5 ZR340 Programming

5.1 Overview

This section contains information and procedures that allow the technician to program the ZR340.

You can program the ZR340 in two ways:

- ❑ DTMF over the radio channel ("over-the-air") from a radio, base station, or hand-held radio
- ❑ DTMF from a remote telephone, connected through the telephone company central office or a PBX to the **Phone** jack on the rear of the ZR340

5.2 Programming Over-The Air

The ZR340 may be programmed using a radio equipped with a DTMF keypad. While programming the unit, it is helpful, but not required, to have a secondary receiver (scanner, or monitor receiver) tuned to the repeater output frequency. This enables you to hear the prompt tones generated by the ZR340. The access code is user programmable (refer to "Program Access Code (90#) [See Also: "Access Code (01#)"]" on page 5-9).

The following paragraphs describe how to enter and exit the programming mode and how to enter a command.

5.2.1 Entering a Command

To execute a program command, a DTMF number is entered followed by the "#" key. Each time a command is completed, the ZR340 responds with five "go ahead" beeps indicating that it is waiting for another command. If an error is detected while programming, the ZR340 sends an error "bedo" signal over the transmit audio.

NOTE: While entering a command, the '' key functions as a "clear entry" key.*

All numbers can be entered with or without leading zeros except when programming the Morse code identification (CWID). For example, a 1 may be entered as 0001#, 001#, 01#, or 1#.

Some commands require additional numbers, as in the case of the program mode access code (refer to explanation below). These commands will send two "further information needed" beeps while programming. Although you do not have to wait for each prompt tone before entering the next command (because all commands are internally buffered), we recommend that you listen for the corresponding tones.

NOTE: At any time while programming the unit, if no DTMF tones are detected during a 60-second period, the ZR340 will exit program mode automatically.

5.2.2 Program Mode Access Code

The program mode access code must be entered before programming can take place. The default program mode access code is 12123.

5.2.3 Entering the Program Mode

To enter the program mode:

1. Key the radio and send the five digit DTMF program mode access code (the default is 12123).
2. Unkey the radio and listen for five beeps indicating that you have accessed the programming mode.

IMPORTANT: Each tone in the access code must be sent within one second of the preceding tone, or the access code will not be accepted.

5.2.4 Exiting the Program Mode

To exit the program mode:

1. Enter 99#.
2. Listen for a ringing prompt tone, which confirms that you have exited the programming mode.

NOTE: At any time while programming the unit, if no DTMF key is pressed during a period of 60 seconds, the ZR340 will exit program mode automatically.

5.2.5 DTMF Command Descriptions

A description of the command codes for the ZR340 are given in the following paragraphs. The codes that initiate these command codes follow the description. These codes are be entered into the ZR340 via the DTMF keypad on a radio or a DTMF telephone calling the ZR340.

5.2.5.1 System Commands

Access Code (01#)

This command sets a 1-9 digit (including "*") access code for radio users to access the ZR340.

Example:

01# *987# Set *987 as the access code.

Deaccess Code (02#)

This command sets a 1-9 digit (including "#") deaccess code for radio users to deaccess the ZR340. To enter the DTMF # in the sequence, enter it as a '*' because '#' is used to terminate the command. When the ZR340 writes the string to the EEPROM, it converts all of the '*' entries to '#' entries.

Example:

02# *77# Set #77 as the deaccess code.

Toll Restrict (03#)
[See also: "Toll Restrict Digits 1 and 2 (15#, 16#)"]

The toll restrict code operates in the same way as the access code, but allows the user to bypass all toll restrictions.

The toll restrict code can consist of the digits 0-9 and '*' and cannot exceed eight digits. The default is 99.

03# 88 * Set 88* as the access code required to bypass toll restrictions.

DTMF Dial (04#) / Pulse Dial (05#)

These commands set the dialing mode for the ZR340.

Examples:

04# Set to DTMF dial mode **(default).**

05# Set to pulse dial mode.

Ringing Interval (06#, 07#, 08#)

These commands designate how many times the ZR340 allows the phone to ring before answering and ring the mobile.

Examples:

06# Wait one ring **(default)**.

07# Wait five rings.

08# Wait ten rings.

DTMF Timeout Time (10#)

This command sets the number of seconds the ZR340 should wait between DTMF digits from the mobile, when dialing a phone number, before dropping out of digit regeneration. It can be from 0 to 60 seconds. The default is 3 seconds.

Example:

10# 11# Set DTMF timeout time to 11 seconds.

Hook Flash (11#, 12#)

The mobile may "hook flash" the telephone line by sending a DTMF "*0".

Examples:

11# Hook flash enabled.

12# Hook flash disabled **(default)**.

Call Alert (13#, 14#)

The ZR340 can alert mobiles with two quick beeps during normal repeater operation if a telephone call is coming in.

Examples:

13#	Call alert enabled.
14#	Call alert disabled **(default)**.

Toll Restrict Digits 1 and 2 (15#, 16#)

These commands designate up to four "prohibited" digits for the first (15#) and second (16#) digits dialed in a phone number.

Examples:

15# 9#	Disable all outside calls from inside plant area.
16# 019#	Disable long-distance calls by preventing a dial with 0 or 1, and "900-" or "976-" numbers with 9 as the second dialed digit.

Ringing Method (17#, 18#)

These commands designate the ringing method. The ringing and/or waiting ends after the mobile Radio Timeout has expired (refer to "Radio Timeout (36#, 37#, 38#)").

Examples:

17#	Ring once on channel, wait for mobile to answer. The ZR340 becomes inactive if mobile does not answer within one minute.
18#	Ring on channel until mobile answers or Radio Timeout is exceded **(default).**

Repeater Enable/Disable (19#, 20#)

These commands set the carrier repeat status.

Examples:

19#	Enable repeater **(default)**.
20#	Disable repeater.

Repeat Hang Time (21#-24#)

These commands set the delay before unkeying the transmit radio.

Examples:

21#	No repeat hang time.
22#	1-second repeat hang time **(default).**
23#	3-second repeat hang time.
24#	5-second repeat hang time.

Morse ID (25#)
(See also commands 63#-65#)

To program the Station ID with the DTMF keypad, you must first understand how to enter the number and letter codes so that the resulting Morse code corresponds to the required station's call sign. Each code will contain two digits. Refer to Figure 5-1 when following the steps to enter the codes.

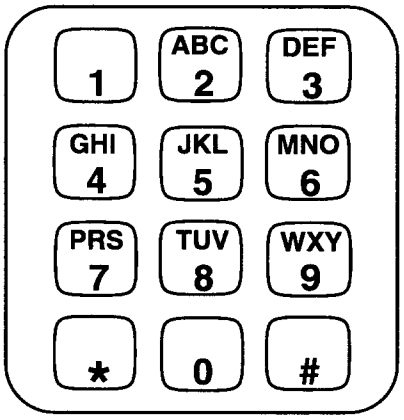

Figure 5-1. DTMF Keypad

To enter a letter code:

1. Determine the desired letter's position on the key (1 for the leftmost letter on a key, 2 for the center letter, or 3 for the rightmost letter).
2. Press the digit that corresponds to the letter's position (1, 2, or 3). This is the first digit of the letter code. For example, the first digit in the code for the letter N would be 2.
3. Press the key that the desired letter appears on. This is the second digit of the letter code. For example, the second digit in the code for the letter N would be 6.

The only characters not represented by this method are Q, Z, and the slant-bar ("/"). The code for Q is "10", the code for Z is "20", and the code for "/" is "30."

To enter a number code:

1. Press the "0" key.
2. Press the key that the desired number appears on.

Examples:

Set the call sign K9JU/R (enter the following on the DTMF keypad):

	25#	25	09	15	28	30	27	#
Meaning -	ID#	K	9	J	U	/	R	done

Courtesy Tone (26#, 27#)

These commands enable or disable the courtesy tone.

Examples:

26#	Enable courtesy tone.
27#	Disable courtesy tone **(default)**.

Privacy Mask (28#, 29#)

These commands set the privacy mask status. (Privacy Mask is functional only during Half-duplex operation.)

Examples:

28#	Set privacy mask on.
29#	Set privacy mask off **(default)**.

Call Limit Timer (30#-35#)

These commands set the duration of the call limit timer.

Examples:

30#	Enable call limit timer **(default).**
31#	Enable call limit timer and allow user to reset with '*.'
32#	Set no call limit/Disable call limit timer.
33#	Set call limit to 3 minutes **(default)**.
34#	Set call limit to 5 minutes.
35#	Set call minutes to 10 minutes.

Radio Timeout (36#, 37#, 38#)

These commands set the timer for loss of radio activity.

Examples:

	Stop call after loss of radio signal for:
36#	30 seconds **(default)**.
37#	45 seconds.
38#	1 minute.

Operating Mode (40#-46#)

These commands set the operating mode of the ZR340.

Examples:

40#	Set Half-duplex mode **(default)**.
42#	Set Simplex VOX.
43#	Set Simplex VOX with pre-key.
44#	Simplex sampling.
45#	Simplex sampling with VOX to extend the sample interval.
46#	VOX/sampling between words (intelligent mode).

VOX Sample Before Dial Tone (48#, 49#)

For the VOX sampling operating modes, these commands allow up to 15 seconds before issuing dial tone to the mobile.

Examples:

48#	Enable VOX sampling before issuing dial tone.
49#	Disable VOX sampling before issuing dial tone **(default).**

Auto Dial Numbers (50#-59#)

These ten commands may contain pre-programmed, speed dialing telephone numbers. Each command may contain a single number of up to 16 digits. The numbers are recalled by following the access code, within 1 second, with the auto dial number. 50# corresponds to auto dial number 0 and 59# corresponds to auto dial number 9.

Examples:

50#	17085763693	call Bob.
54#	18003561520	call Radius Product Services.

Mobile Answer Mode (60#-62#)

Examples:

60#	COR to answer (no DTMF required).
61#	Access code to answer **(default)**.
62#	Direct channel access (no mobile action required).

Repeat Morse Code ID (CWID) (63#-65#)

Examples:

63#	Disable CWID.
64#	Repeat CWID every 10 minutes only with channel activity **(default)**.
65#	Repeat CWID every 10 minutes.

Repeat Courtesy Tone (67#, 68#)

The "over" courtesy beep tone will be transmitted after a mobile unkeys.

Examples:

67#	Enable repeat courtesy tone.
68#	Disable repeat courtesy tone **(default)**.

Simplex Mode Parameters (70#-77#)

These commands select the operating parameters for Simplex operation.

Examples:

70#	Sample rate 0.5 seconds.
71#	Sample rate 1.0 second **(default)**.
72#	Sample rate 1.5 seconds.
73#	VOX hold time 0.5 seconds.
74#	VOX hold time 0.8 seconds.
75#	VOX hold time 1.0 second **(default)**.
76#	VOX hold time 1.3 seconds.
77#	VOX hold time 1.5 seconds.
78#	Automatic sample window*.
79#	Increment sample window by 10 msec.
80#	Decrement sample window by 10 msec.

NOTE: You can perform this command only from a DTMF equipped radio.

COR Hang Time (81#-84#)

These commands set the COR hang time or disable it.

Examples:

	Sets the COR hang time to:
81#	No COR hold time **(default)**.
82#	100 msec.
83#	300 msec.
84#	500 msec.

Detect Busy Telephone Line (85#-87#)

These commands set when busy signals will be detected to stop a call.

Examples:

85#	Disconnect on busy for first 20 seconds **(default)**.
86#	Disable busy detect.
87#	Disconnect on busy for duration of call.

Program Access Code (90#) [See Also: "Access Code (01#)"]

The program mode access code is used to gain access to the ZR340's program mode with either a DTMF equipped mobile or portable, or a DTMF telephone. The program access code must be exactly five digits in length (no shorter, no longer) and defaults to 12123.

This command sets a new program access code.

Example:

90# 63693#	Enter number '63693' as the new program access code.

Reset (91#)

This command will reset the ZR340 to all of the factory default settings. Refer to Appendix A, "Quick Reference of Programming Codes," for the defaults. When this command is used, all custom programming is returned to the factory defaults.

Setup and Testing (92#, 93#)

These commands are for initial setup and testing. Pressing any digit or the "Connect" button on the ZR340 will end the test.

Examples:

92#	Transmit audio level test.
93#	Repeat audio level test.

High Speed Telephone (Only) Programming (94#)

This command is used to rapidly program the ZR340 from automatic, high speed equipment via high speed DTMF. This is only possible from a telephone line ***not*** over-the-air.

Program Exit (99#)

This command causes the ZR340 to exit the programming mode.

Example:

99#	Exit programming.

*NOTE: **At any time while programming the unit, if no DTMF key is pressed during a period of 60 seconds, the ZR340 will exit program mode automatically.***

5.3 Programming via Telephone

5.3.1 Entering Program Mode Through a Telephone

The ZR340 can be programmed using a DTMF telephone connected through the telephone company central office or a PBX to the **Phone** jack on the back panel.

1. Dial the number of the ZR340 repeater and wait 14 rings.
2. After the the ZR340 double beeps, enter the programming access code.

5.4 Programming Example

The following section describes the programming information for the radios used to assemble a GR Series repeater with the ZR340 repeater controller. The first configuration uses two 16-channel, UHF Radius GM300 radios. A low power, 1 to 10 Watt, radio is used for the receive radio and a 10-25 Watt radio for the transmit radio. The second configuration uses an 8-channel 25-40 Watt GM300 radio as the transmit radio.

The frequencies for the repeater are receive on 469.550 MHz and transmit on 464.550 MHz. Tone coded squelch, TPL, of 146.2 (4B)will be used. The Time Out Timer of the transmit radio will be turned OFF to allow "long" telephone calls to be made. "Local" mode will be used because of a high RF environment. No signalling systems will be programmed into the radios. Normal receiver and transmitter audios will be used for both radios.

5.4.1 The Receive Radio

The Receive Radio is a 16-channel, low power (1-10 Watt) Radius GM300. Mode 1 will be programmed to receive on 469.550 MHz with TPL146.2 (4B). The transmit frequency will be "BLANK".

1. Connect the RIB to the receive radio and the repeater power supply to an ac outlet. Turn on the power supply.
2. From the RSS "MAIN MENU", press **F3** (GET SAVE) to bring up the "GET / SAVE MENU".
3. Press **F2** (READ CODEPLUG).
4. When the computer has finished reading the codeplug, press **F10** (EXIT).
5. Press **F4** (CHANGE VIEW) to bring up the "CHANGE / VIEW CODEPLUG MENU".
6. Press **F2** (RADIO WIDE).
7. Repeatedly press **Tab** until the "ACC. External" area is highlighted.
8. Repeatedly press "up-arrow" key to scroll through the accessories until "General I/O" appears. (Refer to Figure 5-2.)
9. Press **F9** (OTHER ACCESSORY) to view the "ACCESSORY CONNECTOR CONFIG" screen.
10. If necessary, press **Tab** until the "DESCRIPTION" column for "PIN#" 4 is highlighted.
11. Press up arrow to set the "DESCRIPTION" to "CSQ Detect". If the "High" active level description is present then proceed to step 12. Otherwise, press **Tab** until the "Low" is highlighted under the "ACT LEVEL" column. Press "up-arrow" key to toggle to the "High" condition. Press **Enter**.
12. Repeatedly press **Tab** until the "DESCRIPTION" for "PIN#" 12 is highlighted.
13. Press the "up-down" arrow key to set the "DESCRIPTION" to "PL/DPL & CSQ Det". If the "Low" active level description is present then proceed to step 14. Otherwise, press **Tab** until the "High" is

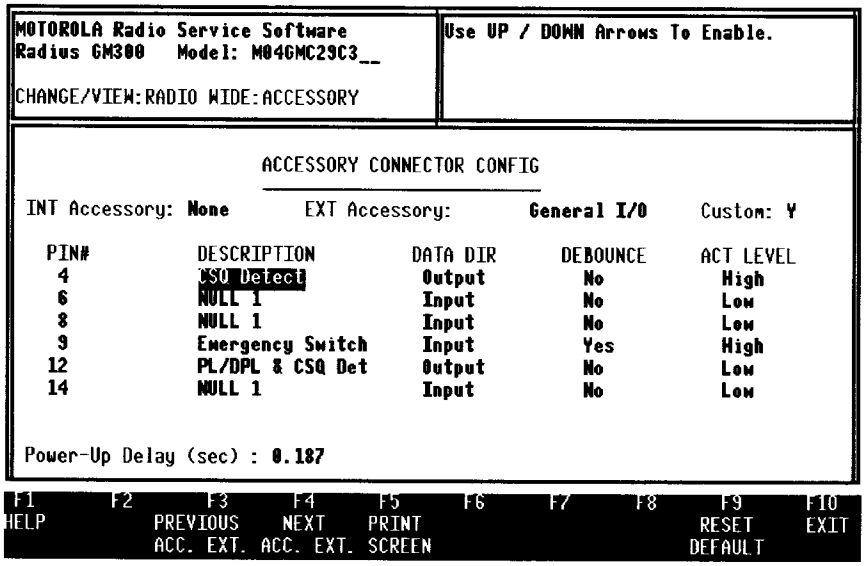

Figure 5-2. Change/View, Radio Wide, Receive Radio Mode

highlighted under the "ACT LEVEL" column. Press the "up-arrow" key to toggle to the "Low" condition. Press **Enter**.

14. If a "Power-Up Delay (sec)" is desired, then press **Tab** until that area is highlighted. Select the desired delay with the "up-down" arrow key. (Refer to Figure 5-3.)
15. Press **F10** (EXIT) twice to return to the "CHANGE / VIEW CODEPLUG MENU".
16. Press **F5** (MODE) to move to the "CHANGE/VIEW:MODE" screen.
17. Press **Tab** to highlight the "Rx Frequency" area. Key in the receive frequency ("469.5500"). Press **Enter**.
18. If a transmit frequency exists, key in "BLANK" or "B". Press **Enter**.
19. Press the "up-arrow" key to scroll the "Rx Squelch Type" to "TPL". Press **Enter**.
20. Key in the TPL tone ("146.2") or code designator ("4B"). Press **Enter**.
21. Press **Tab** until the "Local/Distance" area is highlighted. Use the "up-arow" key to toggle to "Local". Press **Enter**. (Refer to Figure 5-4.)
22. Press **F10** (EXIT) twice to return to the "MAIN MENU" screen. Verify that you have the "MAIN MENU".
23. Press **F3** (GET SAVE) to bring up the "GET / SAVE MENU".
24. Press **F8** (PROGRAM CODEPLUG) to program the radio. You will be prompted to verify that you want to program the radio; press **F2** (CONTINUE) to confirm.
25. Press the **F7** (SAVE FILE) key to save the codeplug data to a disk file. If the radio has not been previously archived, you will be prompted to supply a "Customer ID:" such as "ZR340_RX".
26. Press **F8** to save the data to the disk.

5.4.2 The Transmit Radio

1. Move the RIB programming cable to the transmit radio.
2. Press **F2** (READ CODEPLUG).
3. When the computer has finished reading the codeplug, press **F10** (EXIT).

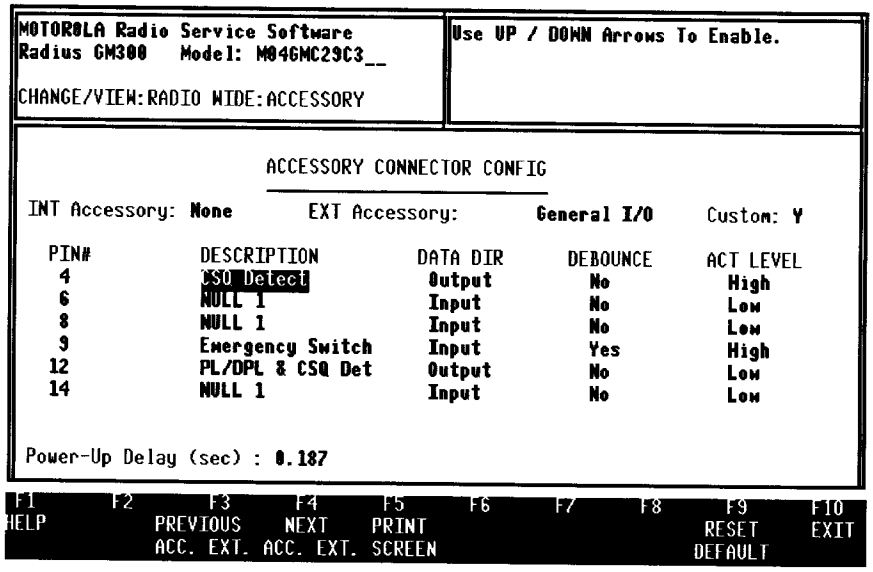

Figure 5-3. Change/View, Radio Wide, Receive Radio Mode

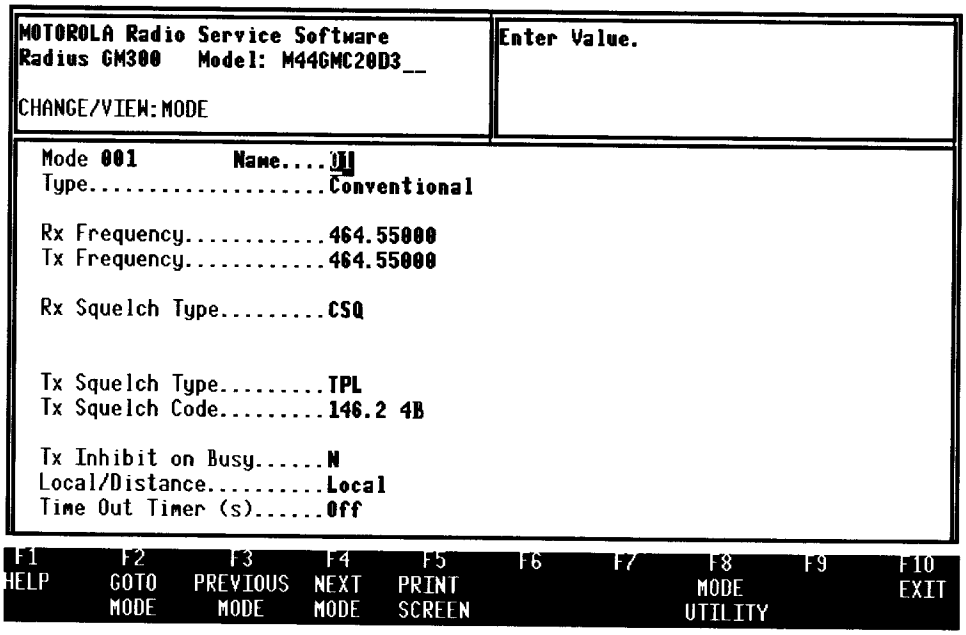

Figure 5-4. Change/View, 8-Channel Transmit Radio Mode

4. Press **F4** (CHANGE VIEW) to bring up the "CHANGE/VIEW CODEPLUG MENU".
5. Press **F2** (RADIO WIDE).
6. Repeatedly press the **Tab** key until the "ACC. External" area is highlighted.
7. Repeatedly press "up-arrow" key to scroll through the accessories until "General I/O" appears. Your screen will look similar to that of Figure 5-2.
8. Press **F9** (OTHER ACCESSORY) to view the "ACCESSORY CONNECTOR CONFIG" screen.
9. If necessary, press **Tab** until the "DESCRIPTION" column for "PIN#" 4 is highlighted.

10. Press "up-arrow" key to set the "DESCRIPTION" to "CSQ Detect". If the "High" active level description is present then proceed to step 11. If the active level is "Low", then press the **Tab** key until the "Low" is highlighted under the "ACT LEVEL" column. Press the"up-arrow" key to toggle to the "High" condition. Press **Enter**.
11. Repeatedly press **Tab** until the "DESCRIPTION" for "PIN#" 12 is highlighted.
12. Verify that that the "DESCRIPTION" is the "NULL1" function. If it isn't, press "up-arrow" key to scroll to "NULL1". Press **Enter**.
13. If a "Power-Up Delay (sec)" is desired, then press **Tab** until that area is highlighted. Select the desired delay with the "up-down" arrow key.) (Refer to Figure 5-5.)
14. Press **F10** (EXIT) twice to return to the "CHANGE / VIEW CODEPLUG MENU".
15. Press **F5** (MODE) to move to the "CHANGE/VIEW:MODE" screen.
16. Press **Tab** to highlight the "Rx Frequency" area. Key in the receive frequency ("464.5500" which equals the transmit frequency). Press **Enter**.
17. Key in the transmit frequency ("464.5500"). Press **Enter**.
18. Press "up-arrow" key to scroll the "Rx Squelch Type" to "TPL". Press **Enter**.
19. Key in the TPL tone ("146.2") or code designator "4B". Press **Enter**
20. Press "up-arrow" key to scroll the "Tx Squelch Type" to "TPL". Press "**Enter**.
21. Key in the TPL tone ("146.2") or code designator "4B". Press **Enter**.
22. If there are any co-channel users who may not be interferred with, you may wish to enable the "Tx Inhibit on Busy". ("Y" means yes, and "N" means no). Use "up-arrow" to choose your desired operation. Press **Enter**.
23. You are going to use local mode. Use "up-arrow: key to scroll to "Local" in the "Local/ Distance" highlight. Press **Enter**.
24. Key in "000" in the "Time-Out Timer (s)" highlight to turn OFF the time-out timer.

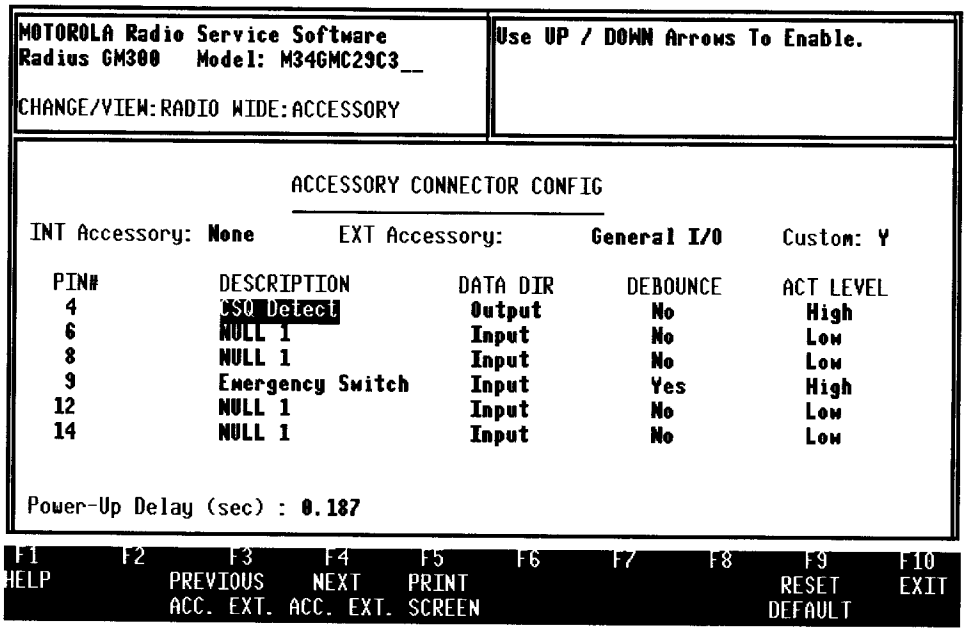

Figure 5-5. Change/View, Radio Wide, 16-Channel Transmit Radio Accessory

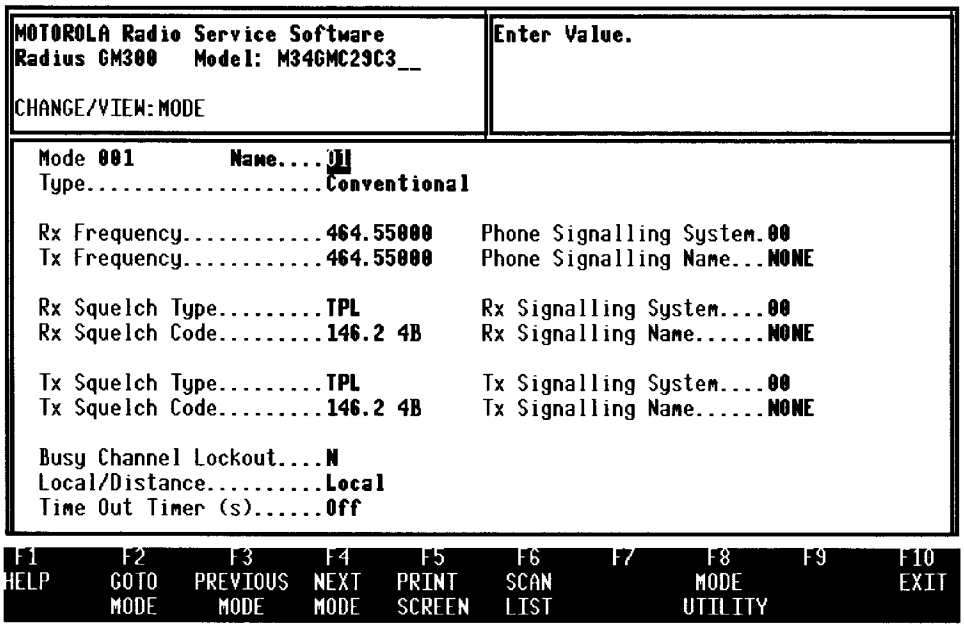

Figure 5-6. Change/View, 16-Channel Transmit Radio Mode

25. Press **F10** (EXIT) twice to return to the "MAIN MENU" screen. Verify that you have the "MAIN MENU".
26. Press **F3** (GET SAVE) to bring up the "GET / SAVE MENU".
27. Press **F8** (PROGRAM CODEPLUG) to program the transmit radio. You will be prompted to verify that you want to program the radio; press **F2** (CONTINUE) to confirm.
28. Press **F7** (SAVE FILE) key to save the codeplug data to a disk file. If the radio has not been previously archived, you will be prompted to supply a "Customer ID:" such as "ZR340_TX".
29. Press **F8** to save the data to the disk.

5.4.3 The Non 16-channel Transmit Radio

Instead of the 16-channel GM300 used above, the transmit radio may be a Radius 8-channel GM300, M10 or M120 radio. The programming is the same. Use an 8-channel 25-40 Watt UHF radio for the following.

1. Move the RIB programming cable to the transmit radio.
2. Press **F2** (READ CODEPLUG).
3. When the computer has finished reading the codeplug, press **F10** (EXIT).
4. Press **F4** (CHANGE VIEW) to bring up the "CHANGE/ VIEW CODEPLUG MENU".
5. Press **F5** (MODE) to move to the "CHANGE/VIEW:MODE" screen.
6. Press **Tab** to highlight the "Rx Frequency" area. Key in the receive frequency ("464.5500 which equals the desired transmit frequency). Press **Enter**.
7. Key in the transmit frequency ("464.5500"). Press **Enter**.
8. If necessary, use "up-arrow" key to scroll the "Rx Squelch Type" to "CSQ". Press **Enter**.
9. Press "up-arrow" key to scroll the "Tx Squelch Type" to "TPL". Press **Enter**.
10. Key in the TPL tone ("146.2") or code designator ("4B"). Press **Enter**.

11. If there are any co-channel users who may not be interferred with, you may wish to turn ON the "Tx Inhibit on Busy". ("Y" means yes, ON and "N" means no, OFF). Use "up-arrow" key to choose your desired operation. Then, press **Enter**.
12. You are going to use local mode. Use "up-arrow" key to scroll to "Local" in the "Local/ Distance" highlight. Press **Enter**.
13. Key in "000" to turn the time-out timer OFF.

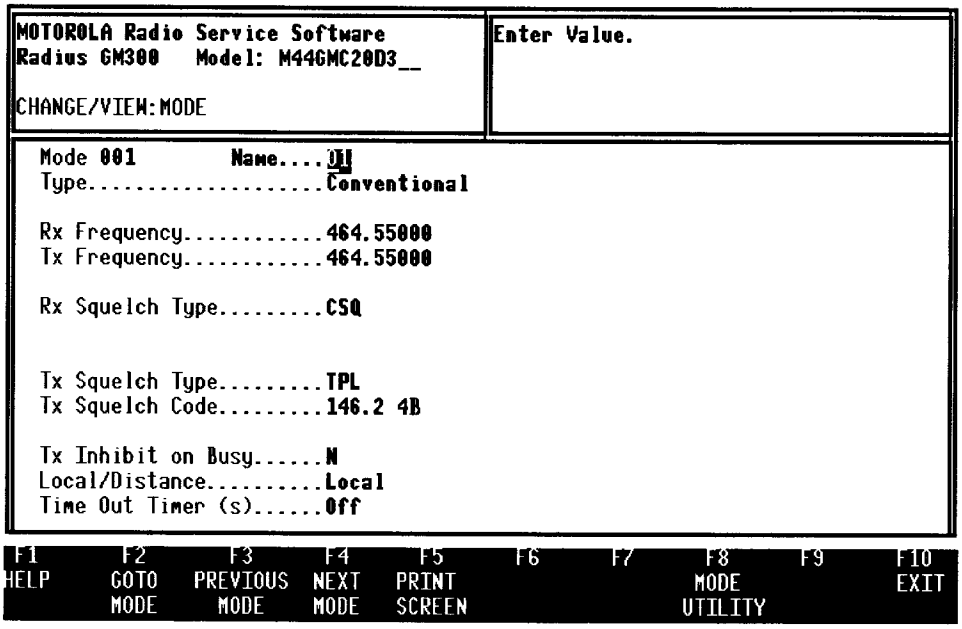

Figure 5-7. Change/View, 8-Channel Transmit Radio Mode

14. Press **F10** (EXIT) twice to return to the "MAIN MENU".
15. Press **F3** (GET SAVE) to bring up the "GET / SAVE MENU".
16. Press **F8** (PROGRAM CODEPLUG) to program the transmit radio. You will be prompted to verify that you want to program the radio; press **F2** (CONTINUE) to confirm.
17. Press **F7** (SAVE FILE) to save the codeplug data to a disk file. If the radio has not been previously programmed, you will be prompted to supply a "Customer ID:" such as "ZR340_8ch_TX".
18. Press **F8** to save the data to the disk.

NOTE: Note: Jumper plug, JP9, inside the ZR340 must be moved to the "8-A" position.

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