

119A INTERCONNECTING UNIT

IDENTIFICATION, INSTALLATION, CONNECTIONS, OPERATION, AND MAINTENANCE

1. GENERAL

1.01 The 119A interconnecting unit (IU), Fig. 1, provides a connection between customer-provided (CP) 2-wire terminal equipment and Bell System 2-wire cable facilities for the transmission of dc supervisory signals and voiceband transmission over the same conductors (tip and ring). When a 4-wire to 4-wire application is required, two 119A IUs must be supplied. The 119A IU will maintain a degree of longitudinal balance of cable facilities at voiceband frequencies regardless of the balance to ground of the CP equipment. The 119A IU also provides for protection of cable facilities against hazardous voltages and current originating in the CP equipment. The circuit will not pass conventional ringing signals, does not provide protection against faulty network control signaling, and does not provide voiceband signal power limiting.

1.02 The 119A IU does not replace the need for station protector blocks. "Sneak" current fuse protection for the 119A IU is required at stations fed by exposed facilities.

1.03 This issue of the section is based on the following drawings:

SD-1G286-01 Issue 1

CD-1G286-01 Issue 1

If this section is to be used with equipment or apparatus reflecting later issue(s) of the drawing(s), reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

2. IDENTIFICATION

PURPOSE

- To provide a 2-wire connection between CP terminal equipment and Bell System metallic voice-grade private line facilities

- To provide for the transmission of dc signaling and voice transmission over the same pair of wires
- To maintain longitudinal balance at voice frequencies
- To provide protection for Telephone Company personnel and equipment against hazardous voltages and currents.

ORDERING GUIDE

- Unit, Interconnecting, 119A (one IU required per CP terminal equipment—two units are required for 4-wire applications).

Associated Apparatus (order separately)

- Wire, Inside D, or equivalent (for connecting the T and R leads from the 119A IU to the Telephone Company 2-wire cable facility)
- Wire, Ground, No. 14 (for connecting the ground terminal of the 119A IU to an approved grounding electrode).

Replaceable Components

- Fuse, Type AGC, 175MA (3AG), Bussman, or Fuse, Type 312.175 (3AG), Littelfuse



The resistance and operate time of these fuses are vital to the proper operation of the circuit—do not substitute a different type.

- Pack, Circuit, FT6
- Pan, Base, 840804926
- Cover, 840129365
- Cover, Front, 840127948.

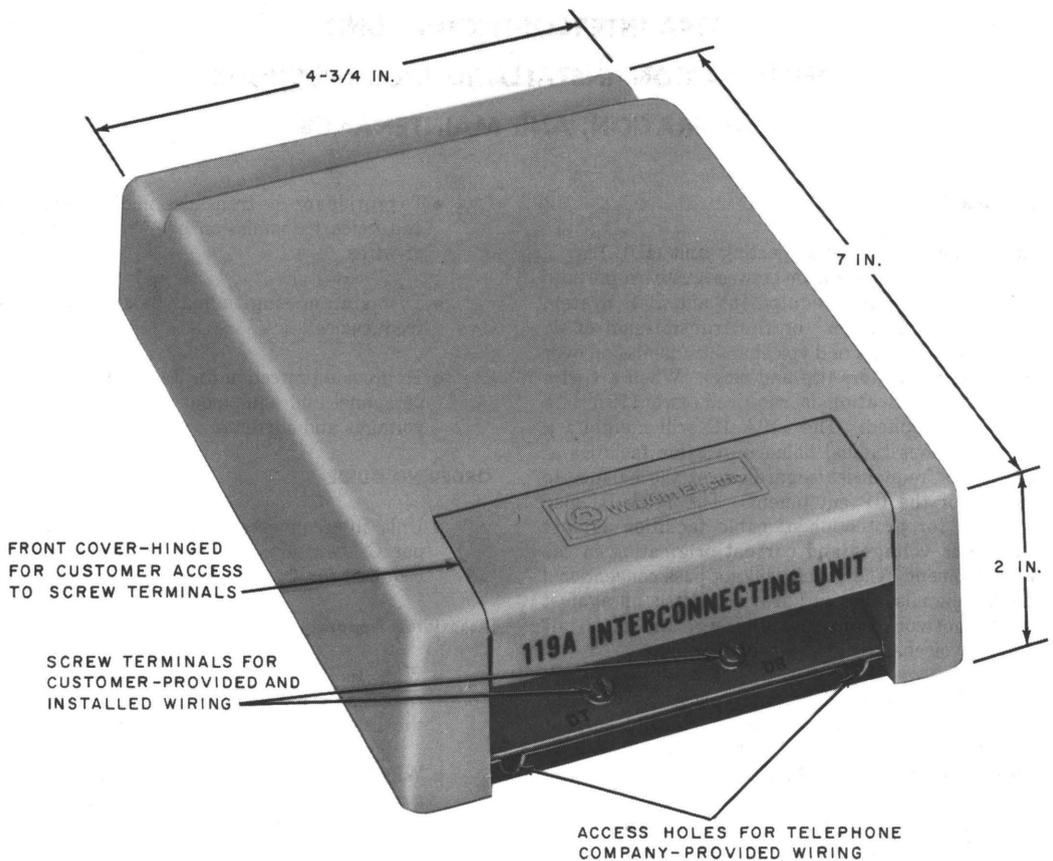


Fig. 1—119A Interconnecting Unit

DESIGN FEATURES

119A Interconnecting Unit

- Consists of an *FT6 circuit pack* mounted on an *840804926 base pan*, enclosed by an *840129365 (light grey) cover*.
- Mounts in any position on a wall or any suitable flat surface.
- Provides one keyhole slot and one screw hole in base pan for mounting unit.
- Size—approximately 4 3/4 by 7 by 2 inches (See Fig. 1.)
- Weight—approximately 2.2 pounds.
- Passive device—does not require power for operation.
- Provides voice transmission range from approximately 300 to 3000 Hz.
- Maintains dc continuity for low speed signaling such as relay control or push-to-talk operation of intercom systems. Will pass loop signaling

or simplex dc pulses up to about 20 pulses per second between resistive station terminations. For other terminations, such as relays, the pulsing speed will be lower. DX signaling may be used up to about 12 pulses per second.

- Provides arresters to limit surge voltage levels in excess of 230 ± 35 volts applied to the IU from the Bell System cable facilities.
- Provides zener diodes and fuses to limit the voltage and current from the CP equipment to 75 ± 4 volts peak conductor to ground, 150 ± 8 volts peak between conductors and 175 ma per conductor.
- Provides thermal switches which can be manually reset after overload condition has occurred and been removed.
- Maintains dc continuity and permits metallic dc signaling with a maximum current of 150 ma per conductor; permits simplex or duplex signaling with a maximum current of 60 ma in either or both conductors. Maximum working voltage 70V peak conductor to ground or 140V peak between conductors.
- Provides a degree of balance at voiceband frequencies for the 2-wire transmission path regardless of the balance of the CP equipment.
- Provides screw terminals for connection to Bell System 2-wire cable facility and to CP equipment.
- Provides heavy-duty ground screw terminal for connection to an approved grounding electrode.
- Provides hinged front cover for customer access to screw terminals for connection to his equipment.

3. INSTALLATION AND CONNECTIONS

3.01 The location of the 119A IU shall be determined by the following conditions:

- The IU may be mounted in any position on a wall or other smooth flat surface.

- The IU should be located in an area free of dampness and excessive dust or dirt, with adequate room for access to the equipment for maintenance and connections. The ambient temperature of the area should not exceed 140°F.

Note: In general, there is no restriction on the length of the customer interface cord which provides the transmission path between the CP equipment and the IU. The Bell System responsibility terminates at the interface terminals of the IU. The D inside wire between the IU and the telephone line terminal or protector block is restricted only to the presentation of a neat station appearance. The No. 14 ground wire run from the IU should be as short and straight as possible.

3.02 Install the 119A IU as follows.

- (1) Remove and discard Fiberglas tape.
- (2) Remove the snap-off cover assembly and the FT6 circuit pack.
- (3) To install the IU on a wall, position the base pan vertically against the wall with key-hole slot up. The base pan should be positioned so that the customer has unobstructed access to the screw terminals (DT and DR) on the unit which are provided for connection to the CP equipment. Secure the base with two screws (not supplied with unit).
- (4) Remove 2 inches of the cable sheath from the D inside wire and cut off the two unused wires as close to the sheath as possible. Route the D inside wire (right side) and the No. 14 station ground wire (left side) through the access holes and strain relief posts on the base pan (see Fig. 1, 3, and 4).

Note: The No. 14 station ground wire must be routed to clear the component leads projecting from the underside of the FT6 circuit pack. Improper routing will result in bowing of the printed circuit board when the FT6 circuit pack is remounted on the base pan.

- (5) Feed the ground wire and the D inside wire through the hole provided insuring that the sheath of the D inside wire remains below the

board and only the T, R, and ground wires pass through the hole. Reattach the FT6 circuit pack to the base pan using the four screws provided; ascertain that the circuit board is not bowed by the wiring underneath.

(6) Connect the No. 14 station ground wire to terminal G on the metal heat sink on the FT6 circuit pack (see Fig. 2, 3, and 4). Insure that the ground wire insulation extends above the level of the circuit board. The other end of the No. 14 station ground wire must be connected to an approved grounding electrode. Attach ground warning tag 3013B (not supplied with unit).

(7) Refer to Section 460-100-201 for proper station grounding procedures.

(8) Perform tests shown in 5.04 after installing.

(9) Connect the two leads from the D station wire to terminals T and R on the printed wiring board.

Caution: Do not overtighten screws on the printed wiring board.

(10) When connections have been completed, replace the snap-on cover assembly.

3.03 The installer should instruct the customer to raise only the hinged portion of cover to gain access to interface terminals DT and DR. **Caution customer that overtightening screw terminals may cause stripping.** The installer **will not** connect the interface leads to the IU and will not provide ground to the customer.

3.04 At locations served by exposed facilities provide "sneak" current protection by mounting 60A fuses on a 123-type station protector supported by a 94A protector mounting. Both units can be

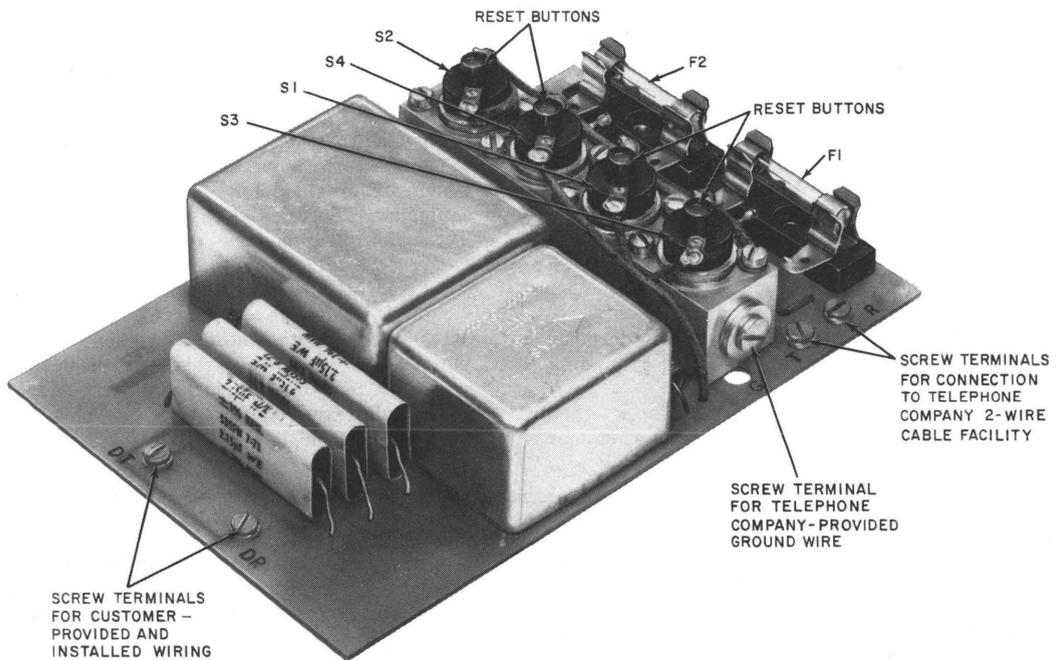


Fig. 2—FT6 Circuit Pack

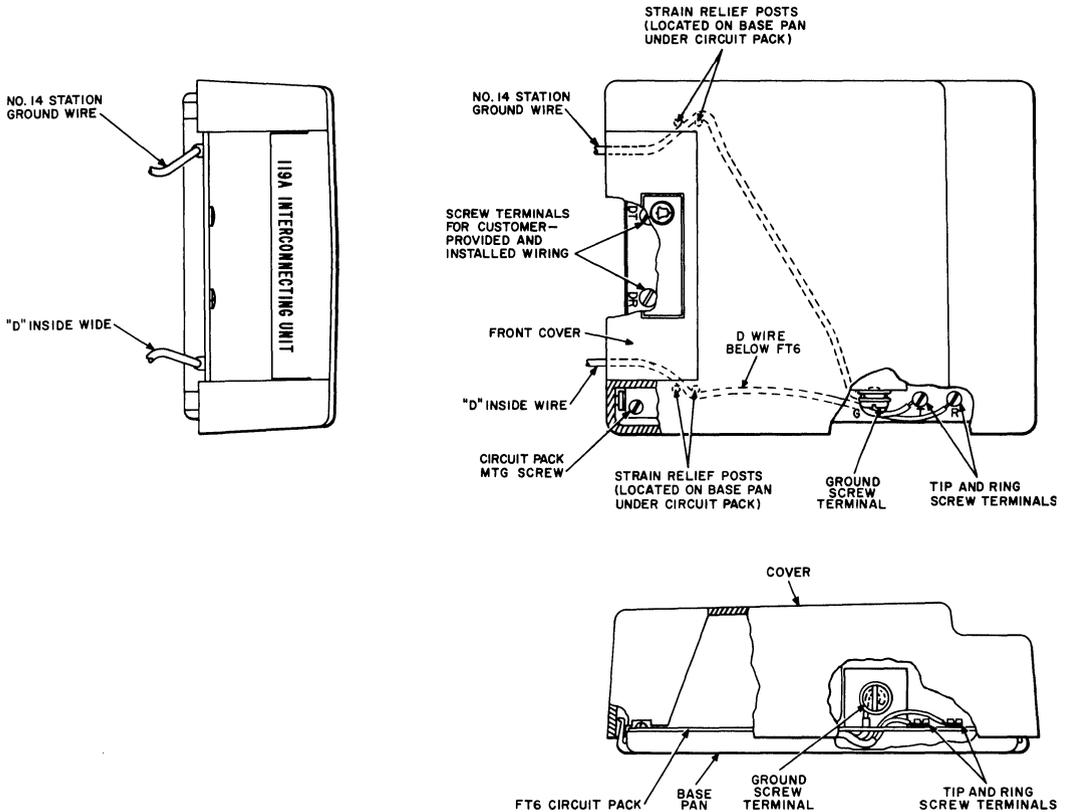


Fig. 3—119A Interconnecting Unit—Pictorial

mounted on a 1094 protector mounting as shown in Section 460-100-400.

4. OPERATION

4.01 Voltage and Current Protection: Fuses F1 and F2 (see Fig. 5), zener diodes CR1 and CR2, surge arresters E1 and E2, and thermal switches S1, S2, S3, and S4 provide hazardous current and hazardous voltage protection for personnel and equipment.

4.02 Surge arresters (gas tubes) E1 and E2 short the line to ground through the heavy duty ground screw terminal G and the No. 14 station ground wire, when potentials in excess of 230 volts

are applied on the cable facility side of the IU. Since a path to ground can be established through the gas tubes (surge arresters) at voltages lower than the breakdown voltage of the regular station protector, "sneak" current protection for the 119A IU is required at locations served by exposed cables.

4.03 Fuses F1 and F2 have a resistance of approximately 10 ± 2 ohms and are rated to operate at 175 ma. When the circuit current, because of improper loading by the customer, exceeds 175 ma, one or both of the fuses will operate. The snap-off cover assembly must be removed to replace the fuses.

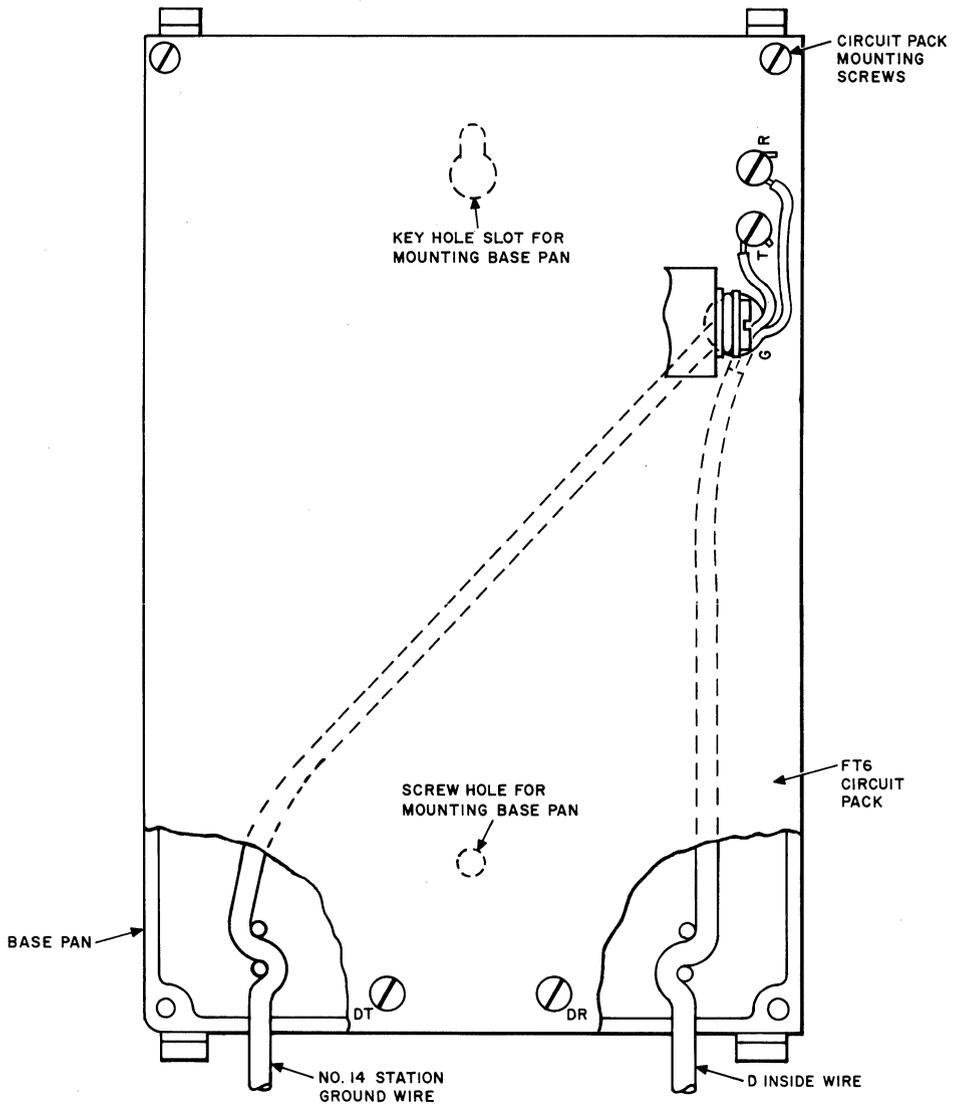
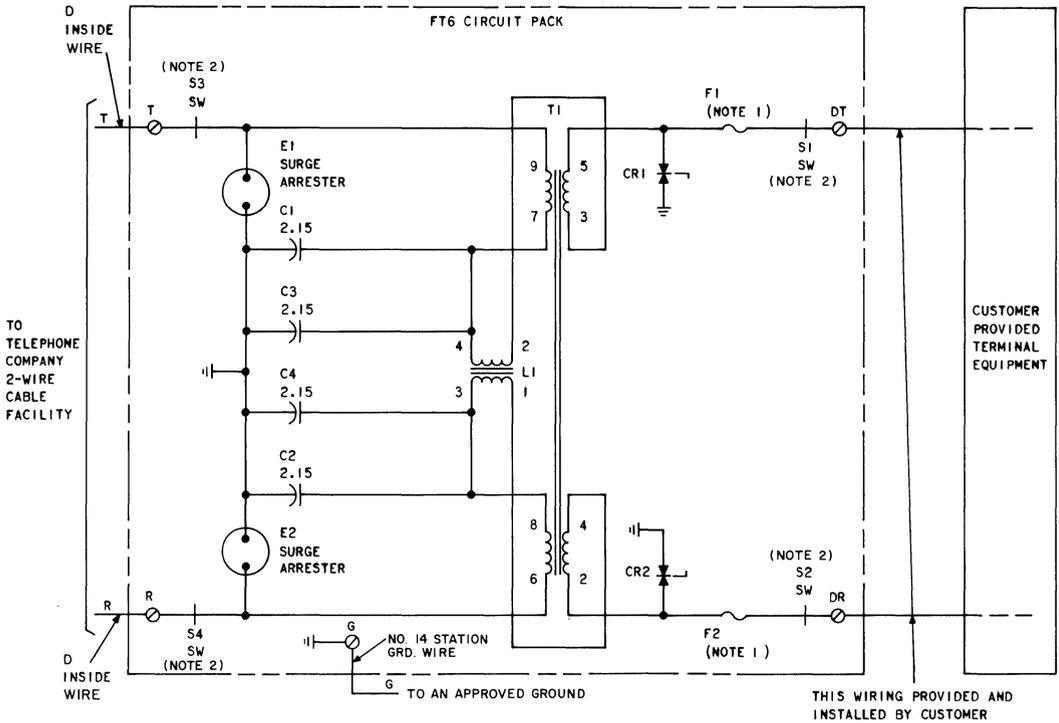


Fig. 4—Route of Station Wiring and Location of Terminals

4.04 When the voltage from the CP equipment exceeds 75 ± 4 volts peak to ground on either the tip or ring lead (150 ± 8 volts from tip to ring), zener diodes CR1 and CR2 will break down and limit the voltage to 75 ± 4 volts conductor to ground.

When this overvoltage condition exists and the impedance of the CP equipment is sufficiently low, power will be dissipated in the zener diodes causing the zener diode heat sink to become warm. When the temperature of the aluminum block (heat sink)



NOTES:

1. FUSES ARE BUSSMAN TYPE AGC, 175MA(3AG), OR LITTELFUSE TYPE 312-175(3AG), REPLACEMENT WITH THE PROPER FUSE IS IMPERATIVE; THE RESISTANCE AND OPERATE TIME OF THE FUSE ARE VITAL TO THE PROPER OPERATION OF THE CIRCUIT.
2. S1, S2, S3 AND S4 ARE THERMAL SWITCHES MOUNTED ON THE SAME HEAT SINK AS CR1 AND CR2.

Fig. 5—Schematic—119A Interconnecting Unit

on which the diodes are mounted reaches 194°F, one or more of the thermal switches S1, S2, S3, or S4, which are mounted on the same heat sink, will function to open the circuit. Therefore, the IU circuit has the capability to limit the voltage from the CP equipment indefinitely. The reset buttons located on the top of the thermal switch body (see Fig. 2) must be depressed to restore the circuit to normal after the thermal switches have operated. The reset buttons will not restore the circuit to normal until the temperature of the heat sink drops to approximately 184°F. The snap-off cover assembly must be removed to gain access to the thermal switch reset buttons.

4.05 Transmission and Signaling: Signals to and from the CP equipment pass through transformer T1 in the 119A IU. This transformer is designed to provide a 1:1 coupling for ac signals with a minimum amount of low frequency envelope delay distortion. The transformer windings are connected series opposing to minimize the possibility of an unbalanced current saturating the transformer. Capacitors C1, C2, C3, and C4 together with inductor L1, serve to insure good longitudinal balance.

4.06 The 119A IU provides approximately 35 dB of longitudinal signal suppression at 1000

Hz. It provides a voice frequency range of approximately 300 to 3000 Hz; the return loss in this range is at least 24 dB; the attenuation deviation in this range is less than 0.4 dB. The insertion loss at 1000 Hz is 0.8 dB. Series dc loop resistance of the IU is 56 to 80 ohms.

5. MAINTENANCE

5.01 Follow local instructions to obtain circuit release before performing tests.

5.02 Maintenance of the 119A IU on the customer premises should be limited to local tests, replacing fuses, resetting thermal breakers and checking the condition of the telephone line (protectors and sneak current fuses if used).

Note: Do not attempt individual component repair or replacement on the printed circuit pack; replace the 119A IU.

5.03 Apparatus Required to Perform Tests:

- KS-16979, List 1 or KS-14510, List 1 volt-ohm-milliammeter, or equivalent.

5.04 Tests:

(a) Before commencing tests check for hazardous voltages as follows: Measure the voltage from T to G, R to G, and from DT to G, from DR to G, and between DT and DR, and between T and R using the 300V scale on meter. (Measure both ac and dc.) If 70V dc or 50V ac or more is present from T to G, R to G, DT to G or DR to G, or 140V dc or 100V ac or more is present between DT and DR, or between T and R, it is an indication that a hazardous voltage may be present. In this case, wear rubber gloves and take proper safety precautions.

(b) Remove the wires from terminals DT, DR, T and R on the FT6 circuit pack. **Do not remove the No. 14 station ground wire from terminal G.** Mark or tag wires so that polarity is not reversed when reconnecting.

(c) If voltages exceeding the limits in step (a) are present, perform the following tests:

(1) With the unit disconnected repeat step (a) on the interface leads to determine the origin of the hazardous voltage.

(2) Take steps to remove the hazardous voltage from the line, or report the condition to your supervisor. If CP equipment is causing this condition, report the condition to the customer.

(3) Do not attempt further tests or repairs until the hazardous voltage condition has been corrected.

(d) Check for blown fuse (F1 or F2) on FT6 circuit pack. Measure the resistance of the fuses (10 ± 2 ohms). Replace with the same type fuse if defective. Retest after replacement.



The operate time and resistance of these fuses are vital to the proper operation of the circuit—do not substitute.

(e) Depress the reset buttons on thermal switches S1, S2, S3, and S4 (see Fig. 2).

(f) Using the volt-ohm-milliammeter, measure the resistance between terminal DT and terminal T. Repeat this measurement between terminal DR and terminal R. The meter should indicate a resistance between 28 ohms and 40 ohms in each instance.

(g) Using the volt-ohm-milliammeter, measure the resistance between terminal DT and terminal G. The meter should indicate an open circuit after an initial capacitive charging current. Repeat this measurement between terminal DR and terminal G, between terminal T and terminal G, and between terminal R and terminal G. All terminals should indicate an open circuit to ground.

(h) If the above tests indicate trouble in the 119A IU, replace the FT6 circuit pack or 119A IU.

(i) Reconnect the T, R, DT and DR leads (maintain polarity).

5.05 If the tests are satisfactory, and trouble condition still exists, follow local reporting procedures for CP trouble.



Do not attempt any test or repair to the customer-provided equipment.

5.06 When in the repairman's judgment the trouble is located in the CP equipment, the Repair Service Bureau should be notified so that proper Maintenance of Service Charge billing can be initiated as outlined in Section 660-101-312 entitled Maintenance of Service Charge on Services With Customer-Provided Equipment (CPE).