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## ELECTRONIC SWITCHING SYSTEMS

NO. 3

TEST FRAME  
CIRCUITSECTION I - GENERAL DESCRIPTION1. PURPOSE OF CIRCUIT

1.01 The test frame circuit interconnects various circuits on the test frame. These interconnected circuits are used to automatically and manually test the peripheral equipment of No. 3 Electronic Switching System (ESS) and associated lines and trunks. One of the major units on the frame is the peripheral test unit which contains most of the trunk and line test panel (TLTP) and all the plug-in circuitry for this frame. The details of this unit are covered in SD-3H520-01.

1.02 The test frame contains:

- (a) Milliwatt generator
- (b) Milliwatt distribution network
- (c) 60A control unit
- (d) Test voltage supply (rectifier)
- (e) Inverter
- (f) Fusing, frame filters, and alarm circuitry
- (g) TOUCH-TONE\* station test receiver (TTSTR)
- (h) Writing shelf with associated jacks
- (i) Idle line control unit
- (j) Transmission measuring set (TMS)
- (k) Voltmeter unit
- (l) Telephone set

(m) Miscellaneous unit (contains monitor amplifier and assorted relays, inductors, etc).

1.03 The listed items that work closely with the circuit in SD-3H520-01 are described more completely in CD-3H520-01.

SECTION II - DETAILED DESCRIPTION1. MILLIWATT GENERATOR/DISTRIBUTOR NETWORK

1.01 This circuit generates a precise signal used in transmission loss measurement of trunks, junctors, and lines. The circuit ties to the TLTP, the tone presence detector, and the milliwatt and transmission environment test circuit.

## MILLIWATT GENERATOR

1.02 The milliwatt generator is a precision sinusoidal-signal generator with an output of 0.05m at 1 kHz. Details relating to the circuit may be found in SD-95277-02 and J94071F-1 documentation. Connecting information may be found in SD-3H520-01.

## MILLIWATT DISTRIBUTION NETWORK

1.03 The 71F milliwatt distribution network consists of ten resistor attenuator networks used to balance out line loss between the milliwatt generator/distributor circuit and the circuit that uses the signal. Details relating to the circuit may be found in SD-95277-02 and J94071D-1 documentation. Connecting information may be found in SD-3H520-01.

\* Registered U.S. Patent Office.

2. 60A CONTROL UNIT

2.01 When the milliwatt circuitry is used in testing two trunks in a loop-around configuration, the 60A control unit is inserted in the loop to prevent fraudulent use of the connection.

2.02 This unit is designed to pass only 1 kHz  $\pm 2$  percent (the reference tone of the milliwatt generator). The level of the 1 kHz signal must be greater than -15 dBm in order for the two ports of the unit to be connected, thus completing the loop. If another tone greater than -45 dBm is detected, the path will open for at least 3 seconds. When the path is opened, a 900-ohm 2.15-UF balanced termination is applied to each port. Additional information may be found in SD-99331-01 and J99329A, L1 documentation.

3. TEST VOLTAGE SUPPLY (RECTIFIER)

3.01 The rectifier unit is used in conjunction with the voltmeter unit to provide necessary operating voltages.

3.02 The voltmeter circuit on the test frame requires several voltage levels to perform the various tests. The rectifier unit supplies +200 volts, +116 and -116 volts, +100 volts, and +20 volts direct current for the voltmeter circuit. The 200-volt level is used in the insulation breakdown test (BT). The +116 and -116 volt levels are used to check the station ringer gas tubes (+STA uses +116 volts and -STA uses -116 volts). The 100-volt and 20-volt levels are used in resistance tests (the 100-KOHM range uses the 100 volts and the 20-KOHM and 1-KOHM ranges use the 20 volts). Additional information may be found in KS19412, L1 documentation.

4. INVERTER

4.01 If commercial power fails, 120 volt ac power is still required for the TTY and one recorded announcement machine. The KS20816, L2 inverter provides this backup ac power (protected ac power).

4.02 The KS20816, L2 inverter is designed to provide 120-volt 60-cycle single-phase 2-wire alternating current. The unit can supply four circuits with a combined rating of not more than 500 volt-amperes. Included in this rating is the capability of supplying the surge current necessary to start a model 35 TTY equipped with a LMU3 motor. Two scan points are provided. The first scan point (ACOF ferrod) indicates that the inverter failed or that the ac output failed. The second scan point (ACACF ferrod) indicates that the commercial ac power failed or that the inverter is running. Additional information may be obtained in KS20816, L2 documentation.

5. FUSING AND FRAME FILTER

5.01 The fuse blocks and frame filter are located at the base of the frame and serve as power distribution points.

5.02 The test frame circuitry uses both -48 volts and +24 volts. A J1A053M-L27 filter is used for both voltages. The two voltages are distributed in two fuse block groupings. A fuse alarm relay, located at the base, has a contact tied to a system alarm ferrod. In addition, the fuse alarm buses are tied to two lamps (24-volt and 48-volt lamps) to give visual indications in the event that a fuse should blow.

6. TOUCH-TONE STATION TEST RECEIVER

6.01 This circuit, in conjunction with the station ringer-test line, is used to check out customer TOUCH-TONE telephones.

6.02 The circuit allows the installer to check out all functions of the TOUCH-TONE pad in a telephone to verify that the TOUCH-TONE pad works, the ringer works, and the handset functions properly. The circuit is used in conjunction with FB521 and FB522 of the peripheral test circuit SD-3H520-01. For additional information on the unit refer to SD-1A199, SD-3H520-01, and CD-3H520-01 documentation.

7. WRITING SHELF WITH ASSOCIATED JACKS

7.01 The writing shelf provides a convenient place to mount the access trunk one (AT1) and two (AT2) jacks, the 0 dBm and -10 dBm signal source jacks, the transmission one (TM1) and two (TM2) external signal input jacks, and the telephone jack pair (TELA, TELB). A spare jack is also provided (SP). All jacks, except the telephone jacks, are of the 239A type and will accept the standard switchboard type 310 plugs. The telephone jacks accept the 396A type dual plug. The 0 dBm and -10 dBm signal source jacks provide a source of 1 kHz 0 dBm or -10 dBm signals respectively. The TM2 jack allows for external measuring instruments to be connected while the TM1 jack allows an external test signal to be used. The telephone jacks connect a head set to the telephone circuitry.

8. IDLE LINE CONTROL UNIT

8.01 A U.S.O.C. 2JJ type idle line control unit is used to control ac power to the TTY. When the TTY is not in use, ac power is removed after a fixed interval of time. The ac power is applied via the idle line control unit when the TTY is needed. The ac power required for operation of the unit is derived from the commercial source or, in case of commercial power failure, the inverter supplies the unit with power.

9. TRANSMISSION MEASURING SET

9.01 A transmission measuring set is used in conjunction with the TLTP.

9.02 The J94023CR type transmission measuring set has a range of +10 dBm to -20 dBm with a 6-dBm full scale. For information about the unit refer to the J specifications. For information on its use refer to CD-3H520-01.

10. VOLTMETER UNIT

10.01 The voltmeter unit consists of a meter movement and a switch panel.

10.02 The voltmeter J3H001DC circuit consists of the meter movement, the switch panel, the test voltage supply, parts of FB513 and FB511 in SD-3H520-01, and part of the TLTP. The meter provides both voltage (metallic and FEMF) measuring and resistance measuring capabilities. The other functions of the meter, such as +STA and BT, measure the resistance between tip or ring and ground. For more detail on the operation of this circuit refer to CD-3H520-01.

11. TELEPHONE SET

11.01 A modified panel-mounting TOUCH-TONE telephone set, part of the TLTP, is used on the test frame.

11.02 A standard 2750B type telephone set has been modified to accommodate a transfer function that allows headsets plugged into any telephone jack in the office to be used in place of the handset of the telephone set. In addition, two modifications have been included to:

- (a) Provide an amplifier for this head set function,
- (b) Meet design requirements of the TLTP.

11.03 A guard assembly (P-90D197) and a TLTP accessible FLASH key have also been included. The telephone can be used for communication both inside and outside the office. The TOUCH-TONE pad is used, in addition to originating calls, for input digits (access codes) to the program for connecting the TLTP access trunk to various circuits.

11.04 For additional information refer to CD-3H520-01.

12. MISCELLANEOUS UNIT

12.01 The miscellaneous unit contains a collection of relays and inductors, a KS19328-L1 monitor amplifier, and other parts requiring plate-type mounting.

SECTION III - REFERENCE DATA1. WORKING LIMITS1.01 Input Supply Voltage Ranges:

The input +24 volts supply	+21.3 to +26.8 volts.
The input -48 volts supply	-42.8 to -52.5 volts.
The input 120 volts ac supply	110 to 125 volts alternating circuit.

2. FUNCTIONAL DESIGNATIONS

2.01 None.

3. FUNCTIONS

3.01 Provides balanced milliwatt signal source.

3.02 Provides fraud protection on long transmission measurements involving two lines.

3.03 Provides necessary voltages for voltmeter.

3.04 Provides ac back-up power for TTY and 17A announcement machine.

3.05 Provides testing of TOUCH-TONE pads on customer telephone sets.

3.06 Provides control of TTY ac power.

3.07 Provides measurements of transmission losses.

3.08 Provides measurement of line voltages, resistances, condition of gas-tube ringers, and leadkage resistances.

3.09 Provides telephone communications in conjunction with trunk and line test panel as well as a source of digit information for trunk and line tests.

3.10 Provides monitoring capabilities on lines or trunks connected to test panel.

4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a keysheet, the connecting information thereon is to be followed.

(a) Peripheral Controller - SD-3H110-01.

(b) Master Scanner - SD-3H140-01.

(c) Peripheral Test Unit - SD-3H520-01.

5. MANUFACTURING TESTING REQUIREMENTS

Intermediate Requirements

5.01 None.

End Requirements

5.02 This circuit should be tested to verify that it is wired in accordance with the schematic and wiring drawings, that the requirements of the circuit requirements table are met, and that the circuit is capable of performing all functions stated in this circuit description.

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