

6 ZR320 Controller Programming

6.1 Overview

This section contains information and procedures that allow the technician to program the ZR320 controller.

You can program the ZR320 controller in the following ways:

- with a Motorola RIB compatible interface, using a computer running Motorola GM300/GR300 Radio Service Software (RSS)
- 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 ZR320 controller
- remotely, through the ZR330 controller.

6.2 User Equipment Type

The ZR320 controller has the capacity for 100 users numbered from 00 to 99. Each user can be programmed to operate on a certain equipment type (i.g. TPL radio, QCII pager, etc.). When a user does not have an equipment type programmed, that user is considered inactive and is not allowed to place or receive calls. The equipment type determines how a user functions and what type of selective signalling is used to notify that user when a call is coming in. It only determines the **type** of selective signalling, i.e. TPL, DPL, QCII, or none, it does **not** determine the actual tones used to signal the radio. These tones are designated by the user number.

6.2.1 TPL User

When a user has an equipment type of TPL mobile or TPL talkback pager, the user number selects the tone. Refer to Table 3-1 on pages 3-2 and 3-3 for the tones assigned to each user number. For example, user number 01 encodes 67.0 Hz. This means that you must consider which user number will encode the correct tone, instead of which tone to assign to a user number. The user number with the desired tone becomes the one you will choose. User numbers 00 and 51-99 do not encode any TPL tone; they can be used for carrier squelch only TPL users.

6.2.2 DPL User

When a user has an equipment type of DPL mobile or DPL talkback pager, the user number selects the DPL code. Refer to Table 6-1 for the codes assigned to each user number. Note that user number 00 is not carrier squelch as in the case of TPL. In this case, the user number you choose will properly encode the correct DPL code.

6.2.3 Quik-Call II User

When a user has an equipment type of QCII mobile, QCII Group, QCII tone only page, QCII tone and voice pager or QCII talkback pager, the user number selects the two tones that make up the QCII sequence. Refer to Table 6-4 on page 6-9 for the tones that correspond to the digits of the user number. You must ensure that the user number for the ZR320 corresponds to the two-tone sequence in the user's equipment. For example, if tone one is 879.0 Hz, and tone two is 903.2 Hz, the user number is 89.

IMPORTANT: Only one equipment type may be assigned to each user number. TPL user 'carrier squelch,' DPL user '645,' and Quik-Call II user with tones 879.0 Hz and 903.2 Hz cannot exist at the same time for user number 89.

6.3 Programming via Radio Service Software (RSS)

We recommend that you program the ZR320 controller using a PC that runs the Motorola Radio Service Software (RSS), because it is the easiest programming method. Using this software allows you to access the programmable features of the ZR320 controller from user-friendly screens on the PC. You can archive the final configuration for safekeeping or later examination. The **programming** port is hardware compatible with the Motorola RIB. The RSS prompts the system installer to plug into the ZR320 controller, and when to read or write its configuration.

Table 6-1. TPL/DPL Code Conversion

User	DPL Code*	Freq. (Hz)/TPL Code	User	DPL Code*	Freq. (Hz)/TPL Code
00	023	- CSQ	+50	274	254.1 J9
01	025	67.0 XZ	51	306	-
02	026	69.3 WZ	52	311	-
03	031	71.9 XA	53	315	-
04	032	74.4 WA	+54	325	-
+05	036	77.0 XB	55	331	-
06	043	79.7 WB	+56	332	-
07	047	82.5 YZ	57	343	-
08	051	85.4 YA	58	346	-
+09	053	88.5 YB	59	351	-
10	054	91.5 ZZ	+60	356	-
11	065	94.8 ZA	61	364	-
12	071	97.4 ZB	62	365	-
13	072	100.0 1Z	63	371	-
14	073	103.5 1A	64	411	-
15	074	107.2 1B	65	412	-
16	114	110.9 2Z	66	413	-
17	115	114.8 2A	67	423	-
18	116	118.8 2B	68	431	-
+19	122	123.0 3Z	69	432	-
20	125	127.3 3A	70	445	-
21	131	131.8 3B	+71	446	-
22	132	136.5 4Z	+72	452	-
23	134	141.3 4A	+73	454	-
24	143	146.2 4B	74	464	-
+25	145	151.4 5Z	75	465	-
26	152	156.7 5A	76	466	-
27	155	159.8 J1	77	503	-

Table 6-1. TPL/DPL Code Conversion (Cont'd.)

User	DPL Code*	Freq. (Hz)/TPL Code	User	DPL Code*	Freq. (Hz)/TPL Code
28	156	162.2 5B	78	506	-
29	162	165.5 J2	79	516	-
30	165	167.9 6Z	80	532	-
31	172	171.3 J3	81	546	-
32	174	173.8 6A	82	565	-
33	205	177.3 J4	83	606	-
†34	212	179.9 6B	84	612	-
35	223	183.5 J5	85	624	-
†36	225	186.2 7Z	86	627	-
37	226	189.9 J6	87	631	-
38	243	192.8 7A	88	632	-
39	244	196.6 J7	89	645	-
40	245	199.5 J8	90	654	-
†41	246	203.5 M1	91	662	-
42	251	206.5 8Z	92	664	-
†43	252	210.7 M2	93	712	-
†44	255	218.1 M3	94	723	-
45	261	225.7 M4	95	731	-
46	263	229.1 9Z	96	732	-
47	265	233.6 M5	97	734	-
†48	266	241.8 M6	98	743	-
49	271	250.3 M7	99	754	-

* For Inverted DPL Codes, refer to Appendix B.

† DPL user numbers not valid for use with standard Motorola products.

6.3.1 Configuring the System

6.3.1.1 Set Repeater Type and Radio Parameters

After reading the ZR320 controller and/or the repeater radios, from the Main Menu:

1. Press **F4** (Change/View).
2. Press **F5** (Mode Configuration).

The screen that appears will vary, depending on the type of ZR320 repeater you have read (refer to Figure 6-1 and Figure 6-2).

You may choose between two types of ZR320 repeaters:

- Phone Base Rmt (with local, extended local, dc remote, or tone remote)
- Phone Base PA (with public address)

NOTE: If you have read only the ZR320 controller, the screens in Figure 6-1 and Figure 6-2 will not appear. If you have only read either the transmit or the receive radio, not all fields will be shown.

When the cursor is positioned on the line titled **Repeater Type**, the up/down arrow keys will toggle between the different repeater types. If you did not read the ZR320 option board, the screen may read "Generic" on this line.

For information about Rx and Tx frequencies, Rx squelch types and codes, Tx inhibit on busy, and local/distance, refer to the GM300 Radio Service Software Manual (6880902Z36).

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MOTOROLA Radio Service Software Radius GM300 Model: M34GMC09C3__ CHANGE/VIEW: MODE									
Repeater Type..... Phone Base Rmt Rx Frequency..... 456.52500 Tx Frequency..... 451.52500 Rx Squelch Type..... TPL Rx Squelch Code..... 67.0 XZ Tx Inhibit on Busy..... N Local/Distance..... DX									
F1 HELP	F2	F3	F4	F5 PRINT SCREEN	F6	F7	F8	F9	F10 EXIT

Figure 6-1. Change/View, Phone Base Rmt

MOTOROLA Radio Service Software Radius GM300 Model: M34GMC09C3__ CHANGE/VIEW: MODE		Enter Frequency In MHz. Ex: 451.6500							
Repeater Type..... Phone Base PA Rx Frequency..... 456.52500 Tx Frequency..... 451.52500 Rx Squelch Type..... TPL Rx Squelch Code..... 67.0 XZ Tx Inhibit on Busy..... N Local/Distance..... DX									
F1 HELP	F2	F3	F4	F5 PRINT SCREEN	F6	F7	F8	F9	F10 EXIT

Figure 6-2. Change/View, Phone Base PA

6.3.2 ZR320 Controller Programmable Features

A variety of programmable features may be set for the ZR320 controller . They are divided into two categories:

- System-Programmable Fields
- User-Programmable Fields

6.3.2.1 System-Programmable Fields

The information in these fields affects all users on the repeater.



From the Main Menu:

1. Press **F4** (Change/View).
2. Press **F2** (Radio/Wide).

One of the ZR320 System Configuration Screens in Figure 6-3 or Figure 6-4 should appear. Figure 6-3 is the screen for simplex mode, and Figure 6-4 is the screen for full- and half-duplex modes for typical repeater operation. For an explanation on the operation of these modes, refer to the GR300/GR500 Repeater Service Manual (6880903Z42).

The information that was read for the repeater will determine which of the following screens appears.

MOTOROLA Radio Service Software		Use UP / DOWN Arrows To Enable.	
CHANGE/VIEW:PHONE BASE(320)			
Unit ID.....0	Stop Scan Tone.....131	Morse ID.....KS2XBL	Courtesy Tone.....N
Autocall User.....91	Answer Time (s).....30	Access Code.....*	Dialing Mode.....DTMF
Deaccess Code.....#	Toll Restrict 1.....01	Toll Restrict.....99	Toll Restrict 2.....01
Program Code.....12320	Pager Talk Time (s)...15	Rings To Answer.....1	VOX Hang Time (s)....1.0
Disconnect On Busy...First 20 secs	COR Hang Time (s)....0.0	Radio Timeout (s)....45	Interconnect Mode....Simplex VOX
Call Limit (min)....003	Multi-User.....Y	Call Limit Reset.....Y	
QCII Tone Group 1....3		QCII Tone Group 2....3	
Ring On Channel.....Until Answer			
F1 HELP	F2	F3	F4
	F5 PRINT SCREEN	F6 VIEW USERS	F7
			F8
			F9
			F10 EXIT

Figure 6-3. System Configuration, Simplex

MOTOROLA Radio Service Software			
CHANGE/VIEW:PHONE BASE(320)			
Unit ID.....0	Stop Scan Tone.....131	Morse ID.....KS2XBL	Courtesy Tone.....N
Autocall User.....91	Privacy Mode.....N	Access Code.....*	Carrier Repeat.....Off
Deaccess Code.....#	Answer Time (s).....30	Toll Restrict.....99	Dialing Mode.....DTMF
Program Code.....12320	Toll Restrict 1.....01	Rings To Answer.....1	Toll Restrict 2.....01
Disconnect On Busy...First 20 secs	Pager Talk Time (s)...15	Radio Timeout (s)....45	Tx Hang Time (s)....001
Call Limit (min)....003	Interconnect Mode....Half Duplex	Call Limit Reset.....Y	Multi-User.....Y
QCII Tone Group 1....3		QCII Tone Group 2....3	
Ring On Channel.....Until Answer			
F1 HELP	F2	F3	F4
	F5 PRINT SCREEN	F6 VIEW USERS	F7
			F8
			F9
			F10 EXIT

Figure 6-4. System Configuration, Duplex

Table 6-2 lists the command key functions available from within the ZR320 Configuration Screens. Table 6-3 lists other key functions available from within the ZR320 Configuration Screens.

Table 6-2. Command Key Functions

Command	Function
F1, Help	Get specific help for highlighted field
F5, Print Screen	Print contents of screen
F6, View Users	Go to User Configuration screen
F10, Exit	Go to previous menu

Table 6-3. Other Key Functions

Command	Function
ESC	Exit to Main Menu
Tab/Enter/Return	Accept data currently in field and move prompt forward one field.
Shift + Tab	Accept data currently in field and move prompt backward one field
Up/Down Arrow	Scroll through selections or increase/decrease current relative value
Left/Right Arrow	Move cursor left/right one space
Back Space	Erase current character in field and move cursor left one space

Unit ID

When multiple ZR320 controllers are used with a ZR330 controller, or multiple ZR330 controllers, the unit ID is used to distinguish between different ZR320 controllers in the system. A typical application would be a single ZR330 controller with foreign exchange (FX) lines for calling into more than one dialing area.

The range for the unit ID is 0-9. The default is 0.

Morse (Station) ID

If set, the ZR320 controller transmits the call sign of the repeater station at the end of each phone call and every 10 minutes, either continuously or only with channel activity. The station ID option sets the station's Morse code ID. The ID is sent at the end of each call at 30% deviation and 25 words per minute. The ID tone frequency is 1 kHz.

The Morse ID can be up to eight characters long. These characters can be digits from 0-9, the letters A-Z and the slat-bar '/'. The default is a blank field.

IMPORTANT: *The ID will be sent even if the radio does not answer a call.*

Autocall User

The autocall user number serves two purposes:

- Designates a default user, who is called if a caller does not specify a user number within five seconds after making a connection to the ZR320 controller (refer to "Multi-User" on page 6-12).
- Determines what action to take when the phone rings, and the ZR320 controller is operating in single-user mode.

The range for the autocall user number is 00-99. The default is 00.

Access Code

The access code must be entered before the user number and steering digit to sign-on to the ZR320 controller.

The access code can be up to eight digits long. It can consist of the digits 0-9 and the * symbol. The default is *.

Deaccess Code

The deaccess code must be entered before the user number to disconnect a call in progress.

The deaccess code can be up to eight digits long, and it can consist of the digits 0-9 and the # symbol. The default is #.

Toll Restrict

The toll restrict is a bypass code that can be entered from a radio to bypass the toll restrict digits 1 and 2 (refer to "Toll Restrict 1" and "Toll Restrict 2" on page 6-10). It eliminates any dialing restrictions.

Program Code

The program code is used to gain access to the ZR320's program mode from a DTMF equipped radio, portable, or a DTMF telephone. It is not required for RSS programming. The program code must be exactly five digits in length (no shorter, no longer), and it can be composed of the digits 0-9. The default is 12320.

IMPORTANT: Do not make the program code a subset of the access code. If you do, the ZR320 controller will not be programmable over the air.

Rings to Answer

The rings to answer feature determines when the ZR320 controller answers the phone (multi-user) or when it begins ringing on the channel (single-user). This allows a dispatcher to answer the telephone and manually connect the ZR320 controller to the telephone line for greater control of telephone usage.

In single-user mode, the ZR320 controller doesn't need an over dial digit so it proceeds with the call when the number of rings from the PSTN has exceeded the number set. In multi-user mode, the ZR320 controller answers the phone after the number of rings from the PSTN has exceeded the count as set above.

The Rings to Answer can be set to:

- 1 ring before answering (**default**)
- 3 rings before answering
- 5 rings before answering

Disconnect on Busy

The ZR320 controller can use the VOX circuit for detecting a busy signal on the telephone line. After 10 cycles of busy tone are detected, the call is terminated.

The Disconnect on Busy can be set for:

- no checking for busy signal (**default**)
- check for busy signal during first 20 seconds of call
- check for busy signal continuously throughout the call

Radio Timeout

Because the radio party must be in control of the interconnect at all times, some means of automatically terminating a call is required. The Radio Timeout is the amount of time that the ZR320 controller allows the call to continue without the presence of carrier. The Radio Timeout is a safety net for times when a radio gets out of range and cannot terminate the call.

The Radio Timeout can be set to:

- 30 seconds (**default**)
- 45 seconds
- 60 seconds

Call Limit

The ZR320 controller has a call limit timer that is used to restrict the length of calls. Double warning beeps are sent every 3 seconds starting 15 seconds before the call is to be terminated.

The Call Limit can be set to:

- Off
- 3 minutes (**default**)
- 5 minutes
- 10 minutes

Call Limit Reset

The Call Limit Reset is used to allow or disallow the user to extend the call limit by using a DTMF '*'.

The Call Limit Reset can be set to:

- Y—reset allowed
- N—reset not allowed (**default**)

QCII Tone Groups 1 and 2

QCII Tone Groups 1 and 2 are used for selecting tones for signalling pagers. The user number is used to select the tones. Each digit in the user number can be set to correspond with a frequency in one of six tone groups. The first digit of the user number (in the 10's place) corresponds to the first tone from the QCII and the second digit of the user number (in the 1's place) corresponds to the second tone from the QCII (refer to Table 6-4 to determine the corresponding frequencies for the digits in the user number). If the first and second digits generate the same frequency, a group call (an eight-second tone of the same frequency) will be issued.

The QCII Group 1 and Group 2 digits can be set to correspond to frequencies in tone groups 1-6. The defaults are tone group 1 for QCII Tone Group 1 and tone group 2 for QCII Tone Group 2.

Table 6-4. QCII Tone Group Frequencies

User Digit	Tone Group 1 Frequencies	Tone Group 2 Frequencies	Tone Group 3 Frequencies	Tone Group 4 Frequencies	Tone Group 5 Frequencies	Tone Group 6 Frequencies
0	330.5	569.1	1092.4	321.7	553.9	1122.5
1	349.0	600.9	288.5	339.6	584.8	1153.4
2	368.5	634.5	296.5	358.6	617.4	1185.2
3	389.0	669.9	304.7	378.6	651.9	1217.8
4	410.8	707.3	313.0	399.8	688.3	1251.4
5	433.7	746.8	953.7	422.1	726.8	1285.8
6	457.9	788.5	979.9	445.7	767.4	1321.2
7	483.5	832.5	1006.9	470.5	810.2	1357.6
8	510.5	879.0	1034.7	496.8	855.5	1395.0
9	539.0	928.1	1063.2	524.6	903.2	1433.4

Ring on Channel

The Ring on Channel determines how the ZR320 controller will ring on the air when a user is called over the radio channel. For the ZR330 controller user, this option has no effect; the ZR320 controller rings until the ZR330 controller answers.

The Ring on Channel can be set to:

- Once and wait**—The ZR320 controller sends a single ring over the channel and waits for the radio to answer within the mobile answer time.
- Until answer**—The ZR320 controller rings on the air until the radio answers, for up to the mobile answer time (**default**).

NOTE: If you are using the call forwarding feature, the ZR320 controller should be set to Until answer.

Stop Scan Tone

You can specify a TPL tone or DPL code (refer to Table 6-1) as the stop scan tone. This option is system-wide, so each time a QCII page is transmitted, the set TPL/DPL will accompany it. When scanning with QCII as the squelch system on a GP300/GM300, the radio will detect the subaudible TPL/DPL, and will remain on the channel as long as that tone is transmitted. Without the TPL/DPL decode, the radio will remain on the QCII channel during scan whenever there is activity on the channel. Programming a TPL or DPL stop scan tone, however, speeds up the scanning process, because, as soon as the page is answered, the subaudible frequency is no longer sent, and the radio will continue scanning other channels.

The Stop Scan Tone can be set to:

- Off (default)
- Any TPL frequency
- Any DPL code (023-754)

Courtesy Tone

When using TPL with reverse-burst or DPL in a quiet area, sometimes the telephone party is unable to tell when the radio user has stopped talking. The courtesy or "over" tone (1 kHz) indicates to the telephone user when it is time to speak. It is always disabled on radio to radio calls.

The courtesy tone can be set to:

- Y—enabled
- N—disabled (**default**)

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Privacy Mode

Privacy mode is an option for blocking out one side of the conversation when the repeater is operating in half-duplex mode. When privacy mode is on, a high-pitched tone is sent in place of the receive audio from the radio, thus discouraging casual eavesdropping by scanner listeners, etc.

The privacy mode can be set to:

- Y—On
- N—Off (default)

Carrier Repeat

The carrier repeat option is to enable the repeater function. If TPL/DPL has been programmed on the receive radio, only received signals with the correct TPL or DPL are repeated.

The carrier repeat can be set to:

- On (CSQ, any TPL tone, or any valid DPL code)
- Off (default)

Answer Time

The answer time is the amount of time allowed for a radio to answer the call before the call is forwarded to the call forward user, if such a user has been programmed (refer to "Forward Call To" on page 6-14 for information on how to program the call forward user). A call can be forwarded twice before it is terminated.

An example of multiple call forwarding would be a user who is called at home on a ZR330 controller. If the user does not answer, the call is forwarded to his radio. If the radio does not answer, the call gets forwarded to his pager. In this way, very complicated communication schemes can be supported.

The range for the answer time is 10-60 seconds. The default is 30 seconds.

Dialing Mode

The ZR320 controller dials into the Public Switched Telephone Network (PSTN).

The dialing mode can be set to:

- Pulse—using 40/60 make-break ratio rotary pulses at 10 pps (pulses per second)
- DTMF—using nonregenerated DTMF digits (default)

When used with the ZR330 controller, the pulse setting instructs the ZR320 controller to pulse dial all DTMF digits. The DTMF setting instructs the ZR320 controller to pass the DTMF commands from the radio or ZR330 controller directly to the telephone.

Toll Restrict 1

Use the toll restrict feature for a repeater on an internal phone exchange. Its function is to limit calls from mobiles and portables. The values entered for toll restrict 1 designate certain digits to be "prohibited" as the first digit in a telephone number. If a mobile user dials any of these "prohibited" digits as the first digit, the call will be terminated.

Up to four separate values can be set for the toll restrict 1, each in the range of 0-9. The default setting is a blank field (no restrictions).

Toll Restrict 2

The values entered for toll restrict 2 designate certain digits to be "prohibited" as the second digit in a telephone number. If a mobile user dials any of these digits as the second digit, the call will be terminated.

Up to four separate values can be set for the toll restrict 2, each in the range of 0-9. The default setting is a blank field (no restricted digits).

Pager Talk Time

When calling a tone + voice pager, the talk time determines the maximum amount of time that the caller's voice may be transmitted on the channel. If the pager talk time is set to 10, the call is terminated after 10 seconds. Also, as soon as there is a loss of carrier from a mobile, or a gap of 2 seconds is detected in the caller's voice (using the VOX circuit), the call is terminated.

The range for the pager talk time is 1-30 seconds. The default is 10 seconds.

Tx Hang Time

The transmit or repeat hang time is the amount of time after loss of the received signal carrier before the transmitter is actually unkeyed. This keeps the transmitter from being keyed/unkeyed continuously between gaps in the conversation.

The Tx Hang Time can be set to:

- Off
- 1 second
- 3 seconds (default)
- 5 seconds

VOX Hang Time

When the ZR320 controller is operating in the simplex VOX or simplex VOX with pre-key, the VOX hang time keeps the transmitter keyed during small gaps or pauses in the telephone party's speech.

The VOX hang time can be set to:

- 0.5 seconds
- 0.8 seconds
- 1.0 seconds (default)
- 1.3 seconds
- 1.5 seconds

COR Hang Time

During simplex operation, the COR hold timer is used to desensitize the COR input for times when the mobile is fading or picket-fencing. The ZR320 controller remains in the mobile to telephone mode for a programmable period of time after carrier has dropped.

The COR hang time can be set to:

- 0.0 seconds (default)
- 0.1 seconds
- 0.3 seconds
- 0.5 seconds

Interconnect Mode

There are four modes of operation of the ZR320 controller during telephone interconnect.

Half Duplex—interconnect for a duplex repeater.

This mode provides normal conversation for the caller. The mobile user may only listen or speak. Half Duplex Mode allows the mobile user to interrupt the caller but the caller cannot interrupt the mobile user.

Full Duplex—interconnect for a duplex repeater.

This is normal "telephone" operation. The caller and the mobile user can talk and listen at the same time,

and either may interrupt the other at any time. The mobile radio used must be full-duplex capable. This is the mode of operation used when the ZR330 controller acts as a single user, telephone line extender.

Simplex VOX—interconnect for a simplex radio.

The mobile to phone connection uses the COR indication of the simplex radio. The phone to mobile connection uses the voice detection circuits of the ZR320 controller. Both paths are talk or listen but not at the same time. The phone to mobile path or the mobile to phone path is determined on a “first-come-first-served” basis.

Simplex Prekey—interconnect for a simplex radio.

This mode has the same basic operation as Simplex VOX, except that the loss of COR from the simplex radio will key the transmitter of the simplex radio, anticipating the phone caller’s speech transmission.

Multi-User

The ZR320 controller can operate in Multi-User or Single-User mode.

In the Multi-User mode, a caller to the ZR320 controller must enter a user number. If the user number is not entered within five seconds of making the connection, the call will be put through to the autocal user (refer to “Autocall User” on page 6-7).

In the Single-User mode, the call is directed to the autocal user immediately.

The Multi-User can be set to:

- Y—multi-user operation
- N—single-user operation (**default**)

6.3.2.2 User-Programmable Fields

The information in these fields affects the active user.

You must go through one of the System Configuration Screens (Figure 6-3 or Figure 6-4) to reach the screen containing the User-Programmable Fields.

From the System Configuration Screen:

1. Press **F6** (View Users).

The screen in Figure 6-5 should appear.

In the User ID field on the left half of the screen, the information for that user is displayed. The right half of the screen is the information for the first call forward user (refer to “Forward Call To” on page 6-14). This user number can be entered at the bottom left of the screen, in the **Forward Call To** field.

NOTE: *The right half of the screen is for display only; none of the settings can be changed. To change settings for any user, that user number must be active in the User ID field on the left half of the screen.*

MOTOROLA Radio Service Software									
CHANGE/VIEW: PHONE BASE(320):USERS									
User ID..... 89 Status..... QCII Radio QCII Tones..... 1034.7 1063.2 Forward Call To... 31 84	Forward User <hr/> User ID..... 31 Status..... QCII Radio QCII Tones..... 304.7 288.5 Forward Call To... 84								
F1 HELP	F2 GOTO USER	F3 PREVIOUS USER	F4 NEXT USER	F5 PRINT SCREEN	F6 VIEW ALL	F7 DELETE USER	F8 ADD USER	F9	F10 EXIT

Figure 6-5. User Configuration

Table 6-5 lists the command key functions available from within the User Configuration screen.

Table 6-5. Command Key Functions

Command	Function
F1, Help	Accesses on-line help option
F2, GoTo User	Sets the cursor on the field next to User ID and allows you to go directly to a user number
F3, Previous User	Displays previous active user
F4, Next User	Displays next active user
F5, Print Screen	Prints contents of screen
F6, View All	Goes to screen in Figure 6-6.
F7, Delete User	Deactivates current user, next active user appears in User ID field
F8, Add User	Sets cursor on the field next to User ID, and allows you to activate a new user number
F10, Exit	Go to previous menu

User ID

There are 100 users numbered from 00 to 99. The user ID can be set to any of these.

Status

The Status field allows you to set a particular user number to a particular equipment type. The user number and equipment type determine the method of selectively signalling the user. For example, if user number 01 has been programmed with an equipment type of TPL radio, a call to user 01 will cause the ZR320 controller to selectively signal the radio with a TPL of 67.0 Hz (refer to Table 6-1 for TPL Tone and DPL Code information). Users above user number 51 with equipment types of TPL radio or TPL talkback are called with carrier only. As a second example, if user number 65 has been programmed with an equipment type of QCII talkback, when user 65 is called, the ZR320 controller will selectively signal that user with digit 6 and digit 5 from Table 6-4.

Each user's status can be set to:

- Off—disabled (default)
- PL (TPL) Radio
- DPL Radio
- QCII Tone Pager
- QCII Tone and Voice (T&V) Pager
- PL (TPL) Talkback
- DPL Talkback
- QCII Talkback
- Direct Air
- Direct Air DPL
- Direct Air TPL
- ZR330 Remote
- QCII Radio
- QCII Group Radio

Quik-Call II Tones

The frequencies corresponding to each digit of the Quik-Call II user number are displayed in these fields. Refer to "QCII Tone Groups 1 and 2" on page 6-8 for a more detailed explanation.

Forward Call To

The Forward Call To field contains the call forward user number (the user to whom a call is forwarded if the active user does not answer). Because calls to pagers are not expected to be answered, call forwarding is not used on tone only or tone + voice pagers.

Use Table 3-1 on pages 3-2 and 3-3 when cross-referencing TPL tones or DPL codes to user numbers. Remember that a user number cannot be used more than once on the same system. Therefore, it is not possible to have one radio user that decodes TPL tone 67.0 Hz and another radio user that decodes DPL 025 on the same system since user slot 01 cannot be programmed as both TPL radio and DPL radio. Multiple users (00 and 51-99) can be set for an equipment type of carrier squelch.

6.3.2.3 View All Users

From the User Configuration screen, you can call up a screen that allows you to view the settings for all available users on the system. To do this:

1. Press **F6** (View All).

The screen in Figure 6-6 should appear.

To place the cursor on a given user field, press **F2**, type in the desired user number, and press **Enter**. Although this screen is primarily for your reference, you can designate the current user by pressing **F10** (EXIT) while the cursor is on the desired user.

MOTOROLA Radio Service Software											
CHANGE/VIEW:PHONE BASE(320):VIEW ALL		User 84 = QCII Radio									
User Operating Mode		0	1	2	3	4	5	6	7	8	9
.	= Off	00] PL	AIR	.	.	.	.	.	.	.	[ 00
PL	= PL Radio	10 ] .	.	.	.	.	.	.	.	.	[ 10
DPL	= DPL Radio	20] .	DPL	.	.	.	.	.	TP	.	[20
TP	= QCII Tone Pager	30] .	QCR	.	.	TVP	.	.	.	.	[ 30
TVP	= QCII T&V Pager	40 ] .	.	.	.	.	.	.	.	.	[ 40
PLT	= PL Talkback	50 ] .	.	.	.	.	.	DPT	.	.	[50
DPT	= DPL Talkback	60 ] .	.	.	.	.	.	.	.	.	[ 60
QCT	= QCII Talkback	70 ] .	.	.	.	.	.	.	.	.	[ 70
AIR	= Direct Air	80] QCR	.	.	.	QCR	.	.	.	QCR	[80
330	= ZR330 Remote	90 ] .	.	.	.	.	.	.	.	.	[ 90
QCR	= QCII Radio										
Goto User:		0	1	2	3	4	5	6	7	8	9
F1	F2	F3	F4	F5	F6	F7	F8	F9	F10		
HELP				PRINT					EXIT		
				SCREEN							

Figure 6-6. View All Users

6.3.3 Programming Example

A major renovation and expansion of the Hotel Donotell includes an improved radio communications system. The hotel desires selective paging capabilities as well as telephone interconnect for designated management and service personnel. Portable and mobile radios and pagers will be used by the various functions of the hotel.

A permanent installation of a GR500 repeater is requested by the customer. There are some older PL and DPL only pagers that will be supplemented by newer Quik-Call II pagers and field radios. The features of the ZR320 Selective Calling Interconnect Controller are needed.

The ZR320 repeater controller requires the 16-channel GM300 radios. A 1 to 10 Watt, UHF GM300 will be used as the receive radio. A 40 Watt UHF GM300 radio will be used as the transmit radio. The repeater will transmit on 463.5250 MHz and receive on 468.5250 MHz. All of the field radios have time-out-timers; the "TOT" of the transmit radio will be programmed to OFF for extended interconnect operation.

Carrier Repeat operation will be with DPL code 131 which the ZR320 controller generates. The repeater will have a Tx Hang Time of 3 seconds. The FCC station callsign of KJUU658 will be identified by Morse ID (CWID) every 10 minutes when the repeater is active.

The personnel of the hotel will be defined as "users" and separated by the TPL tones, DPL codes and Quik-Call II capcodes. Therefore, the ZR320 controller will be operating in the multi-user mode. The user groups to be programmed into the ZR320 controller based GR500 repeater will be assigned the User Numbers and Equipment types shown in Table 6-6; the user numbers for the TPL and DPL pagers are determined from Table 6-1 (TPL/DPL Code Conversions). Note that the TPL and DPL pagers will be entered as "Talkback Pagers" even though they can not transmit.

Table 6-6. User Groups

User	User Number	Equipment
Hotel supervisor	21	QCII Radio
Maintenance manager	29	QCII Radio
Maintenance employees	89	QCII T & V Pager
Front desk	23	QCII Radio
Grounds and landscaping	13	TPL-1Z Talkback Pager
Convention center manager	27	QCII Talkback Pager
Kitchen/food services	57	DPL343 Talkback Pager
Housekeeping	10	TPL-ZZ Talkback Pager
House "dick"	26	QCII Radio
"Group" call	22	(QCII format)

The new Quik-Call II pagers that were purchased have Capcodes requiring the A and B tones both come from tone group 2.

Telephone interconnect operation will be Half Duplex. The Access Code prefix will be "411207" and the Deaccess Code prefix will be "#73." The Answer Time will be set at 10 seconds to increase efficiency. To discourage extended interconnect operation, the Call Limit Timer of the ZR320 controller defaults to 3 minutes but it can be extended (reset) if necessary. The Privacy Mode is used to prevent the field radio half of the conversation from being heard by other field radios. The Courtesy Tone is activated to assist the telephone callers. If a busy signal is detected anytime during interconnect operation, the call is to be terminated.

The employees of the hotel are not allowed to place outside calls. Toll Restrict 1 digits will be "0", "1" and "9." Toll Restrict 2 digits will not be needed. Managers will be allowed to place toll calls; the Toll Restrict bypass code will be "880808."

In case a manager does not answer a page or a telephone caller does not know the User number, Call Forward and Autocall User will be the Front Desk (user 23).

To prevent unauthorized reprogramming of the ZR320 controller, you want to change the "Program Code" to "60107."

6.3.3.1 Programming the Controller and Radios

The programming of the repeater controller and radios will be addressed in this example.

For the following, **Esc** is the escape key, **Tab** is the tab key, and **Enter** is the enter key (which may be marked with only an arrow).

Reading the Codeplug

1. From the "MAIN MENU", press **F3** (GET/SAVE Codeplug Data).
2. Press **F6** (CHANGE to Repeater mode). **F2** will be redefined as "READ Repeater."
3. Press **F2** (READ Repeater). A prompt will appear on the screen: "Connect the programming cable to the Repeater Option Board, or press **F10** for a Generic Repeater." The ZR320 controller is a Repeater Option Board. Plug the RIB programming cable into the ZR320 controller front panel "Programming" jack.
4. Press **F2** (CONTINUE) to read the ZR320 controller.

5. When the ZR320 controller has been read, a prompt will appear to tell you to "Connect the programming cable to the TRANSMIT Radio Connector, or press **F10** to skip it." Move the RIB programming cable to the microphone jack on the transmit radio.
6. Press **F2** (CONTINUE) to read the codeplug of the transmit radio.
7. After the radio is read, a highlighted area may appear to advise that the radio was previously programmed in Radio mode. Press **F2** (CONTINUE).
8. Another highlight may appear to advise you that any custom programming will be overwritten. Press **F2** (CONTINUE). A prompt appears: "Connect the programming cable to the RECEIVE Radio Connector, or press **F10** to skip it."
9. Move the RIB programming cable to the microphone jack on the receive radio.
10. Press **F2** (CONTINUE) to read the codeplug of the receive radio.
11. After the radio is read, the highlighted areas detailed for the transmit radio may appear for the receive radio. For each highlighted area, press **F2** (CONTINUE).
12. Press **Esc** to return to the "MAIN MENU."

Entering the Radio Frequencies

1. Press **F4** (CHANGE/VIEW Codeplug Data).

First, we will program the radio parameters.

2. Press **F5** (MODE).
3. Use **Tab** to move to the "Rx Frequency" highlight. Key in the receive frequency, in MHz, ('468.5250'). Press **Enter**.
4. Key in the transmit frequency, in MHz, in the "Tx Frequency" highlight ('463.5250'). Press **Enter**.
5. In the "Rx Squelch Type" highlight, use the up/down arrow keys to scroll through the choices to "DPL." Press **Enter**.
6. In the highlight for "Rx Squelch Code", key in the desired DPL code for the repeater operation, ('131'). Press **Enter**.
7. If the "Tx Squelch Type" is not "CSQ", use the up/down arrow keys to select "CSQ." Press **Enter**.
8. The hotel is the sole user on this frequency. In the "Tx Inhibit on Busy" highlight, use the up arrow to choose "N" (for No). Press **Enter**.

Setting the Local/Distance Operation

1. The hotel is located near an urban environment. Maximum interference protection of the receive radio is needed. In the "Local/Distance" highlight, use the up arrow key to select "Local" operation. Press **Enter**.
2. The "Repeater Type" highlight at the top of the screen, should show either "Phone Base PA" or "Phone Base Rmt." No other external accessories will be used with the ZR320 controller; choose either type.

- The RSS screen should look like Figure 6-7. Press **F10** (EXIT).

MOTOROLA Radio Service Software Radius GM300 Model: M34GMC29C3__		Enter Frequency In MHz. Ex: 451.6500							
CHANGE/VIEW:MODE									
Repeater Type.....Phone Base PA									
Rx Frequency..... 168.52500									
Tx Frequency.....463.52500									
Rx Squelch Type.....DPL									
Rx Squelch Code.....131									
Tx Inhibit on Busy.....N									
Local/Distance.....Local									
F1 HELP	F2	F3	F4	F5 PRINT SCREEN	F6	F7	F8	F9	F10 EXIT

Figure 6-7. Change/View: Mode, Local/Distance

Next, the system wide parameters of the ZR320 controller will be set.

Setting the ZR320 System Wide Parameters

- Press **F2** (RADIO WIDE Configuration: Repeater Option Board).
- Press **Tab** to highlight "Morse ID." Key in "KJUU658" as the FCC assigned call sign of the repeater. Press **Enter**.
- In the "Autocall User" highlight, key in "23" for the front desk. Press **Enter**.
- In the "Access Code" highlight, key in "411207" for the access code prefix. Press **Enter**.
- In the "Deaccess Code" highlight, key in "#73" for the deaccess code prefix. Press **Enter**.
- In the "Toll Restrict" highlight, key in "880808" for the toll restrict bypass access code prefix. Press **Enter**.
- In the "Program Code" highlight, key in "60107." Press **Enter**.
- In the "Rings To Answer" highlight, use the up/down arrow keys to select "1" (RSS default value). Press **Enter**.
- In the "Disconnect On Busy" highlight, use the up/down arrow keys to select "Always." Press **Enter**.
- In the "Radio Timeout (s)" highlight, use the up/down arrow keys to select "30" (RSS default value). Press **Enter**.
- In the "Call Limit (min)" highlight, use the up/down arrow keys to select "003" (RSS default value). Press **Enter**.
- In the "Call Limit Reset" highlight, use the up/down arrow keys to select "Y." Press **Enter**.
- In the "QCII Tone Group 1" highlight, key in "2." Press **Enter**.



14. In the "QCII Tone Group 2" highlight, key in "2." Press **Enter**.
15. In the "Ring On Channel" highlight, use the up/down arrow keys to select "Until Answer" (RSS default value). Press **Enter**.
16. In the "Stop Scan Tone" highlight, use the up/down arrow keys to select "Off" (RSS default value). Press **Enter**.
17. In the "Courtesy Tone" highlight, use the up/down arrow keys to select "Y." Press **Enter**.
18. In the "Privacy Mode" highlight, use the up/down arrow keys to select "Y." Press **Enter**.
19. In the "Carrier Repeat" highlight, key in "131" for the desired repeater DPL code to be transmitted. Press **Enter**.
20. In the "Answer Time (s)" highlight, key in "10." Press **Enter**.
21. In the "Dialing Mode" highlight, use the up/down arrow keys to select "DTMF" (RSS default value). Press **Enter**.
22. In the "Toll Restrict 1" highlight, key in "019." Press **Enter**.
23. In the "Toll Restrict 2" highlight, use the space bar to "erase" any previously entered digits. Press **Enter**.
24. In the "Pager Talk Time (s)" highlight, key in "20." Press **Enter**.
25. In the "Tx Hang Time (s)" highlight, use the up/down arrow keys to select "003" (RSS default value). Press **Enter**.
26. In the "Interconnect Mode" highlight, use the up/down arrow keys to select "Half Duplex" (RSS default value). Press **Enter**.
27. In the "Multi-User" highlight, use the up/down arrow keys to select "Y." Press **Enter**.
28. The RSS screen should look like Figure 6-8. This completes the entries for the system wide parameters.

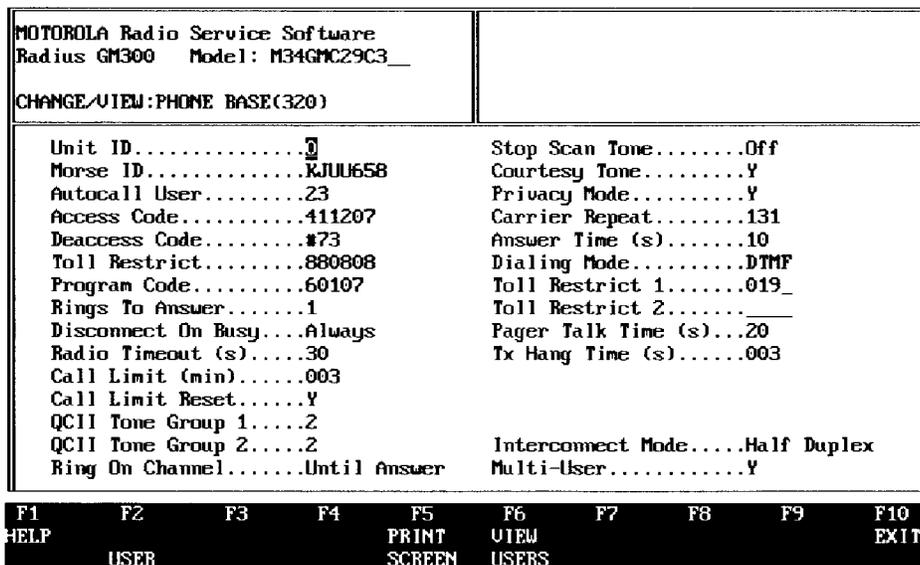


Figure 6-8. Setting System Wide Parameters

6

Enabling and Configuring Users—The Supervisor

We will now begin defining the users for the repeater. Let's start with the head Kahuna, the Hotel Supervisor.

1. Press **F6** (View Users).
2. Press **F8** (Add User or Add Format).
3. In the "User ID" highlight, key in "21" for the Hotel Supervisor. Press **Enter**.
4. In the "Status" highlight, use the up/down arrow keys to select "QCII Radio." The "QCII Tones" for user 21 will appear below the "Status" line (A tone = 634.5 Hz and B tone = 600.9 Hz). Press **Enter**.
5. In the "Forward To" highlight, key in "23" for the Hotel Supervisor call forward to the Front Desk. Press **Enter**. This completes the entries for the "Super." Let's continue with the Front Desk, user "23."

Enabling and Configuring Users—The Front Desk

1. Press **F8** (Add User or Add Format).
2. In the "User ID" highlight, key in "23" for the Front Desk. Press **Enter**.
3. In the "Status" highlight, use the up/down arrow keys to select "QCII Radio." The "QCII Tones" for user 21 will appear below the "Status" line (A tone = 634.5 Hz and B tone = 669.9 Hz). Press **Enter**.
4. If there is an entry in the "Forward To" highlight, use the space bar to "erase" it. Press **Enter**.

The other QCII radios will be entered in the same way the Hotel Supervisor except the "user" number and, therefore, the QCII tones will be different. Call Forward will also be to user "23." The RSS screens for the QCII radio should look like Figure 6-9.

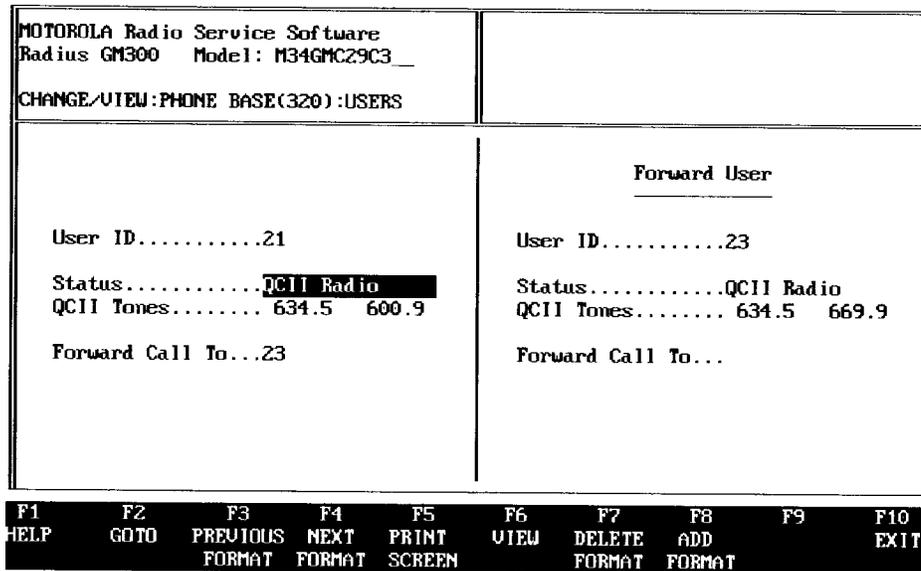


Figure 6-9. Enabling and Configuring Users—Supervisor

The TPL and DPL pagers will be entered as equipment type "TPL (or DPL) Talkback" pagers. The QCII Tone & Voice pagers are entered as equipment type "QCII T&V." The different TPL tones or DPL codes are cross referenced to the user numbers in Table 6-1. Those user numbers are then entered in the "User ID" highlight. The correct equipment type must be chosen in the "Status" highlight with the up/down arrow keys. There is no call forwarding for the pagers.

The "Group" call user number "22" will be entered as a "QCII T&V Pager" since group calls are normally broadcast announcements. Again, no call forwarding is required.

After all of the users data has been entered, press **F6** (View) to check the user numbers and equipment types on a single screen (see Figure 6-10). If every thing is correct, the repeater can be programmed. If there are any mistakes, press **F10** (EXIT) to return to the "Users" screen for correction.

Programming the ZR320 Controller and Repeater Radios

MOTOROLA Radio Service Software												
Radius GM300 Model: M34GMC29C3												
CHANGE/VIEW:PHONE BASE(320):VIEW ALL		User 21 = QCII Radio										
User Operating Mode		0	1	2	3	4	5	6	7	8	9	
.	= Off	00	1	.	.	.	.	.	.	.	.	[ 00
PL	= PL Radio	10	1	PLT	.	PLT	.	.	.	.	.	[ 10
DPL	= DPL Radio	20	1	.	QCR	QCR	QCR	.	QCR	QCR	.	QCR [20
TP	= QCII Tone Pager	30	1	.	.	.	.	.	.	.	.	[ 30
TUP	= QCII T&V Pager	40	1	.	.	.	.	.	.	.	.	[ 40
PLT	= PL Talkback	50	1	.	.	.	.	.	DPT	.	.	[50
DPT	= DPL Talkback	60	1	.	.	.	.	.	.	.	.	[ 60
QCT	= QCII Talkback	70	1	.	.	.	.	.	.	.	.	[ 70
AIR	= Direct Air	80	1	.	.	.	.	.	.	.	TUP	[80
330	= ZR330 Remote	90	1	.	.	.	.	.	.	.	.	[ 90
QCR	= QCII Radio											
Goto User:		0	1	2	3	4	5	6	7	8	9	

F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
HELP				PRINT					EXIT
	USER			SCREEN	USERS				

Figure 6-10. Enabling and Configuring Users—Front Desk

1. Press **Esc** to return to the "MAIN MENU."
2. Press **F3** (GET/SAVE Codeplug Data).
3. Press **F8** (PROGRAM Repeater). A message will appear that directs you to plug the RIB programming cable into the Repeater Option Board (the ZR320 controller in this case). Then press **F2** (CONTINUE).
4. When the ZR320 controller has been programmed, a message will direct you to plug the programming cable into the TRANSMIT radio. Then press **F2** (CONTINUE).
5. After the transmit radio is programmed, a message will direct you to plug the programming cable into the RECEIVE radio. Then press **F2** (CONTINUE).
6. Press **F7** (SAVE Archive File), to save all of the information to a disk file. If the repeater has not been previously programmed, you will be prompted to "CONTINUE" by pressing **F2** (CONTINUE). You will be asked for a "Customer ID:" such as "Hotel_Donotell."
7. Press **F8** (SAVE), to save the data to an archive file.

Enabling the CWID

To enable the CWID to transmit every 10 minutes on with activity, the DTMF section 3.4 – "Programming Over-The Air" will be used. Please refer to section 3.4 for details on using this method.

1. Access the operating ZR320 repeater with a DTMF radio.
2. Key in the programming mode access code "60107*" with the Touch-Code pad on the DTMF radio.

3. After the 5 "OK beep" tones, from the ZR320 controller, key in "61#" with the Touch-Code pad.
4. After the 5 "OK beep" tones, deaccess the programming mode by keying in "99#" with the Touch-Code pad.
5. The ZR320 controller exits the program mode with a "ringing" signal.

6.4 Programming Over-The Air

The ZR320 controller can 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 ZR320 controller. The access code is user programmable (refer to "Program Access Code (90#) [See Also: "Access Code (01#)"]" on page 6-29).

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

6.4.1 Entering a Command

To execute a program command, a DTMF number is entered followed by the "#" key. Each time a command is completed, the ZR320 controller responds with five "go ahead" beeps indicating that it is waiting for another command. If an error is detected while programming, the ZR320 controller 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 key is pressed during a 60-second period, the ZR320 controller will exit program mode automatically.

6.4.2 Program Mode Access Code

The program mode access code followed by a '#' must be entered before programming can take place. The default program mode access code is 12320.

6.4.3 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 12320), followed by a '#'.
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.

6.4.4 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 ZR320 controller will exit program mode automatically.

6.4.5 DTMF Command Descriptions

A description of the command codes for the ZR320 controller are given in the following paragraphs. The codes that initiate these command codes follow the description. These codes are entered into the ZR320 controller via the DTMF keypad on a radio or a DTMF telephone calling a ZR320 or ZR330 controller in the remote programming mode.

6.4.5.1 System Commands

Access Code (01#)

This command sets a 1-9 digit (including “*”) access code for radio users to access the ZR320 controller.

Example:

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

Once set, *987019 is the full **phone** access code for user 01, and *987017 is the full **paging** access code for user 01.

NOTE: The underlined steering digit (7 or 9) dictates the function of the ZR320 controller. For phone access, either a “9” or a “” may be used as the steering digit.*

Deaccess Code (02#)

This command sets a 1-9 digit (including “#”) deaccess code for radio users to deaccess the ZR320 controller. To enter the DTMF # in the sequence, enter it as a “*” because ‘#’ is used to terminate the command. When the ZR320 controller writes the string to the EEPROM, it converts all of the “*” entries to ‘#’ entries.

Example:

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

Once set, #7701 is the disconnect code for user 01.

Toll Restrict (03#)

[See also: “Toll Restrict” Digits 1 and 2 (14#, 15#)]

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

The toll restrict bypass prefix can consist of the digits 0-9 and “*” and cannot exceed eight digits. The default is 99.

Example:

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

Using the previous examples, the toll restrict/bypass code for user 01 would be 8801*.

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

These commands set the dialing mode for the ZR320.

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

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

These commands designate how many times the ZR320 allows the phone to ring before answering.

- 06# Wait one ring (**default**).
- 07# Wait three rings.
- 08# Wait five rings.

Accessory TPL/DPL (09#)

This command enables TPL or DPL generation with local or accessory microphone PTT. This allows an auxiliary microphone input to have TPL or DPL capability. The syntax is identical to the 20# command.

Examples:

- 09# 01# Encode TPL 67 Hz during local/accessory PTT.
- 09# 199# Encode DPL 754 during local/accessory PTT.
- 09# 00# Disable TPL/DPL during local/accessory PTT.

Answer Time (10#)

This command sets the number of seconds the ZR320 controller should wait before forwarding a call to the call forward user. The range is 10 to 60 seconds. The default is 30 seconds.

Example:

- 10# 11# Set answer time to 11 seconds.

Toll Restrict Digits 1 and 2 (14#, 15#)

These commands designate up to four "prohibited" digits (0-9) for the first (14#) and second (15#) digits dialed in a phone number.

Examples:

- 14# 9# Disable all outside calls from inside plant area.
- 15# 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.

Ringling Method (16#, 17#)

These commands designate the ringling method. The ringling and/or waiting ends after the mobile answer time has expired (refer to "Answer Time (10#)").

- 16# Ring once on channel, wait for mobile to answer.
- 17# Ring on channel until mobile answers (**default**).

Repeater Enable/Disable (18#, 19#, 20#)

These commands set the carrier repeat status and TPL/DPL encoding. The correct TPL tone or DPL code is from the list of users, Table 6-1. A DPL user number must be preceded by a "1".

NOTE: Setting encoding enables the repeat only in RSS programming. You must use the 18# command to enable the repeater as well as the 20# command to encode TPL/DPL when programming via DTMF tones.

Examples:

18#	Enable repeater.
19#	Disable repeater (default).
20# 01#	Encode TPL 67.0 Hz during repeat.
20# 199#	Encode DPL 754 during repeat.
20# 0#	Repeat carrier squelch without TPL/DPL encode (disable encode).

Repeat Hang Time (21#-24#)

These commands set the delay before unkeying the transmit radio.

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

Morse ID (25#)

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 6-11 when following the steps to enter the codes.

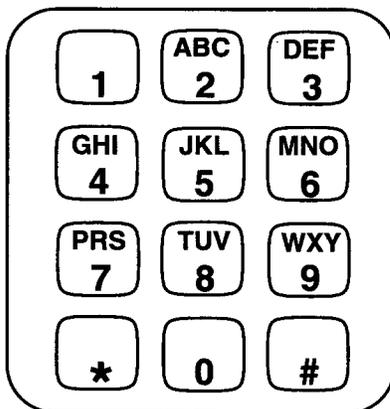


Figure 6-11. DTMF Keypad

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 and Z. The code for Q is "10" and the code for Z is "20." Later issues of firmware include the slant-bar ("/"); 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.

Example:

Set the call sign WNQR 414 (enter the following on the DTMF keypad):

25# 19 26 10 27 04 01 04 #

Meaning - ID# W N Q R 4 1 4 done

Courtesy Tone (26#, 27#)

These commands enable or disable the courtesy tone.

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

Privacy Mask (28#, 29#)

These commands set the privacy mask status.

- 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.

- 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. Stop call after loss of radio signal for:

- 36# 30 seconds (**default**).
37# 45 seconds.
38# 1 minute.

Operating Mode (40#-43#)

These commands set the operating mode of the ZR320.

- 40# Set half-duplex mode (**default**).
41# Set full-duplex mode.
42# Set simplex VOX.
43# Set simplex VOX with pre-key.

VOX Hang Time (44#-49#)

For the VOX operating modes, these commands change the VOX hang time. Change VOX hang time to:

44#	0.5 seconds.
45#	0.8 seconds.
46#	1 second (default).
47#	1.3 seconds.
48#	1.5 seconds.

6.4.5.2 User Commands

Call Forward User Number (50#)

This command is used to set the call forward user number for any user. After the command has been executed, two beeps sound, prompting you to enter the user number. After you enter the user number, the ZR320 issues two more beeps prompting you to enter a call forward user number (for forwarding calls to, if the first user does not answer). If you wish to disable call forwarding on a particular user, press the '#' key when the ZR320 is asking for the second user number. Because calls to pagers are not expected to be answered, call forwarding is not used on tone only or tone + voice pagers.

NOTE: For calls to be forwarded as programmed, the first user must both be enabled. Refer to "Selecting User Equipment Type (69#-80#)".

Example:

50# 89# 31# If user number 89 does not answer, forward the call to user 31.

Morse ID (60#, 61#, 62#)

60#	Disable any Morse ID.
61#	Sends the Morse ID every 10 minutes only with activity.
62#	Sends the Morse ID every ten minutes regardless of activity.

Unit ID (63#)

Unit ID is used where multiple ZR320 controllers are used with one or more ZR330 controllers. The range is 0-9. The default is 0.

Example:

63# 3# Enter unit ID of 3.

QCII Stop Scan Mode (64#)

To enter a TPL, begin the sequence with a '0' and for DPL, begin with a '1'. The TPL/DPL digits (the last two entered) come from Table 6-1 that is used to assign TPL and DPL codes to system users. To eliminate TPL/DPL encode during QCII signaling, enter "00." During calls to tone only and tone and voice pagers, the stop scan tone will not be encoded. The default is "00" - no TPL or DPL encode with QCII pages.

Examples:

64# 013#	Set ZR320 to generate TPL tone 100.0 Hz.
64# 103#	Set ZR320 to generate DPL code 031.
64# 0#	Disable DPL/TPL encode with QCII pages.

QCII Tone Groups 1 and 2 (65#, 66#)

These commands set the QCII tone groups. The range is 1-6. Both tone groups may be the same.

Examples:

65# 4# Select QCII tone 1 from group 4 (default =1).

66# 6# Select QCII tone 2 from group 6 (default =2).

Talk Time (67#)

This command sets the amount of time for callers to talk to pagers. The range is 1-30 seconds. The default is 10 seconds.

Example:

67# 20# Set the talk time to 20 seconds.

Autocall User Number (68#)

This command sets the autocall user number, who is called if a telephone caller does not enter a user number within five seconds of connecting to the ZR320 controller.

Example:

68# 31# Select user 31 as the autocall user.

Selecting User Equipment Type (69#-80#)

These commands select the equipment type for the active user.

Examples:

69# 23# QCII Radio Group Call unit for user 23.

70# 02# Disable User 02.

71# 49# PL (TPL 250.3 Hz) Radio User 49.

72# 80# DPL 532 Radio User 80.

73# 89# QCII Radio User 89.

74# 21# QCII Tone Only Pager User 21.

75# 23# QCII Tone and Voice Pager User 23.

76# 28# TPL (TPL 162.2 Hz) Talkback Pager User 28.

77# 83# DPL 606 Talkback Pager User 83.

78# 61# QCII Talkback Pager User 61.

79# 73# Direct Air User 73.

80# 00# ZR330 Remote Phone User 00.

NOTE: You may also want to set call forwarding for the enabled user, unless that user's equipment type is a tone only or a tone and voice pager (74#, 75#). Refer to "Call Forward User Number (50#)" for the necessary commands.

Single-/Multi-User (81#, 82#)

[See Also: "Unit ID (63#)" and "Autocall User Number (68#)"]

These commands set the mode of operation for the ZR320 controller.

81# Set single user operation (default).

82# Set multi-user operation.

COR Hang Time (83#-86#)

These commands set the COR hang time or disable it. Set the COR hang time to:

83# No COR hold time (default).

84# 100 msec.

85# 300 msec.

86# 500 msec.

Detect Busy Telephone Line (87#, 88#, 89#)

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

87# Disconnect on busy for first 20 seconds (default).

88# Disable busy detect.

89# Disconnect on busy for duration of call.

6.4.5.3 Diagnostic Commands**Program Access Code (90#)**

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

The program mode access code is used to gain access to the ZR320 controller'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 12320.

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 ZR320 controller to all of the factory default settings. Refer to Appendix A, "Quick Reference of Programming Codes," for the defaults. When this command is used, the user and the call forwarding databases are erased.

Setup and Testing (92#,93#, 95#)

These commands are for initial setup and testing. Pressing any digit will end the test.

Examples:

92# Transmit level test.

93# TPL/DPL level test.

95# Hybrid test.

Remote Programming (97#)

This command is used to remotely program a ZR320 controller from a ZR330 controller. Refer to "Programming the ZR320 Controller through the ZR330 Controller" below.

Program Exit (99#)

This command causes the ZR320 controller 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 ZR320 controller will exit program mode automatically.

6.5 Programming via Telephone

6.5.1 Entering Program Mode Through a Telephone

The ZR320 controller 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.

NOTE: While in the telephone programming mode, DTMF programming cannot be accessed over the radio channel.

6.5.1.1 Single/Multi User Mode

The differences in the way the ZR320 controller handles incoming phone calls from the landline require two methods for programming, one for single-user and another for multi-user mode.

To access programming mode for the ZR320 controller in **single-user mode**:

1. Turn off the transmit radio. (This frees the radio channel for other users.)
2. Dial the phone number of the ZR320 controller.
3. Let the phone ring until the mobile answer time has expired. At this time the ZR320 controller answers the telephone line and sends two beeps to the caller.

IMPORTANT: Phone mail or answering machines on the same line as the ZR320 controller may prevent the mobile answer time from expiring, inhibiting program mode.

4. Enter the five digit program mode access code, remembering to enter digits no more than one second apart.
5. Press #.
6. Listen for five beeps indicating that you have accessed the programming mode.

To access programming mode for the ZR320 controller in **multi-user mode**:

1. Turn off the transmit radio. (This frees the radio channel for other users.)
2. Dial the phone number of the ZR320 controller.
3. Let the ZR320 controller answer the telephone and send the query beep to the caller.
4. Enter the five digit program mode access code, remembering to enter digits no more than one second apart.
5. Press #.
6. Listen for five beeps, indicating that you have accessed the programming mode.

6.6 Programming the ZR320 Controller through the ZR330 Controller

The ZR320 controller can be remotely programmed through a ZR330 Radio/Telephone Interface. To accomplish this, perform the following steps.

1. Enter the ZR330 controller's DTMF programming mode.
2. Enter command code 97#. A beep will be heard indicating that the VOX to talk mode has been accessed.
3. Enter the program mode access code of the ZR320 controller being programmed, remembering to enter digits no more than one second apart.
4. Press #.
5. Program the ZR320 controller as you would with a DTMF-equipped mobile radio.

NOTE: At any time while programming the unit, if no DTMF key is pressed during a period of 60 seconds, the ZR320 controller will exit program mode automatically.

6. Hang up the ZR330 radio/telephone when finished programming.

NOTE: Hanging up the telephone will send the command 99# to the ZR320 controller to terminate remote programming. If the user has already sent the command, nothing will happen when the ZR330 radiotelephone sends it again.