LOCAL TEST CABINET NO. 1
DESCRIPTION OF EQUIPMENT

CONTENTS

1. GENERAL

1.01 This section describes the local test cabinet which is designed for use in making tests of the subscriber line and trunk plant in the smaller manual and dial offices where a test desk is not provided.

1.02 The principal features of the local test cabinet are as follows:

(a) A volt-milliammeter testing circuit consisting of a high resistance voltmeter and a 100-volt testing battery which enables accurate tests to be made of line insulation resistance and capacity.

(b) A transmission testing feature similar to that in the 12 and 14 type local test desks which enables transmission tests to be made.

(c) A variety of connecting arrangements facilitating the connection of the testing circuit to the line or trunk circuit under test.

(d) A test cabinet which may be used in portable form. It employs a standard portable test set metal housing.

1.03 This section has been reissued to include information on testing panel subscriber lines and the +STA and -STA keys as well as to bring it up to date generally.

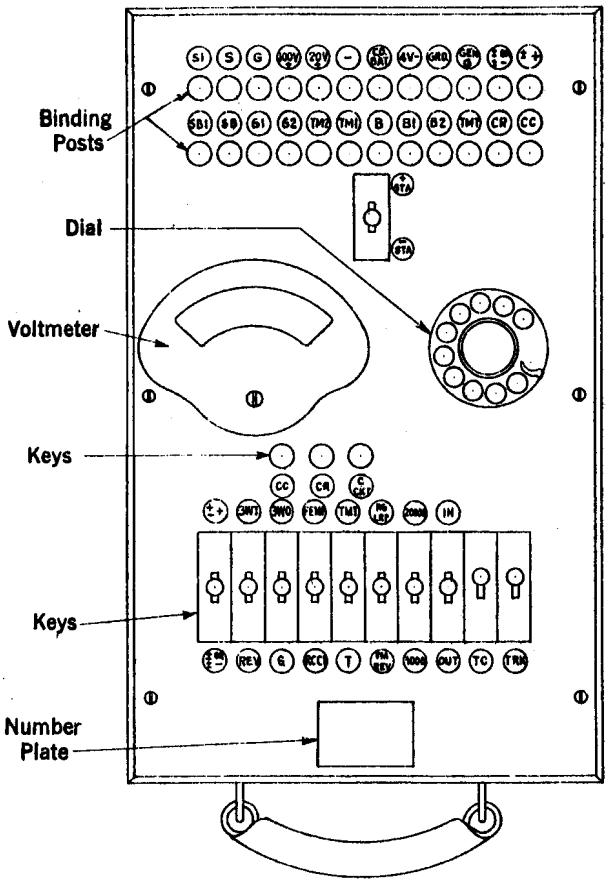
2. EQUIPMENT ARRANGEMENTS OF TEST CABINET

2.01 The apparatus of the local test cabinet is mounted in a standard metal box approximately eighteen inches long, twelve inches wide and eight inches deep.

2.02 The test cabinet is used as a portable box with a portable battery box or is permanently located and wired in the office. In the latter case the test batteries are located on the relay rack.

2.03 The arrangement of the equipment on the panel of the local test cabinet is shown in Fig. 1. The apparatus on the face of the panel consists of keys for controlling the tests, a Weston model 269 volt-milliammeter, a dial if required and a number of binding posts. Some of these binding posts are for use in connecting central office battery, test battery, ringing and coin battery supply to the test cabinet, while others are used for setting up different test circuit conditions by means of local strapping, as pointed out in more detail later on. The equipment mounted underneath the panel consists of a retardation coil, induction coil, repeating coil, condensers, resistances and a voltmeter multiplier. A panel containing the jacks is located in the front end of the cabinet. The jack panel is shown in Fig. 1 in the end view of the test cabinet. There are no relays in the test cabinet.

2.04 A portable battery cabinet, shown in Fig. 2 with cover removed, is used for housing six 22-1/2-volt block type batteries, which comprise the 100-volt testing battery. A compartment is provided for each battery and a separate compartment contains the fuses and the resistance lamp wired in series with the battery leads. The battery leads are connected to a jack designated 100 V by means of which the battery is connected to the local test cabinet. The +STA and -STA voltage is supplied either from the coin generator, local test desk or a local battery supply circuit.


Binding Posts
Dial
Voltmeter
Keys
Keys
Number Plate

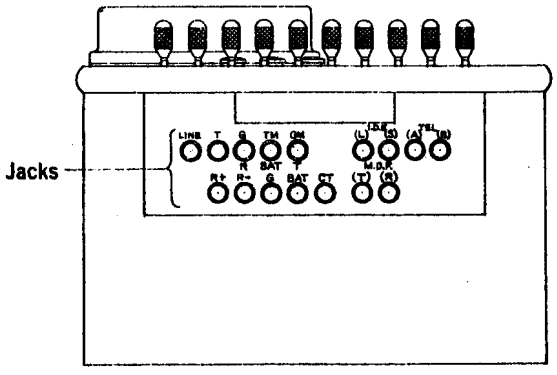
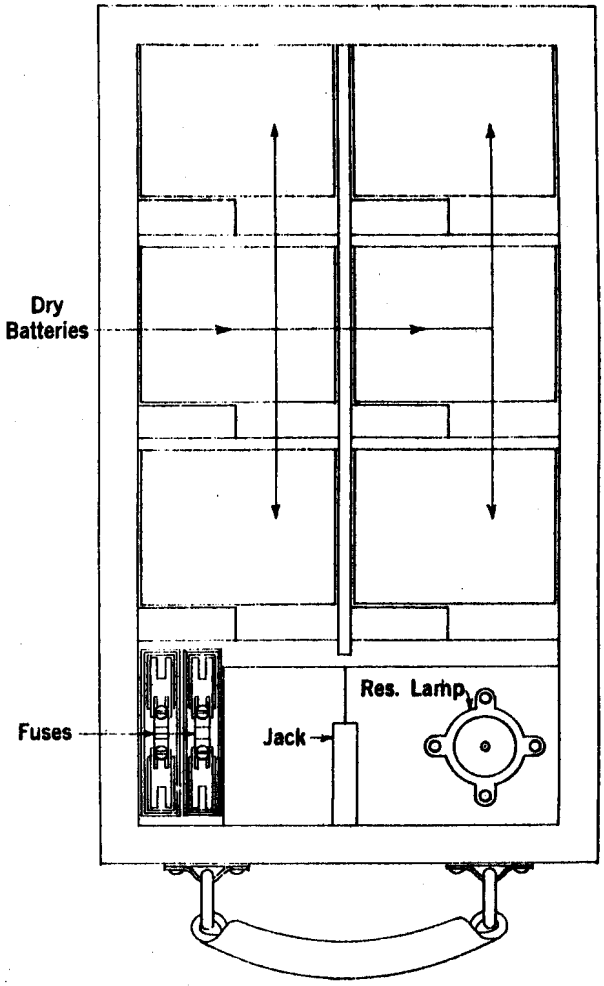

Jacks

Fig. 1


Dry Batteries
Fuses
Jack
Res. Lamp

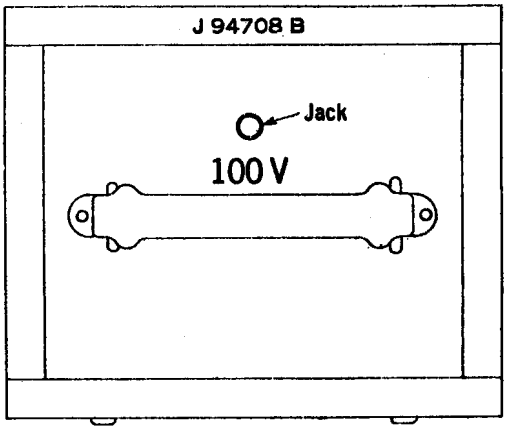

J 94708 B
Jack
100 V

Fig. 2

3. MEANS FOR CONNECTING BATTERY, RINGING AND COIN CONTROL SUPPLY TO LOCAL TEST CABINET

3.01 When the local test cabinet is located permanently at the distributing frame or on the switchboard cable turning section, the test battery, central office battery and ringing current supply and coin control current supply, if the office is arranged for coin service, can be wired permanently to the test cabinet.

3.02 In offices in which the local test cabinet is used in portable form, central office battery and ringing supply jacks and coin control jacks if required, are provided at the main distributing frame and also at the distributing frame in community dial and the smaller step-by-step offices. The connector frame in step-by-step offices is equipped with the battery supply jack required for using the local test cabinet at this frame. If the test cabinet is used in portable form at a manual switchboard, battery and ground supply can be wired to a spare jack circuit in the switchboard.

3.03 Jacks are provided in the test cabinet to which the frame jacks are connected by means of cords. Binding posts are also provided for making connections to battery, ringing and coin control supply under special conditions where the cords are not available or in case it is desired to use the local test cabinet where the frame jacks are not available.

3.04 The following table shows the functions of the various supply jacks and the associated binding posts:

Jacks	Binding Posts	Functions
T BAT	100 V + 20 V +	Test battery supply.
BAT G	CO BAT GRD	Central office battery and ground supply. (See Note)
R R-	± or ± - GEN G	Ringing current and generator ground supply in a-c or a-c - d-c offices, negative superimposed ringing current and generator ground supply in 4-party full selective offices and hand generator in magneto offices not equipped with ringing machines.
R+	± +	Positive superimposed ringing current supply in 4-party full selective offices.
CT	CC CR	Coin collect and coin return current supply.
	4 V-	Dry cell battery for transmitter supply in magneto offices.
	R R1	Provided on some cabinets for use with a rheostat.

Note: In magneto offices ground supply only is required. It is connected to the GRD binding post.

3.05 The local test cabinet is universally arranged for use in magneto, 24-volt and 38-volt common battery manual, step-by-step, and panel offices. Due to the differences in the battery supply and sleeve conditions required for the various types of offices, binding posts are required and by means of local strapping between binding posts the required testing conditions can be set up for each case. When the local test cabinet is used for only one of these conditions, straps may be soldered to the binding post terminals underneath the panel.

4. MEANS FOR ESTABLISHING TEST CONNECTIONS

4.01 When the local test cabinet is used in portable form, the test connections are made by means of cords connected to jacks in the test cabinet. The connections may be made to the subscriber line at the distributing frame protectors, through a switchboard jack, by means of a No. 234 plug connected to terminal strip lugs at the distributing frame in step-by-step offices or through a test connector. The following paragraphs give the connections to be made from the jacks in the cabinet.

4.02 Line jack for connecting to test connector jack for controlling test connector by means of a dial on the cabinet.

4.03 M.D.F. (two jacks) for connecting to the distributing frame test cord which is equipped with two No. 252 type plugs for establishing test connections to the protectors. The No. 152 plug is used with ridged side to left.

4.04 T jack for connecting to jack of line or trunk when local test cabinet is used at switchboard or at jack panel. Also to be used with test connector test cord when test cabinet is used at connector frame.

4.05 G jack is a grounded jack for connecting to a line or trunk to test for cross with circuit to which the T jack is connected.

4.06 TM and GM jacks are for use in non-multiple magneto offices and correspond to the T and G jacks, respectively.

4.07 I.D.F. (two jacks) for use with a standard service observing cord in making connection to a subscriber line on the distributing frame terminal strip. The No. 152 plug is used with ridged side to left.

Note: This connection should not be used in panel offices as the test circuit sleeve conditions are not suitable for the panel line circuit.

4.08 When the local test cabinet is located permanently at the distributing frame, connections may be made to the protectors by means of a main frame cord, connected directly to the M.D.F. jacks of the local test cabinet, or the test circuit may be wired to M.D.F. test jacks and the main frame cord can be connected to these jacks. This latter arrangement is provided where the frame cord, if connected directly to the test cabinet, would not reach all of the protectors. In addition, the local test cabinet is arranged to connect to two test cords located in a switchboard position in a manual office. One of these cords is used for connecting the test circuit to a line or trunk and the other cord is used in conjunction with it when it is desired to test for crosses between two lines or two trunks. A call circuit feature provides means for communication between the test cabinet and the switchboard position for ordering up test connections.

4.09 When the test cabinet is located on the cable turning section of a manual switchboard the call circuit is not required. In this case test cords may be provided in a switchboard position or test connections may be made by patching the test circuit directly to a jack of the line or trunk circuit by means of a three-conductor patching cord. A test trunk terminating in jacks at the M.D.F. may be provided.

4.10 In step-by-step offices connections to lines are made as follows:

(a) The feature for making connections to terminal strip punchings is provided for establishing test connections at the distributing frame in the smaller step-by-step offices and in community dial offices, particularly those not equipped with test connectors.

(b) When the test cabinet is used at the test connector in step-by-step offices, two cords connected to the terminals of a No. 240-C plug are used to connect the test circuit to the test connector. The No. 240-C plug connects to the test jack of the test connector. The cords connect to the LINE and T jacks.

(c) When the test cabinet is permanently located, it may be associated with one or more test distributors. If only one test distributor is to be used with the cabinet, it will be wired directly to the cabinet. If the test cabinet is required to work with more than one test distributor, a pair of jacks wired from the cabinet will be located convenient to the jacks associated with the test distributors. Connections are made between the cabinet jacks and the required test distributor jacks with patching cords.

4.11 When the test cabinet is permanently located in a panel office, it may be arranged for connection by means of the jack circuit to a B switchboard incoming selector. Under this arrangement the T jack shall be patched to the associated jack of the incoming test selector with a patching cord.

5. TELEPHONE CIRCUIT, TALKING LINE AND CALL CIRCUIT

5.01 Where the local test cabinet is permanently located, a subscriber line circuit may be wired directly to the test cabinet or the test cabinet talking line leads may be bridged to the switchroom telephone for use as a talking line. If a separate subscriber line circuit is used it is equipped with a subscriber set which serves as an incoming signal. The subscriber set is mounted in a convenient location near the test cabinet.

5.02 The telephone set in the test cabinet may be connected either to the talking line or across the test circuit. Provision is made in the test circuit to supply talking battery through a repeating coil to lines under test.

5.03 The call circuit feature consists of a non-locking 92 type key (C-CKT) which bridges the telephone set on the call circuit to the switchboard position in a manual office in which the test trunk terminates enabling the tester to talk with the operator.

6. TEST CIRCUIT FEATURES

Volt-Milliammeter Testing Feature

6.01 For detecting the nature of trouble on a subscriber line or on a trunk, the testing circuit of the local test cabinet is provided with a 100-volt dry cell battery poled opposite to the central office battery and a volt-milliammeter having the following scales:

0 to 150 volts with resistance of 100,000 ohms
0 to 30 volts with resistance of 20,000 ohms
0 to 30 volts with resistance of 1,000 ohms
0 to .375 ampere with resistance of less than 1 ohm

The instrument is provided with an external multiplier and shunt to give the different scales. Since the calibration for the instrument, when mounted in a horizontal position, is slightly different from that for vertical mounting, two KS numbers have been assigned to the instrument, KS-6562 for horizontal mounting and KS-6563 for vertical mounting.

6.02 When making resistance measurements the 100-volt test battery is used with the 100,000-ohm scale. A 20-volt tap on the test battery is used with the 20,000 and 1,000-ohm scales. The milliammeter scale is used in connection with the central office battery. Resistance measurements made by the volt-milliammeter are most accurate when the external resistance is equal to the resistance of the instrument. For this reason, the volt-milliammeter is provided with the four windings so as to enable the test deskman to choose a winding which will be of the same order of resistance as the external resistance. Resistances of a few ohms or as high as 500,000 ohms can be measured with a fair degree of accuracy. The resistance values may be determined by the following formula:

$$X = \frac{E - E_1}{E_1} \times R$$

where X is the value of the resistance being measured, E the voltage of the test battery, E_1 the reading of the voltmeter and R the resistance of the volt-milliammeter. In determining the value of a resistance by means of the milliammeter scale, the following formula may be used:

$$X = \frac{E}{I} - R_1$$

where X is the resistance measured, E the voltage of the central office battery, I the reading of the milliammeter and R_1 the resistance of the milliammeter circuit plus the resistance in the ring side of the test circuit in series with the meter. Values of the resistances corresponding to the readings on the meter are given in tables included in the section on the method of operation of the local test cabinet.

6.03 The volt-milliammeter is specially designed so as to give an appreciable throw of the needle when a capacity is caused to be charged or discharged through its windings. Hence, it can be used with considerable success in checking the capacity of a subscriber line by means of which it can be determined whether the line is closed through to the station and, within certain limits, the number of stations connected to a party line. The throws of the needle for typical line conditions are given in a table in the method of operation section.

6.04 In the course of making tests on subscriber lines, potentials from other sources than the test battery may be encountered, such as the central office battery or potentials due to earth currents. The high voltage of the voltmeter circuit test battery makes it unnecessary, in the ordinary course of testing, to be much concerned with earth potentials when making tests for insulation resistance and capacity. The test battery is poled opposite to the central office battery so that the presence of external battery on the circuit under test can readily be determined. In this case, the deflection of the needle in excess of the test battery voltage indicates at once the presence of external battery on the circuit. Because of the fact that the winding for the 150-volt scale of the volt-milliammeter has a very high resistance, foreign or earth potentials can be measured with considerable accuracy even if there should be a few thousand ohms resistance in the external circuit. However, if the latter resistance is an appreciable percentage of the resistance of the instrument, the error may be considerable.

7. KEY FUNCTIONS

The keys provided in the cabinet are arranged to function as follows:

7.01 TRK key in the talking position, connects the telephone and dial to the talking trunk line and in the holding position, disconnects the telephone and dial, and holds the talking trunk by placing a short circuit across the tip and ring.

7.02 TC key in the dialing position connects the telephone and dial to the line to test distributor or connector and in the holding position, disconnects the telephone and dial and holds the line by a short circuit across the tip and ring.

7.03 OUT and IN keys connect the test circuit through the test cord to the distributing frame protectors either to the line outside the office or to the inside portion of the line.

7.04 20,000 key connects 20-volt test battery through 20,000 ohms to the meter.

7.05 1000 key connects 20-volt test battery through 1000 ohms to the meter.

7.06 RG LRP key has a double function (1) to remove the ringing ground when ringing on a party line which has a receiver off the hook and (2) to connect ground through 1000 ohms to the tip of the test circuit when the T key is operated for testing on prepay coin lines. When LRP key is not equipped the G key is used for testing on prepay coin lines.

7.07 VM REV key reverses the connections of the meter with respect to the test circuit when the FEMF key is operated.

7.08 TMT key connects the telephone set through an artificial line to the repeating coil for making transmission tests on subscriber lines.

7.09 T key connects the telephone across the test circuit in series with a condenser.

7.10 FEMF key connects the meter to ground instead of to the test battery in order to measure foreign potentials.

7.11 RCCI key connects central office battery through the repeating coil and milliammeter in series to the ring side of the test circuit for testing purposes and in conjunction with the T key for supplying talking battery to lines being tested.

7.12 3WT key disconnects the meter from the ring side of the line and connects it to the sleeve lead (third wire).

7.13 G key connects direct ground to the tip side of the test circuit.

7.14 3WO key opens the sleeve lead (third wire) and when the T key is operated, connects the secondary of the induction coil in series with a resistance across the test circuit.

7.15 REV key reverses the tip and ring leads of the test circuit between the test circuit and the line.

7.16 ± + and ± or ± - keys apply ringing current as indicated to the ring and ground to the tip side of the test circuit.

7.17 CC and CR keys apply current to the tip side of the line for collecting and returning coins deposited in coin boxes.

7.18 CCKT key connects the telephone circuit in the cabinet across the call circuit to the switchboard operator's telephone.

7.19 The +STA and -STA keys are used to check for the presence of cold cathode tube stations on party lines and visual indicators. Use the +STA key for positive stations or 21 type indicators and the -STA key for negative stations or 103A key equipments.

8. CIRCUIT DESCRIPTIONS

8.01 Following is a list of the circuit drawings pertaining to the local test cabinet. Detailed circuit descriptions will be found in the associated CD sheets.

Title	Drawing
Local Test Cabinet - Test Circuit	SD-90223-01
Test Jack Circuit	SD-90239-01