



RADIO CONTROL CENTER

MULTI-STATION CONTROL CONSOLES

(With Type EC-76-A & EC-77-A Panels)

Maintenance Manual LBI-4001

DF-4083



SPECIFICATIONS*

DIMENSIONS

42" H x 60" W x 30" D
(Includes Desk and Turret)

TEMPERATURE RANGE

—30°C to 60°C (—22°F to 140°F)

MAXIMUM POWER REQUIREMENTS 250 watts at 117 VAC, 50/60 Hz
(Six-station Control)

*These specifications are intended primarily for the use of the serviceman. Refer to the appropriate Specification Sheet for the complete specifications.

GENERAL  ELECTRIC

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WARNING

No one should be permitted to handle any portion of the equipment that is supplied with high voltage; or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS.

TABLE 1 — COMBINATION NOMENCLATURE

1st & 2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit	8th & 9th Digit
DC DESK CONSOLE	2 TWO-STATION CONTROL	1 STANDARD	A STANDARD	A 1-FREQUENCY TRANSMITTER & RECEIVER	T DC CONTROL	11 STANDARD
	3 THREE-STATION CONTROL	2 TYPE 99 TONE	B CHANNEL GUARD	B 2-FREQ. TRANS. & 1-FREQ. RCVR.		
	4 FOUR-STATION CONTROL	3 TYPE 90 TONE		C 2-FREQ. TRANS. & 2-FREQ. RCVR.		
	5 FIVE-STATION CONTROL	4 DIGITAL SIGNALING		D 1-FREQ. TRANS. & 2-FREQ. RCVR.		
	6 SIX-STATION CONTROL			R 1-FREQ. TRANS. & SEARCH LOCK MONITOR (OR 2 RECEIVERS)		
				S 2-FREQ. TRANS. & SEARCH LOCK MONITOR (OR 2 RECEIVERS)		

OPTIONAL EQUIPMENT

OPTION	EQUIPMENT
5133	Footswitch (7488951-P1)
5136	Swivel Chair (Vinyl Seat)
5137	Swivel Chair (Fabric Seat)
5138	Straight Chair (Vinyl Seat)
5139	Straight Chair (Fabric Seat)
5142	Swinging-Arm Microphone (Model 4EM13A1)
5148	Left Pedestal Desk
5149	Right Pedestal Desk
5150	Two Pedestal Desk
5152	Typewriter Platform (For Left Pedestal Desk)
5153	Typewriter Platform (For Right Pedestal Desk)
5154	220 to 117-VAC Step-Down Transformer (19C307131-P1)
5156	Desk Microphone (Model 4EM28A10)
5157	Desk Microphone (Model 4EM28B10 - used with Channel Guard)

DESCRIPTION

The General Electric Radio Control Center provides dispatching, monitoring, and supervisory control functions required in modern two-way radio remote control systems. Control Centers described in this manual are for controlling 2 to 6 base stations. They are capable of providing up to five remote control functions for each base station. The Control Centers are compatible with radio systems that use remote control panel Types KC-7-A or KC-16-A at the remote station location. DC control and audio voltages are connected to the associated radio equipment over wire (telephone) lines.

The basic control center consists of an attractively styled desk with a three-section turret assembly. The cabinet is finished with a tan metallic enamel, providing a finish that is highly scratch resistant. A beige laminated plastic desk top provides a writing surface that harmonizes with the cabinet finish. The desk may have one or two pedestals which contain sliding storage drawers for filing logs, reports and other items. A swing-down back panel provides access to wiring on the distribution block at the rear of the desk. Optional office furniture includes a typewriter

platform and straight or swivel-base arm chairs.

The three-section turret assembly mounts at the rear of the desk top. Each turret section can accommodate a 19-inch panel drawer assembly which may be pulled forward for routine inspection and maintenance. Three duplex AC power receptacles, located at the rear of the turret, provide power connections for the drawer assemblies and miscellaneous test equipment.

The center section of the turret contains a Model 4EC76A14 Control Panel. This panel provides up to 10-watts of audio to the speaker. The Control Panel front includes illuminated push-button switches for selecting the desired station audio (from the Monitor Panel) and for selecting remote control functions at that station. Each station select switch operates a relay on an associated line termination module and the relay contacts transfer the desired station from the Monitor Panel to the Control Panel. A volume control, speaker, compression meter, clock and swivel microphone are also mounted on the front of the Control Panel. When servicing the Control Panel, refer to unit Maintenance Manual LBI-4002.

The left section of the turret contains the Monitor Panel. These panels determine

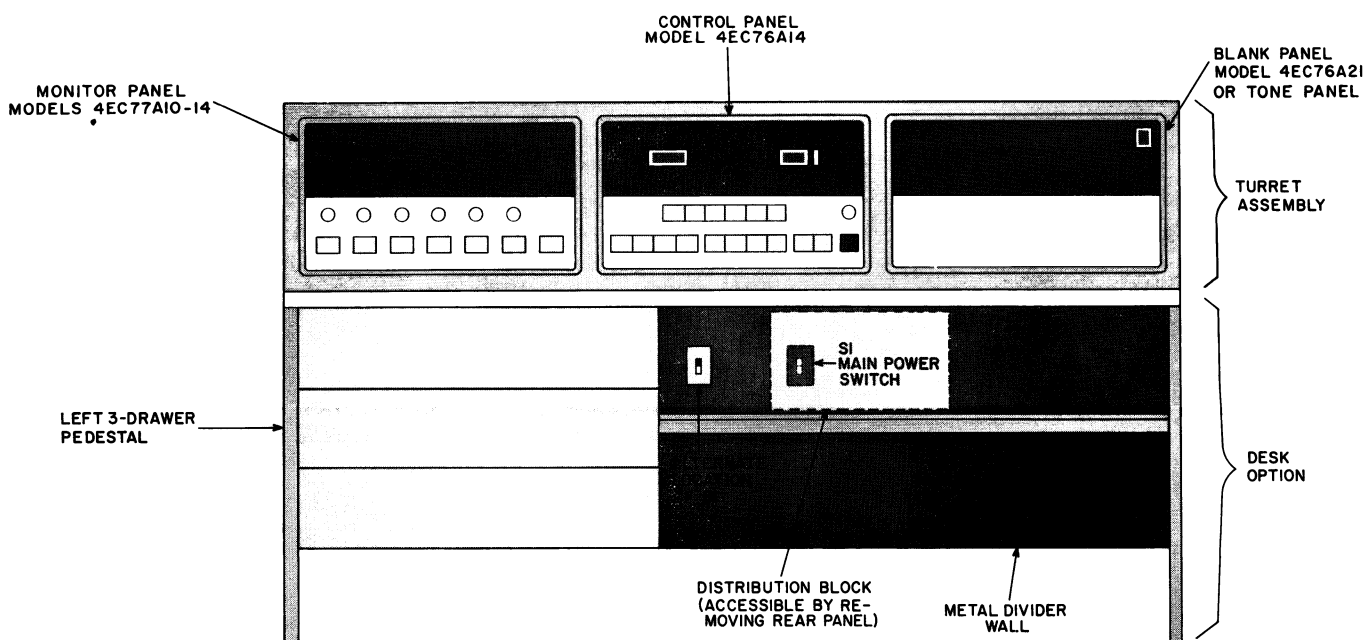


Figure 1 - Typical Radio Control Center

the number of stations that can be controlled from the Radio Control Center (see Table 2). Refer to unit Maintenance Manual LBI-3984 when servicing the Monitor Panel.

Table 2 - Monitor Panel Application

Model Numbers	Stations Controlled
4EC77A10	Two
4EC77A11	Three
4EC77A12	Four
4EC77A13	Five
4EC77A14	Six

The right section of the turret contains either a blank 19-inch panel (Model 4EC76A21) or one of three types of Tone Panels. The Tone Panels and their applications are shown in Table 3.

Refer to the Combination Nomenclature and Option Index Chart (Table 1) for a complete listing of available accessory application kits and options which are designed to meet the different requirements of individual two-way radio systems.

CONNECTIONS

All connections to the control center except microphone and power connections are made at terminal boards TB1-TB4, located on the distribution block at the rear of the console desk. Access to the distribution block is gained by inserting a screwdriver in the dimple in the center (top edge) of the rear panel and prying the panel outward.

TELEPHONE LINES

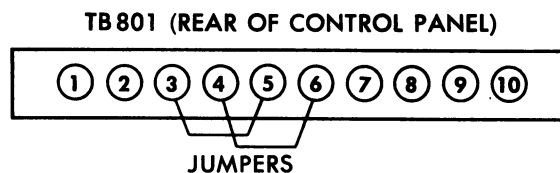
Three types of telephone line connections are commonly used in remote control applications. The three connection methods and their individual characteristics are shown in Table 4 and Figure 2. All lines

must be connected using the same method.

For proper operation of the DC control circuit, the polarity of the telephone pair carrying the control voltages must be the same at both the control center and the remote control panel (at the base station). Therefore, before connecting the telephone pair it is necessary to identify each end of the wires that will carry the control voltage. Temporarily connect one of the wires at the remote control panel to a good earth ground, and measure the resistance of each of the wires to ground at the control center. The ungrounded wire will appear as an open circuit. The grounded wire will show a resistance. Identify the wires at both ends and observe line polarity as indicated in the following procedure.

1. Connect the telephone lines to TB2-TB4 on the distribution block and make jumper connections to TB801 (10-point terminal board nearest the AC line cord connection at the rear of the control panel chassis) according to the method selected.

Method 1 - Single Telephone Pair (Control Voltage Simplex Line to Line)



- a. Connect a jumper between TB801-3 and TB801-5.
- b. Connect a jumper between TB801-4 and TB801-6.
- c. Connect telephone pair(s) to audio terminals of TB2, TB3 and TB4 as shown in Figure 3. Observe the following line polarities:

Stations 1, 3 and 5 - Terminal 1 connects to TB701-1 at the station.

Table 3 - Tone Panel Application

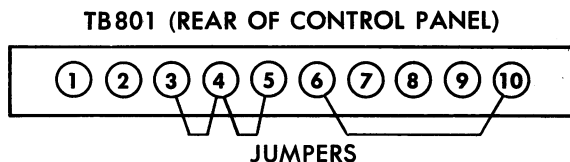
TONE TYPE	MODEL NUMBER	APPLICATION	MAINT. MANUAL
99	4EH19A10 4EH19A11 4EH19A12	100-Call Sequential Tone Signaling 400-Call Sequential Tone Signaling 900-Call Sequential Tone Signaling	LBI-3986
90	4EH19B10 4EH19B11 4EH19B12	Pulse Tone (5-tone, 1050-1650 Hz Freq Range) Pulse Tone (5-tone, 1800-2400 Hz Freq Range) Pulse Tone (10-tone, 1050-2400 Hz Freq Range)	LBI-3985
Digital (Dial)	4EH19C10 4EH19C11 4EH19C12	Digital Pulse Tone (590 Hz) Digital Pulse Tone (1500 Hz) Digital Pulse Tone (2805 Hz)	LBI-3987

Table 4 - Telephone Line Connection Methods

Method	Description	Advantages or Disadvantages
1	One metallic pair: for both audio and control voltages with control voltage simplex from line to line.	Economical; dependable where earth currents may be large, or where a good earth ground cannot be obtained; keying clicks will be heard in paralleled control facilities.
2	One metallic pair: for both audio and control voltages with control voltage simplex from line to ground.	Economical; earth ground currents (encountered near power company substations) may interfere with control functions; keying clicks minimized.
3	Two telephone pairs; one for audio voltage and one for control voltage (metallic pair).	Provides best performance; keying clicks will not be heard; least susceptible to earth ground currents which may interfere with control functions.

Stations 2, 4 and 6 - Terminal 5 connects to TB701-1 at the station.

Method 2 - Single Telephone Pair (Control Voltage Simplex Line to Ground)



- a. Connect a jumper between TB801-3 and TB801-4.
- b. Connect a jumper between TB801-4 and TB801-5.
- c. Connect telephone pair(s) to audio terminals of TB2, TB3 and TB4 as shown in Figure 3. Observe the following line polarities:

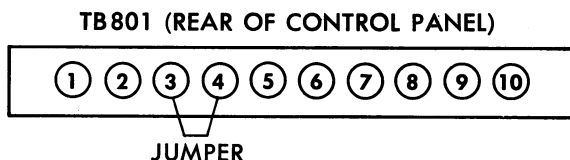
Stations 1, 3 and 5 - Terminal 1 connects to TB701-1 at the station.

Stations 2, 4 and 6 - Terminal 5 connects to TB701-1 at the station.

- d. Make connections to earth ground for each station as follows:

Station 1 - TB2-4	Station 4 - TB3-8
Station 2 - TB2-8	Station 5 - TB4-4
Station 3 - TB3-4	Station 6 - TB4-8

Method 3 - Separate Control and Audio Pairs



- a. Connect a jumper between TB801-3 and TB801-4.
- b. Connect audio pairs to audio terminals of TB2, TB3 and TB4 as shown in Figure 3.
- c. Connect control pairs to terminals of TB2, TB3 and TB4 as shown in Figure 3. Observe the following line polarities:

Stations 1, 3 and 5 - Terminal 3 connects to TB701-5 at the station.

Stations 2, 4 and 6 - Terminal 7 connects to TB701-5 at the station.

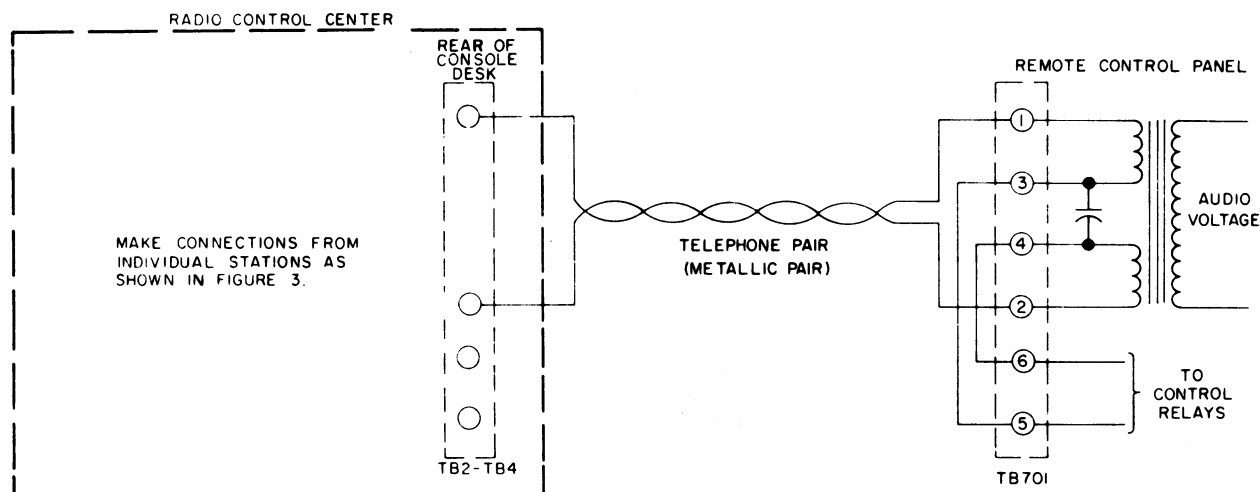
2. Connect terminal 8 of terminal board TB1 to a good earth ground, such as a cold water pipe or an electrical conduit. It is essential to have a good ground, regardless of the method of telephone line control used, as a safety measure for the dispatcher.

AC POWER

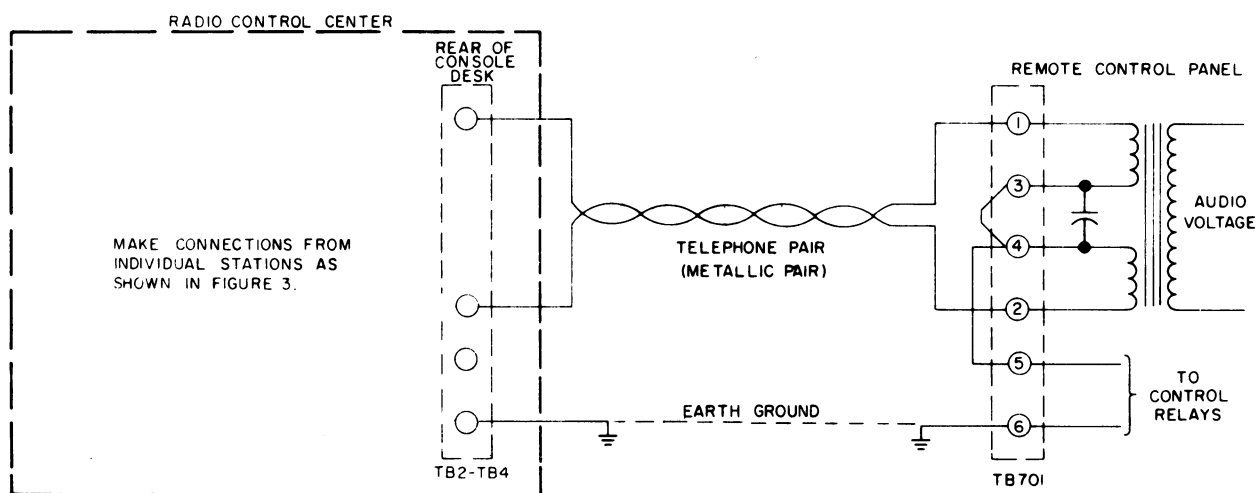
When the AC Power Junction Box with Switch S1 has been installed and wired as described in Installation Instruction LBI-4003, connect the control center to a 117-volt, 50/60 Hz source. An optional 220/117-volt AC stepdown transformer is available for operation from a 220-volt, 50/60 Hz source.

The main power switch (S1) is located on the distribution block at the rear of the desk, or on the metal divider wall if front access is desired. S1 connects power to the duplex AC power receptacles at the rear of the turret. Cable connections between S1 and the AC power receptacles are shown on page 9.

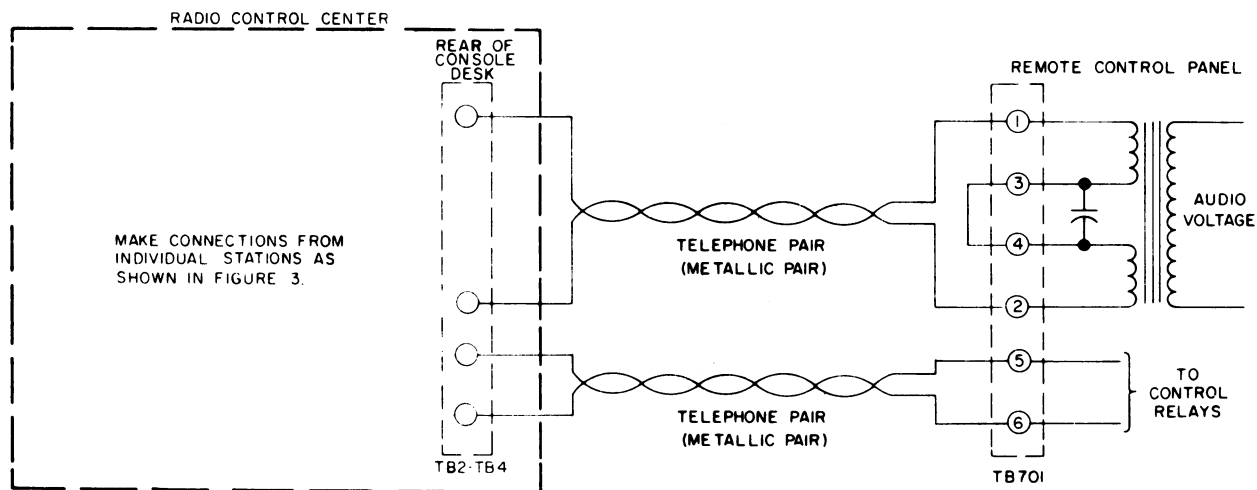
Connect the AC power cable for each 19-inch panel to one of the AC receptacles at the back of the turret.



METHOD 1 - SINGLE TELEPHONE PAIR WITH CONTROL SIMPLEXED LINE TO LINE



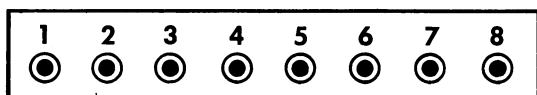
METHOD 2 - SINGLE TELEPHONE PAIR WITH CONTROL SIMPLEXED BETWEEN CENTER TAP AND GROUND



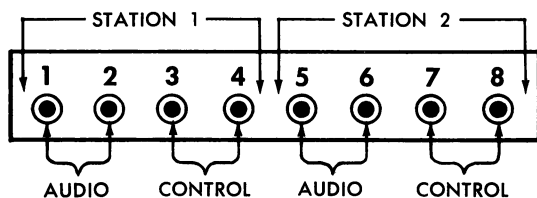
METHOD 3 - SEPARATE CONTROL AND AUDIO PAIRS

Figure 2 - Telephone Line Connection Methods

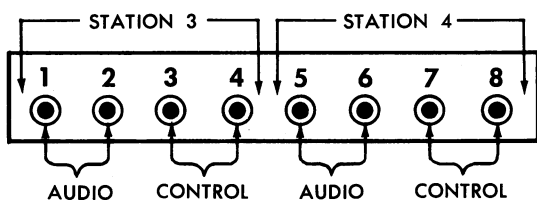
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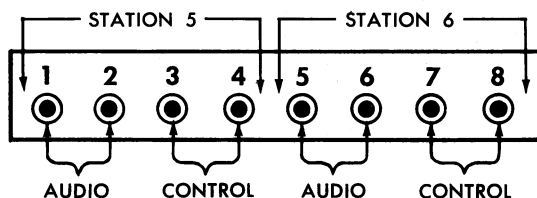
TB1



TB2



TB3



TB4

Figure 3 - Telephone Line Connections

ACCESSORIES

DESK MICROPHONE MODEL 4EM28A10 or B10

When the desk microphone is used, make connections as follows:

1. Route the microphone cable through a slot in the bottom of the control panel frame and secure with clamp and screw provided.
2. Plug cable connector into J801.
3. For 4EM28B10 only: Remove the black wire between J801-4 & TB806-2.

FOOTSWITCH MODEL 4KC1C1

When the footswitch is used, make connections to terminals TB1-7 and TB1-8 on the distribution block at the rear of the desk.

ADJUSTMENT PROCEDURE

After the necessary connections have been made to the control center, a few adjustments to the Control Panel and Monitor Panel are required before placing the control center in service. These adjustments are described in the unit Maintenance Manuals.

NOTE

Before starting adjustment, make sure that the station VOLUME control (R511 on the EP-38-A) has been set for no more than 6 volts RMS at the audio pair with maximum system deviation.

OPERATION

Before attempting to operate the Radio Control Center, be sure that AC power switches S1 and S801 are turned ON (the lamp behind the clock serves as the power ON indicator). S1 is located on the distribution block or on the metal divider wall (see Figure 1). S801 is located on the back of the control panel chassis.

MONITOR PANEL

Channel 1 for each station is monitored automatically by circuits of the Monitor Panel. Individual VOLUME controls and CALL/MUTE switches (with push-to-operate, push-to-release action) are provided on the front of the Monitor Panel for each station. When MUTE is selected, the bottom half of the switch lights and audio volume from the associated station is reduced. The CALL position permits full audio volume from the station. A flashing CALL lamp in the upper half of the switch operates on incoming audio, regardless of the switch position.

A push-to-operate, push-to-release ALL MUTE switch is also located on the front of the Monitor Panel. This switch lights when in the ALL MUTE position, and mutes all incoming calls except those that are selected from the Control Panel (center section).

CONTROL PANEL

In order to establish control of a station, the audio input for that station must be switched from the Monitor Panel to

the Control Panel by operating the associated station select switch on the Control Panel. The station select switches are momentary-action and light when operated. They are electrically interlocked, therefore, when a second switch is operated the first switch is released and its light is turned off.

Switches and controls required for remote operation of a selected station are located on the front of the Control Panel within easy reach of the operator. The switches are illuminated, push-button type, with either momentary or alternate (push-to-operate, push-to-release) switching action. Typical control procedures for transmit and receive operation and a table describing push-button switch functions follow.

To Receive A Message

1. Select the desired receive channel by pressing the RECEIVE 1/RECEIVE 2 switch. (Lighted half of the switch indicates the channel selected). When separate RECEIVE 1 and RECEIVE 2 switches are used, pressing both switches provides simultaneous monitoring (of two receivers) or search-lock monitoring (of a two-frequency receiver).

2. When the first call is received, adjust the VOLUME control for the desired listening level.

To Transmit A Message

1. Select the desired transmit channel by pressing the XMIT 1/XMIT 2 switch. (Lighted half of the switch indicates the channel selected).
2. Listen briefly to make sure no one is using the channel. Operate the CHANNEL GUARD MONITOR switch if your remote control station is equipped with Channel Guard.
3. Press the TRANSMIT switch on the front panel to key the station transmitter. If an optional desk microphone or footswitch is used, the transmitter may be keyed by the microphone transmit button or by the footswitch.

Switch and Control Functions

Individual system requirements will determine the number of switches that are installed on the control panel and the functions provided by the control center. Tabel 5 describes the available switches and controls and gives the function of each.

Table 5 - Switch and Control Functions

CONTROL	FUNCTION
STATION SELECT SWITCHES	Momentary-action, push-button switch. Lights when the station is selected. Enables the selected station transmitter to operate when the TRANSMIT switch is pressed. The station select switches are electrically interlocked to prevent simultaneous selection of two or more stations.
XMIT 1/XMIT 2	Alternate-action pushbutton switch for transmit channel selection. When XMIT 1 is selected, operation is on transmit channel #1 and the upper half of the switch is lighted. When XMIT 2 is selected, operation is on transmit channel #2 and the lower half of the switch is lighted.
REPEATER DISABLE	Alternate-action, pushbutton switch. Lights when operated to disable the repeat mode of operation at the base station. When the switch is not lighted, the station will operate as a repeater.
CHANNEL GUARD MONITOR	Alternate-action, pushbutton switch. Lights when operated to disable Channel Guard at the base station. This position permits monitoring of all communications on the base station frequency. When the switch is not lighted, only Channel Guard coded signals are monitored.

Table 5 (continued)

CONTROL	FUNCTION
RECEIVE 1/RECEIVE 2	<p>Alternate-action, pushbutton switch, for receiver channel selection.</p> <p>When RECEIVE 1 is selected, operation is on receive channel #1 and the upper half of the switch is lighted.</p> <p>When RECEIVE 2 is selected, operation is on receive channel #2 and the lower half of the switch is lighted.</p>
RECEIVE 1 RECEIVE 2	<p>Alternate-action, pushbutton switch. Lights when channel 1 receiver is selected (see following note).</p> <p>Alternate-action, pushbutton switch. Lights when channel 2 receiver is selected (see following note).</p> <p style="text-align: center;">- NOTE -</p> <p>Separate switches for RECEIVE 1 and RECEIVE 2 are used when simultaneous monitoring of two single-frequency receivers or search lock monitor of a two-frequency receiver is required. Pressing both switches provides the simultaneous monitoring or search lock monitor function.</p>
SUPV CONTROL	Alternate-action, pushbutton switch. Lights when SUPV CONTROL is selected to provide supervisory control over all transmissions from other control consoles. This permits an operator to terminate unauthorized or unwanted transmissions. The switch places a short across the control pair, thus, no transmission can be initiated while the switch is lighted.
INTERCOM	Momentary-action, pushbutton switch. Lights when pressed. Allows communication with persons at base station or at other consoles without energizing the transmitter. Simply press the INTERCOM switch and talk into the microphone. Do not press the TRANSMIT switch. To listen, release the INTERCOM switch.
MUTE	Alternate-action, pushbutton switch. Lights in the MUTE position. The switch permits the operator to temporarily reduce the speaker volume for business discussions, telephone calls, etc, without changing the VOLUME control setting.
TONE	Momentary-action, pushbutton switch. Lights when pressed. The switch activates the tone alert oscillator which transmits an alerting tone signal for designating messages of special importance.
TRANSMIT	Momentary-action, pushbutton switch. Lights when pressed and keys the base station transmitter.
VOLUME CONTROL	Adjustable resistor. Audio level of speaker is varied by this control.
VU Meter and Compression Meter	The VU meter or Compression meter enables the operator to check the line level. At normal voice levels, the VU meter should occasionally swing up to zero (0). With the Compression meter, the needle should be in the green area.
Digital Clock	The console may be equipped with a 12 or 12/24-hour digital clock. The clock is connected so that it operates with power switch S801 (on back of the center Panel Chassis) in the ON or OFF position. However S1 on the console distribution block must be ON.

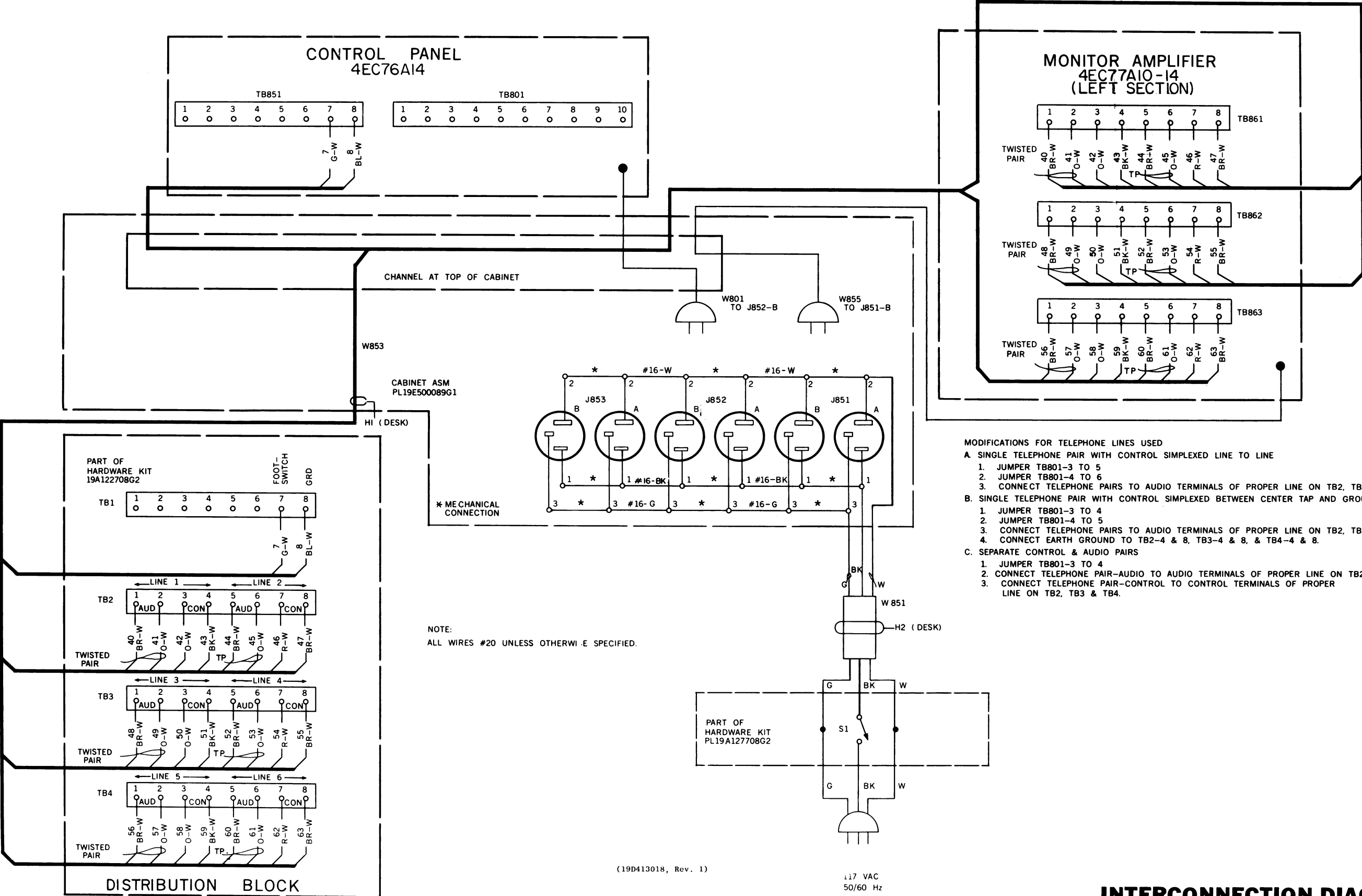
MAINTENANCE

The Radio Control Center is designed for ease of servicing and minimum maintenance. The 19-inch panels in the console turret may be pulled forward for routine inspection and maintenance in the following manner:

1. Grasp the panel frame and pull the panel forward until the stop is reached.
2. To completely remove the panel from the turret, lift the panel to clear the stop and pull forward. No electrical disconnections are required to set the panel on the desk top.

Circuits on the power distribution block are accessible from the rear of the control center. Insert a screwdriver blade in the dimple in the center (top edge) of the rear panel of the desk. Then, pry outward to release the panel and expose the distribution block.

Refer to the appropriate unit Maintenance Manual for detailed troubleshooting and servicing information.



INTERCONNECTION DIAGRAM

MULTI-STATION CONTROL CONSOLE

PARTS LIST

LBI-3982

CABINET ASSEMBLY - 19E500839-G1
HARDWARE KIT - 19A122708-G2

SYMBOL	G-E PART NO.	DESCRIPTION
		CABINET ASSEMBLY 19E500839-G1
J851 thru J853	19B209395-P1	----- JACKS AND RECEPTACLES ----- Receptacle, power: 3 wire grounding type, 15 amps at 125 v; sim to Circle F Mfg. 1517-2.
W851	19B205814-G1	----- CABLES ----- Cable assembly: approx 80 inches long.
W853	19C311633-G1	Cable assembly. Includes:
	19B209260-P103	Terminals. (52)
		----- MISCELLANEOUS -----
	19A115874-P1	Friction catch. (Used to secure drawers).
	4035267-P1	Plug button. (Drawer slides).
		HARDWARE KIT 19A122708-G2
S1	19B209396-P1	----- SWITCHES ----- Toggle: 15 amps, 120 VAC; sim to GE 5941.
TB1 thru TB4	19C301087-P4	----- TERMINAL BOARDS ----- Phen: 8 terminals; sim to GE CR151D.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PARTS LIST

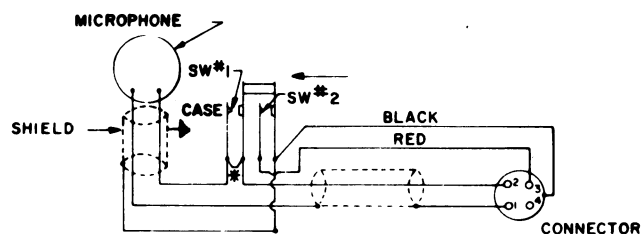
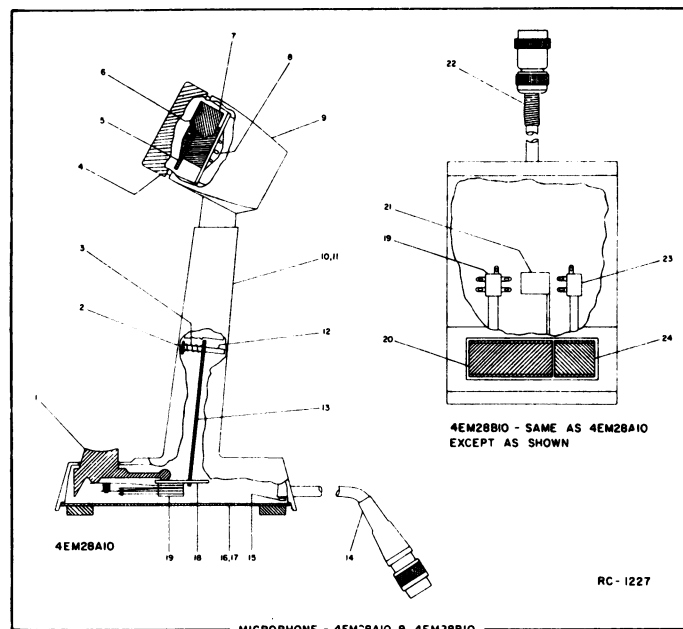
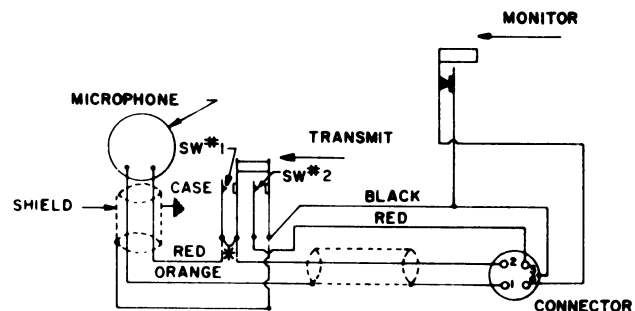
LBI-3623B

MAGNETIC CONTROLLED DESK MICROPHONE

MODEL 4EM28A10 (19C307105-P1)
 MODEL 4EM28B10 (19C307106-P1)
 (SEE RC-1227)

SYMBOL	G-E PART NO.	DESCRIPTION
MECHANICAL PARTS		
MODEL 4EM28A10		
1		Pushbutton. Shure Brothers RP-68.
2		Washer. Shure Brothers 30A697.
3		Spring. Shure Brothers 44A149.
4		Cap and grille. Shure Brothers RP-72.
5		Magnetic controlled cartridge. Shure Brothers RP-13.
6		Washer. Shure Brothers 34A223.
7		Shield. Shure Brothers 53A528.
8		Damping pad. Shure Brothers 20B33.
9		Housing. (Part of item 4).
10		Base. (Part of item 4).
11		(Not used).
12		Pin. Shure Brothers 31A848.
13		Bracket. Shure Brothers 53A637.
14		Cable and plug. Shure Brothers RP-65.
15		Cable clamp. Shure Brothers 53A532.
16		Bottom plate. Shure Brothers 90A1015.
17		(Not used).
18		Mounting bracket. Shure Brothers 53A633.
19		Switch. Shure Brothers RP-70.
MODEL 4EM28B10		
1		(Not used).
2		Washer. Shure Brothers 30A697.
3		Spring. Shure Brothers 44A149.
4		Cap and grille. Shure Brothers RP-72.
5		Magnetic controlled cartridge. Shure Brothers RP-13.
6		Washer. Shure Brothers 34A223.
7		Shield. Shure Brothers 53A528.
8		Damping pad. Shure Brothers 20B33.
9		Housing. (Part of item 4).
10		(Not used).
11		Base. (Part of item 4).
12		Pin. Shure Brothers 31A848.
13		Bracket. Shure Brothers 53A637.
14		(Not used).
15		Cable clamp. Shure Brothers 53A532.
16		(Not used).
17		Bottom plate. Shure Brothers 90B1015.
18		Mounting bracket. Shure Brothers 53A633.
19		Switch. Shure Brothers RP-71.
20		Pushbutton (Transmit). Shure Brothers RP-69.
21		Locking arm. Shure Brothers 53A667.
22		Cable and plug. Shure Brothers RP-66.
23		Switch. (Part of item 19).
24		Pushbutton (Monitor). (Part of item 20).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

CIRCUIT DIAGRAM
4EM28A10CIRCUIT DIAGRAM
4EM28B10

(RC-302, Sh. 2)

* JUMPER MAY BE REMOVED FOR PARALLEL OR SPECIAL OPERATION

NOTES:

1. SWITCH #1 OF THE MICROPHONE CIRCUIT MUST CLOSE FIRST AND OPEN LAST.
2. MONITOR AND TRANSMIT BUTTONS ARE MECHANICALLY INTERLOCKED, MAKING IT NECESSARY TO PRESS MONITOR BUTTON BEFORE TRANSMITTING. TO MONITOR CONTINUOUSLY, PRESS MONITOR BUTTON DOWN AND SLIDE FORWARD TO "LOCK" POSITION. PRESS AND PUSH BACK BUTTON TO RELEASE. TO OPERATE MONITOR AND TRANSMIT FUNCTIONS INDEPENDENTLY, REMOVE LOCKING ARM BRACKET (PART 21 SHOWN ABOVE AND IN PARTS LIST).

SERVICE SHEET

DESK MICROPHONES
 MODELS 4EM28A10 & B10
 (Options 5156 & 5157)

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service parts may be obtained from Authorized GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-4001

Progress Is Our Most Important Product



COMMUNICATION PRODUCTS DEPARTMENT LYNCHBURG, VIRGINIA
(In Canada, Canadian General Electric Company, Ltd., 100 Wingold Ave., Toronto 19, Ontario)