

LBI-39135A

Programming Manual

M-RK/ORION

Diagnostic Radio Code (SPK0654)

Group 23 or later

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INTRODUCTION

The M-RK/Orion Diagnostic Radio Code (SPK0654) is specially designed radio code that provides diagnostic capability. The Diagnostic radio code is used as temporary replacement radio code for diagnostic purposes only. The Diagnostic radio code installation procedure (using the EDACS-3/CONV-1 PC Programmer) is the same as standard radio code. The Diagnostic radio code test features are:

- *Display/LED Verification (Power-Up Test Mode)*
- *Keypad Verification*
- *System/Group Verification*
- *Volume Knob Verification*
- *PTT, Option, Clear, Emergency Button Verification*
- *Backlight Verification (M-RK II Only)*
- *Diagnostic Variables*

This manual provides basic installation instructions for downloading the Diagnostic code into the radio using the EDACS-3/CONV-1 PC Programmer. The Programmer manual (TQ-3374 or TQ-3367) should be used as the reference for system hook-up, EDACS-3/CONV-1 PC Programming Software installation and operating instructions. The main focus of this manual is to provide diagnostic radio code operating instruction.

INSTALLATION PROCEDURE

WARNING

The PC Programmer is used to WRITE the radio (flash) code to the radio. EDACS-3/CONV-1 PC Programmer version 10 or later is also used to READ the flash (code) out of the radio. **Do not download** the Diagnostic radio code to the radio, unless there is a backup copy (on floppy diskette or hard drive) of the current radio code loaded in the radio.

STEP 1 - INITIAL SET-UP CONDITIONS:

1. Follow the System Hook-Up procedures described in Chapter 2 of the Programmer manual (TQ-3374 or TQ-3367).
2. Turn the radio on. The radio should be in the programming mode.

3. Start the EDACS-3/CONV-1 radio programmer.

STEP 2 - SAVE CURRENT PERSONALITY AND FLASH CODE

If the current personality and/or radio (flash) code are not backed up to disk, now is a good time to read the personality and/or radio (flash) code and save to disk.

STEP 3 - CREATE TEST PERSONALITY

Create a test personality. The diagnostic radio code is guaranteed to support personalities up to 2K bytes in size for version 1 and 2 (ROM 6 128K Flash and 8K Ram).

NOTE

Standard radio code supports radio personality files up to 10K bytes in size. Diagnostic test personalities should be created small. Any existing personality may be used as a test personality as long as the size of the file is approximately 2K bytes or less. Problems may occur if a personality is used larger than the recommended size.

STEP 4 - LOAD THE TEST PERSONALITY AND DIAGNOSTIC SOFTWARE

1. Insert the Diagnostic Disk into the floppy drive. From a DOS prompt type:

```
copy a:xxxxxxx.bin c:\ge\pool\bin
```

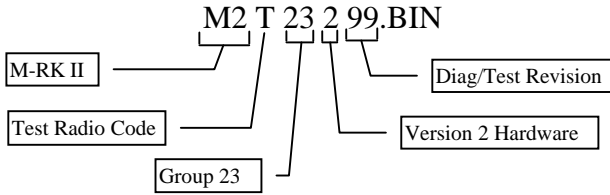
where **a:** → *is the computer floppy drive letter*

xxxxxxx.bin → *is the name of diagnostic radio code file*

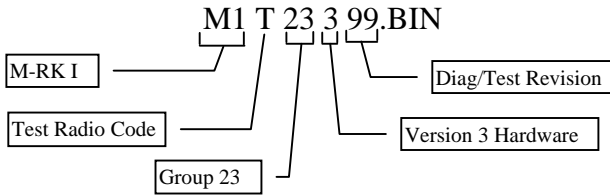
c:\ge\pool\bin → *typical location of radio code files on the computer hard drive*

The Diagnostic Radio Code diskette contains several diagnostic radio code files. Each file is applicable to a particular type of M-RK or ORION radio. The filename identifies the type of radio the file should be used for using the following method and examples:

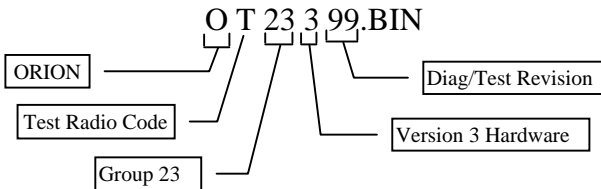
For an M-RK II with Version 2 Hardware, use file:



For an M-RK I radio with Version 3 hardware, use file:



For an ORION radio with Version 3 hardware, use file:



- From the EDACS-3/CONV-1 PC Programming Software Current Personalities Screen, press **F5 Programm**. Enter the test Personality file name.

```

Ericsson GE Mobile Communications Inc.
-----
Personalities      EDACS RADIO PROGRAMMER - 3      TQ-3374
-----

```

Program Radio

Personality name: ← **Enter Test Personality file name**

F1 - Program Personality.
 F2 - Programming options.
 F10 - Back - don't program radio.

Please be sure the radio is connected to COM1 and that the radio is turned on before pressing F1.

Use the cursor Enter the personality to program

F1 Prog F2 More F3 F4 F5 F6 F7 F8 F9 Help F10 Back

Press F9 for field help, Shift F9 for window help

Figure 1 - Program Personality Window

3. Press **F2 More** for more programming options. Tab to the Radio Code field and enter the Diagnostic radio code filename (as described earlier) that is applicable to the radio. Press **F1 Prog** to write the test personality and Diagnostic code to the radio.

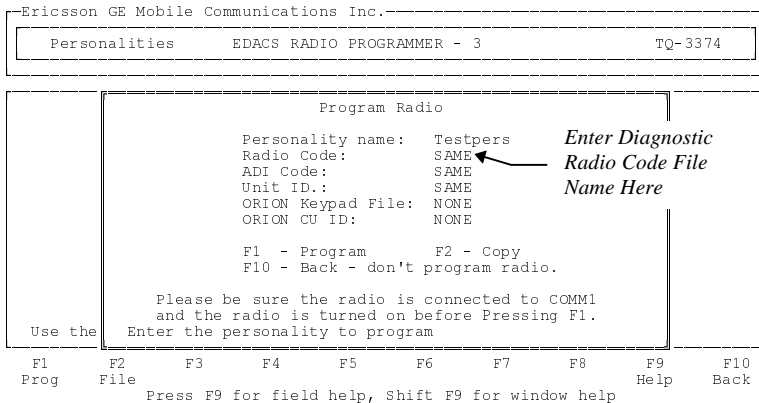


Figure 2 - Program Radio (More) Window

4. If the program radio is successful, the diagnostic code is ready to be used. Turn the radio off and disconnect the programming cable from the radio.

USING THE DIAGNOSTIC RADIO CODE

POWER-UP TEST MODE

The Power-Up Test Mode is used to verify proper operation of the display/LEDs, keypad, knobs and buttons. The Power-Up Test Mode does not apply to Orion radios due to the built in test provided with the Orion Control Unit Software. This section describes the procedure for using the diagnostic radio code Power-Up Test Mode for MRK radios and the built in control unit test for the Orion radios.

M-RK I

1. **Power-Up Test Mode Verification** . Turn the radio on. All the LEDs should be lit. After approximately one second the current system/group knob position will be indicated by a tone and the LEDs will extinguish.

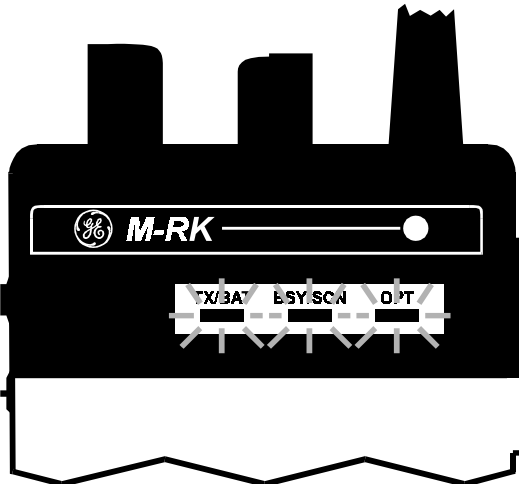


Figure 3 - M-RK I Power-Up Display

2. **Key pad verification**. Press each key on the keypad to test the keys. Every key press should cause the radio to sound the key-ack tone at the current volume level and light the corresponding LED.
3. **System/Group Knob Verification**. Repositioning the system/group knob should cause the radio to sound a tone at the current volume level corresponding to the current knob position. The tone will be higher for higher knob position. For example, the first knob position will cause the radio to sound a low frequency tone and the last knob position will cause the radio to sound a high frequency tone.

4. **Volume Knob Verification.** Repositioning of the Volume knob should cause the radio to sound the key-ack tone at the new volume level.

M-RK II/M-RK II Scan

1. **Power-Up Test Mode Verification.** Turn the radio on. All pixels and icons on the display should be lit at the power up contrast level set by the PC Programmer. Next, the current system/group knob position should be indicated on the bottom line along with the key-ack tone at the current volume level. After approximately one (1) second, the icons as well as the current system/group knob position display message should extinguish.

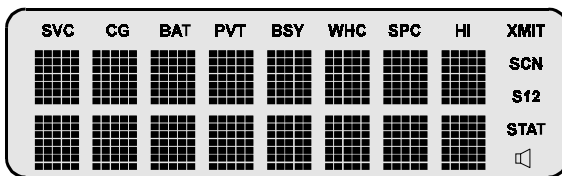


Figure 4 - M-RK II Power-Up Display

2. **Key Pad Verification.** Every key press should cause the radio to sound the key-ack tone at the current volume level and display (on the top line) the name of the key or the label that is printed on the key. The top line of the display will return to the fill pixel display after approximately one (1) second.

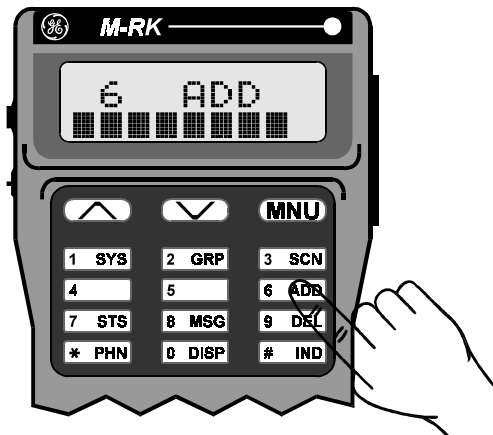


Figure 5 - M-RK II Key Pad Verification

3. **System/Group Knob Verification.** Repositioning the system/group knob should cause the radio to sound the key-ack tone at the current volume level and display the knob position on the bottom level of the display. The bottom line of the display returns to the full pixel display after approximately one (1) second.
4. **Volume Knob Verification.** Changing the Volume knob should cause the volume level to change and be displayed on the top line. The top line of the display will return to the full pixel display after approximately one (1) second.
5. **Backlight Verification.** Pressing the PTT button, Option button, Clear button or any key on the keypad should cause the backlight to light up at the level indicated by the PC Programmer.

Orion Control Unit Test

The Orion Control Unit has built into the Software the capacity to test the control unit's keypad, display, LED's, knobs and buttons. For this reason the Diagnostic Radio Code Power-Up Test Mode does not apply to the Orion radio.

1. To Access the Orion Control Unit Test Mode, press the appropriate two (2) keys on the keypad simultaneously. See Figure 4.

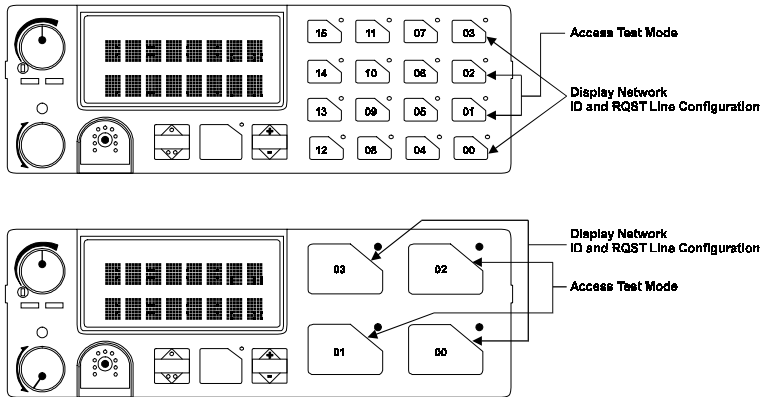


Figure 6 - Access Control Unit Test Mode

1. Upon entering the control unit test mode, the following conditions should occur:
 - copyright information should be on the display
 - all keylights should be on
 - the BUSY, SCAN and TX LEDs should be on

2. Use the Up1 and Down1 to control the display intensity. Use the Up2 and Down2 to control the backlight intensity.
3. Test the keys on the keypad by pressing each key. The keylight above each key should extinguish as the key is pressed.
4. After all the keylights are extinguished, the BUSY, SCAN, and TX LEDs should go out.
5. The volume, light intensity and rotary selector knob information along with software version should appear on the display.
6. Pressing keys **01** and **02** will display the control unit's network ID and RQST line configuration. Pressing the **01** and **02** keys will also result in the Federal SS2000 siren and lights interface to send out a two byte bit pattern.

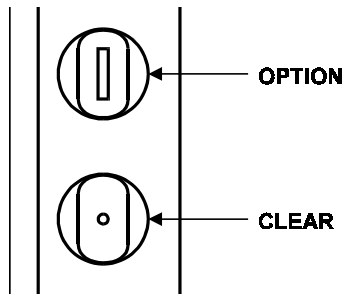
NOTE

In the control unit test mode, the control unit will not communicate with any network devices.

RADIO OPERATION (M-RK Radios Only)

When the radio is powered up with the diagnostic code, the radio is in the Power-Up Test Mode as described previously. To exit the Power-Up Test Mode and enter the Diagnostic Test Load Mode (normal operation with limited features):

press the **OPTION** and
CLEAR buttons
simultaneously



The Diagnostic Test Load Mode allows the radio to function as a normal radio with a limited set of features. The following is a list of enabled and disabled features for Conventional and Trunked systems.

Enabled General Features

- ⇒ Diagnostic Variables Menu
- ⇒ Battery Feature
- ⇒ System Change
- ⇒ Volume Adjust
- ⇒ Group/Channel Change

Disabled General Features

- ⇒ Regular Menu

NOTE

The radio may power-up with a temporary error message, if the radio does not have Aegis hardware or if Aegis software has not been loaded. This warning message can be ignored.

Enabled Conventional Features

- ⇒ Tone Channel Guard/Digital Channel Guard Encode/Decode
- ⇒ Transmit And Receive
- ⇒ DTMF Encoding During Transmit
- ⇒ Channel Scanning
- ⇒ Monitor
- ⇒ Squelch Adjust

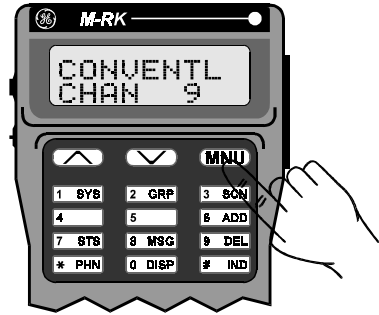
Enabled Trunked Features

- ⇒ Clear Voice Group Calls (Transmit and Receive)
- ⇒ Aegis Group Calls (Transmit and Receive)

DIAGNOSTIC RADIO MENU

The Diagnostic Radio Menu is only available for M-RK II, M-RK II Scan and Orion radios. In Conventional Systems **only**, the Diagnostic Menu displays ten (10) diagnostic variables that affect and/or reflect various aspects of the radio. There are seven (7) additional informational items provided for radios with version 3 hardware. There are four (4) transmit/receive diagnostic variables that can be edited, the remaining are for display only.

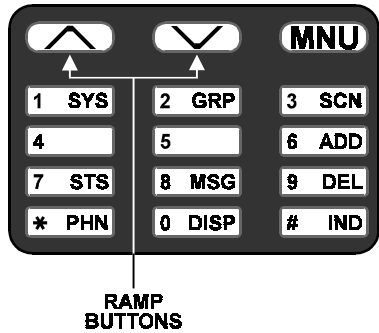
Access the Menu by pressing the **MENU** key on the radio keypad while on a Conventional System.



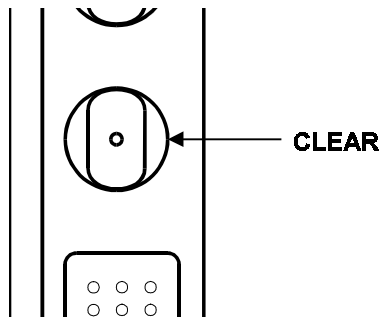
Once accessed, the Diagnostic Radio Menu displays the current diagnostic variable on the top line of the display followed by a value



Use the **Ramp Up** ▲ and **Ramp Down** ▼ keys to scroll through the menu items



Exit the menus by pressing the **CLEAR** button.



Editable Tx/Rx Diagnostic Variables

The radio operates according to the values of the diagnostic variables while in the Diagnostic menu. After exiting the menu (by pressing CLEAR) the radio operation is no longer affected by the values of the diagnostic variables.


To modify or change the value of an editable diagnostic variable, press the **MENU** key when the desired variable is being displayed. This puts the radio in the Entry Mode.

Enter the new value directly from the keypad or by using the **Ramp Up** \blacktriangle and **Ramp Down** \blacktriangledown keys to increment or decrement the value by one. The new value is displayed on the bottom line. The **OPTION** button can be used to backspace for editing.



PWR = 0
100

Pressing the **MENU** key again causes the diagnostic variable to take the new value (if it is in the valid range).



PWR = 100

The following diagnostic menu items can be edited:

NOTE

The **PWR**, **DEV** and **SQWT** variables from the Diagnostic Menu can be used to Calibrate Tracking Data. The value displayed for each of these variables represent temporary equivalent Tracking Data values. The values in these variables can be changed while making Power, Deviation, or Squelch measurements which will assist in finding the desired tracking data values. As stated before the radio only operates according to these variables while in the Diagnostic Menu. **THE TRACKING DATA FOR THE RADIO CANNOT BE CHANGED USING THE DIAGNOSTIC RADIO CODE.** Once the desired values are found, the Tracking Data must be changed using the PC Programmer. Refer to the Tracking Data section in the appropriate Service Manual.

DAT - Data **Valid Range:** 0-5

- "0" Tx Clear Voice on current channel when PTT is pressed
- "1" Tx Random High Speed Data on current channel when PTT is pressed
- "2" Tx Random GE-STAR on current channel when PTT is pressed
- "3" Tx Dotting on current channel when PTT is pressed
- "4" Tx 9-bit Pseudo High Speed Data pattern when PTT is pressed
- "5" Tx 11-bit Pseudo Random Speed Data pattern when PTT is pressed

BAUD - High Speed Data Baud Rate **Valid Range:** 0-1

- "0" Use 4800 Baud when transmitting
- "1" Use 9600 Baud when transmitting

PWR - Power Level Override **Valid Range:** 0-255

When PTT is pressed, radio will transmit on current channel at corresponding Power Level (does not reflect a specific wattage, but a value relative to the particular radio capabilities).

DEV - Tx Deviation Override **Valid Range:** 0-63

When PTT is pressed, radio will transmit on current channel with corresponding Deviation (does not reflect a specific deviation, but a value relative to the particular radio capabilities).

SQWT - Squelch Override **Valid Range:** 0-255

Mute/Unmute speaker on current channel at corresponding squelch level (does not reflect a specific squelch level, but a value relative to the particular radio capabilities).

Non-Editable Variables

All of these variables display a value between 0 and 255 that is read from the radio. Some variables have a limit that will not be exceeded. For example, RSSI will never indicate a value greater than 130. The following is a list of the Non-Editable Variables:

RSSI	Strength Of Current Signal
SQRD	Squelch Level of Current Signal
UDC	Resistor Value of UDC
VOL	Current Volume Knob Value
BATT	Battery Level
BRDT	Board Type

UDC Devices And Programming Resistor

The M-RK radio must be interfaced with a variety of accessories with a minimum number of connections. The M-RK software senses the type of accessory connected to the radio by measuring the resistance value connected to pin 8 (UDC SENS IN). The function of the remaining pins are then defined by the software. The following table provides the UDC devices and the corresponding resistor value and the **UDC** value that is displayed:

Device Number	Value Displayed (0-255)	Resistor Value $\pm 2.5\%$	Accessory Type
0	0-35	<100 ohms	Programming Cable
1	36-50	1270	Reserved
2	51-55	1540	PC Data Cable
3	56-60	1870	Reserved
4	61-66	2210	Key Loader Cable
5	67-72	2670	Reserved
6	73-79	3160	Vehicular Charger with Orion Control Unit
7	80-87	3740	Speaker/MIC with and without Antenna
8	88-95	4420	Earphone
9	96-105	5360	Vehicular Charger, Normal Display
10	106-115	6490	Vehicular Charger, Inverted Display
11	116-126	7680	External Microphone
12	127-138	9530	Speaker/MIC "B"
13	139-151	11.8K	Reserved
14	152-166	15.0K	Reserved
15	167-181	20.0K	Reserved
16	182-229	27.4K	Reserved
17	230-255	Infinity	Normal M-RK Operation

The following non-editable variables apply to Version 3 radios:

PRS NAME	Name of personality
FLSH VER	Group number, hardware version number and revision of radio flash software
COPYRIGHT	Ericsson copyright information
RCP VER	Version of RCP code in the radio
ICP VER	Version of ICP code in the radio
ADI ROM	ADI ROM code version in the radio
ADI NON	ADI RAM code version in the radio

NOTES

NOTES

Ericsson Inc.

Private Radio Systems

Mountain View Road

Lynchburg, Virginia 24502

1-800-528-7711 (Outside USA, 804-528-7711)

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