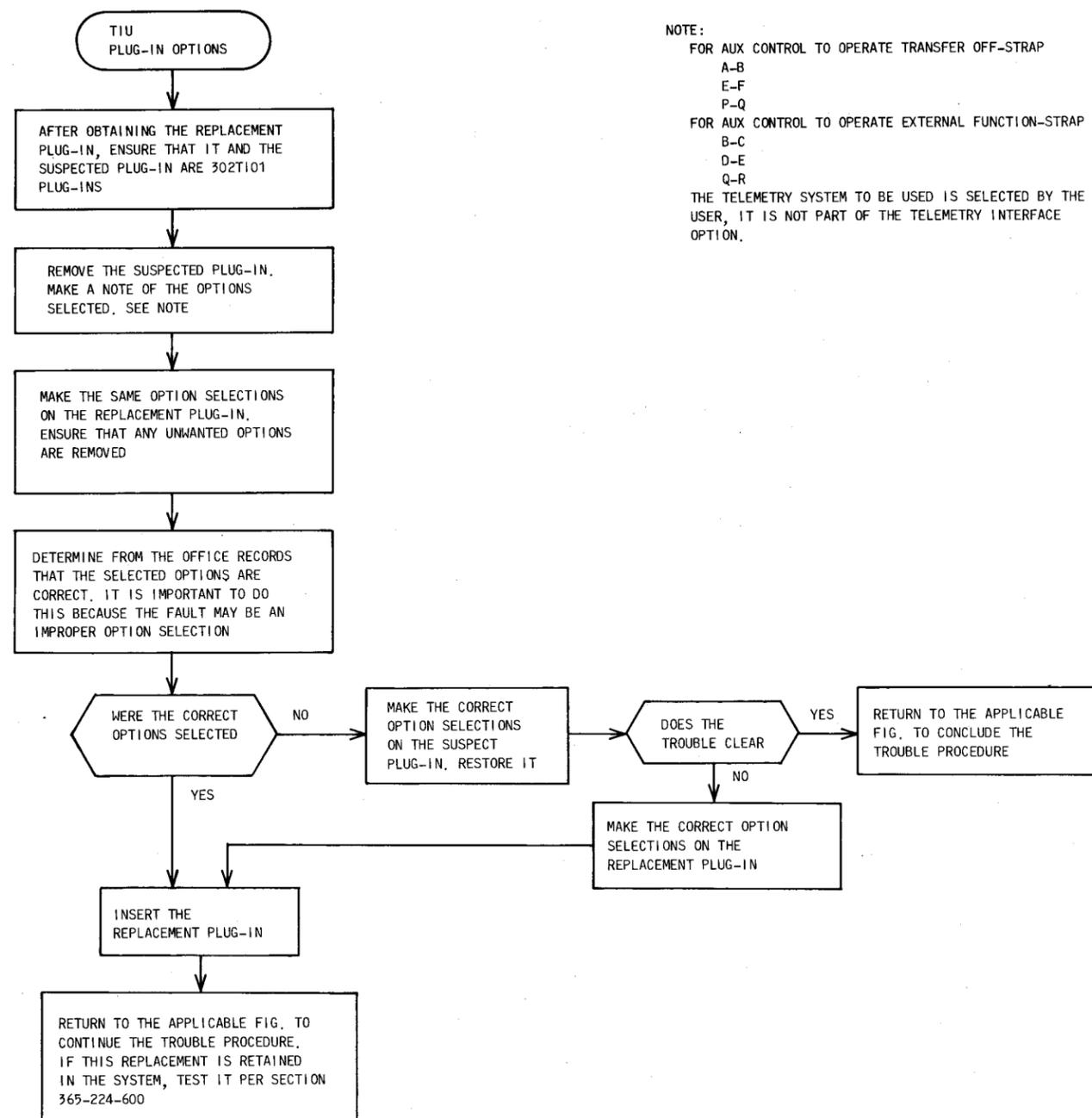


TABLE: RINGING REQUIREMENTS
 DC -34 TO -56 VOLTS DC
 AC 64 TO 130 VOLTS AC

CAUTION
 USE A 524G OR EQUIVALENT CAPACITOR IN SERIES WITH THE -DMM LEAD FOR THE AC MEASUREMENT

Fig. 62—Ringing Power Trouble Chart



NOTE:
 FOR AUX CONTROL TO OPERATE TRANSFER OFF-STRAP
 A-B
 E-F
 P-Q
 FOR AUX CONTROL TO OPERATE EXTERNAL FUNCTION-STRAP
 B-C
 D-E
 Q-R
 THE TELEMETRY SYSTEM TO BE USED IS SELECTED BY THE
 USER, IT IS NOT PART OF THE TELEMETRY INTERFACE
 OPTION.

Fig. 63—Telemetry Interface Plug-In Options