

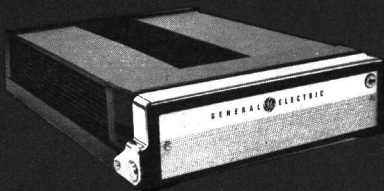
 **MOBILE RADIO**

# MASTR

## PROGRESS LINE

### *Professional Series*

**MAINTENANCE MANUAL**



**MOBILE RADIO**



**CONTROL UNIT**

470—512 MHz  
30 and 60 Watt

**TWO-WAY FM  
MOBILE  
COMBINATIONS**

LBI-4435

DF-9013



**SPEAKER**

**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.

## EQUIPMENT INDEX

EQUIPMENT	MODEL OR TYPE NUMBER
30-Watt Transmitter 60-Watt Transmitter	ET-59-G&H ET-60-G&H
Receiver	ER-42-K&L
Control Unit	EC-59-A
Power Supplies 12-Volt, 70-Watts 12-Volt, 35-Watts 6/12-Volts 12/28-Volts	4EP37A10 4EP37B10 4EP37C10 4EP37D10
Five-Watt Speaker	4EZ16A19
Microphone	4EM25A10
470 470-512 MHz Roof-Mount Antenna	4EY12A13
Fuse Assembly 12-Volt (Medium Power) 12-Volt (High Power)	19B216021G2 19B216021G3
Fuse and Relay Assembly 6-Volts 28-Volts	7487952G20 7487952G19
Mounting Frame	19C303430G1
Mounting Hardware Trunk Mount Front Mount	19A121626G2 19A121626G1
Battery Cables 12- or 28-Volt 6-Volt	7147499G6 7147499G5
Trunk-Mount Power Cable 12-Volt 6-Volt 28-Volt	19C303601G2 19C303606G1 19C303603G2
Front-Mount Power Cable 12-Volt 6-Volt 28-Volt	19C303601G1 19C303607G1 19C303603G1
Trunk-Mount Control Cable (18-Foot) One-Frequency Multi-Frequency	19C303626G1 19C303626G3
Ignition Switch Cable 12-Volt 6- or 28-Volt	19A121454G1 19A121454G2
Microphone Bracket	7141414G2
Key	5491682P8
Alignment Tools Hex Slug Type Slotted Screw Type	4038831P2 4033530G2
OPTIONS	
Trunk-Mount Spacer Kit, Option 7082 23-Foot, 12-Volt Power Cable, Option 7083 23-Foot Control Cable One-Frequency, Option 7084 Multi-Frequency, Option 7085	19A121884G1 19C303601G3 19C303626G2 19C303626G4

## SPECIFICATIONS

### DIMENSIONS (H x L x W)

Trunk Mount  
Front Mount.

3-3/4" x 19" x 13-1/2"  
3-3/4" x 19-7/8" x 13-1/2"

### WEIGHT

64 pounds

### BATTERY DRAIN

#### 30 WATTS

(470-512 MHz only)

#### 60 WATTS

#### Receiver

At 13.8 VDC

At 28 VDC

At 6.6 VDC

At 13.8 VDC

Standby (Squelched)

175 mA

450 mA

2.1 amps

175 mA

Full Audio (5 Watts)

1.1 amps

1.3 mA

3.9 amps

1.1 amps

Transmitter Filaments  
On (Squelched)

1.2 amps

1.25 amps

4.8 amps

1.9 amps

#### Transmitter

At 13.6 VDC

At 28 VDC

At 6.4 VDC

At 13.4 VDC

14 amps

7 amps

31 amps

25 amps

### DUTY CYCLE

Transmit: 20% (one minute on, four  
minutes off)

Receive: Continuous

### 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	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit	8th & 9th Digits
Mechanical Package	Operating Voltage	RF Power Output Range	Channel Spacing	Mounting	Number of Freq.	Options	Frequency Range
<b>M</b> Mobile Unit	<b>T</b> 12-VDC Unit	<b>5</b> 16—38 watts	<b>5</b> 25 kHz	<b>T</b> Trunk-Mount Mobile	<b>A</b> 1-Freq. T 1-Freq. R	<b>S</b> Standard	<b>81</b> 470—494 Hz
	<b>A</b> 6/12-VDC unit with 12-V cables	<b>6</b> 38—64 watts		<b>F</b> Front-Mount Mobile	<b>B</b> 2-Freq. T 1-Freq. R	<b>U</b> Channel Guard	<b>91</b> 494—512 Hz
	<b>E</b> 6/12-VDC unit with 12-V cables				<b>C</b> 2-Freq. T 2-Freq. R	<b>P</b> UHS Receiver	
	<b>U</b> 28/12-VDC unit with 28-V cables				<b>D</b> 1-Freq. T 2-Freq. R	<b>G</b> UHS Receiver & Channel Guard	
	<b>J</b> 28/12-VDC unit with 12-V cables				<b>E</b> 3-Freq. T 3-Freq. R		
					<b>F</b> 4-Freq. T R-Freq. R		

## DESCRIPTION

General Electric MASTR Progress Line Mobile Radio Combinations are attractively styled, ruggedly constructed units that are designed to meet the most stringent requirements in the field of two-way FM radio.

The MASTR combination is contained in a "slide-rail" mounting frame and is designed for either Front-Mount or Trunk-Mount installations. The radio is tamperproof when locked in the mounting frame. When unlocked, the unit can be easily pulled out of the frame for servicing.

Both the transmitter exciter board and the receiver are fully transistorized. Silicon transistors are used throughout for added reliability.

In many installations, battery drain in standby operation is so low (only 50 milliamps in 12-volt systems) that the radio never has to be turned off.

## SERVICING

The MASTR transmitter, receiver and power supply consist of one-piece modules that can be easily removed from the splash-proof mobile case. All major modules and tuning adjustments are accessible from the top of the unit.

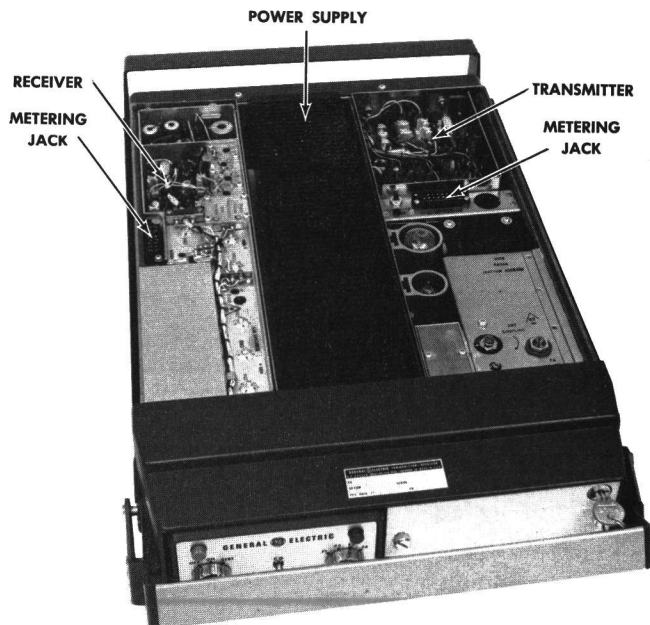


Figure 1 - Typical Module Layout for MASTR Progress Line

Both the transmitter and receiver are equipped with centralized metering jacks 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.

## TRANSMITTER

The transmitter assembly consists of the transistorized exciter board and the power amplifier section. Both the 30-watt and 60-watt transmitters use only three tubes, and may be equipped with:

- One through four frequencies
- Channel Guard (to eliminate nuisance calls)

## RECEIVER

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

- One through four frequencies
- Channel Guard

## POWER SUPPLIES

Four different transistorized power supplies are available for MASTR mobile combinations. In the medium power range (30-watt), power supplies are available for the following positive or negative ground vehicle systems:

- 12-Volt
- 6/12-Volts
- 12/28-Volts

The high power (60-watt) supply will operate in a 12-volt positive or negative ground vehicle only.

## CONTROL UNITS

The Control Unit is used for both Front-Mount and Trunk-Mount installations. In Front-Mount applications, the Control Unit is attached to the front panel of the two-way radio. In Trunk-Mount applications, the Control Unit is mounted on the underside of the instrument panel near the operator.

## INITIAL ADJUSTMENT

After the MASTR Two-Way Radio has been installed (as described in the INSTALLATION Manual), the following adjustments should be made by an electronics technician who holds a 1st or 2nd Class FCC Radiotelephone license. Alignment tools are provided with the radio.

Make sure that a RADIO TRANSMITTER IDENTIFICATION form (FCC Form 454-C or General Electric Form NP270303) has been filled out and attached to the transmitter.

### TRANSMITTER ADJUSTMENT

The initial adjustment for the transmitter includes loading the power amplifier into the antenna, and checking the frequency procedure, refer to the ALIGNMENT PROCEDURE in the MAINTENANCE MANUAL for the transmitter.

#### NOTE

Battery polarity must be observed when the two-way radio is installed. No damage will occur to the unit if the power cable connections are accidentally reversed, as long as the unit is not keyed. However, connecting the yellow and black ignition switch leads to the wrong polarity will cause the inline fuse in the yellow lead to blow. Always check to see if the receiver is operating properly before keying the transmitter.

### RECEIVER ADJUSTMENT

The initial adjustment for the receiver includes zeroing the receiver to the system operating frequency, and matching the antenna transformer to the antenna. For the Receiver Initial Adjustment Procedure, refer to the FRONT END ALIGNMENT PROCEDURES in the MAINTENANCE MANUAL for the receiver.

## OPERATION

Complete operating instructions for the Two-Way Radio are provided in the separate OPERATOR'S MANUAL (LBI-3525). The basic procedures for receiving and transmitting messages follows:

### TO RECEIVE A MESSAGE

1. Turn the radio on by turning the STBY-ON-OFF switch to the STBY (Standby) position if you are not expecting any calls but wish to monitor other calls, or to the ON position if you expect to have to answer calls. The green light stays off in the STBY position to save battery.
2. Turn the SQUELCH control clockwise (to the right) as far as possible.
3. Adjust the VOLUME control until the "hissing sound is easily heard, but is not annoyingly loud.
4. Now, slowly turn the SQUELCH control counterclockwise (to the left) until the "hissing" sound just fades out.

The radio is now ready to receive messages from other radios in the system.

### TO TRANSMIT A MESSAGE

1. Apply power to the transmitter by turning the STBY-ON-OFF switch to the ON position. Let the unit warm up for 30 seconds.
2. Press the push-to-talk button on the microphone and speak across the face of the microphone in a normal (or softer) voice. Release the button as soon as the message has been given. The red signal light on the control panel will glow each time the microphone button is pressed, indicating that the transmitter is on the air. The receiver is muted whenever the transmitter is keyed.

## MAINTENANCE

### 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 at regular intervals. This preventive maintenance should include the maintenance checks listed on the following page.

### 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.

MAINTENANCE CHECKS	INTERVAL	
	6 Months	As Required
CONNECTIONS - Ground connections and connections to the voltage source should be periodically checked for tightness. Loose or poor connections to the power source will cause excessive voltage drops and faulty operation.	X	
GENERATOR AND REGULATOR - The generator and voltage regulator should be maintained periodically to keep the generating system within safe and economical operating limits. If generator voltage is excessive, tube, lights, etc., may burn out prematurely. This condition is indicated when the battery loses water rapidly. Usage of 1 or 2 ounces of water per cell per week is acceptable for batteries in continuous operation.		X
MECHANICAL INSPECTION - Since mobile units are subject to constant shock and vibration, check for loose plugs, nuts, screws, and parts to make sure that nothing is working loose.	X	
RELAY CONTACTS - Examine the contacts of the relay. Where relay contacts carry little or no current, the contacts do not clean themselves and an insulating coating is apt to form. When contacts become coated, remove the film with a suitable solvent applied with a non-metallic brush, such as a toothbrush. Current-carrying contacts are subject to pitting and should be burnished from time to time. Dust and particles should be removed by a clean, dry, non-metallic brush.		X
ANTENNA - The antenna, antenna base and all contacts should be kept clean and free from dirt or corrosion. If the antenna or its base should become coated or poorly grounded, loss of radiation and a weak signal will result.	X	
ALIGNMENT - The transmitter and receiver meter readings should be checked periodically, and the alignment "touched up" when necessary. Refer to the applicable ALIGNMENT PROCEDURE and Troubleshooting Sheet for typical voltage readings.		X
FREQUENCY CHECK - Check transmitter frequency and deviation as required by FCC. Normally, these checks are made when the unit is first put into operation, after the first six months, and once a year thereafter.		X

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 Two-Way Radio, 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.

## 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

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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.

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GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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