SUBSCRIBER LINE CARRIER SYSTEM - 5 CHANNEL

SEISCOR SUBSCRIBER CARRIER SYSTEM TYPE SSC-5

INSTALLATION & CONNECTIONS

CENTRAL OFFICE & SUBSCRIBER TERMINALS

CONTENTS

1. GENERAL

1.01 This section includes information on the installation of the central office terminals, repeaters, and subscriber terminals of the Five Channel Seiscor Subscriber Line Carrier Telephone System, Type SSC-5.

2. SSC-5 CENTRAL OFFICE TERMINAL

2.01 The mounting for the five SSC-5 central office terminals (Channels 1-5) and the common equipment card used with each system is by means of a relay rack mounted card rack with provisions for plugging in the individual SSC-5 central office terminals and the common equipment card.

Each SSC-5 central office terminal consists of a single printed circuit card which contains the carrier circuitry and filters necessary for operation. Cards are plugged in from left to right with Channel 1 occupying the left hand position, Channel 2 to the right, and so on. The sixth position is used for the common equipment card in system #1.

2.02 The rack mounted card holder for 23" rack using three mounting spaces is designed to accommodate two complete SSC-5 Systems (five channels and one common equipment card per system). Another version of the 23" rack mount occupies 14 rack spaces and accommodates ten SSC-5 Systems (a total of 50 carrier channels).

2.03 All connections are made to the rear of the rack mounted card housing to wire wrap terminals on the card plugs. Wiring is shown in Figure 1.

2.04 In addition to the mounting details outlined in paragraph 2.02, prewired mobile installation cabinets are available to accommodate two SSC-5 Systems (a total of ten

channels). These cabinets may be mounted on the end of the main frame, wall mounted, or may be placed on the floor. These cabinets are especially useful for emergency use where a small number of circuits are required; and being pre-wired, they will not require the service of an installer to mount in a relay rack and wire.

The only wiring involved is applying central office battery to a common strapping terminal and running jumper wires.

2.05 Cabling from relay rack SSC-5 central office terminals to the terminal strip on the horizontal frame should follow standard practices with regard to numbering of channels, fanning out, dressing of leads, and lashing of the finishing wiring. Special care should be taken to insure that no split pairs occur in the cabling (see Figure 1).

2.06 48V central office battery is necessary for the operation of the SSC-5 System. Each five channel system, including power fed to the remote subscriber terminals and repeaters, draws approximately .3 amperes. Thus, a shelf draws .6 amperes, and should be fused with a 3 ampere fuse. The common equipment card which supplies power to the subscriber terminals and the repeaters is separately fused with a fuse mounted on the front of the card (.5 ampere fuse).

The purpose of the .5 ampere fuse is to disconnect power from the common equipment card in the event the physical pair used for the carrier line becomes grounded at a point close to the central office. Electronics in the various central office terminal cards are fed by the central office battery through a dropping resistor which is a part of each channel card. For this reason, failure of the electronics portion cannot blow a central office fuse and cause failure of both systems fed from the common central office fuse.

3. SSC-5 CENTRAL OFFICE TERMINAL INSTALLATION INSTRUCTIONS

3.01 When using the rack mounted card holder, assembly #9960-4933, mount the card holder for the SSC-5 central office terminal units on designated relay rack. Refer to Figure 1 for the following steps.

3.02 Wire wrap connections on the socket pins of the SSC-5 card rack, reading from top to bottom, are designated as A, B, C, D, F, H, J, K, and L.

3.03 It will be necessary to multiple all J pins together and to multiple all L pins together. The bottom terminal (L) is minus 48V central office battery and goes to the fuse block assigned to the SSC-5 System.

J is ground and central office positive battery.

Other multiples necessary are common to each system and do not connect between systems. Pins H and K of each system are separately multipled together as shown in Figure 1. These leads are used solely for intersystem wiring and should not be connected to external apparatus or

bunching blocks.

The top two terminals of the channel sockets of the card rack are designated A and B, and the carrier derived circuit, "Tip" and "Ring". Terminals C, D, E, and F on the sockets associated with the channel cards are left blank. On the plug used to receive the common equipment card, terminal A is a fuse alarm associated with the fuse in the common equipment card.

The physical cable pair used as a carrier pair is connected to E and F on the common equipment socket.

3.04 From the testboard, verify that the carrier cable pair is free of grounds, shorts or crosses. Place jumper connecting SSC-5 system (punchings E & F) to assigned carrier pair. (See Figure 1).

3.05 If practicable, connect each of the five channels (punchings A & B) to assigned central office equipment (see Figure 1).

3.06 Bridge SSC-5 System Test Set (9960-4405) on carrier pair and connect ground lead. Push the "Line Volts" ("PWR" on early models) button. This is a measurement of the carrier pair voltage to ground. (Record measurement).

Requirement - at least 90 volts

NOTE: Actual voltage will be about twice the C.O. battery voltage.

If requirement is not met refer to 363-900-903SB for trouble location.

3.07 Press "RPTR OUT" button on test set to measure channel 5 carrier level on line.

Requirement - 0.5± 1 dBm

NOTE: Use conversion chart to convert meter reading to dBm.

If requirement is not met, refer to 363-900-903SB for trouble location.

3.08 If Central Office Equipment has been connected to all five Central Office Terminals, verify dialing , ringing and talking over each channel using the test set.

If any channel does not operate properly, check wiring, central office line assignment, etc. If trouble cannot be found, substitute another channel card for channels that do not operate properly.

This step makes certain that the central office end of the system operates properly and that installation of the system can proceed.

NOTE: (See Figure 2). The System Test Set referred to earlier is a hand carry unit that contains:

A. Five basic SSC-5 subscriber terminals.

B. A "Sonalert" audio signalling device to simulate ringing.

C. A DC/DC converter to convert power feed voltage on the carrier line to a value to properly operate the unit.

D. A switch to connect a System Test Set to any of the five channels.

E. A meter to verify proper input and output levels of repeaters and to verify proper voltage for power feed from the carrier line to ground.

4. SSC-5 REPEATER DESCRIPTION & GENERAL INSTALLATION PROCEDURES

4.01 Repeaters are required if the carrier line exceeds 35 db attenuation at 124 khz. The repeaters serve to amplify both the carrier frequency energy transmitted from the central office and the carrier frequency energy transmitted from the subscriber terminal toward the central office.

4.02 Proper location for repeaters is normally calculated based on the facility over which the carrier is to be used. A procedure is described herein that will verify the proper location before installation provided the central office terminal has been installed and checked as described in section 3 (see Figure 4 for schematic).

4.03 Repeaters are mounted in a sheet steel enclosure, assembly #9960-4680, which is designed for pole or stub mounting (see Figure 3-A).

The normal enclosure will accommodate ten repeaters (ten systems or 50 channels).

A smaller housing, assembly #9960-3953, can also be provided which will house three repeaters (three systems or 15 channels). (Figure 3)

Connections to the repeater are on a conventional terminal strip and are normally made with either bridle wire or stub cable whichever is more appropriate (see Figure 3).

4.04 Lightning protection is provided as an intergral part of each repeater, and need not be furnished externally.

4.05 Each repeater, SSC-5 assembly #9960-4121, is a plug-in unit similar to SSC-5 central office terminal cards, and will handle one system (five channels).

4.06 Before actual mounting of the repeater housing, proper location can be verified by using System Test Set, assembly #9960-4405. (see Figure 2). This test set will verify attenuation from the central office to the proposed location of the repeater before actually <u>cutting the carrier line</u> to connect to the repeater housing.

4.07 At the 1st repeater, connect the two line terminals of the System Test Set across the carrier pair. Connect the ground terminal to cable shield. Measure "line volts".

Expectancy - At least 90 volts

Press "RPTR IN" button to measure carrier level.

Requirement: -35 $\pm$3.5 dBm

NOTE: The measured level varies with cable temperature. For example, the cable will measure about -38.5 dBm if its temperature is 100°F, whereas the same cable pair will measure about -31.5 dBm if its termperature is 40°F.

If the requirement is met, proceed

with repeater installation. If the requirement is not met, the probable cause is either (1) load coil not removed, (2) bridged tap, (3) wrong cable make-up used in layout calculations, or (4) water in the cable. In either latter event, a new repeater location is required. Relocation of any repeater point requires relocation of all following repeater points. Consult the engineer before relocating any repeater point.

5. SSC-5 REPEATER HOUSING (assembly #9960-3953) & SSC-5 REPEATER (assembly #9960-4121) INSTALLATION INSTRUCTIONS

5.01 After verification of location as described above, actual mounting of the housing can begin.

5.02 The housing is mounted on a removable hanger bracket (see Figure 3) which is first mounted on a suitable stub or pole at the desired location. After mounting the hanger, the cabinet is hung on the hanger and secured by a bolt on the bottom of the cabinet to the hanger.

5.03 After mounting, the carrier line is connected to the terminal strip in the housing as shown in Figure 3. The top two pairs of terminals apply to repeater #1; the next two pairs apply to repeater #2, etc.

The uppermost pair connects to the carrier line going toward the central office. The pair immediately below it connects to the pair continuing twoard the field subscribers or the next repeater, if required.

Connections to the repeater cabinet may be made from a terminal with bridle wire or, depending on the location and circumstances, stub cable or other means.

Make sure that a proper ground is connected to the ground clamp in the box since the ground wire is important not only for lightning protection, but is also necessary to supply power to the repeaters.

5.04 After wiring to the terminal strip is completed, the SSC-5 repeater, assembly #9960-4121, is plugged into the card cage in the proper position.

5.05 Bridge line terminals of System Test Set across field cable pair. Connect test set ground terminal to cabinet ground. Measure "line volts".

Expectancy: About 2 volts less than the voltage read in 3.06.

NOTE: Voltage read at this point will drop as successive repeaters and terminals are added.

5.06 Measure repeater output (RPTR OUT).

Requirement: 0 $\pm$ 3.5 dBm

If requirement is met go to 5.08.

5.07 If requirement is not met, open connection to field pair and connect a 130 ohm resistor across repeater output, field side. Bridge System Test Set across resistor. Measure repeater output.

Requirement: 0 ± 1 dBm

If requirement is not met, the repeater is probably bad. If requirement is met, the field cable pair is probably at fault. Bridged tap should be suspected.

5.08 The procedure at the 2nd, 3rd and 4th repeaters is the same as that at the 1st repeater (4.07 through 5.07). However, the line voltage measured at each successive repeater will be less than that observed at the preceeding repeater. For example:

Line Volts at 1st rep. - 2 volts less than at C.O.
Line Volts at 2nd rep. - 5 volts less that at C.O.
Line Volts at 3rd rep. - 9 volts less than at C.O.
Line Volts at 4th rep. - 15 volts less thant at C.O.

Prior to tests at the most remote repeater point, the Carrier Line Termination, required at the end of short end sections, should be in place. Otherwise the measurement of repeater output will be in error.

5.09 Connect System Test Set line terminals to the carrier pair at its remote end. Connect ground terminal to ground. Measure "line volts".

Requirement: At least 78 volts

NOTE: When subscriber terminals are added, this voltage will decrease but will be not less that the required 70 volts with all terminals installed.

5.10 Press "RPTR IN" button to measure carrier level.

Requirement: At least -
-28 dBm at 40°F
-30 dBm at 68°F
-32 dBm at 98°F

NOTE: Each subscriber terminal connected will increase the loss about 1 dB. Therefore, the level at the most distant station protector can be as low as -38 dBm (includes 1 dB for drop wire).

If requirement is not met and the pair has d.c. continuity, the trouble may be (1) a load coil not removed, (2) carrier line branches (which would not be terminated at this stage), or (3) excessively wet cable.

5.11 When level requirements are met, press CHAN 1 button and make dialing, talking, and ringing tests. Repeat for channels 2 thru 5. (This test requires that the central office terminal be connected to associated C.O.E.).

5.12 The repeatered line is now ready for installation of subscriber terminals.

6. SSC-5 SUBSCRIBER TERMINAL DESCRIPTION

6.01 This unit consists of a molded plastic enclosure suitable for mounting on floor joints, backboards, walls, or other convenient locations on the subscriber's premises. The physical dimensions of this assembly are 6" x 4½" x 1½".

6.02 The complete SSC-5 subscriber terminal circuit is contained on one printed wiring board which slides into grooves in the plastic

base-mounting unit. Gas tube protectors are built in the terminal which coordinate with the station protection provided at the customer's premises.

6.03 Subscriber terminals are provided with channel identification (channel 1, channel 2, etc.). Make sure that proper channel is installed to agree with installation order.

7. SSC-5 SUBSCRIBER TERMINAL INSTALLATION INSTRUCTIONS (see Figure 5)

7.01 SSC-5 Assembly #9960-4111 - Channel 1

SSC-5 Assembly #9960-4112 - Channel 2

SSC-5 Assembly #9960-4113 - Channel 3

SSC-5 Assembly #9960-4114 - Channel 4

SSC-5 Assembly #9960-4115 - Channel 5

If the SSC-5 subscriber terminal unit has been in storage over 60 days, the nickel cadmium battery may be at least partially discharged. To make certain the batteries are fully charged, P.E.D./Seiscor has available a portable battery charging case (Battery Charger, assembly #9960-3274). This unit has capacity to charge 12 Nicad batteries of either the type used in SSC-1 (6.0V) or the type used in the SSC-5 (7.2V). These charging cases can be located in store room or inventory points, and provide charging capability by merely plugging the charger into a 115V AC outlet.

The charger is so designed that batteries can be left in the unit indefinitely without fear of damage or overcharging.

It is very important to make sure that battery used in any SSC-5 subscriber terminal is 7.2V and not 6.0V. Improper operation will result if this precaution is not followed.

7.02 Remove the snap cover from the unit and slide out the printed circuit card. (Verify that the printed circuit card bears the proper channel identification number called for in this praticular location.)

CAUTION: Do not set the circuit board on any metal surface if the battery is connected.

7.03 Mount the plastic base unit as near to the station protector and to existing connecting blocks as possible. Be sure to leave sufficient room to remove the circuit card at a later date should it ever become necessary.

7.04 Replace the circuit card by sliding it into the plastic base mount and insert the 7.2V nickel cardium battery into its holder on the card using associated quick connect terminals.

7.05 Refer to drawings on Figure 5 for connection details and to Figure 4 for schematic wiring information.

7.06 Connect the SSC-5 subscriber terminal as shown in Figure 5 with carrier or "Tip & Ring" leads wired to the station protector and to the repeatered carrier line.

Make sure that the earth ground is connected to the ground terminal of the SSC-5 terminal block.

7.07 A three wire lead is required to the telephone set (sets). Connect the tip (green) and ring (red) wires to the SSC-5 subscriber terminal unit as shown in Figure 5. Also connect the "Bell" or yellow wire as shown.

CAUTION: Do not multiple the yellow wire from the telephone set to either the "tip" or "ring" from the set. A separate wire must be used all the way to the SSC-5 subscriber terminal unit.

Do not connect the yellow wire to earth ground or multiple with one of the leads used between the lighting transformer and the instrument on princess and trimline telephones.

7.08 Snap the plastic cover on the base mount for the SSC-5 subscriber terminal unit. This completes the installation and wiring.

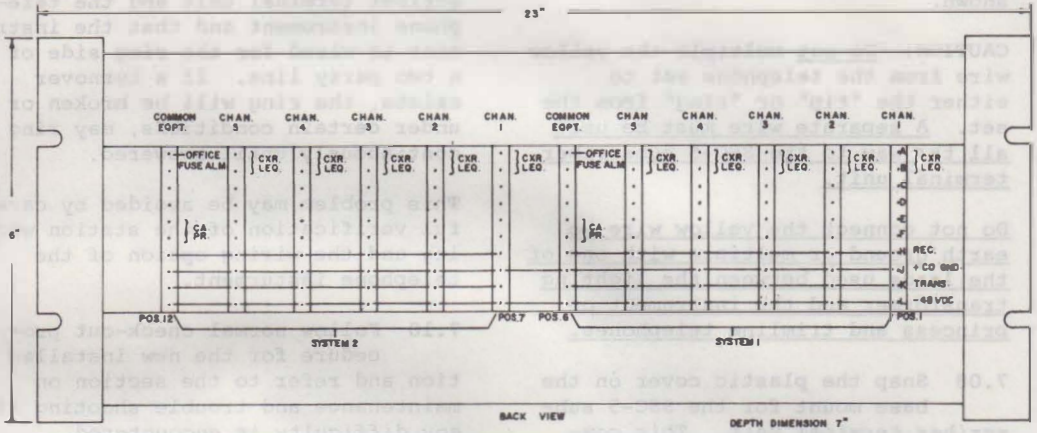
7.09 Verify that a properly wired sub set has been used for the SSC-5 subscriber. SSC-5 is not suitable for key systems without a special adapter (consult P.E.D./ Seiscor engineers).

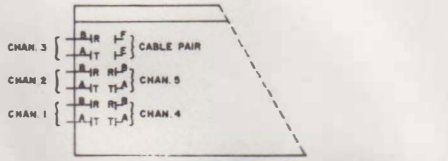
CAUTION: Verify that there has been no "Tip" and "Ring" turnover between the terminals of the SSC-5 subscriber terminal unit and the telephone instrument and that the instrument is wired for the ring side of a two party line. If a turnover exists, the ring will be broken or under certain conditions, may ring continuously until answered.

This problem may be avoided by careful verification of the station wiring and the wiring option of the telephone insturment.

7.10 Follow normal check-out procedure for the new installation and refer to the section on maintenance and trouble shooting if any difficulty is encountered.

SSC-5 WIRING FOR SHELF CABINET 23"-12 CHANNEL
(9960-4933)

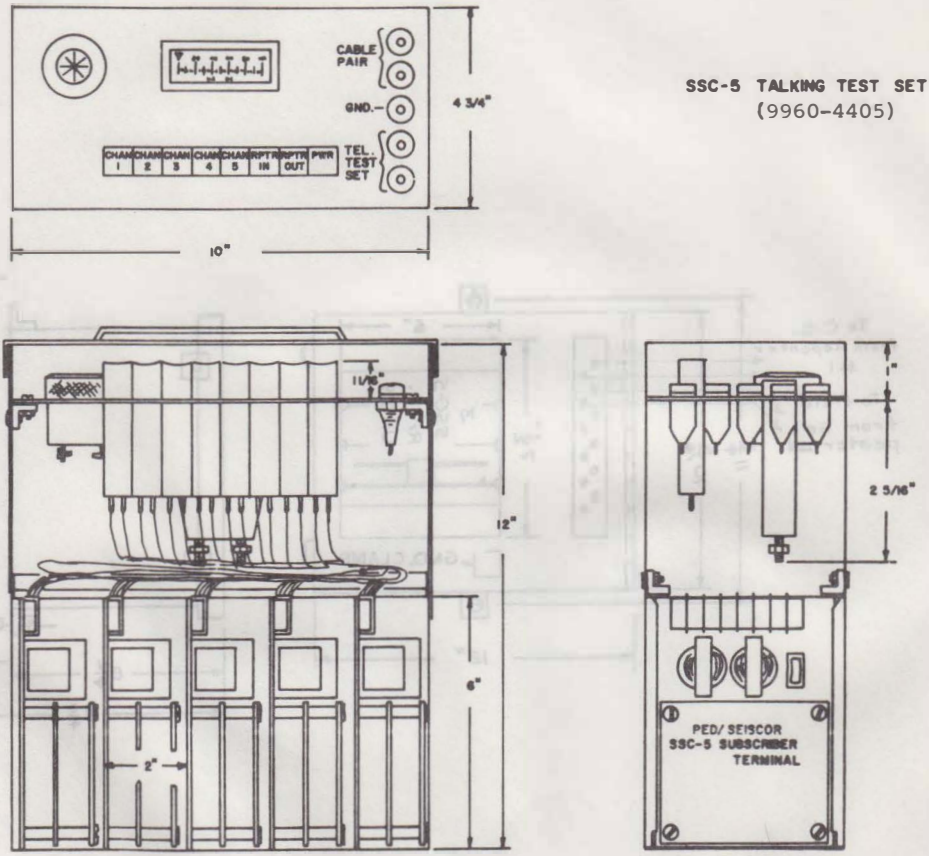




TYP. 6 PCHG TS MMDF WIRING FOR ONE SYSTEM SSC-5

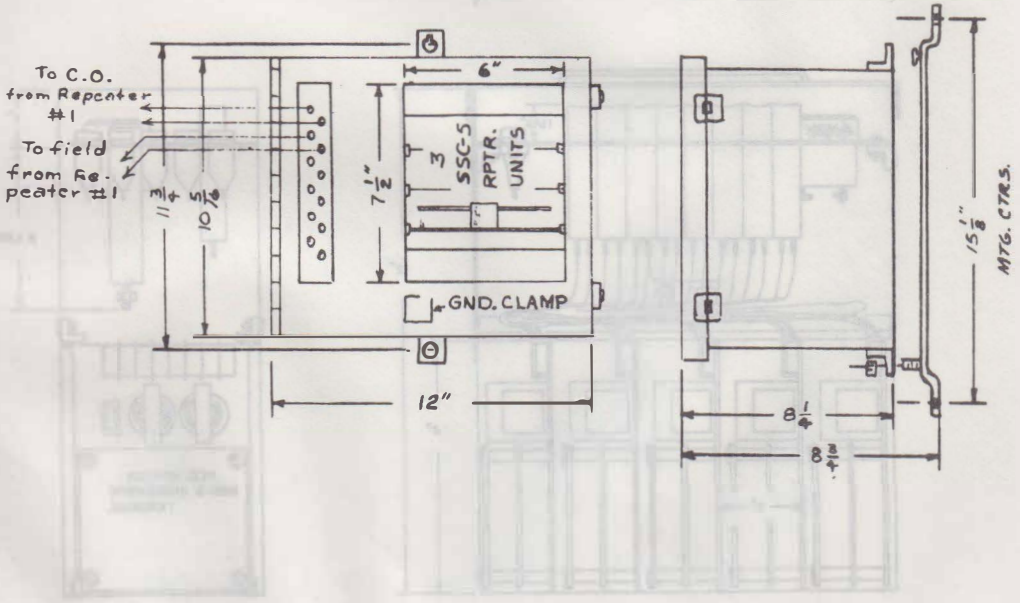
NOTE: MULTIPLE WIRING ON PUNCHINGS H,J,K&L TO BE RUN BY INSTALLER.

FIGURE 1



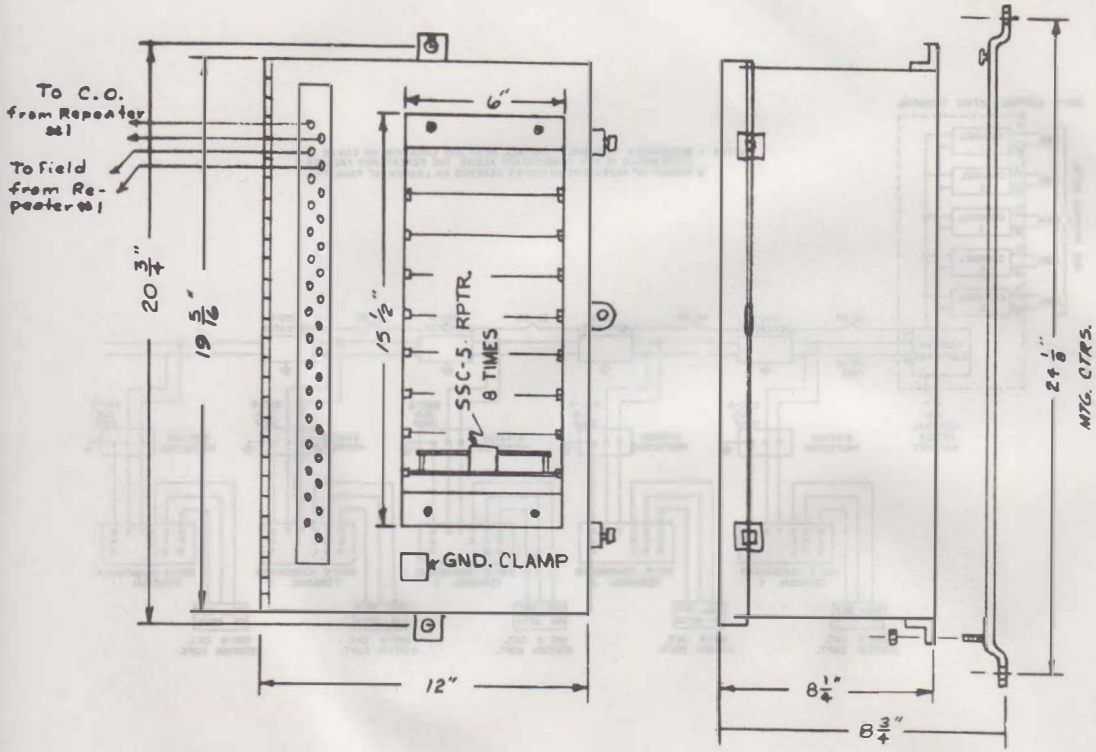
SSC-5 TALKING TEST SET
(9960-4405)

FIGURE 2



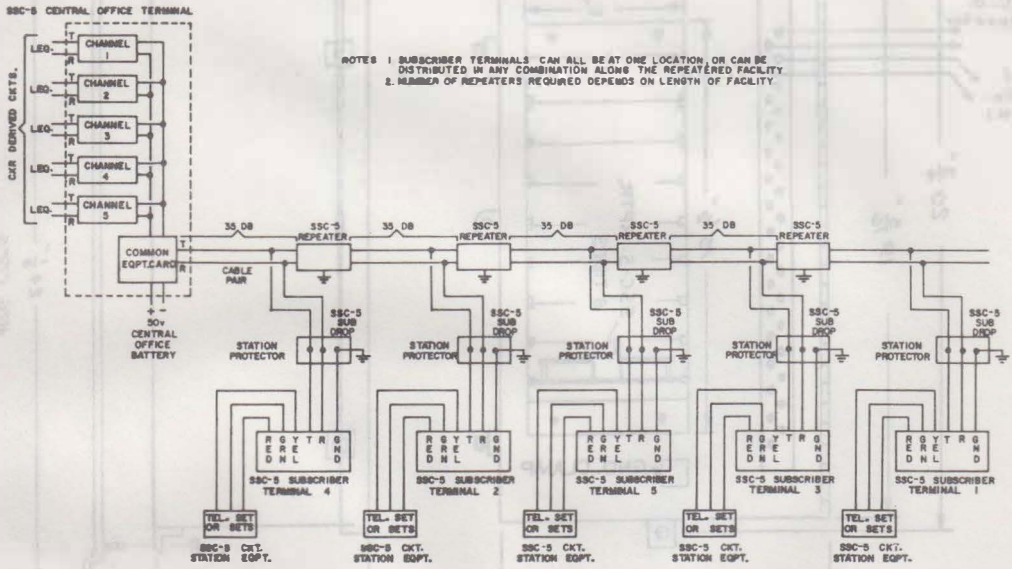
SSC-5 3 UNIT, REPEATER HOUSING
(9960-3953)

FIGURE 3



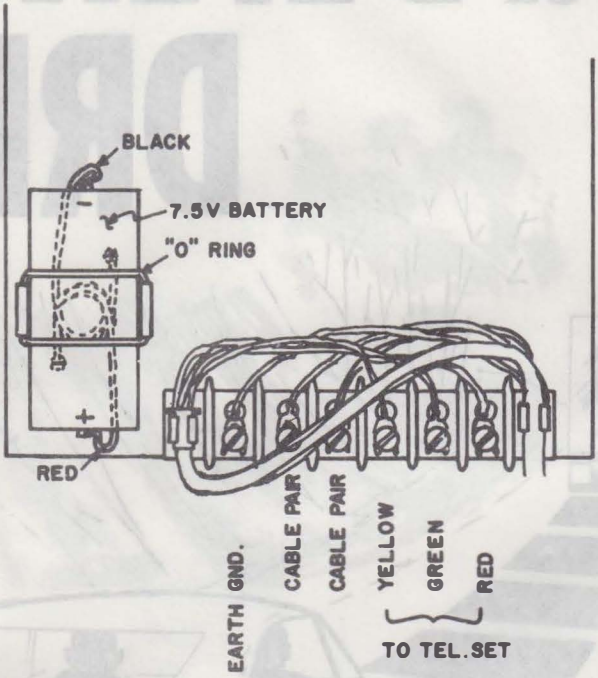
SSC-5 8 UNIT, REPEATER HOUSING
(9960-4680)

FIGURE 3A



SSC-5 SYSTEM

FIGURE 4



NOTE, BATTERY MUST BE DISCONNECTED OR REMOVED WHEN UNIT IS REMOVED FROM SERVICE. UNIT IS "ON" AS LONG AS BATTERY IS CONNECTED.

CONNECTIONS TO SSC-5
SUBSCRIBER TERMINAL

FIGURE 4

be a DEFENSIVE DRIVER

Keep your DISTANCE