MOBILE RADIO

MASTR

Progress Line

MAINTENANCE MANUAL

POLE MOUNT STATION

TWO-WAY FM
POLE MOUNT
STATION
COMBINATION

REMOTE CONTROL

LBI-4146B

MICROPHONE

DF-9014

GENERAL ELECTRIC

9014

TABLE OF CONTENTS

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.

EQUIPMENT INDEX

EQUIPMENT	TYPE OR MODEL NUMBER
Transmitter	ET-55-A through ET-60-D
Receiver	ER-39-A through ER-42-H
Pole Mount Cabinet	7132483-G6
Station Power Supply	EP-38-A
Antenna Relay (mounts on EP-38-A)	19A121260-G1
Line Amplifier	EA-24-A
Remote Control Panel	4KC16A12
Microphone	4EM25A10
Microphone Mounting Kit	7141414-G2
Speaker Assembly	19B219618-G1
Handle	7145676-P2
Alignment Tools (hex slug type) (slotted screw type)	4038831-P2 4033530-G2

OPTIONAL EQUIPMENT

EQUIPMENT	OPTION NO.	TYPE OR MODEL NUMBER
Priority Search-Lock Monitor	7678 & 7679	19A127679-G1
Receiver Power Supply	7708, 7709, 7976, 7977	4EP39A11
Antenna Relay	7708, 7709, 7976, 7977	19A121260-G2
Antenna Matching Power Supply	7804 - 7809	4EP41A10
Antenna Matching Unit (30-40 MHz)	7804 & 7807	4EY8A2
Antenna Matching Unit (40-50 MHz)	7805 & 7808	4KY8A3
Antenna Matching Unit (152-174 MHz)	7806 & 7809	4KY8C1
Heater Kit	3551	4KZ3A1
Test Meter Panel	7609	19A121953-G1
Meter Switching Panel	7609	19A121460-G1
Transmitter Metering Cover	7648	19C303676-G3
Receiver Metering Cover	7649	19C303676-G2
Intercom-Kit	7620	19A122231-G9
220/110 volt Stepdown Transformer Kit	7608	19A1212971-G1
Audio Compressor Kit	7621	19A122231-G10
Line Compensation Kit	5169	19B216906-G1

SPECIFICATIONS*

DIMENSIONS (H x W x D)	42" x 23" x 12-1/4"
WEIGHT	Approximately 170 pounds
DUTY CYCLE (Transmit & Receive)	Continuous
INPUT VOLTAGE	117 VAC, ±10%, 50/60 Hz
INPUT POWER	Transmit: 1100 watts Receive: 176 watts
OPERABLE TEMPERATURE RANGE	-30°C (-22°F) to +60°C (+140°F)

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

COMBINATION NOMENCLATURE

1st Digit Mechanical Package	2nd Digit Operating Voltage	3rd Digit RF Power Output Range	4th Digit Channel Spacing	5th Digit Control	6th Digit Number of Freq.	7th Digit Options	8th & 9th Digits Frequency Range
P Pole-Mount Station	**M** 117 VAC	**5** 16—38 watts	**4** 20 kHz	**R** Remote Control Station	**A** 1-Freq. T 1-Freq. R	**S** Standard	**11** 25—33 MHz
		6 38—64 watts	**6** 30 kHz		**B** 2-Freq. T 1-Freq. R	**N** Noise Blanker	**22** 33—42 MHz
		7 64—128 watts	**7** 40 kHz		**C** 2-Freq. T 2-Freq. R	**U** Channel Guard (71.9—156.7 Hz)	**33** 42—50 MHz
			8 50 kHz		**D** 1-Freq. T 2-Freq. R	**V** Channel Guard (162.2—203.5 Hz)	**44** 66—77 MHz
			9 60 kHz		**E** 3-Freq. T 3-Freq. R	**W** Noise Blanker & Channel Guard (71.9—156.7 Hz)	**45** 77—88 MHz
					F 4-Freq. T 4-Freq. R	**X** Noise Blanker & Channel Guard (162.2—203.5 Hz)	**55** 132—150.8 MHz
						P UHS Receiver	**66** 150.8—174 MHz
						G UHS Receiver & Channel Guard (71.9—156.7 Hz)	**77** 406—420 MHz
						H UHS Receiver & Channel Guard (162.2—203.5 Hz)	**88** 450—470 MHz

DESCRIPTION

The General Electric MASTR Progress Line Pole Mount Station is a ruggedly built two-way remote radio station. The station can be mounted outdoors in remote locations regardless of weather conditions. Both the transmitter exciter and the receiver are fully transistorized. Silicon transistors are used throughout for added reliability. An optional heater kit is available for installations where the climate is such that the cabinet temperature drops below 5°F.

SERVICING

The transmitter, receiver, power supply control panel, and options are mounted to a "swing-out" rack to provide ease in servicing either side of the component rack. The transmitter and receiver modules are equipped with centralized metering jacks, and are mounted on swing-out chassis for simplified alignment and troubleshooting.

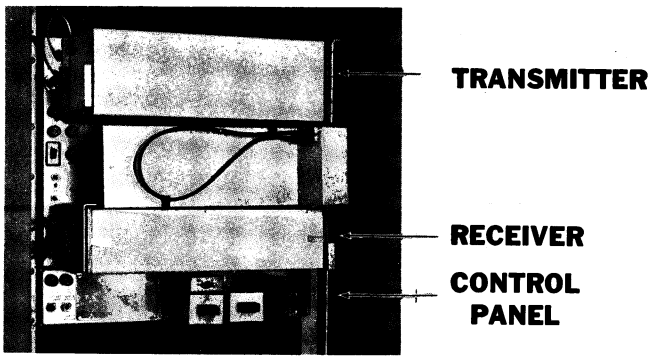
The transmitter and receiver modules may be used interchangeably in mobile and station installations. No modifications are required when transferring the units from one type of operation to another.

The station may also be equipped with an optional built in Test Set to facilitate servicing.

TRANSMITTER

The transmitter assembly consists of the transistorized exciter board and the power amplifier section. The standard transmitter may be equipped with:

- One through four frequencies
- Channel Guard (tone squelch)



Front View

RECEIVER

The fully transistorized receiver is completely contained in an aluminum casting, which provides excellent electrical shielding and reduces the effects of vibration. The standard receiver may be equipped with:

- One through four frequencies
- Channel Guard (tone squelch)
- Noise Blanker (25-50 MHz and 132-174 MHz)

POWER SUPPLIES

Transmitter-Receiver Power Supply

Station Power Supply Type EP-38-A provides operating voltages for both the transmitter and receiver. In addition to plate, screen and bias voltages for the transmitter, the power supply provides:

- Regulated -20 Volts for the transistorized transmitter exciter-board.
- Regulated +10 Volts for the receiver and for transmitter Channel Guard
- Regulated +12.6 Volts for transmitter filaments, receiver audio, relays and pilot lights

Antenna Switching Relay

The antenna switching relay (K502) is mounted on the power supply. Keying the transmitter energizes the relay, which connects the transmitter output to the antenna. When the transmitter is unkeyed, K502 is de-energized and the receiver is connected to the antenna.

Receiver Power Supply (Optional)

Receiver Power Supply Type EP-39-A is provided when the Pole Mount Station is equipped with a second receiver.

ANTENNA MATCHING UNITS (Optional)

The Antenna Matching Unit is designed to provide the gain necessary to match two or three receivers to a single antenna where frequency separation requirements are 1.0 MHz or less. The unit consists of a highly selective, dual-tuned preselector circuit with individual cathode follower outputs to properly match the receiver inputs.

HEATER (Optional) (4KZ3A1)

The Heater is an option used where the climate is such that an auxiliary cabinet heater is required. The heater consists of a 250-Watt heater strip and a temperature-operated switch. When the temperature of the cabinet drops below 5°F, the switch closes, thereby applying power to the heater strip. When the temperature rises above 5°F, the heater will be turned off by the opening of the switch. The heater strip is usually mounted on the bottom of the cabinet on the inside in a convenient location. Splice one lead from the temperature switch to a lead from the heater strip. Connect other lead from the temperature switch to Power Supply 4EP38A10, TB502-14 and other lead from heater strip to TB502-15. For complete Installation Instructions of Heater Kit refer to EBI-4353.

LINE AMPLIFIER

Line Amplifier Type EA-24-A are used for matching the receiver output to a 600-ohm telephone pair in remote control applications.

The amplifier assembly is mounted on the back of the power supply over the VOLUME and SQUELCH controls.

REMOTE CONTROL PANEL

The Control Panel contains the AC input circuit, remote control kits, and telephone line connections. The panel is mounted on the chassis mounting frame below the Transmitter-Receiver Power Supply.

AC Input

The 117-Volt AC input is connected directly to TB706-1 and 2. All power to the station is controlled by switch S701 on the Control Panel.

An optional 220/110 Volt AC Stepdown Transformer Kit is available for use when the input line voltage is 220 Volts AC.

WARNING

117-Volt AC is always present at TB706-1 and 2. Always use care when servicing the Control Panel, even when switch S701 is in the OFF position.

Telephone Lines

The key link in a Remote Control installation is the telephone line from the Dispatcher Unit to the Remote Control Station. The telephone line is connected directly from the dispatcher's console to the Remote Station wherever it may be located.

There are three methods of telephone line control:

1. Two telephone pair--one for audio and one for control.

2. One metallic pair for both audio and control, simplexing the control voltage from the center-tap of the output transformer to ground.

3. One metallic pair for both audio and control, simplexing the control voltage from one line to the other by
sp splitting the output transformer with a capacitor.

Refer to the MAINTENANCE MANUAL for Remote Control Panel Model 4KC16A12 to obtain complete information on remote control telephone lines.

MICROPHONE (Model 4EM25A10)

A microphone is mounted inside the station for use during service and maintenance work by the serviceman. The Microphone is connected to mike jack J902 located on the front side of the power supply.

SPEAKERS

Speaker Assembly

Speaker Assembly 19B219618G1 is used in later station combinations, and provides an audio output of 1.5 Watts. The speaker assembly mounts on the chassis of Transmitter-Receiver power supply Model 4EP38A12.

NOTE

When a speaker is not used, a 3.5-ohm, 10-Watt resistor must be connected from TB501-11 to TB502-5 as a substitute for the speaker load impedance.

Speaker 4EZ16A20

Speaker Model 4EZ16A20 is used in earlier station combinations, and provides an audio output of 5 Watts, an attenuator is located on the speaker case for adjustment of audio output level by the serviceman.

The 4EZ16A20 is available as an external speaker option.

INITIAL ADJUSTMENT

After the MASTR Pole Mount Station has been installed as described in the Installation Manual, the transmitter, receiver, power supply and control panel must be adjusted by an electronics technician who holds a 1st or 2nd Class FCC Radiotelephone or Radiotelegraph license before the station can be placed in operation.

TEST EQUIPMENT REQUIRED

The following test equipment is required for the adjustment of both transmitter and receiver:

1. A tuning tool and a screwdriver.
2. GE Portable Test Set Model 4EX3A10 which is especially designed for testing the MASTR Station transmitter and receiver--or a 20,000 ohms-per-volt multimeter--or an optional built-in Station Test Metering Panel.
3. A signal source operating at the system frequency (preferably the transmitter which will normally be monitored by the receiver).

TRANSMITTER ADJUSTMENT

The initial adjustment for the transmitter includes:

- Loading the power amplifier into the antenna.
- Checking the frequency and modulation.

For the Initial Adjustment procedure, refer to the ALIGNMENT PROCEDURE in the MAINTENANCE MANUAL for the transmitter.

RECEIVER ADJUSTMENT

The initial adjustment for the receiver includes:

- Zeroing the receiver to the system operating frequency.
- Matching the antenna transformer to the antenna.

For the Receiver Initial Adjustment Procedure, refer to the FRONT END ALIGNMENT PROCEDURE in the MAINTENANCE MANUAL for the receiver.

POWER SUPPLY ADJUSTMENT

The initial adjustment on the power supply includes:

- Turning on power switch S501.
- Setting VOLUME control R511 to mid-range, and setting SQUELCH control R512 for quieting.

LINE AMPLIFIER ADJUSTMENT

The initial adjustment for the line amplifier consists of setting LINE LEVEL ADJUST R1501 located on the power supply for 2.7 volts RMS (+11 dB) at the telephone pair.

For the line amplifier adjustment procedure, refer to the Maintenance Manual for the power supply.

CONTROL PANEL ADJUSTMENT

The initial adjustment for the control panel includes:

- Turning ON power switch S701.
- Adjusting AUDIO LEVEL CONTROL R701.

For the Initial Adjustment Procedure, refer to the MAINTENANCE MANUAL for the control panel.

ANTENNA MATCHING UNIT ADJUSTMENT

Refer to the MAINTENANCE MANUAL (ADJUSTMENT procedures) for the Antenna Matching Unit.

MAINTENANCE

The Pole Mount Station is designed for ease in servicing and minimum of maintenance. The chassis units are mounted on a "swing-out" frame for quick servicing of both sides of the chassis assembly.

Swing the chassis frame out as follows:

1. Remove bolt holding top of left mounting frame to cabinet.
2. Remove screw or bolt and nut from bottom of left mounting frame holding frame to cabinet back bracket.
3. Grasp handle located on upper portion of left mounting frame and pull carefully to swing out the entire chassis assembly.

TEST AND TROUBLESHOOTING PROCEDURES

The individual Maintenance Manual for the transmitter and receiver describe standard test procedures which the serviceman can use to compare the actual performance

of the transmitter or receiver against the specifications of the unit when shipped from the factory.

In addition, specific troubleshooting procedures are available to assist the serviceman in troubleshooting the transmitter, receiver and power supply.

For best results in servicing the station, the TEST PROCEDURES should be used in conjunction with the TROUBLESHOOTING PROCEDURES. Both sheets are listed in the Table of Contents of the applicable Maintenance Manual.

PREVENTIVE MAINTENANCE

To insure high operating efficiency and to prevent mechanical and electrical failures from interrupting system operations, routine checks should be made of all mechanical and electrical parts. This preventive maintenance should include the maintenance checks listed on the following page:

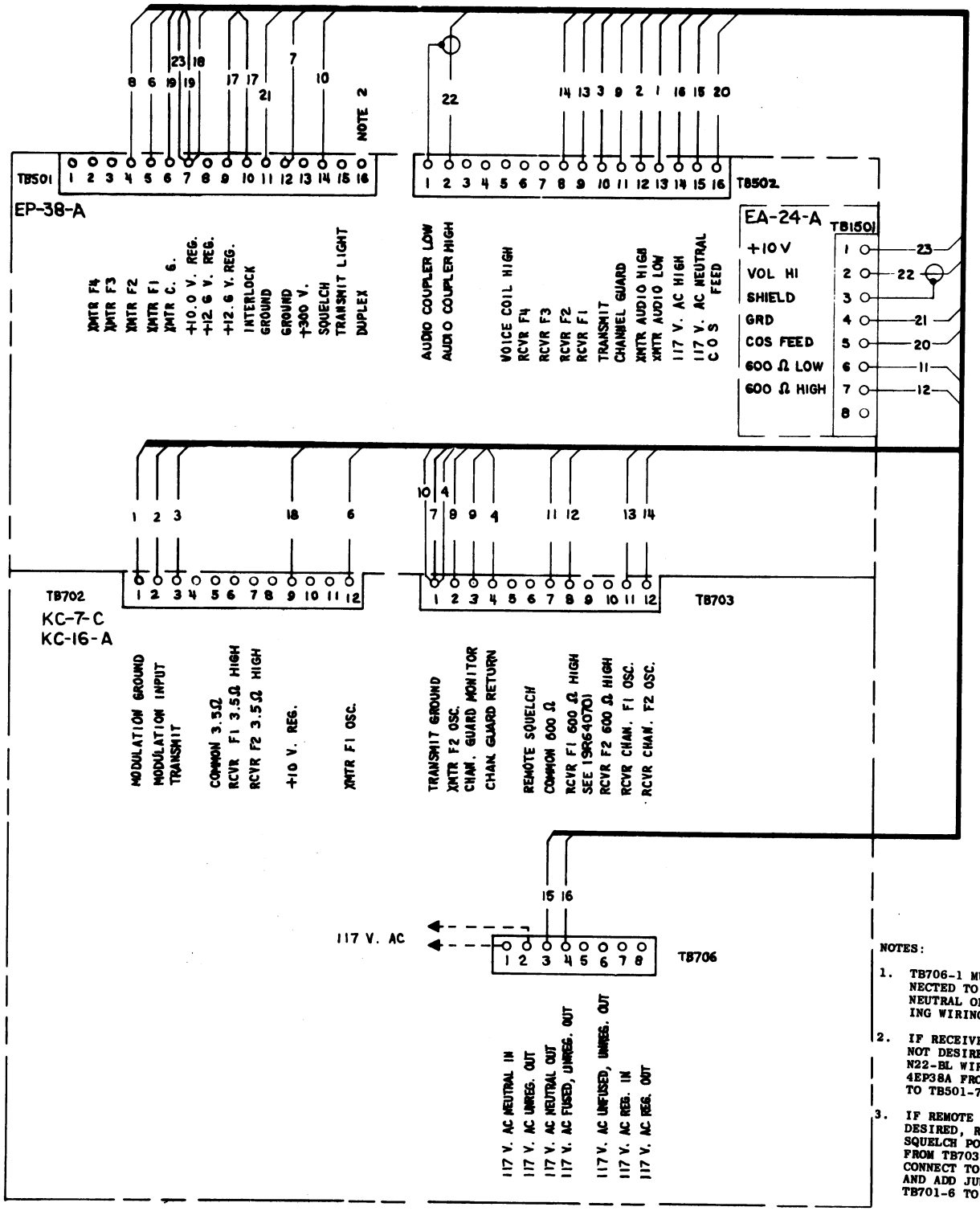
PREVENTIVE MAINTENANCE PROGRAM

CHECK THE FOLLOWING ONCE A YEAR:

1. Transmitter frequency and deviation (FCC requires this check-up at least ONCE a year) ..... ☐
2. Measure and record the antenna system VSWR ..... ☐
3. Check input voltage at TB706-1 and -2 on control panel. Reading should be within 10% of 117 VAC. (Also check during routine service calls) ..... ☐
4. Compare and record transmitter meter readings with voltage taken during initial tune-up. Retune, if necessary ..... ☐
5. Compare and record receiver meter readings with voltage taken during initial tune-up. Retune, if necessary ..... ☐
6. Check for positive indication of pressure on transmission line pressure gauge (if pressurized line is used) ..... ☐
7. Clean dust from fan blades and lubricate bearings ..... ☐
8. Burnish pitted or coated relay contacts to smooth out metallic deposits or remove the coating ..... ☐

MAKE THE FOLLOWING MAINTENANCE CHEKCS DURING ROUTINE SERVICE CALLS:

1. Check antenna lines and mast for mechanical stability ..... ☐
2. Visually check:
   - External cables ..... ☐
   - Internal cables ..... ☐
   - plugs ..... ☐
   - sockets ..... ☐
   - terminal boards ..... ☐
3. Check for tightness of nuts, bolts, and screws to make sure nothing is working loose from its mounting ..... ☐
4. Replace tubes as necessary. (It may be convenient to replace all station tubes during the yearly check-up) ..... ☐



(DF-9014)

NOTES:

1. TB706-1 MUST BE CONNECTED TO GROUND OR NEUTRAL OF THE BUILDING WIRING SYSTEM.
2. IF RECEIVER MUTE IS NOT DESIRED, MOVE N22-BL WIRE INSIDE 4EP38A FROM TB501-16 TO TB501-7.
3. IF REMOTE SQUELCH IS DESIRED, REMOVE SQUELCH POT WIRE #10 FROM TB703-1 & CONNECT TO TB703-6 AND ADD JUMPER FROM TB701-6 TO TB702-1.

(19D413495, Rev. 2)

INTERCONNECTION DIAGRAM

MASTR POLE MOUNT STATION COMBINATION
REMOTE CONTROL PANEL

Issue 2

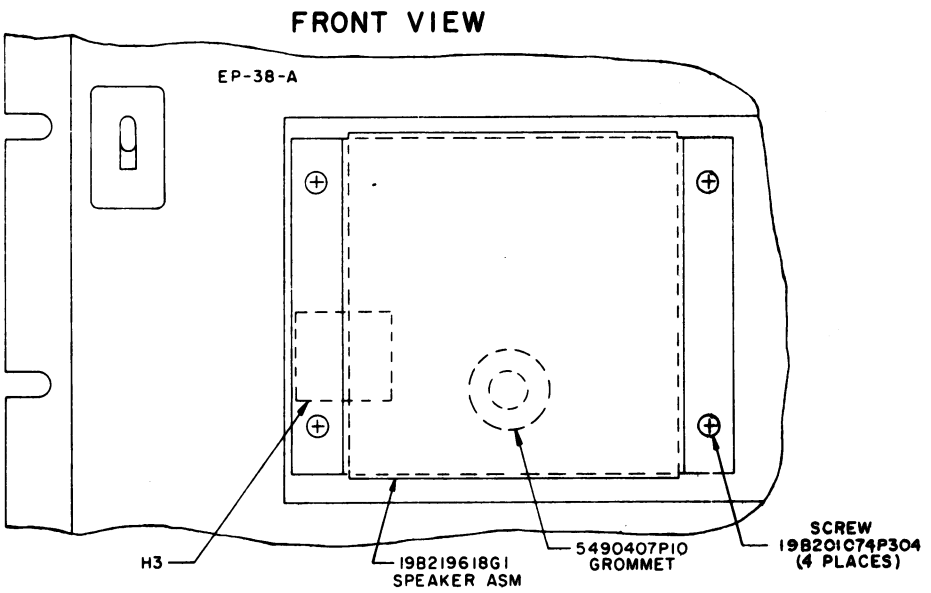
PARTS LIST

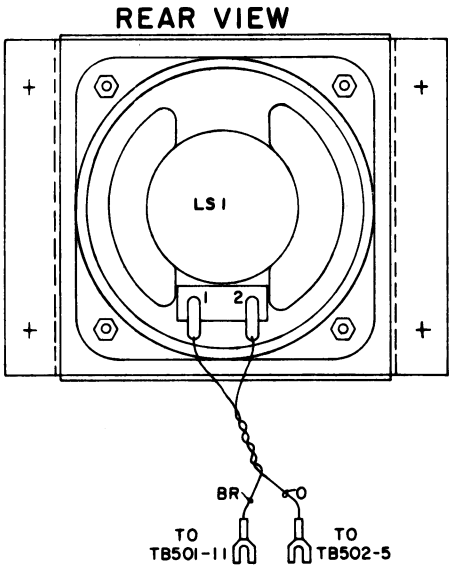
LBI-4427

STATION SPEAKER
19B219618G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS1	19A115964P1	Weatherproof, Permanent Magnet: 3-1/2 inch, 16 ohm ±10% imp at 1000 Hz, 15-19 ohms DC; sim to Oaktron S-9847.
		- - - - - - - - - - MISCELLANEOUS - - - - - - -
	19B219615P1	Cover.
	19B209260P103	Terminal, solderless: sim to AMP 60495-1.
	5490407P10	Grommet.
	19B201074P304	Tap screw: No. 6-32 x 1/4.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES





(19C320601, Rev. 1)

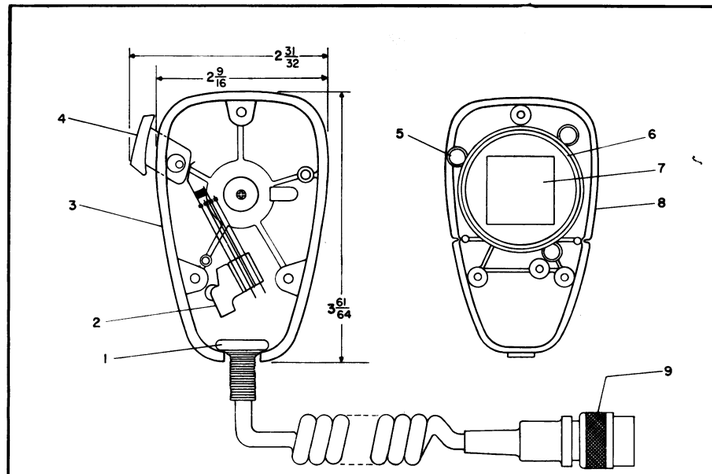
PARTS LIST

LBI-3558B

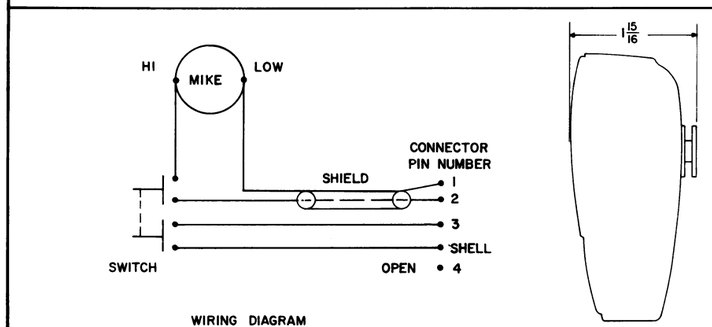
MILITARY MICROPHONE
MODEL 4EM25A10
(PL-19B209102-P1)
(SEE RC-1163)

SYMBOL	G-E PART NO.	DESCRIPTION
		MECHANICAL PARTS
		MODEL 4EM25A10
1		Cable clamp. Shure Brothers RP-16.
2		Switch. Shure Brothers RP26.
3		Case (back) and mounting button: plastic. Shure Brothers RP-67.
4		Switch button: red plastic. Shure Brothers RP-25.
5		Spring. Shure Brothers RP-1.
6		Shield. Shure Brothers RP-23.
7		Magnetic controlled cartridge. Shure Brothers RP-13.
8		Case (front) plastic. (Part of item 3).
9		Cable and plug: approx 6 feet long. Shure Brothers RP-14.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



4EM25A10



WIRING DIAGRAM

RC-1163B

MILITARY MICROPHONE—MODEL 4EM25A10

PARTS LIST

LBI-4151

MASTR POLE MOUNT STATION CABINET
7132483-G6

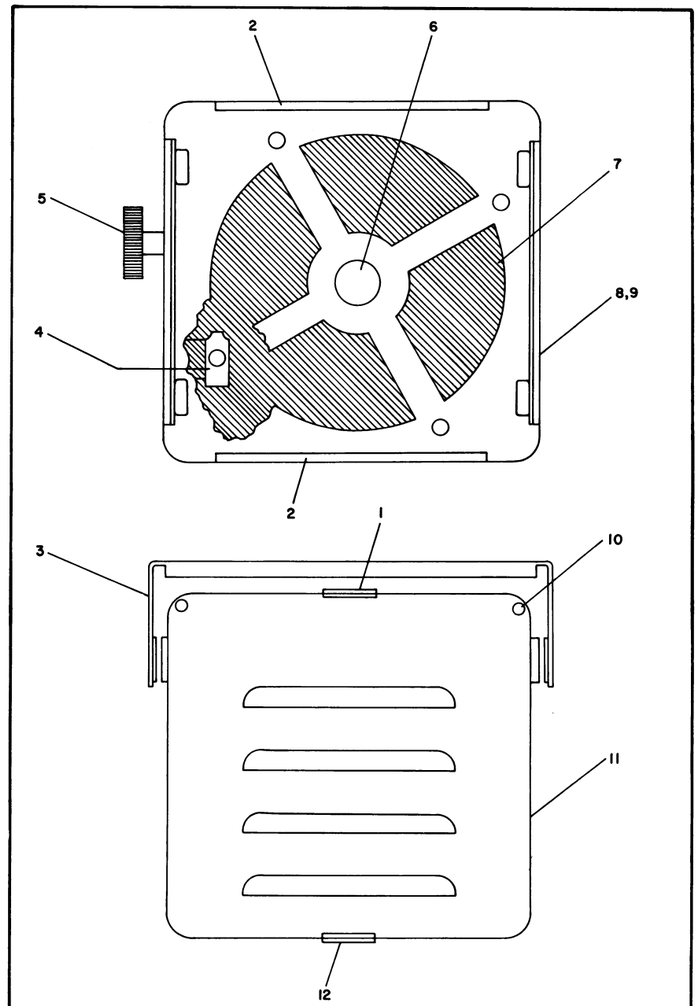
SYMBOL	GE PART NO.	DESCRIPTION
	7353495-P5. 18 19. 20	Door Assembly: Weather seal: rubber, Manhatten Division of Raybestos Manhatten Inc.; Passiac, N.J. 1/2 " OD x 1/4" ID x 9'7". A12A2A.
	7769652-G1	Hinge Assembly: (for swing out mounting bracket).
		Hinge, door: Stanley, cat No. 195 with leaves assembled reversed, no swage, without mounting holes. (give all above information when reordering).
		Pull-Latch: Corbin Cab Lock Co. No. 015642SD.
	7769631-G1	Mounting bracket: (mounts on swing away hinge assembly).
	NP148724	Nameplate (GENERAL ELECTRIC).
	N107P9004-C13	Tap screw: No. 4-40 x 1/4. (Used to secure nameplate).
	7763541-P7	Cable clip: (Lower).
	7763541-P6	Cable clip: (Upper).
	N80P15007C13	Screw, phillips: 8-32- x 7/16. (Used with cable clips).
	N210P15C14	Nut: 8-32. (Used with cable clips).
	N403P16C13	Lockwasher: external tooth, No. 8. (Used with cable clips).
	N80P19008C13	Screw, phillips: 12-24 x 1/2. (Used to secure rack panel assemblies).
	N403P21C13	Lockwasher: external tooth, No. 12. (Used to secure rack panel assemblies).
	19A121317-G15	Interconnection Harness.

PARTS LIST

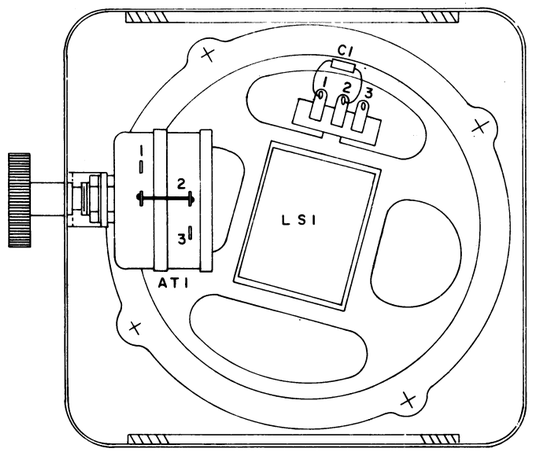
HEATER
MODEL 4KZ3A1

SYMBOL	G-E PART NO.	DESCRIPTION
HR901		Heater Strip: sim to General Electric 51-344.
S901		Thermo-switch: adjusted to +5°F, sim to Fenwall Inc. A-7300.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



RC-1164A



NOTE: ATTENUATOR (AT1) USED ON MODEL 4EZ16A20 ONLY

RC-1363 B

WIRING DIAGRAM - MODEL 4EZ16A20

RC-1362 B

The speaker leads connect to TB501-11 and TB502-5 on the Transmitter-Receiver Power Supply.

SPECIFICATIONS

Audio Power Input:	5-watts
Frequency Range:	300-3000 Hz
Input Impedance:	3.2 ohms
Attenuator:	3.5 ohms

PARTS LIST

LBI-4081

FIVE-WATT STATION SPEAKER

MODEL 4EZ16A20 19D402449-G13
MODEL 4EZ16A21 19D402449-G14

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - ATTENUATORS - - - - - - - - -
AT1	7478301-P48	L-pad, variable, audio: 3.5 ohms res, 4 w, 40 db min attenuation max, 294° rotation.
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19B209233-P1	Electrolytic, non-polorized: 25 µf ±20%, 25 VDCW; sim to Sprague 41D.
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS3	19B209422-P1	Permanent magnet: 5 inch, 3.2 ohms ±10% imp, 2.98 ohms ±15% DC res, 7.5 w max operating.
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W2	7484521-G7	Speaker: 2 conductor with 2 spade tongue terminals, approx 4 feet long.
		MECHANICAL PARTS (SEE RC-1164)
1	5490407-P3	Neoprene grommet.
2	19A121623-P1	(Not used).
3	19A121521-G1	Mounting support.
4	7160861-P20	(Not used).
5	19A115837-P1	Plastic knob. (Used in Model 4EZ16A20).
6	19A12467-P1	(Not used).
7	19C303500-P1	(Not used).
8	19B216269-G3	Can. (Used in Model 4EZ16A20).
9	19B216269-G2	Can. (Used in Model 4EZ16A21).
10	4037072-P10	(Not used).
11	19A121550-G3	Speaker cover.
12	19A115470-P1	Rubber grommet: approx 3/4 inch dia; sim to Atlantic Rubber 2279 (without hole).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

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 - 4146

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

DF-9014

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