

INTERCOMMUNICATING SYSTEMS
WEBSTER ELECTRIC TELETALK
1200 SERIES (LOW-LEVEL)
INSTALLATION

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1. GENERAL

1.01 This section covers the installation of the low-level intercommunicating system equipment known as Teletalk which is manufactured by the Webster Electric Company.

1.02 This equipment shall not be interconnected with the regular exchange telephone service.

1.03 The 1200 series master stations and 700 series master stations can be used interchangeably in high-level systems only.

1.04 A commercial power service outlet is required for each master station and each zero-level remote speaker station connected to a system. Arrangements for the extension of electric service wires to

outlets near these stations shall be made when the preliminary survey to determine the locations of the stations is made. Power outlets are not required at high-level speaker stations. All work in connection with the installation of electric service outlets shall be provided for by the customer in accordance with the Electric Code and any applicable rules and regulations.

2. SUPPLIES

2.01 Webster Teletalk equipment which will be required for the various low-level intercommunicating systems is listed in the description section of this practice (C70.911.00) and will not be listed here.

2.02 Items which are needed for general station work, such as wire, cable, tape, fasteners, etc., are not included but are covered in the C23 Series of Bell System Practices.

3. LOCATING AND MOUNTING

3.01 The following should be considered when locating the various Teletalk equipment:

- (a) The location specified on the service order.
- (b) The customer's desires and wishes.
- (c) The general information contained in the C38 Series of Bell System Practices for locating telephone sets.
- (d) The surrounding noise conditions.

3.02 In general master stations or speaker stations should be located as far from noise sources as feasible. This is done because noise sources near any station interfere with intelligibility at the other end due to the two-way communication. When installing

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Teletalk equipment for the use of personnel who are regularly situated near a noise source, a compromise location may have to be chosen, or a handset may have to be installed. For intelligible communication the signal should over-ride ambient (surrounding) noise by several db.

3.03 Acoustical measurements on the output of the three most commonly used speaker stations are shown in Table A. In each case an individual spoke into a master station in a normal tone of voice at a distance of two feet with the volume control on maximum. These figures are only comparative for estimating the area which a given speaker will cover satisfactorily.

TABLE A

Horizontal Angle From Normal Frontal Beam	Sound Level at 5 Feet (70 db Weighting)		
	5G45	8C45	MIL45
0°	70	72	76
45°	68	69	73
90°	65	66	68
135°	64	64	67
180°	67	68	65

3.04 Master stations and remote speaker stations are generally placed on horizontal surfaces, such as desks, tables, stands, etc., and are usually not attached to them.

3.05 Speaker stations are generally mounted on wall surfaces. Locations near aisles or passageways where the speaker projecting from the wall would present a possible accident hazard shall be avoided. If the speaker stations are in corridors or similar locations, they should be located at least eight feet above the floor wherever possible. Use B-10 mounting brackets to make attachment to wall or ceiling. The brackets permit attaching the speaker at any desired angle. (5G45 Series)

3.06 Attach master station junction boxes to wall or desk surfaces with fasteners used for attaching subscriber sets. On rough masonry, or other uneven wall surfaces, use a 3/4-inch backboard approximately the size of the terminal box (see the C23 Series of Bell System Practices).

3.07 One applique unit is required for each low-level termination on the master station. A convenient formula for determining the number of APB's and channels needed where all master stations talk to each other is as follows:

$$(N-1) \times N = \text{Number APB's}$$

Example: Ten master stations all talk to each other low-level.

$$(10-1) \text{ equals } 9 \times 10 = 90 \text{ APB's}$$

The number of channels required are just half the number of applique units.

3.08 Applique units are designed to be mounted in 105-B apparatus boxes (4 per box).

4. WIRING

4.01 Wiring and cabling for high-level Teletalk intercommunicating circuits must be separated from telephone cables and facilities because of crosstalk hazards. In addition, Teletalk circuits should not be installed near high-voltage circuits of commercial power services where hum and noise may be induced in the intercommunicating circuits.

4.02 Regular station wire and inside wiring cable should be used where a minimum separation of one foot or more can be obtained between the Teletalk interstation wiring and telephone wiring and facilities. (Direct crossings of wiring are permissible.) Use shielded wire, lead-covered cable or zero-level circuits in house cable where this separation cannot be obtained or where conditions are such that precautionary measures will not prevent the addition of telephone facilities along side of the Teletalk wiring in the future.

4.03 Zero-level circuits must be used when stations are to be connected by telephone cable.

4.04 The length of cable or wire run between stations in a high-level system is based on an allowable 6 db line loss for voice circuits (Table B), and a dc loop resistance of 35 ohms for annunciator or buzzer circuits (Table C). These tables are based on the maximum length using pure copper.

CAUTION: HIGH LEVEL SHALL NEVER BE RUN IN THE SAME CABLE WITH TELEPHONE SERVICE.

TABLE B (6 db Line Loss)

<u>Wire or Cable</u>	<u>Length (Pair of Wires)</u>
18 Gauge	5,000 Feet
19 Gauge	4,000 Feet
20 Gauge	3,250 Feet
22 Gauge	2,000 Feet
24 Gauge	1,250 Feet
26 Gauge	750 Feet

(Consider using low-level system when these maximums are approached)

TABLE C (35-Ohm dc Resistance)

<u>Wire or Cable</u>	<u>Length (Pair of Wires)</u>
18 Gauge	2,725 Feet
19 Gauge	2,175 Feet
20 Gauge	1,750 Feet
22 Gauge	1,075 Feet
24 Gauge	675 Feet
26 Gauge	425 Feet

(Consider using low-level system when these maximums are approached)

4.05 The allowable length of cable or wire run between stations in a low-level system is based on the dc resistance, which must be less than 3000 ohms, and the need for adequate transmission. These limitations will not be exceeded if the length of the circuit (loop) does not exceed that specified in Table D.

TABLE D

<u>Wire or Cable</u>	<u>Loaded</u>	<u>Nonloaded</u>
19 Gauge	186,000 Feet	84,000 Feet
22 Gauge	93,000 Feet	59,000 Feet
24 Gauge	57,000 Feet	45,000 Feet
26 Gauge	36,000 Feet	36,000 Feet

4.06 Cables or wires to several master stations and associated speaker stations may be terminated on 30-type, or equivalent, connecting blocks located at a central crossconnecting terminal. This is generally not practical where only one or two master stations are installed as the cables or wires between the master stations and speaker stations may be terminated in the junction boxes of the master stations.

4.07 The cord connecting the junction box to the Teletalk master station consists of plastic insulated 26-gauge wire. Each pair of wires is color-coded and twisted. Over all the wires is a brown cotton braided covering. The cord is coded as follows:

<u>Pair No.</u>	<u>Conductor</u>	<u>Mate</u>
1	Light Blue	White
2	Dark Blue	White
3	Orange	White
4	Light Green	White
5	Dark Green	White
6	Light Brown	White
7	Dark Brown	White
8	Light Slate	White
9	Dark Slate	White
10	Pink	White
11	Yellow	White
12	Purple	White
Home Line	Dark Green	Light Green
Ground	Black	-
"A" Relay Supply	Red	-
Spare	Dark Brown	Light Brown
13-24	Same as first 12 conductors	All Red

4.08 The appropriate cord color code for various master stations is shown in Table E. The home line, ground, "A" relay supply, and spare are in addition to those shown in Table E.

TABLE E

<u>Type of Master Stations</u>	<u>Voice Circuits</u>	<u>"B" or (-3) Circuit</u>	<u>Annunciator</u>
1206 (Fig. 1)	1-6	7-12 (color)	
1206A-3 (Fig. 1)	1-6	7-12 (mates)	7-12 (color)
1212 (Fig. 2)	1-12	13-24 (color)	
1212A-3 (Fig. 3)	1-12	13-24 (mates)	13-24 (color)
1218	1-12(L) 1-6(R)	13-24 (color)(L) 7-12 (color)(R)	
1218A-3	1-12(L) 1-6(R)	13-24 (mates)(L) 7-12 (mates)(R)	13-24 (color) 7-12 (color)
1224	1-12(L) 1-12(R)	13-24 (color)(L) 13-24 (color)(R)	
1224A-3	1-12(L) 1-12(R)	13-24 (mates)(L) 13-24 (mates)(R)	13-24 (color) 13-24 (color)

Note: (L) is the left junction box.
(R) is the right junction box.

NOTES

1. When equipped with annunciators only, the colored wires are used. The white mates are spare.
2. When equipped with 3-position keys only, the colored wires are used for the "B" switching leads. The white mates are spare.
3. When equipped with both annunciators and 3-position keys, the colored wires are used for the annunciators. The white mates are the "B" switching leads.

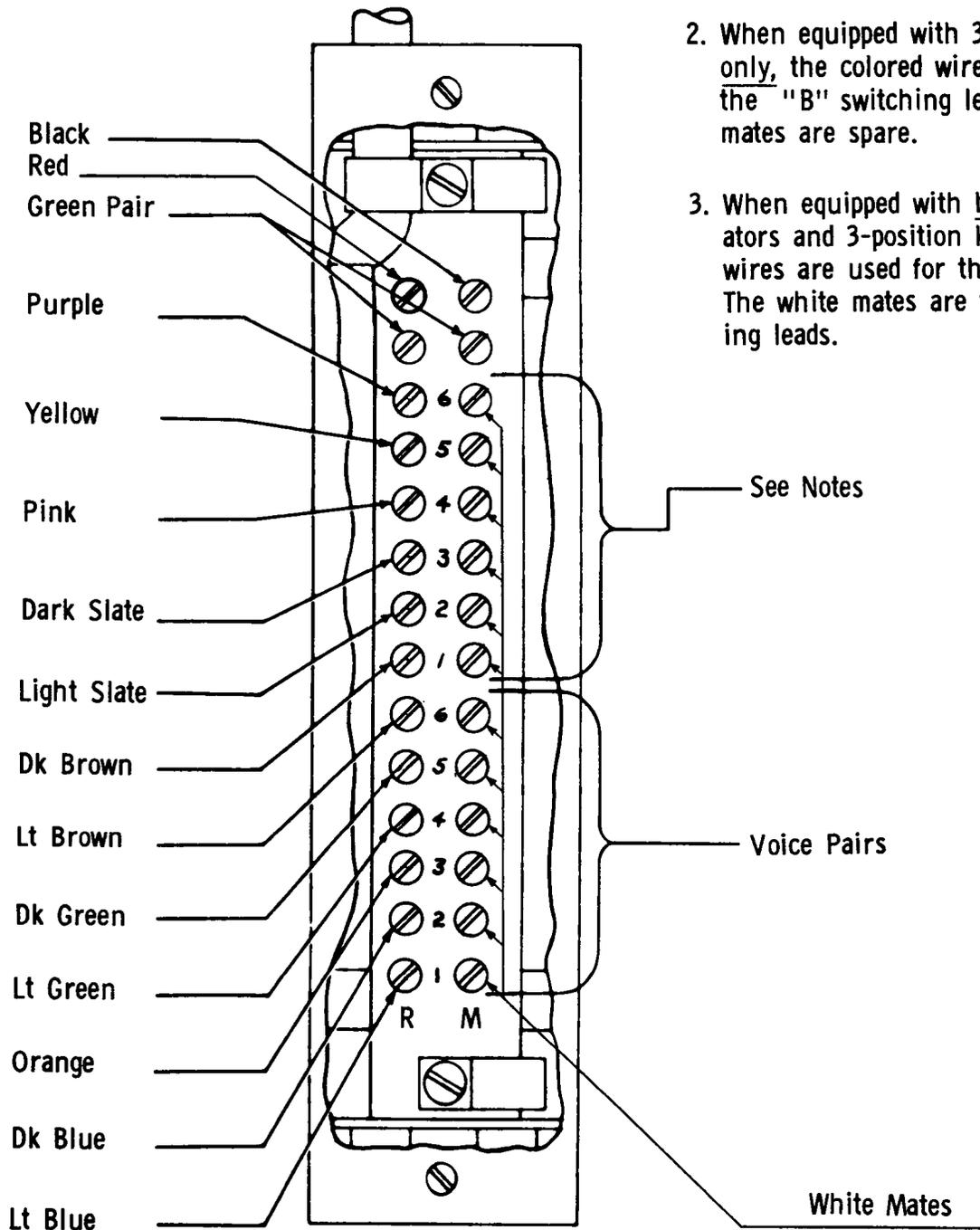


FIG. 1

1206 Terminal Box

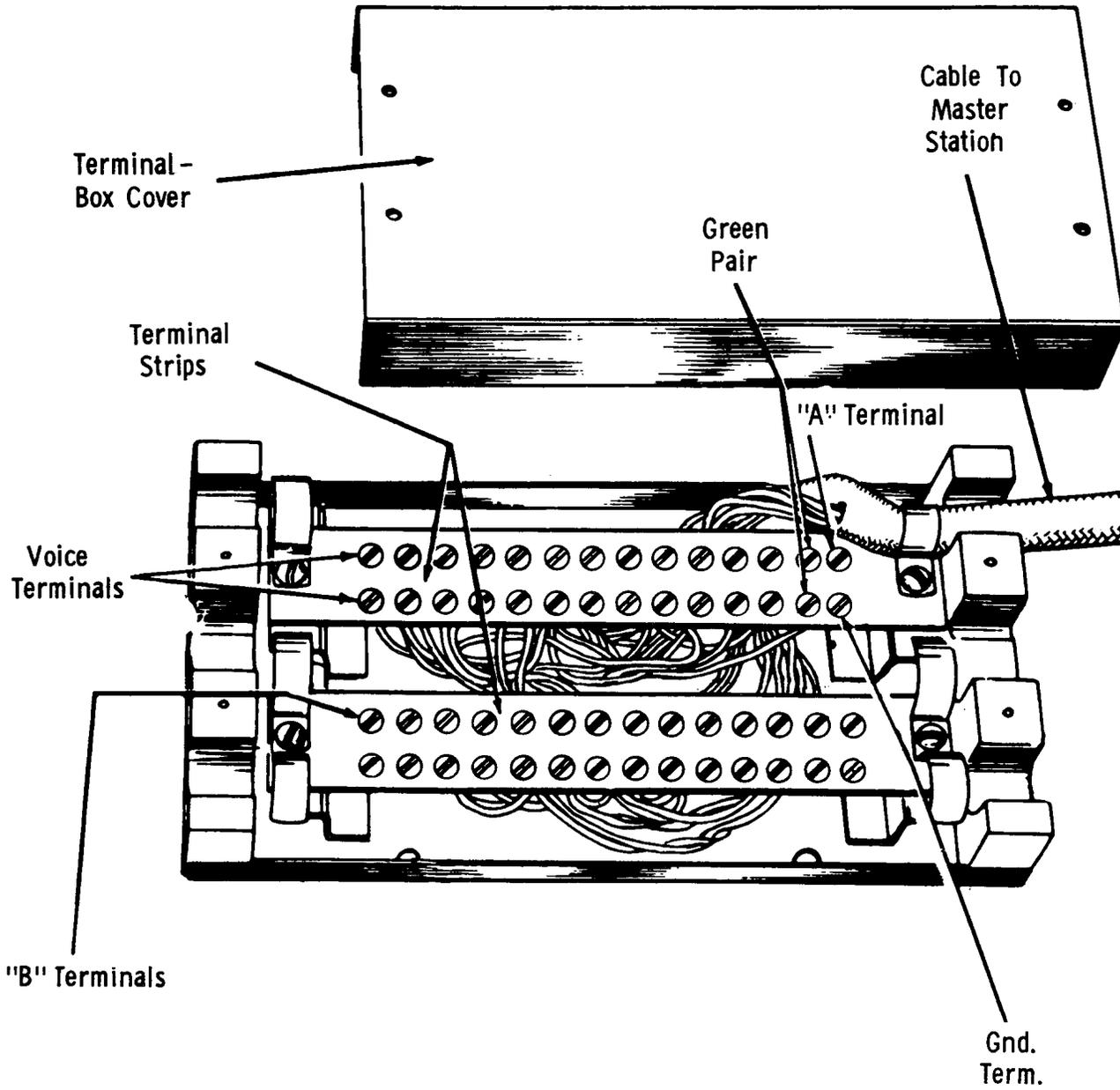


FIG. 2
1212 Terminal Box

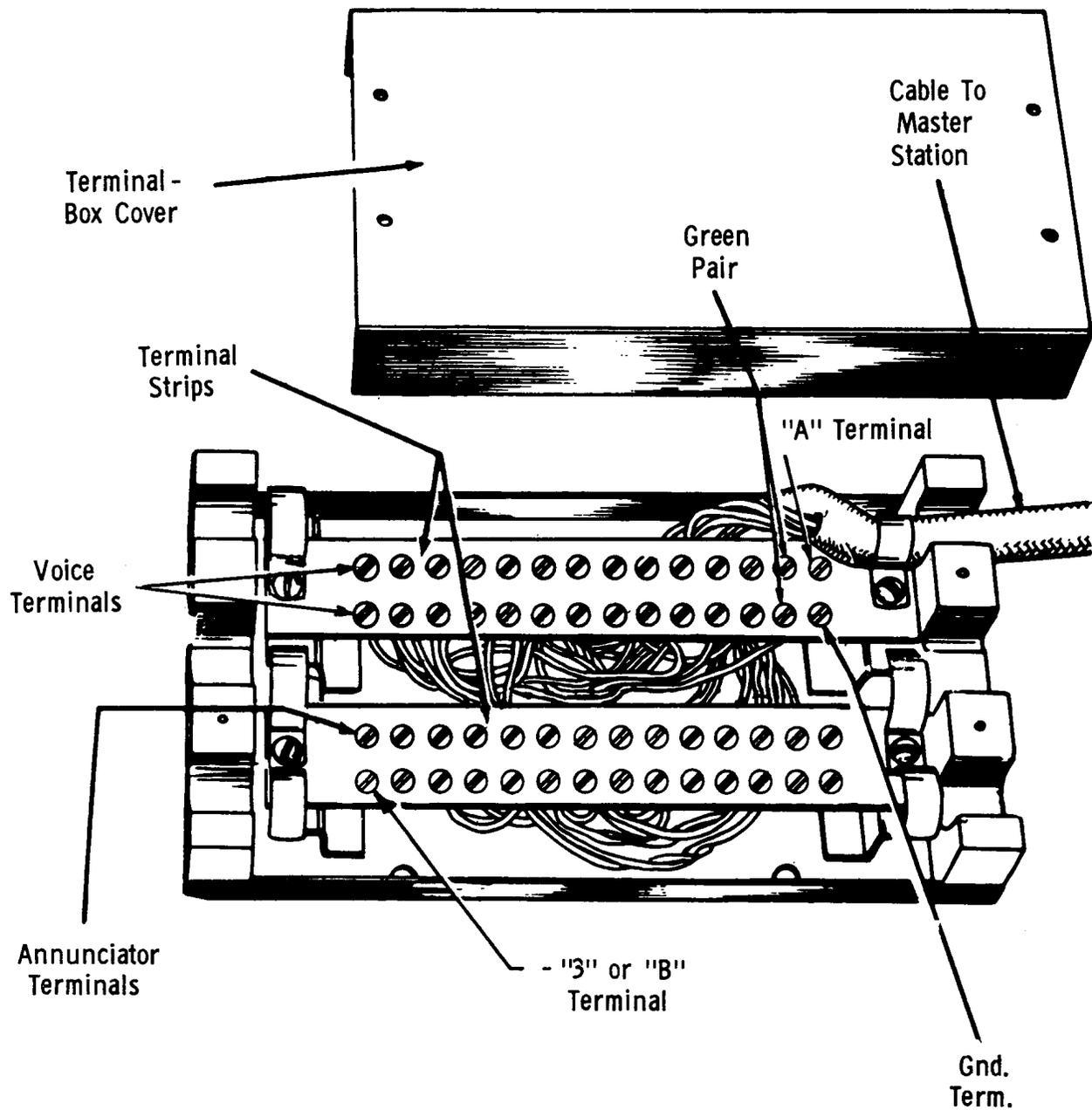


FIG. 3

1212A-3 Terminal Box

5. CONNECTIONS - MODELS WITHOUT ANNUNCIATORS - COMBINATION "M" AND "S" CIRCUITS WITH CALL-IN FEATURE

High-Level Connections

5.01 Arrange to connect "S" circuit master stations to the first selector keys, starting with No. 1 and up consecutively. Then follow the "S" circuit master stations with any "M" circuit master stations. The number of selector keys to be assigned to all these master stations will be one less than the total number. Call one a "floater" and assign a number to the others.

5.02 Connect voice lines from the "floater" station to other master stations at terminals No. 1 at station No. 1, terminals No. 2 at station No. 2, and in this same manner to the other stations. (See Fig. 1 in Section C70.154).

5.03 At station No. 1 connect its green home pair terminals to the No. 1 terminals at all the other master stations. Connect the green home pair terminals of station No. 2 to the No. 2 terminals at all other master stations. Connect the remaining master stations in the same manner (see Fig. 1 in Section C70.154).

5.04 Connect speaker station voice lines in parallel to consecutive terminals, starting next to the call-in terminals, which are the last numbered ones on the strip, thus assigning speakers to the highest numbered selector keys. Connect the call-in switch of the speaker stations to the last numbered terminals in the junction box (call-in terminals).

5.05 To prevent the possibility of cross-talk, keep the master station cables separated from speaker station voice and call-in lines.

Low-Level Connections

5.06 Where high-level master stations are used, assign the next numbered selector keys following them to any master station that will be communicated with over low-level telephone lines. Where high-level master stations are not used connect the low-level master stations to the low numbered selector keys. The assigned terminals in the junction box of each master station are connected to the "V" terminals of an applique unit, one applique unit being needed for each low-level line to a master station.

5.07 Following the master stations assign the next highest numbered selector keys to the RMB remote speaker stations. The assigned terminals are connected to the "V" terminals of an applique unit, one applique unit being needed for each line to a low-level remote speaker station. Connect the "C" terminals of each applique unit to the last numbered terminals in the junction box. These terminals are connected to the call-in key of the master station. See part 7 for further connections.

5.08 Ground each master station from the ground terminal in the junction box to a water pipe or other suitable ground. This ground connection should be as close to the junction box as possible.

Preparation of Switch Panel

5.09 When all connections have been made, remove the selector key panel from the front of the unit. Cut the looped common white jumper wires connecting the selector keys between the last "S" circuit master station and the first "M" circuit master station. Insulate and bend these wires to one side (see Figure 4). It should be remembered that all selector keys assigned to zero-level master stations are "M" circuit. The cutting of the jumpers is necessary in order that "S" circuit operation between master stations can be obtained if desired.

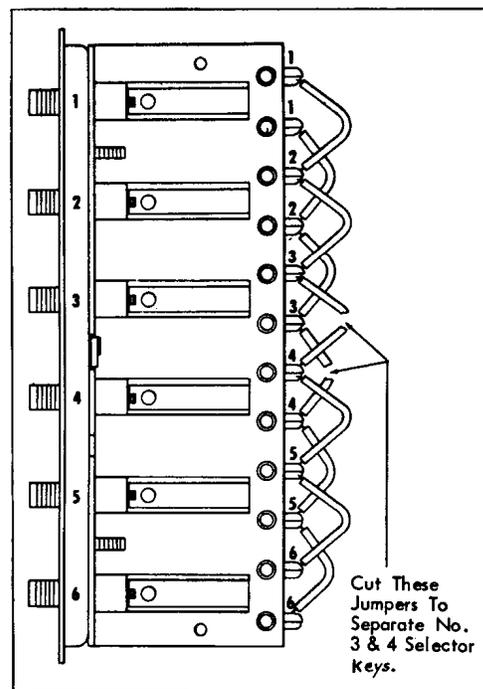


Figure 4 - Top View of Key Panel Showing Looped Jumper Wires

5.10 The panel is removed by turning a latch, located at the top of the panel, with a screw driver. After the latch disengages the cabinet front, tilt the switch panel away using the bottom of the cabinet opening as a hinge (see Figure 5).

5.11 If at a later date, the number of "M" and "S" circuit stations is changed, connect the cut common white

wires back to the proper key terminals and again cut the common white wires between the last "S" circuit master station and first "M" circuit station. Remember that "S" circuit master stations are always assigned to the low numbered selector keys and the "M" circuit stations are always assigned the high numbered keys.

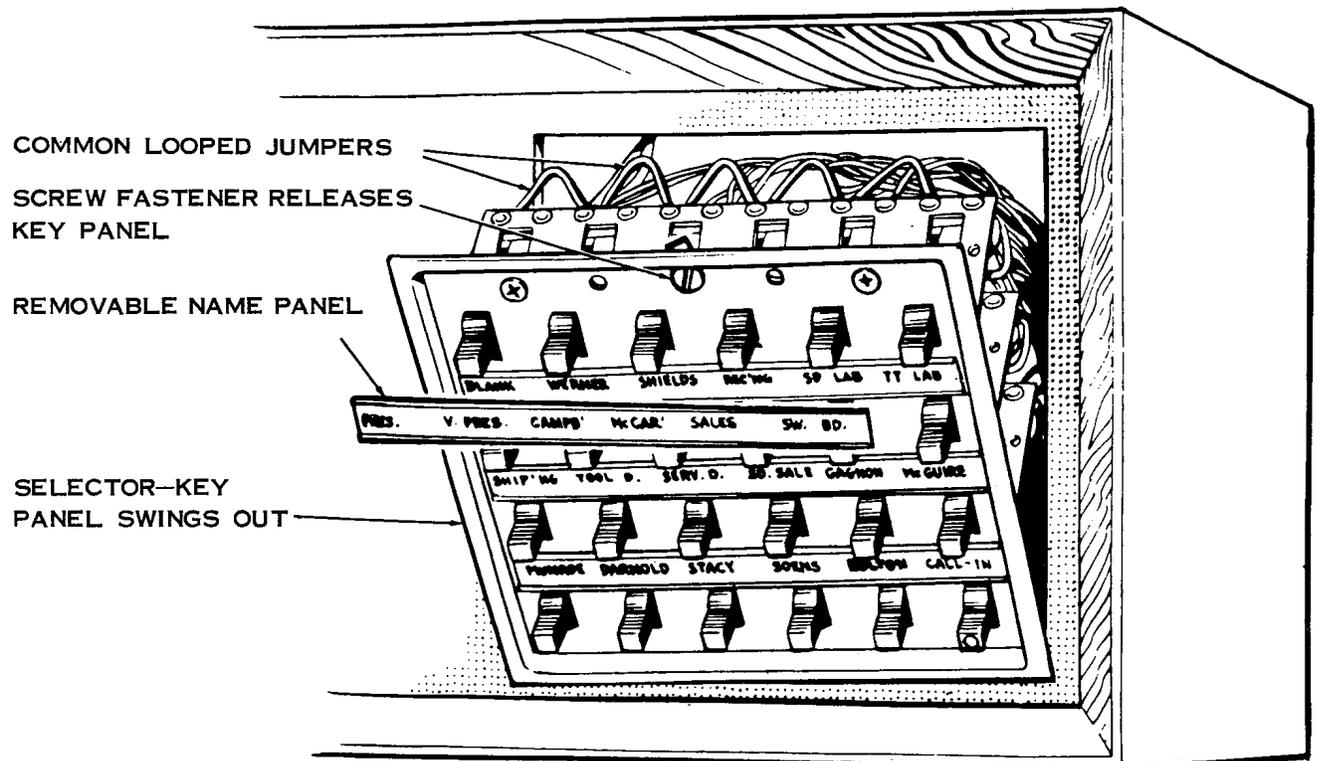


Figure 5 - Removal of Key Panel

5.12 If the master station has two front panels and the common white wires to be cut are on the left front panel, also cut the yellow, yellow-black pair of wires connecting the right front panel to the plug. If the common white wires to be cut are on the right front panel, cut the blue, blue-black pair of wires connecting the left front panel to the plug (see Figure 6).

5.13 If the left front panel is for "S" circuit master stations only and the right front panel is for "M" circuit master stations only, cut the yellow, yellow-black pair from the plug to right front panel and the blue, blue-black pair from the plug to the left front panel. Cut at the keys and tape (see Figure 6).

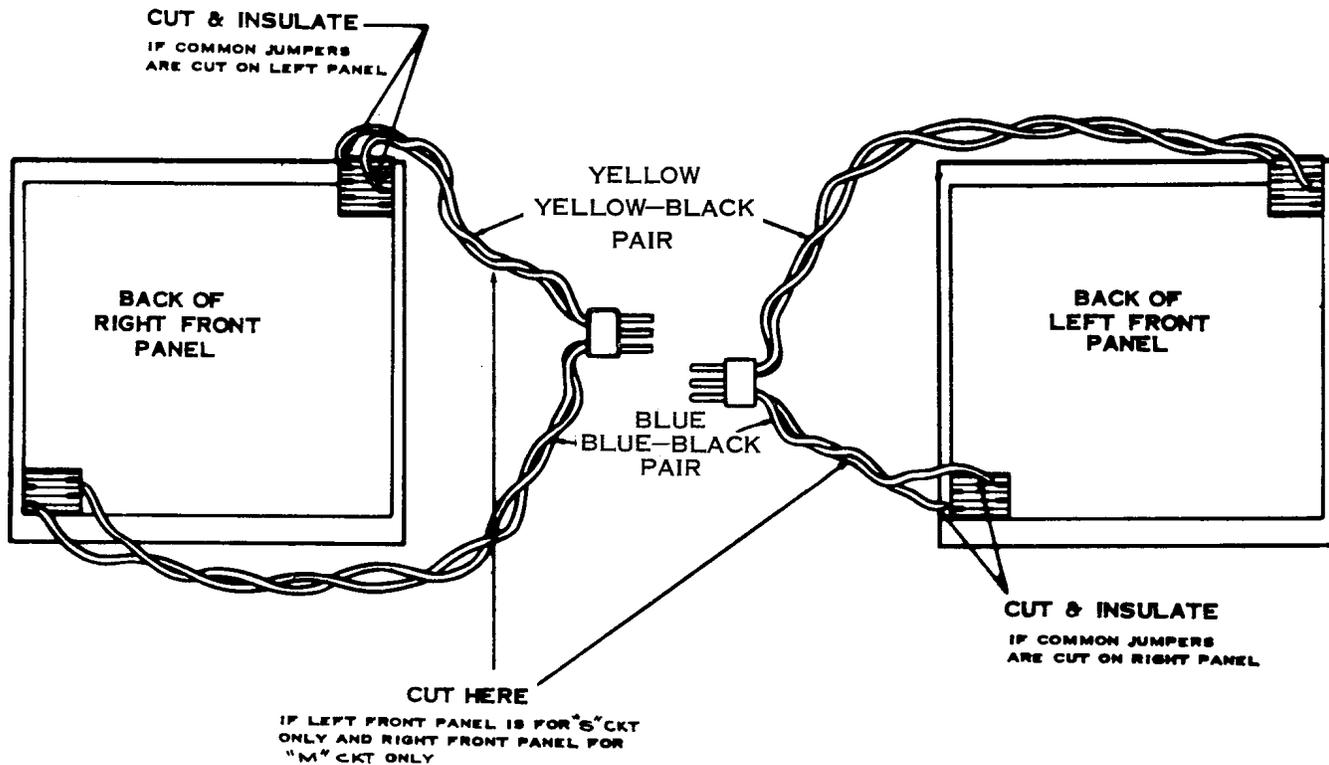


Figure 6 - Connections to be Cut on a Two-Panel Teletalk Without Annunciators

Combination "M" and "S" Circuits Without Call-In Feature

5.14 The connections for a combination "M" and "S" circuit installation, which does not have connections to zero-level telephone lines and only uses master stations and speaker stations without the call-in feature, are the same as the connections for a system using call-in. One exception is that the call-in lines are deleted. If desired, the call-in selector key can be used for an "M" circuit station. If the call-in selector key is not used for an extra "M" circuit station, no connection should be made to the call-in terminals in the junction box; or the call-in circuit should be isolated by removing the buzzer circuit leads (blue and black wires) from the call-in selector key.

Preparation of Switch Panel

5.15 The preparation of the master station switch panel is the same as for a master station in a system using call-in except that the call-in selector key must be prepared if it is to be used for an extra "M" circuit station. To do this, cut and tape

the buzzer circuit leads (blue and black wires) from the call-in selector key (see Figure 7).

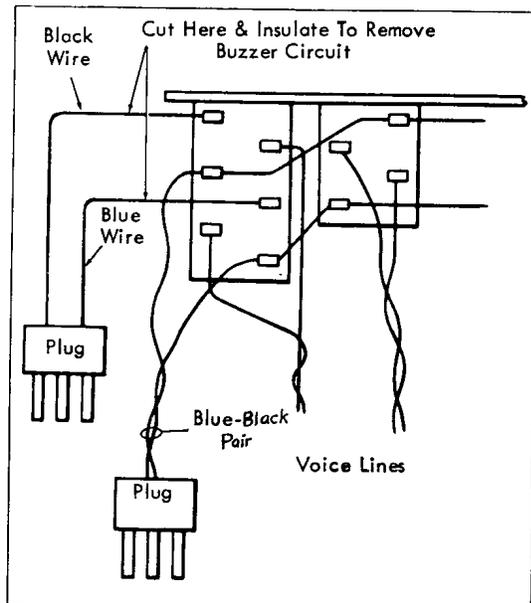


Figure 7 - Connections To Be Cut For Using Call-In Key For "M" Circuit

All "M" Circuit Systems - Connections

5.16 Connections are the same as those given under the sections on combination "M" and "S" circuits with call-in feature and combination "M" and "S" circuits without call-in.

5.17 Preparation of Switch Panel - For an all "M" circuit system, the looped common white jumper wires between selector keys should not be cut. The twisted yellow, yellow-black pair of wires should be cut and insulated from the No. 1 selector key. This will prevent double amplification at a master station listening to a speaker station when another master station calls the speaker station. The call-in circuit can be removed if desired, and the call-in key be used for an additional "M" circuit station by cutting and taping the buzzer leads (blue and black wires) from the call-in selector key (see Figure 7). This cannot be done if the master station is to converse with any master station or remote speaker station over zero-level telephone lines.

All "S" Circuit Systems - High-Level Connections

5.18 In all "S" circuit systems, master stations are connected in the same manner regardless of the number of stations used. Arrange to connect all master stations to the first selector keys starting with No. 1. The number of selector keys to be assigned to the master stations will be one less than the total number of master stations in the system.

5.19 Connect the voice lines from the "floater" station to other master stations at terminals No. 1 at station No. 1, terminals No. 2 at station No. 2 and in this same manner to the other master stations.

5.20 At station No. 1 connect the green home pair terminals to the No. 1 terminals of all the other master stations. Connect station No. 2 green home pair terminals to the No. 2 terminals of all the other master stations. Connect the remaining master stations in the same manner.

5.21 Preparation of the Switch Panel, High-Level - For an all "S" circuit system the common white jumpers between selector keys should not be cut. The last

selector key must be prepared by cutting and insulating the twisted blue, blue-black pair of wires, and the buzzer circuit (blue and black wires, see Figure 8).

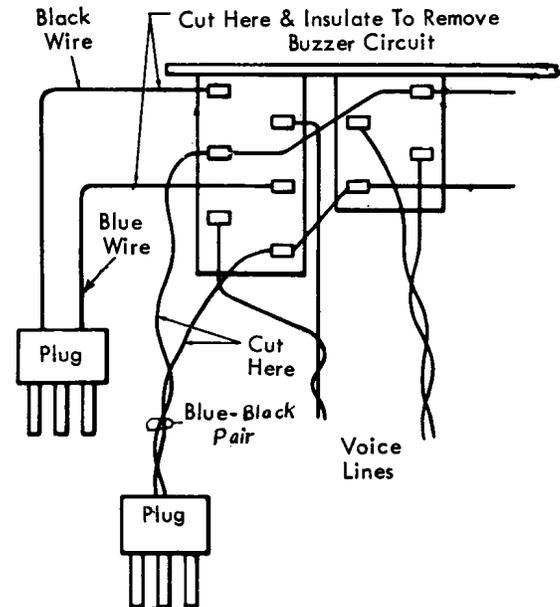


Figure 8 - Connections to Be Cut For An All "S" Circuit System

6. CONNECTIONS - ANNUNCIATOR AND SWITCHING CIRCUIT (-3) MODELS

6.01 Annunciator model master stations are installed in the same manner as standard master stations as far as voice lines are concerned, except that they are not equipped with the call-in key and circuit (see part 5).

Preparation of Switch Panel

6.02 When preparing the switch panel for the various systems:

- (a) Do not cut the buzzer circuit (blue and black wires) from the last numbered selector key (see Figure 9).
- (b) Cut the looped white jumper wires (voice commons) connecting the selector keys between the last "S" and the first "M" circuit master station where combined. If all master stations are "S" circuit, cut the twisted blue, blue-black pair of wires from the last selector key (see Figure 9).

(c) If the master station is connected to both RMB remote speaker stations and any type master stations, cut the red jumper wire between the selector key assigned to the last master station and the first RMB remote speaker station. This jumper will not necessarily be cut between the same two selector keys that the white voice jumpers are cut.

(d) If there are connections to other master stations but none to RMB remote speaker stations, the gray wire between the amplifier plug and the last selector key should be cut and insulated. If there is more than one switch panel, the gray wire should also be cut on all the other panels.

(e) If the master station has two panels and the red jumper to be cut is on the right front panel, the gray wire between the last selector key of the left front panel and the amplifier plug should be cut and insulated (see Figure 10).

(f) The gray wire or red jumper wire need not be cut on master stations connected to RMB remote speaker stations or speaker stations only.

Installations

6.03 In each junction box a terminal strip will be found for connecting annunciator circuits. Limitations of these circuits are covered in paragraphs 4.04 and 4.05.

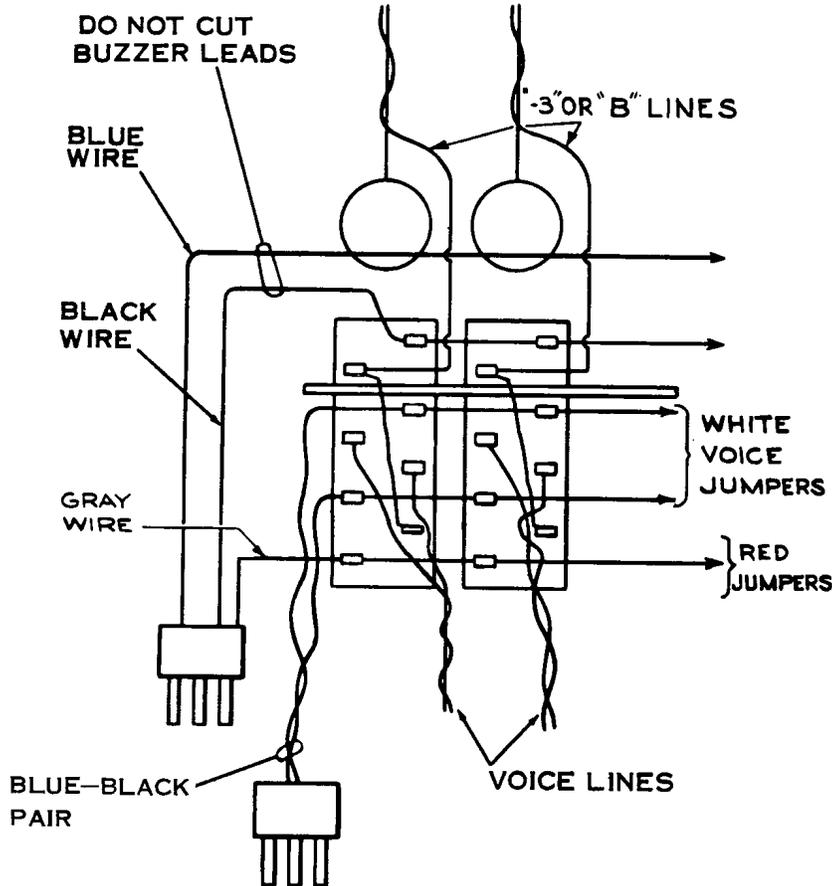


Figure 9 - Last Selector Switch of Annunciator Model

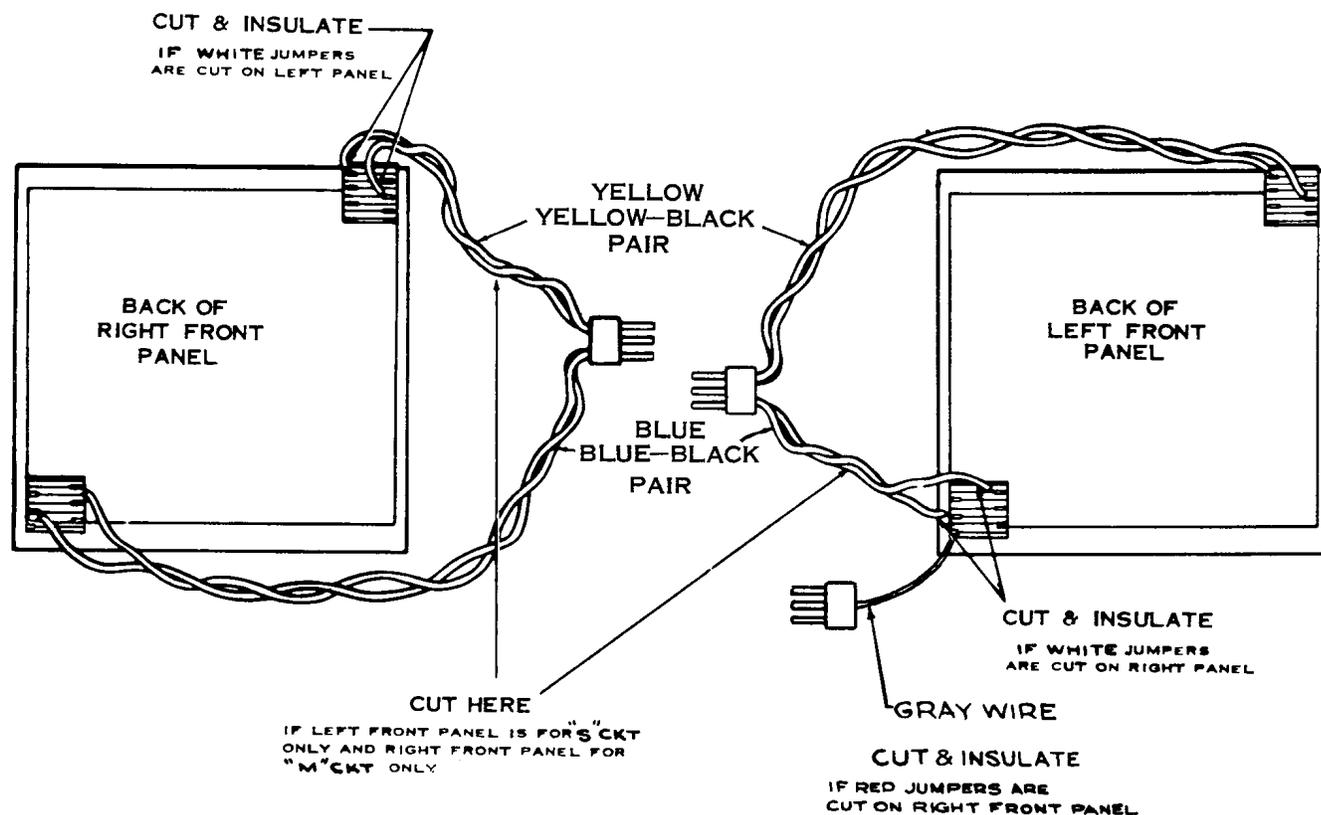


Figure 10 - Connections To Be Cut On A Two Panel Annunciator Teletalk

6.04 If there are more than two or three annunciator models in the system, it may be desirable to run the annunciator and voice lines from each unit to a centrally located terminal box for the interconnection of all units (see paragraph 4.06). The wiring problem may be greatly simplified by this method. If an installation is divided into groups of units separated by an appreciable distance, it may be advisable to connect each group separately, each group having its own central terminal box with each central terminal box connected by a suitable cable.

6.05 All annunciator model master stations which must call each other should have three-position selector keys (-3). The third position (down) of the selector key is used as a push button to operate the annunciator assigned to that station number on the switch panel of the other annunciator model master stations in the system.

6.06 If an annunciator-type master station is to communicate with another master station over zero-level line, both units must be annunciator models and both must have three-position selector keys. It is not possible to interchange the annunciator-type master station with the regular call-in-type master station in a zero-level system. They can be interchanged on high-level operation only.

High-Level Connections

6.07 Arrange to connect "S" circuit master stations to the first selector keys, starting with No. 1 and up consecutively. Then follow the "S" circuit master stations with any "M" circuit master stations. The number of selector keys to be assigned to all these master stations will be one less than the total number. Call one a "floaters" and assign a number to the others.

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6.08 Connect voice lines from the "floater" station to other master stations at terminals No. 1 at station No. 1, terminals No. 2 at station No. 2, and in this same manner to the other stations. (See Figure 2 in Section C70.911.03).

6.09 At station No. 1 connect its green home pair terminals to the No. 1 terminals at all the other master stations. Connect the green home pair terminals of station No. 2 to the No. 2 terminals at all other master stations. Connect the remaining master stations in the same manner. (See Figure 2 in Section C70.911.03).

6.10 Connect the annunciators for the master stations communicating over high-level lines by making the connections first for one station, then for another, and so on, until the annunciator system is completed. The annunciator keys at each master station are connected as follows.

Master Station No. 1 (assigned line No. 1)

- Key No. 1 - connect to annunciator No. 1 of floater station.
- Key No. 2 - connect to annunciator No. 1 of station No. 2.
- Key No. 3 - connect to annunciator No. 1 of station No. 3.

(Continue as above until all connections are made to keys of station No. 1).

Master Station No. 2 (assigned line No. 2)

- Key No. 1 - connect to annunciator No. 2 of station No. 1.
- Key No. 2 - connect to annunciator No. 2 of floater station.
- Key No. 3 - connect to annunciator No. 2 of station No. 3.

(Continue as above until all connections are made to keys of station No. 2).

Floater Station

- Key No. 1 - connect to annunciator No. 1 of station No. 1.
- Key No. 2 - connect to annunciator No. 2 of station No. 2.
- Key No. 3 - connect to annunciator No. 3 of station No. 3.

(Continue as above until all connections are made to keys of "floater" station)
See Figure 2 in Section C70.911.03.

6.11 Connect speaker station voice lines in parallel to consecutive terminals, starting with the last numbered one on the strip, thus assigning speakers to the highest numbered selector keys. Connect the annunciator button (B) to the annunciator terminals of the master station to be annunciated. (See Figure 2 in Section C70.911.03).

6.12 It is absolutely necessary that a common or ground connection for the annunciator and keys be made by a wire connecting to the ground in the junction boxes.

Low-Level Connections

6.13 Where high-level master stations are used, assign the next numbered selector keys following them to any master station that will be communicated with over low-level telephone lines. Where high-level master stations are not used, connect the low-level master stations to the low numbered selector keys. The assigned terminals in the junction box of each master station are connected to the "V" terminals of an applique unit, one applique unit being needed for each low-level line to a master station (see part 7).

6.14 Following the master stations, assign the next highest numbered selector keys to the RMB remote speaker stations. The assigned terminals are connected to the "V" terminals of an applique unit, one applique unit being needed for each line to a low-level remote speaker station. One "C" terminal of the applique unit is connected to the assigned annunciator terminal in the junction box and the other "C" terminal is connected to the "G" (ground) terminal of the applique unit. Connections to the applique are the same whether communication is desired to a master station or remote speaker station (see part 7).

6.15 The common wire of the annunciator (also common wire of keys of the three-position selector keys) may be No. 26 to No. 14 gauge wire in the interstation cable. Always check the resistance of annunciator lines when making the installation. If the resistance exceeds 35 ohms, the annunciator may not operate properly and correction should be made at the time of installation. (See paragraph 4.04, Table C and paragraph 4.05, Table D.)

7. APPLIQUE UNIT CONNECTIONS, LOW-LEVEL (APB)

7.01 Applique unit connections are made to screw terminals located on the top of the unit. When connecting to a nonannunciator-type master station, seven wires are necessary between the applique unit and the master station junction box. They are as follows:

APB Terminal Strip	Nonannunciator Master Station Junction Box
V	Voice Terminal (assigned selector key)
V	Voice Terminal (assigned selector key)
C	Call-In Terminal (last numbered terminal)
C	Call-In Terminal (last numbered terminal)
B	"B" Terminal (assigned selector key)
A	"A" Terminal (relay power supply)
G	Ground (GND) Terminal

(See Figure 1 in Section C70.911.03)

7.02 When connecting to an annunciator-type master station, six wires are necessary between the applique unit and the master junction box. They are as follows:

APB Terminal Strip	Annunciator Master Station Junction Box
V	Voice Terminal (assigned selector key)
V	Voice Terminal (assigned selector key)
C	Annunciator Terminal (assigned selector key)
C - Strap to G.(below)	
B	(-3) or "B" Terminal (assigned selector key)
A	"A" Terminal (relay power supply)
G - Strap to C (above)	Ground (GND) Terminal

(See Figure 2 in Section C70.911.03)

7.03 The telephone line is connected to the "X" and "Y" terminals of the applique unit. When making connections to a low-level RMB remote speaker station or to another applique unit, the "X" terminal of one unit must be connected to the "Y" terminal of the other.

7.04 Provisions are made on the applique unit terminal strip to vary the tone for the various type telephone lines. A jumper is normally connected from an unmarked terminal to a terminal marked "L". This connection is for a long and nonloaded line. This jumper can be moved from the "L" terminal to the "S" terminal for a short or loaded line. This cuts the high-frequency response. An intermediate frequency response can be obtained by removing the jumper completely.

7.05 The applique unit is designed to function properly if the dc resistance of the loop is less than 3000 ohms and there is adequate transmission. Refer to paragraph 4.05, Table D.

7.06 Each APB applique unit has an attenuator mounted in the end that is slotted for screwdriver adjustment. When the attenuator is turned to the full clockwise position (facing attenuator) it allows maximum output to the line and reception of the maximum signal from the line. In this position the output to the line is zero dbm. When a line shorter than the maximum specified above is used, the attenuator must be turned in the counterclockwise direction to prevent overloading the amplifier and distortion. To adjust the applique unit to the proper level, first converse with the other station and note the amount of distortion. Then turn the attenuator a small given amount in a counterclockwise direction, at each location simultaneously, until the speech is clear, undistorted, and at the desired volume level. When speaking into the speaker microphone of the station, do so at arms length in a normal tone of voice.

8. LOW-LEVEL REMOTE SPEAKER STATION CONNECTIONS (RMB)

8.01 Connections to the low-level remote speaker station (RMB) are made to a terminal strip at the rear of the amplifier chassis. The telephone line is connected to

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the "X" and "Y" terminals. The "X" terminal is connected to the "Y" terminal of the applique unit (or RMB) and the "Y" terminal is connected to the "X" terminal of the applique unit (or RMB).

8.02 Provisions are made on the terminal strip to vary the tone for various type telephone lines. This jumper is normally connected from an unmarked terminal to a terminal marked "L". This connection is for a long and nonloaded line. For a short or loaded line, the jumper can be moved from the "L" terminal to the "S" terminal. This cuts the high-frequency response. An intermediate frequency response can be obtained by removing the jumper completely.

8.03 Provisions are also made on the terminal strip to parallel an external speaker with the speaker microphone which is part of the remote speaker station (RMB). This is accomplished by connecting the external speaker to the No. 2 and No. 3 terminals. (Do not remove the jumper between the No. 1 and No. 2 terminals.)

8.04 If it is desired to use one or two external speakers in place of the remote speaker stations speaker microphone, connect them to the No. 2 and No. 3 terminals, and remove the jumper between the No. 1 and No. 2 terminals.

8.05 The "G" terminal is the ground terminal, and it must be grounded to a good ground such as a cold water pipe.

8.06 The remote speaker station (RMB) is designed to function properly if the dc resistance of the loop is less than 3000 ohms and there is adequate transmission. Refer to paragraph 4.05, Table D.

8.07 The attenuator located at the rear of the chassis is for adjusting the incoming and outgoing voice signal to the line. In the full clockwise position (facing attenuator), maximum input and output signal is obtained. In this position output to the line is zero dbm. When a line shorter than the maximum specified above is used, the attenuator must be turned in the counterclockwise direction to prevent overloading the amplifier and distortion. To adjust the remote speaker station (RMB) to the proper level, first converse with the other station and note the amount of distortion. Then turn the attenuator a small given amount in a counter-

clockwise direction until the speech is clear, undistorted, and at the desired volume level. The attenuator at the opposite end of the cable should be adjusted simultaneously with this one. When speaking into the speaker microphone of the station, do so at arms length in a normal tone of voice.

8.08 A simple two station low-level system can be set up by using just the remote speaker stations (RMB). Observe that the "X" terminal of one unit must be connected to the "Y" terminal of the other. (see Figure 5 in Section C70.911.03)

8.09 Although the operator of a remote speaker station (RMB) can call-in to only one master station, other master stations can call and converse with the remote speaker station (RMB). In this case, there should be no connections between the "A" or "C" terminals of the applique unit and the "A" annunciator or call-in terminals in the junction box of the other master stations. Multiple the "B" and "V" leads only.

9. HIGH-LEVEL SPEAKER STATION CONNECTIONS

5G45 Speaker Station Connections

9.01 Connections to the speaker are made at screw terminals at the bottom of the cabinet. These terminals are identified by the word "Line" (see Figure 6 in Section C70.911.03). (The 5G45 speaker is not equipped with a call-in key.)

5G45R Speaker Station Connections

9.02 This type speaker station is equipped with a call-in key which is connected to the last numbered pair of voice terminals of the master station (designated as the call-in terminals). Thus, when the call-in key at any speaker station is pressed, a buzzer is sounded at the master station (the buzzer tone will also be heard at the speaker station). The individual at the master station will answer by flipping up the call-in selector key. The conversation is carried on over the call-in line. The person at the speaker station converses while pressing the call-in key. The call-in circuit can use the same wire size as the speaker voice circuit and it can be included in the cable. The call-in key should be connected only to one master station in the system. The con-

nections to the speaker unit are made at screw terminals on the bottom of the unit. The call-in terminals are identified by the words "call-in" and the voice line terminals by the word "Line".

5G45B Speaker Station Connections

9.03 This type speaker station is equipped with a push button which is connected to the assigned annunciator terminal of the master station and to the common ground wire of the system. These wires should be connected to the screw terminals on the bottom of the speaker unit which are identified (see Figure 6 in Section C70.911.03). One push button is used to call one master station only. Two or three push buttons can be provided. On these models the annunciator circuit wires are connected to a terminal strip inside the unit.

5G45S and 5G45BS Speaker Station Connections

9.04 These speaker stations are used in silencing circuit (-14) systems. They are equipped with reply-back push buttons which must be held down while talking. When this switch is not pressed, the master station cannot hear your conversations, thus preventing eavesdropping. The voice circuit wiring is the same as for a 5G45 or 5G45B speaker station. A connection from reply-back button to a common (ground) wire of the system is necessary. It is made at a terminal identified by the letter "C" on the bottom of the unit (see Figure 6 in Section C70.911.03).

5G45RS Speaker Station Connections

9.05 This type speaker station is equipped with a reply-back button for use in (-14) systems and a call-in key. The reply-back button must be held down while talking except when calling in using the call-in key. The call-in and voice circuit wiring is the same as for a 5G45R speaker station. A connection from the reply-back button to the common (ground) wire of this system is necessary. It is made at a special terminal inside the unit.

5K45, 5K45BS, and 5K45R Speaker Station Connections

9.06 The connections used for these type stations are similar to the 5G45, 5G45BS, and 5G45R types. These units are used for flush mounting. The chassis extends 2-3/8" from the rear of the face plate and requires a hole 7" in diameter or a standard 8" x 8" x 2-1/2" wall box. (Webster 211-20978)

3D45 and 3D45-3 Speaker Station Connections

9.07 The connections used for these type stations are similar to the 5G45 type. These units are used for flush mounting. The chassis extends 1-5/8" from the rear of the face plate. A 3" wall opening is required for the speaker chassis and a 3/4" hole for the push button. These units are designed for outside use. For surface or flush mounting use Webster 211-20135 back-box.

3D45S and 3D45R Speaker Station Connections

9.08 The connections used for these type stations are similar to the 5G45S and 5G45R types. These two units do not have weatherproofed speakers and are for inside use only.

8C45-2, MIL45 and 10G45 Speaker Station Connections

9.09 The connections used for these type stations are similar to the 5G45 type. If the call-in, annunciator or silencing circuit features are desired separate keys will have to be provided and wired as illustrated in Figures 7 and 8 in Section C70.911.03.

HS45-3 Auxiliary Station Connections

9.10 This unit is used in conjunction with speaker stations where the speaker is inaccessible or where there is a high noise level. A switchhook is provided on a plate which can be mounted in any standard flush or surface mounted switch box (see Figure 9 in Section C70.911.03). Double gang switch box is required for flush mounting. Surface mounting box is furnished with unit.

5G45R-6 Speaker Station

9.11 This type speaker station is equipped with a call-in key and a six-position rotary switch which selects any one of six call-in lines to master stations. The voice lines are connected to the terminals on the bottom of the cabinet identified by the word "Line". The six call-in lines are connected to the numbered terminals inside the cabinet.

10. CONNECTIONS FOR MASTER STATION VARIATIONS

Silencing Circuit Connections (-14)

10.01 A silencing circuit can be incorporated in any 1200 series system employing (-14) master stations. This master station prevents return speech and eavesdropping unless a reply-back button on the "S" remote station is pressed. Silencing circuit master and speaker stations are installed in the same manner as the standard units as far as voice lines and annunciator circuits are concerned. The only exception is that the reply-back button of the speaker station should be connected to a common (ground) wire in the system (see Figure 6 in Section C70.911.03).

10.02 In systems employing more than one (-14) master station, all masters should be connected for "S" circuit operation. It is not recommended that more than one "M" circuit master be used in a (-14) system. If more than one master station is used, all units should be the (-14) type. It is possible to use a master station without the silencing circuit in a (-14) system only if the black jumper wire between terminal No. 34 of the talk-listen switch and the chassis ground is removed.

10.03 The busy signal feature cannot be used on master stations arranged for silencing, nor can the silencing feature or busy signal feature be used in the same system.

All-Call Connections (-1) (Maximum of 8 Speaker Stations)

10.04 The master stations are installed in a system in the same manner as standard units. On models furnished with the call-in key and circuit, the last selector

key is not connected into the all-call switching circuit. Two extra wires are provided on the all-call key for connection to the voice pair of the last selector key whenever it is connected to an additional speaker station. When making a call, lift the all-call switch clockwise and talk, using the talk-listen switch. The all-call switch should be placed in the horizontal position when a call is completed.

10.05 When master stations are used in all-call systems, their talk-listen switches must be left in "Idle" if they are to hear a call.

Handset Model Connections "T" and Busy Signal Model Connections "L"

10.06 These stations are installed in the same manner as standard models. In busy systems it is advisable to use a common ground wire throughout the system. For proper busy signal operation, the talk-listen switch must be in the "Idle" position when not conversing. If this is not done a busy signal will be given to a calling station. The "Idle" position must be used to determine if another station, either remote or master, is busy. On handset models do not lift the handset off the switchhook when determining if a station is busy; otherwise the pilot lamp will signal busy. When calling a remote or master station connected to a zero-level line it is not possible to determine if the station is busy except by monitoring the line. There is no possibility of double amplification.

All-Call Paging Connections (-18)

10.07 The voice lines and annunciator circuits are connected in the same manner as for standard models. In systems where a (-18) master station is employed for paging, a special all-call switch is used to connect the output of the Teletalk to the input of the paging amplifier and transfer the paging amplifier output to the speaker stations. Three cords and numbered terminal blocks are brought out of the master station for voice line and relay connections (see Figure 9 in Section C70.911.03).

10.08 On master stations communicating with zero-level stations, the signal level from the paging amplifier to the applique "V" terminals should not exceed 10 volts.

This can be accomplished by using the 2- or 4-ohm tap on the 85-25 paging amplifier (25 watts) or by adjusting the volume control of the power amplifier.

10.09 The wire size used for relay switching circuit connections should be such that line dc resistance between master station and the 85-25 paging amplifier is as low as possible, approximately two ohms. If 90-25 booster paging amplifiers are used in conjunction with the paging amplifier, the relay circuit line resistance between the booster and the paging amplifier should not exceed one ohm.

10.10 It is possible to connect more than one (-18) Teletalk to one paging amplifier in a system. When this is done, it is necessary that the paging amplifier output wires to the master No. 3 terminal block be polarized to prevent shorting the speaker stations if one calling station breaks in on another. Care should be taken so that one master station does not interrupt another when calling.

10.11 On models furnished with the call-in key and circuit, the last selector key is not connected into the all-call page switching circuit. Two extra wires are provided on the all-call key for connection to the voice pair of this last selector key whenever it is connected to an additional remote station. To page, lift the paging key clockwise and talk using the talk-listen switch. When finished, the paging key should be placed in the horizontal position. It is recommended that master stations in a system not be connected to the paging circuit of a (-18) master station, and wires from the all-call paging keys to selector keys assigned master stations should be cut and insulated.

10.12 "T" and "C" features can be provided on a (-18) model master station. Can be mounted externally on special order.

Paging Connections (-15)

10.13 Voice and annunciator circuits are connected in the same manner as standard units. In systems where a (-15) master station is employed for paging, the last selector key (key with green dot) connects the output of the Teletalk with the input of the paging amplifier, (Second from last key is used for call-in on (-15) models.)

The output terminals of the paging amplifier are connected to speakers which are not part of the Teletalk system. The last numbered pair of terminals of the master speaker junction box is connected to the input terminals of the paging amplifier. A special cord and terminal block is brought out of the master station for connections to the "B" supply cut off relay of the 85-25 paging amplifier. The relay switching circuit total line resistance should be approximately 2 ohms.

10.14 Figure 10, in Section C70.911.03, shows a 1200-15 system. For paging speakers over telephone lines, the output of the Teletalk is attenuated to zero-level with a resistance pad, and then connected to the telephone line, which is in turn connected to the 500-ohm input of an 85-25 paging amplifier. The output of the paging amplifier is connected to the speakers to be paged. No remote control of this amplifier is provided.

52-Type Headset Models (-30)

10.15 Voice and annunciator circuits are connected in the same manner as standard units. External headset jacks are connected to terminals at the Teletalk. Refer to Schematic 1200-30 in the Maintenance section for connections between external jacks and terminals at the Teletalk. When headset is plugged into the jacks, the speaker microphone of the master station is disconnected.

Remote Control of Master Stations (-31M or -31S)

10.16 These stations are installed in the same manner as standard models. The only exception is that an additional terminal is provided to connect to a remote foot switch. Operation of the foot switch, or switch on front panel of the master station, activates a relay in the master station changing from "Listen" to "Talk." No "Idle" position is provided for so the busy signal feature cannot be added.

11. CONVERSIONS AND FIELD MODIFICATIONS

11.01 In some cases it may be practical to convert an existing 700 series master station to a 1200 series station.

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Listed below is the proper catalog number of the required kit to make this conversion. The kit comes completely wired by harness to a plug that mates to the amplifier jack.

<u>Model</u>	<u>Kit No.</u>
724	212-22736
724A	212-22737
724A-3	212-22738

<u>Model</u>	<u>Kit No.</u>
706	212-22727
706A	212-22728
706A-3	212-22729
712	212-22730
712A	212-22731
712A-3	212-22732
718	212-22733
718A	212-22734
718A-3	212-22735

11.02 By suffixing a (-1) to the above kit numbers, a plug and jack is also provided for use on the end of the master station cord.

11.03 In some cases it may be practical to field modify an existing 1200 series master station to a different model or variation. Listed below are recommendations for these modifications, starting with a 1206 master station as a basic unit.

<u>Revised Model</u>	<u>Comment</u>	<u>Labor Hours</u>	<u>Parts Required</u>	<u>Labor Required</u>
1212	Not Difficult	3/4 hr.	Switch Panel Assembly	Replace Existing Wire and Panel
1218	Not Difficult	3/4 hr.	Switch Panel Assembly	Replace Existing Wire and Panel
1224	Not Difficult	3/4 hr.	Switch Panel Assembly	Replace Existing Wire and Panel
1206A	Not Difficult	1-1/2 hr.	Switch Panel Assembly	Replace Existing Wire and Panel
1212A	Not Difficult	1-1/2 hr.	Switch Panel Assembly	Rewire Existing Amplifier Circuit
1218A-3	Not Recommended	---	---	-----
1224A-3	Not Recommended	---	---	-----
1206-C	"S" Circuit Only	1-1/2 hr.	Earphone and Cradle Assembly 100- and 3300-ohm Resistor--Wire	Drill and Rewire Cabinet
1206-L	High-Level Only	1-1/2 hr.	(1) Relay, (2) 75,000-ohm Res. (1) .25 Mfc. Cap.	Mount the Relay, Rewire the Amp. Circuit
1206-T	Not Generally Recommended Tedious	2 hrs.	Handset Assembly, (2) 51-ohm Resistors, (1) 3300-ohm Resistor	Drill Cabinet - Mount Handset Wire
1206-1	Appreciable Wiring Required	2 hrs.	All-Call Switch	Mount Switch and Wire

<u>Revised Model</u>	<u>Comment</u>	<u>Labor Hours</u>	<u>Parts Required</u>	<u>Labor Required</u>
1206-14	Tedious Task	2-1/2 hr.	(1) Silence Relay (2) 20,000- and (1) 6,800-ohm Re- sistor, (1) .25 Mfd. Capacitor	Mount the Relay, Rewire the Circuit
1206-15	Not Difficult	2-1/2 hr.	Switch Panel As- sembly With All- Call Key Junction Block and Cord	Replace Existing Wire and Panel
1206-18	Not Generally Recommended Tedious	3 hrs.	All-Call Switch Junction Block and Cords	Drill Cabinet Mount Switch Wire
1206-30	Not Difficult	3/4 hr.	Plug-In Jack for No. 52 Headset	Mount the Jack and Rewire
1206-31	Not Recommended Complicated Wiring	---	-----	-----

12. HUM AND NOISE TROUBLES

12.01 Hum, noise, or other interference may be produced by medical apparatus, office equipment, motors, or poor waveform of the power supply. It may be picked up by the voice lines running from the speaker stations and amplified in the master unit when the talk-listen switch is in the "Listen" position. Defective tubes may also prove a source of hum and noise in the amplifier.

12.02 Interstation voice lines must always be twisted pair wires, for minimum pickup of interference. The transposing effect obtained from the twisted wires effectively cancels hum or noise picked up by interstation wiring. Care should be taken that the cable does not ground to any pipe, conduit, or other metal surface or by moisture due to leakage, as this will unbalance the canceling effect of the twisted wire and may cause noise, hum, or crosstalk in the Teletalk. In extremely noisy locations where the noise is picked up by the interstation wiring, it may be necessary to install

shielded pairs of wire between the speaker station and the master station grounding the shield at the master station.

12.03 The source of interference caused by office equipment, such as electric typewriters or other equipment using automatic speed regulators, may cause a clicking noise in the Teletalk. Such interference, however, is usually easy to trace since it will occur only when the interfering equipment is in operation. Filters for eliminating the interference caused by these devices are usually available from the manufacturer of the equipment causing such interference. The customer is responsible for obtaining and installing these filters.

12.04 It might be necessary to reverse the power plug to determine the correct polarity for lowest hum level. The chassis connection in the terminal box should always be grounded to a water pipe or other good ground. This will aid in the elimination of hum and noise.

12.05 If the hum or noise cannot be eliminated, refer the trouble to foreman.