GE'S FIRST FAMILY

The MASTR II line of base stations is a complete family of FM radio fixed stations. Approximately 50,000 practical combinations may be selected from standard catalog listings. The utility of each of these combinations may be further enhanced by adding one or more of the 80 options and accessories available.

MASTR II Base and Repeater Stations are offered in 3 RF power ratings and all are adjustable—low power (40 watts), medium power (65 and 110 watts) and high power (250 and 300 watts). Stations in all ratings may be ordered for simplex or duplex operation and be equipped for one of nine different control systems.

ALL SOLID STATE

MASTR II solid-state base stations have benefited from contemporary technology and use a large number of custom-designed integrated circuits and many unique components. In DC control systems, Opto-couplers provide for maximum control line isolation and the virtual elimination of hum. A ferro-resonant transformer in the power supply minimizes the effect of line voltage transients and closely maintains line regulation.

Low and medium-power stations are all solid state using conservatively rated silicon semiconductors. High power stations also are fully transistorized right up to the final power amplifier which incorporates a time proven ultra-reliable tube in the output stage.
MASTR II STATION HIGHLIGHTS

HIGH POWER MODEL

A. Built-in panel meters are standard.
B. The top portion of a high power station contains the power amplifier, PA power supply interface panel and supply power distribution panel. Rack space also is available for extra options.
C. The bottom section consists of the same chassis (transmitter, receiver, power supply and control shelf) as described for low and medium power models. In this case, however, the transmitter is used to drive the PA.

LOW AND MEDIUM POWER MODELS

1. UNITIZED CONSTRUCTION
   Channelled sides and bottom are formed from a single sheet of 16 gauge steel. ("D" cabinet shown with front and rear key-locked panels removed.)
2. RADIO AND CONTROL SECTIONS
   Assembled as a unit into an integral frame which is suitable for either cabinet or open-rack mounting.
3. RACK SPACE FOR OPTIONS
   Larger cabinets will have proportionately more rack space available.
4. COMPUTER-QUALITY POWER SUPPLY
   Totally enclosed and capable of either cabinet or open-rack mounting.
5. CONTROL AND OPTION SHELF
   Accepts up to nine plug-in option and/or function modules. With an optional extender board, modules can be "in-circuit" tested. (Control shelf not included in Extended Local Control models rated for intermittent duty.)
6. LED INDICATORS
   Provide visible status of important operational modes at the station.
7. TRANSMITTER POWER AMPLIFIER
   Front cover is spring-fitted for fast removal without tools. (Illustration shows 100 watt continuous duty PA.)
8. VERTICAL FRONT DOOR
   Swings down from its normal upright position for convenient servicing of receiver and exciter. (Shown with compartment cover removed.)
9. FUSE, AC OUTLET AND LINE SWITCH PANEL
   Swings down and open for reconnecting the transformer terminal strip for 242 VAC.
10. SINGLE CONVERSION RECEIVER
    Single conversion receiver with monolithic crystal filters and quadrature detector assures stable, interference-free reception.

Channelled sides and bottom are formed from a single sheet of 16 gauge steel. ("D" cabinet shown with front and rear key-locked panels removed.)
**REPEATER & BASE STATIONS**

**General Specifications and Dimensions**

**General Data**

<table>
<thead>
<tr>
<th>CABINET</th>
<th>INDOOR CABINETS (floor mount)</th>
<th>INDOOR/OUTDOOR CABINET (wall or pole/crossarm mount)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination 1st Digit</td>
<td>&quot;D&quot;</td>
<td>&quot;S&quot;</td>
</tr>
<tr>
<td><strong>SIZE [in. (cm)]</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height:</td>
<td>30-1/4 (76.8)</td>
<td>44-1/4 (111.4)</td>
</tr>
<tr>
<td>Width:</td>
<td>21-1/2 (54.6)</td>
<td>21-1/2 (54.6)</td>
</tr>
<tr>
<td>Depth:</td>
<td>15.5 (39.4)</td>
<td>15.5 (39.4)</td>
</tr>
<tr>
<td><strong>WEIGHT (min.) [lb. (kg)]</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent Duty:</td>
<td>152 (69)</td>
<td>172 (78)</td>
</tr>
<tr>
<td>Continuous Duty:</td>
<td>160 (72.5)</td>
<td>180 (81.8)</td>
</tr>
<tr>
<td>Packed for Domestic Shipping:</td>
<td>175 (79.3)</td>
<td>195 (88.4)</td>
</tr>
<tr>
<td><strong>NUMBER OF RACK UNITS:</strong></td>
<td>14</td>
<td>22</td>
</tr>
</tbody>
</table>

*Note: One Rack Unit equals 1.75 inches. 40, 65 & 110 W station combinations occupy 11 rack units and 250 & 300 W station combinations occupy 27 rack units of cabinet space.*

**Service Speaker:**
1.5 Watts @ 18 ohms

**Service Microphone:**
Transistorized dynamic

**Performance Data**

**Duty Cycle (EIA)**

- Intermittent: Transmit - 20%; Receive - 100%
- Continuous: Transmit/Receive - 100%

**Ambient Temperature:**

-30°C to +50°C

**Humidity (EIA):**
90% @ 50°C (122°F)

**Input Power Source:**

121 VAC (±20%), 60 Hz

**Optional 50 Hz Source:**

-100/110/120/125.5 VAC
- (Lo & Med. Pwr. — convertible to 242)

**Optional Standby Battery Source:**
13.8 VDC, 55 AH (min.)

*High power stations require external stepdown transformer for use on 220 VAC, 50 or 60 Hz power source.*

**Altitude**

- Operable: Up to 15,000 ft. (4,570 m.)
- Low & Med. Pwr.: Up to 10,000 ft. (3,250 m.)
- High Power: Up to 5,000 ft. (1,525 m.)
- Shippable: Up to 50,000 ft. (15,250 m.)

**Source Power Drain**

- Receiver: 65 W (max.); 176 W (max.); 5 W (Av.)
- Transmitter: 105 W (max.); 200 W (max.); 25 W (Av.)
- (typical models)
- DC56———: 270 W (max.)
- DC66———: 270 W (max.)
- DC76———: 560 W (max.)
- VC96———: 750 W (max.)
- VC96———: 810 W (max.)

**Audio (Line to Transmitter)**

- Line Terminating Impedance: 600 ohms (150 and 900 ohms optional)
- Line Level (adjustable): -20 dBm to +11 dBm
- Output Level to Transmitter (max): 400 mV (adjustable)
- Remote Station: 200 mV (adjustable)
- Frequency Response: ±3 dB @ 300-3000 Hz
- Line Bridging Impedance: 3K ohms @ 300 Hz

**Tone Control**

- Function Tones: 1050, 1150, 1250, 1350, 1450, 1550, 1650, 1750, 1850, 1950 & 2050 Hz
- Secur-it Tone & Transmit Tone: 2175 Hz
- Transmitted 2175 Hz Tone Level: 65 dB below voice
- Permissible Control Line Loss @ 2175 Hz: 50 dB

**Tone & DC Remote Controlled Stations**

**Audio (receiver-to-line)**

- Audio Amplifier: 40 K ohms
- Input Impedance: 1 V rms (330 mV per kHz deviation)
- Output Impedance to Line: 600 ohms (150 and 900 ohms optional)
- Output Level to Line: 0 VU (adjustable)
- Frequency Response: +1 dB and -3 dB @ 300-3000 Hz
- Hum and Noise:
  - Noise Squelch: -55 dB (ref. 11 dBm)
  - Tone Squelch: -30 dB (ref. 11 dBm)

**DC Control**

- Control Currents: -2.5, ±6 & ±11 mA
- Line Loop Resistance (maximum): 11 K ohms (includes 3 K termination)
**REPEATER & BASE STATION OPERATING SPECIFICATIONS**

138 to 174 MHz

**TRANSMITTER**

<table>
<thead>
<tr>
<th>MODEL SERIES</th>
<th>DUTY CYCLE (EIA)</th>
<th>POWER OUTPUT RANGE</th>
<th>POWER INPUT (Maximum)</th>
<th>5 ppm</th>
<th>2 ppm</th>
<th>0.06 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) 156E</td>
<td>Intermittent</td>
<td>10 to 40 W</td>
<td>85 W</td>
<td>KT-41-B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) 166E</td>
<td>Intermittent</td>
<td>10 to 65 W</td>
<td>130 W*</td>
<td>KT-42-A</td>
<td>KT-42-C</td>
<td></td>
</tr>
<tr>
<td>(1) 176E</td>
<td>Intermittent</td>
<td>20 to 110 W</td>
<td>255 W**</td>
<td>KT-43-A</td>
<td>KT-43-C</td>
<td></td>
</tr>
<tr>
<td>(1) 186 (K, J, R or T)</td>
<td>Intermittent</td>
<td>10 to 40 W</td>
<td>85 W</td>
<td>KT-44-B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) 196 (K, J, R or T)</td>
<td>Intermittent</td>
<td>10 to 65 W</td>
<td>130 W**</td>
<td>KT-45-A</td>
<td>KT-45-C</td>
<td></td>
</tr>
<tr>
<td>(1) 176 (K, J, R or T)</td>
<td>Intermittent</td>
<td>20 to 110 W</td>
<td>255 W**</td>
<td>KT-46-A</td>
<td>KT-46-C</td>
<td></td>
</tr>
<tr>
<td>(1) C56</td>
<td>Continuous</td>
<td>10 to 40 W</td>
<td>85 W</td>
<td>KT-47-B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) C66</td>
<td>Continuous</td>
<td>10 to 65 W</td>
<td>130 W*</td>
<td>KT-48-A</td>
<td>KT-48-C</td>
<td></td>
</tr>
<tr>
<td>(1) C76</td>
<td>Continuous</td>
<td>20 to 100 W*</td>
<td>255 W**</td>
<td>KT-49-A</td>
<td>KT-49-C</td>
<td></td>
</tr>
<tr>
<td>VC86 (144 to 174 MHz)</td>
<td>Continuous</td>
<td>200 to 250 W</td>
<td>450 W</td>
<td>KT-78-A</td>
<td>KT-78-E</td>
<td>KT-78-J</td>
</tr>
<tr>
<td>VC96 (144 to 174 MHz)</td>
<td>Continuous</td>
<td>250 to 300 W</td>
<td>465 W</td>
<td>KT-79-A</td>
<td>KT-79-E</td>
<td>KT-79-J</td>
</tr>
</tbody>
</table>

1. Rated Style (1st Digit D, S, P or V) (FCC Type Accepted for 110 kW)

**RATED RF OUTPUT**

<table>
<thead>
<tr>
<th>Continuous Duty</th>
<th>Typical Models</th>
<th>DC56</th>
<th>DC66</th>
<th>DC76</th>
<th>VC86</th>
<th>VC96</th>
</tr>
</thead>
<tbody>
<tr>
<td>138 to 174 MHz:</td>
<td>40 W</td>
<td>65 W</td>
<td>100 W</td>
<td>144 W</td>
<td>174 W</td>
<td></td>
</tr>
<tr>
<td>138 to 174 MHz:</td>
<td>0 dB</td>
<td>80 dB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MODULATION DEVIATION:**

0 to ±5 kHz

(16F3, 15F2, 16F9)

**FM NOISE:**

-55 dB (std. exciter)
-70 dB (PLL exciter)

**AUDIO RESPONSE (EIA RS152B):**

Within +1 and -3 dB of
6 dB/octave pre-emphasis
300 to 3000 Hz per EIA

**AUDIO DISTORTION:**

Less than 2% @ 1000 Hz

**RECEIVER**

**SENSITIVITY**

<table>
<thead>
<tr>
<th>EIA 12 dB SINAD</th>
<th>Standard</th>
<th>UHS</th>
<th>Noise Blanker</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35 µV</td>
<td>0.175 µV</td>
<td>0.175 µV</td>
<td></td>
</tr>
<tr>
<td>0.50 µV</td>
<td>0.25 µV</td>
<td>0.25 µV</td>
<td></td>
</tr>
<tr>
<td>0.20 µV</td>
<td>0.10 µV</td>
<td>0.10 µV</td>
<td></td>
</tr>
</tbody>
</table>

**SELECTIVITY, EIA SINAD**

<table>
<thead>
<tr>
<th>@30 kHz:</th>
<th>-100 dB</th>
<th>-100 dB</th>
<th>-100 dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>@42 kHz:</td>
<td>-95 dB</td>
<td>-95 dB</td>
<td>-95 dB</td>
</tr>
<tr>
<td>Intermod.:</td>
<td>-85 dB</td>
<td>-80 dB</td>
<td>-75 dB</td>
</tr>
</tbody>
</table>

**SPURIOUS & IMAGE REJECTION:**

-100 dB | -95 dB | -95 dB

**RF INPUT IMPEDANCE:**

50 ohms

**CHANNEL SPACING:**

30 kHz/25 kHz

**MODULATION ACCEPTANCE:**

±7.0 kHz

**FREQUENCY STABILITY**

10th Digit "A" or "C":

±0.0005% (−30°C to +60°C)

±0.0002% (0°C to +55°C)

10th Digit "B" or "D":

±0.0002% (−30°C to +60°C)

**AUDIO RESPONSE:**

Within +1 and -8 dB of
6 dB/octave deemphasis
300 to 3000 Hz per EIA

**AUDIO DISTORTION:**

Less than 3%

**MULTICHANNEL PERFORMANCE W/STANDARD EXCITER**

Maximum Freq. Spread (MHz)

<table>
<thead>
<tr>
<th>Lo &amp; Med Pwr</th>
<th>Hi Pwr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8</td>
<td>2.75</td>
</tr>
<tr>
<td>2.0</td>
<td>3.0</td>
</tr>
<tr>
<td>0.60</td>
<td>0.55</td>
</tr>
</tbody>
</table>

**MULTICHANNEL PERFORMANCE W/PLL EXCITER**

Maximum Freq. Spread (MHz)

<table>
<thead>
<tr>
<th>Tx Freq. Range 138-155</th>
<th>Up to 17 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx Freq. Range 150.8-174</td>
<td>Up to 24 MHz</td>
</tr>
</tbody>
</table>

**FCC MODEL NUMBER:**

ER-64-A
The indoor/outdoor, "P" style, cabinet is a weatherproof enclosure suitable for full outdoor exposure. It is supplied with a thermostatically controlled blower to circulate air within the cabinet when needed. The front and rear doors are hinged on the same side of the cabinet so that one opens from the right and the other from the left. Both doors are gasketed and have provisions for locks. Universal brackets are furnished to accomplish wall, pedestal or crossarm/pole mounting. Optional brackets may be specified for mounting on a pole without crossarms.

The illustrations on the right show typical mounting arrangements. Note also that the cabinet may be mounted on the opposite side.

The 50,000 or more stations available in the MASTR II Base Station and Repeater line actually evolve from only 23 basic combinations. They are grouped, for reference purposes, according to operating duty cycle, power level and the type of control for each which is capable. These are identified in the Table below along with the choice of cabinets available for the two power groups.

<table>
<thead>
<tr>
<th>Duty Cycle</th>
<th>Continuous</th>
<th>Intermittent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Level</td>
<td>Up to 100 (110) Watts</td>
<td>250 to 300 Watts</td>
</tr>
<tr>
<td>Choice of Cabinet</td>
<td>30&quot; &amp; 44&quot; Indoor/Outdoor (Standard) 69&quot; Indoor</td>
<td>30&quot; &amp; 44&quot; Indoor/Outdoor (Standard) 69&quot; Indoor</td>
</tr>
</tbody>
</table>

FCC Type Accepted for 110 Watts.

KEY AND EXPLANATION OF 5TH DIGIT REFERENCES

E - Extended Local Control Provides circuits and an interface panel for a multi-conductor cable connection to a separately furnished MASTR Local Controller. With the appropriate control, full operation of the station including frequency selection up to four channels may be performed at the station location or 100 feet away. (See Note A)

K - Extended Local/DC Remote Control Same as "E" control plus provisions for connecting an optional MASTR (DC Remote) Controller via a telephone line. (See Note A)

J - Extended Local/Tone Remote Control Same as "E" control plus provisions for connecting an optional MASTR (Tone Remote) Controller via a telephone line. (See Note A)

NOTE A
A station with "E", "K" or "J" Control must always be connected to a MASTR Local Controller. When a station with either "K" or "J" Control is also connected to a Remote Controller, the remote is incapable of changing frequency or controlling any function other than push-to-talk and monitoring the channel selected by the Local Controller.

R - DC Remote Control Provides circuitry and an interface panel for connection via telephone lines to an optional MASTR (DC Remote) Controller. With the properly equipped Controller, full operation of the station with up to 6 functions including 2 frequency control, may be accomplished from many miles away.

T - Tone Remote Control Similar to "R" control except up to 14 functions including 4 channel selection may be tone controlled with a properly equipped MASTR (Tone Remote) Controller. (Tone Remote control is required wherever telephone lines lack DC continuity.)

Y - Repeater Control Transmitter and receiver are interconnected to operate full duplex (receiver signals are automatically retransmitted). Two antennas are required unless an optional duplexer is specified.

U - Repeater/DC Remote Control Same as "Y" control plus provisions for single channel "R" control when connected to an optional MASTR (DC Remote) Controller.

V - Repeater/Tone Remote Control Same as "Y" control plus provisions for up to 4 channel "T" control when connected to an optional MASTR (Tone Remote) Controller.

N - Repeater/Extended Local Control Same as "Y" control plus provisions for single channel "E" control when connected to an optional MASTR Local Controller.
**ACCESSORIES**

MASTR Local Controller - Required for all Extended Local Stations. Furnished with a Desk Microphone and an 8 foot, multi-conductor, interconnecting cable.

MASTR Local Control Extension - Similar to a Local Controller except without selector switches. For use in parallel with a Local Controller.

Remote Control Console - Required for all DC and Tone Remote Stations. Typical console may be a MASTR Remote Controller, a DESKON, a Command Control Center or equivalent.

Service Speaker - Rated 1.5 watts and supplied with ON-OFF switch, two receiver selector switch and volume control. (Furnished as standard with Repeaters, Remote, and Remote/Repeater Stations.)

Service Microphone - Provides a MASTR II military microphone where needed.

Blowers - With thermostat are available for continuous duty stations operating in unusually hot locations.

Meters (for low and medium power stations) - Up front panel-mounted meters for "V" cabinets.

Plug-in, shelf-mounted module meters.

Pole Mount Brackets - Enables an outdoor cabinet to be mounted on a telephone pole without crossarms.

Antenna Multicoupler - Used for connecting up to 4 receivers in the same band to a single antenna.

Duplexer - Enables a Repeater or duplex station to operate on a single antenna.

**FUNCTIONAL OPTIONS**

Multi-frequency - DC Remote Stations may have 2 transmit and receive frequencies; Tone Extended Local Stations may have up to 4 channels.

Channel Guard - Solid-state, available in 4 configurations; encode/decode, encode-only, decode only or encode and decode with different tone frequencies. Features plug-in networks and Squelch Tail Elimination.

Noise Blanker - Essentially eliminates impulse noise and improves reception. (Not offered in Repeaters, Stations.)

Ultra High Sensitivity (UHS) - Provides a preamplifier for the receiver. (Not offered in Repeaters, Stations.)

Phase Lock Loop Exciter - An alternate exciter with FM ICOM's for widely spaced transmitter frequencies.

2 PPM Frequency Stability - Provides all transmitter and receiver channels with ±0.0003% frequency stability.

Priority Search Lock Monitor (PSLM) - Enables two selected channels of a multifrequency receiver to be alternately monitored with priority established for one.

Carrier Control Timer - Prevents excessively long transmissions and sends an alert tone on cut-off. (Not needed on repeaters.)

Intercom - Enables the station audio circuit to be used for intercommunication by appropriately equipped Remotes. (Intercom is standard on Extended Local/Remote Stations.)

Battery Standby & Alert Tone - Provides a relay panel, battery charger and tone generator. When there is an AC power failure, automatic transfer is made to a customer-furnished 12 VDC source and an audible alarm signal is produced. The alarm will stop and the station will revert when AC power is restored. The power output of 250 or 300 W station will be reduced to approximately 15W on loss of AC power and will automatically return to full power on resumption of the AC source.

Auxiliary Receiver - For use as a second station receiver and/or a satellite receiver in a receiver voting system. A slide-out drawer assembly which occupies 2 rack units.

Duplexer Operation - May be added to (non-repeater) continuous duty stations for simultaneous transmitter and receive operations on duplex channels. Requires an optional duplexer if operation on one antenna is intended.

**CONTROL OPTIONS**

Remote Squelch - Enables a station to be operated on one of two preset noise levels.

Repeater Disable - Applies to a Remote/Repeater Station and may be used to disable the repeat function.

Squelch Operated Relay - Consists of a relay with Form "C" contacts which operates when the receiver unsquelches.

Multiple Channel Guard Encoder - A plug-in module to provide 1) independent selection of tones on Extended Local Stations, or 2) certain tones dedicated to specific channels on multifrequency Remote Stations.

Tone Decoders - Several types are available with up to 5 functions. Each will respond to a certain tone or tone pulses to initiate a specified action. Included are Digital, DTMF, Type 90 and Type 99 Tone Decoders.

Channel Guard Disable - Provides for the on-off control of the decoder on Remote/Channel Guard Stations.

Auxiliary Control - Available with or without relays for up to four control functions.

Four Wire Audio - Converts the control capability of a Remote Station from 2 to 4 wire. (Standard on stations equipped for duplex operation.)

Radio Link Application Kit - Provides a harness and control as indicated by "A" and "B" in the drawing below, for stations operating back-to-back in a radio link application.

DC Interface Panel - For low and medium power stations when operated from a 12 VDC source. Deletes the regular AC power supply.

Voting Kit - Adds a tone circuit to a station receiver which enables it to function as part of a GE receiver voting system.

Shared Repeater Panel - A 3 rack unit with up to 10 plug-in tone modules which enables a Repeater Station to be shared by up to 10 user groups.

Other Options include - 48 VDC Power Supply, Line Protection Kits, Line Compensation Kit, extra AC outlet strip, Extender Board for in-circuit testing of control modules and stepdown transformer for high power stations.

**MOBILE RADIO DEPARTMENT**

WORLD HEADQUARTERS  • LYNCHBURG, VIRGINIA  24502

ECR 1989G