



MTRBi Technical Description

Radio Dispatch Engineering
Revision A
Revision Date: 7/15/2010

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1 Revision History

Revision	Date	Author	Description
A	7/15/2010	Radio Dispatch Engineering	Initial Draft

2 MTRBi Overview

The MTRBi is designed to allow a C-Soft console to control and monitor a MOTOTRBO mobile radio. This manual will explain the steps needed to setup the mobile radio, IP223, and C-Soft. The list of supported features of MTRBi on C-Soft are listed below:

- Receive Audio
- Transmit Audio (Private and Group Calls)
- Changing Zones and Channels
- Transmit Text Messages
- Radio Check
- Radio Disable
- Radio Enable
- Remote Monitor
- Call Alert
- GPS Read
- GPS Location of radios plotted on Google Earth
- Receive Caller ID
- Call History
- Cross Patch
- Up to 10 Parallel C-Soft Consoles per one MTRBi line

3 MTRBi Hardware Setup

This section shows how to connect the IP223, MTRBi, and MOTOTRBO mobile radio together.

3.1 Connecting IP223, MTRBi, and MOTOTRBO Mobile Radio

Below is a picture of how to connect the Hardware for MOTOTRBO:

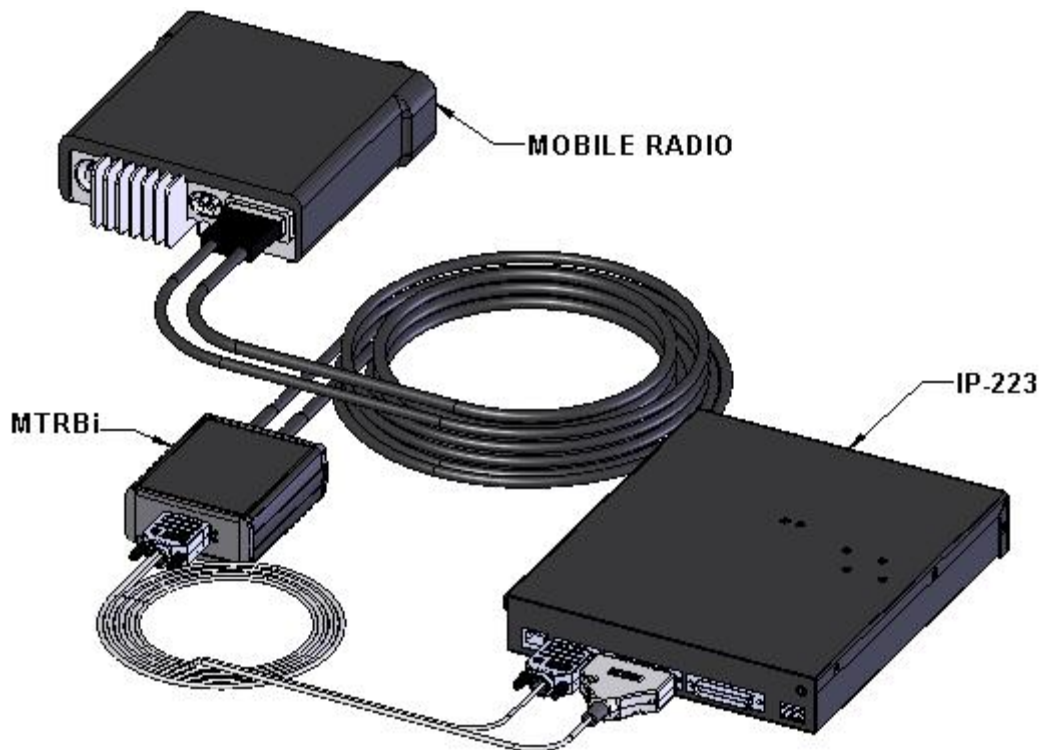


Figure 1

3.2 MTRBi sub-D 9 Connector Pinout

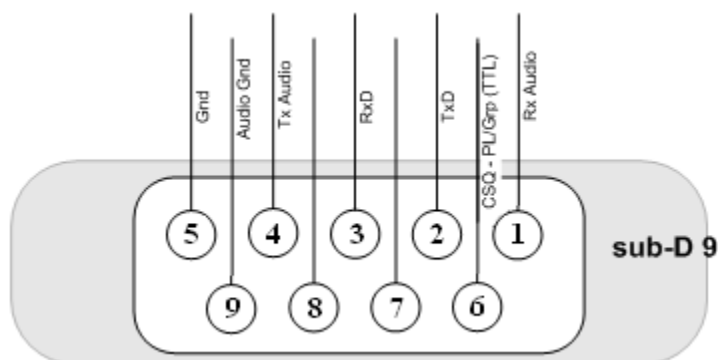


Figure 2

sub-D 9

Pin	Pin Name	Function
1	Rx Audio	Received Audio from Radio (Output)
2	RxD	Data from Control Device (Input)
3	TxD	Data to Control Device (Output)
4	Tx Audio	Transmit Audio to Radio (Microphone-Input)
5	Gnd	Ground
6	CSQ - PL/Grp	Signal Quality (TTL Output)
7	-	not used
8	-	not used
9	Audio Gnd	Extra Ground for Audio

Figure 3

3.3 MAP Interface from MTRBi to MOTOTRBO Radio

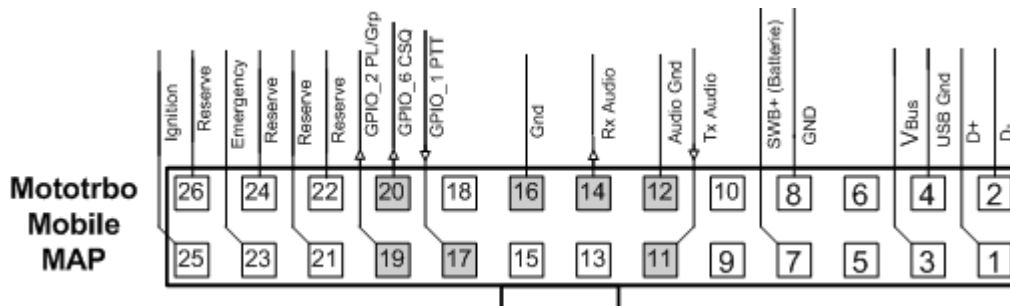


Figure 4

Mototrbo Mobile MAP

<u>Pin</u>	<u>Pin Name</u>	<u>Function</u>
1	USB+	Data (+)
2	USB-	Data (-)
3	VBus	
4	USB Gnd	Ground for USB
7	SW B+	Power Supply
11	Tx Audio	Transmit Audio (Microphone Input)
12	Audio Gnd	Ground for Audio
14	Rx Audio	Receive Audio (Output)
16	Gnd	
17	GPIO_1	PTT (Input)
18	GPIO Gnd	Ground for GPIO (PTT, PL/Grp, CSQ)
19	GPIO_2	PL/Grp (Output)
20	GPIO_6	CSQ for Analog Channel (Output)
23	Emergency	Emergency Switch (Input)
25	Ignition	Ignition Sence (Input)

Figure 5

4 IP223 Setup

The IP223 software and hardware has a specific setup for MTRBi.

4.1 IP223 Hardware

For the MTRBi to work with the IP223 the jumpers need to be set to the values shown below.

- **Line 1 set to position A:** J35, J16, J21, J3, J9 and J11
- **Line 2 set to position A:** J26, J19, J20, J25, J28 and J29

For more information on jumper settings see the IP223 manual in chapter 3 *Installation and Level Settings*.

4.2 IP223 Software

For the MTRBi the Serial Over IP (SOIP) section needs to be setup in the IP223 along with the Line Multicast Setup.

4.2.1 Line Multicast Setup

The Line Multicast Setup (Figure 6) needs to match the Telex Line setup in C-Soft Designer shown in [6.1](#).

Multicast Address Setup

Line Multicast Setup									
Line Number:	Enable via Ethernet:	Line Type:	Line Name:	Rx Mcast Address:	Rx Port:	Tx Mcast Address:	Tx Port:	Tx Group Port:	TTL:
1	☒	Local Mode ▾	Line 1	225.8.11.110	1054	225.8.11.110	1254	0	6
2	☐	Local Mode ▾	Line 2	225.8.11.81	1067	225.8.11.81	1085	0	6

Figure 6

4.2.2 Serial Over IP

To use SOIP via UDP, under the “SOIP Line Type:”, check the “Enable” checkbox and select “UDP” option from “SOIP Type” dropdown menu. Under “UDP Setting” the Address and Ports need to match the setup in C-Soft Designer shown in [6.2](#).

Serial Over IP

SOIP Line Type

Line:	Enable:	SOIP Type:
1	☒	UDP ▼
2	☐	UDP ▼

UDP Setting

Line:	Line Name:	Rx Mcast Address:	Rx Port:	Tx Mcast Address:	Tx Port:	TTL:
1	SOIP UDP 1	225.8.11.110	3055	225.8.11.110	3255	6
2	SOIP UDP 2	225.8.11.81	6056	225.8.11.81	6256	6

TCP Setting

Line:	Line Name:	Host IP:	Inbound Port:	Outbound Port:
1	SOIP TCP 1	172.19.120.120	3350	3368
2	SOIP TCP 2	172.19.120.120	3351	3369

Figure 7

The settings under “UDP Setting” are describes as follow:

- **Line Name:** Name of the SOIP line.
- **Rx Mcast Address:** The multicast address that the IP223 use to listen for the SOIP packets.
- **Tx Mcast Address:** The multicast address that the IP223 use to send SOIP packets.
- **Rx Port:** The port that the IP223 use to listen for SOIP packets.
- **Tx Port:** The port that the IP223 use to transmit SOIP packets.
- **TTL:** Time to live for each SOIP packets.

4.2.3 Serial Port Mode

The Serial Port Mode needs to be setup as shown in Figure 8 for the MTRBi.

Serial Port Mode

Serial Port Mode:	Serial Over IP ▼	Serial Port Params:	9600,N,8,2 ▼
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Figure 8

5 MOTOTRBO Customer Programming Software Setup

This section describes how to setup the MOTOTRBO radios using the Customer Programming Software. Before going through the setup go to “View” in the menu and select “Expert”.

5.1 Mobile and Portable MOTOTRBO Radio Setup

5.1.1 General Settings

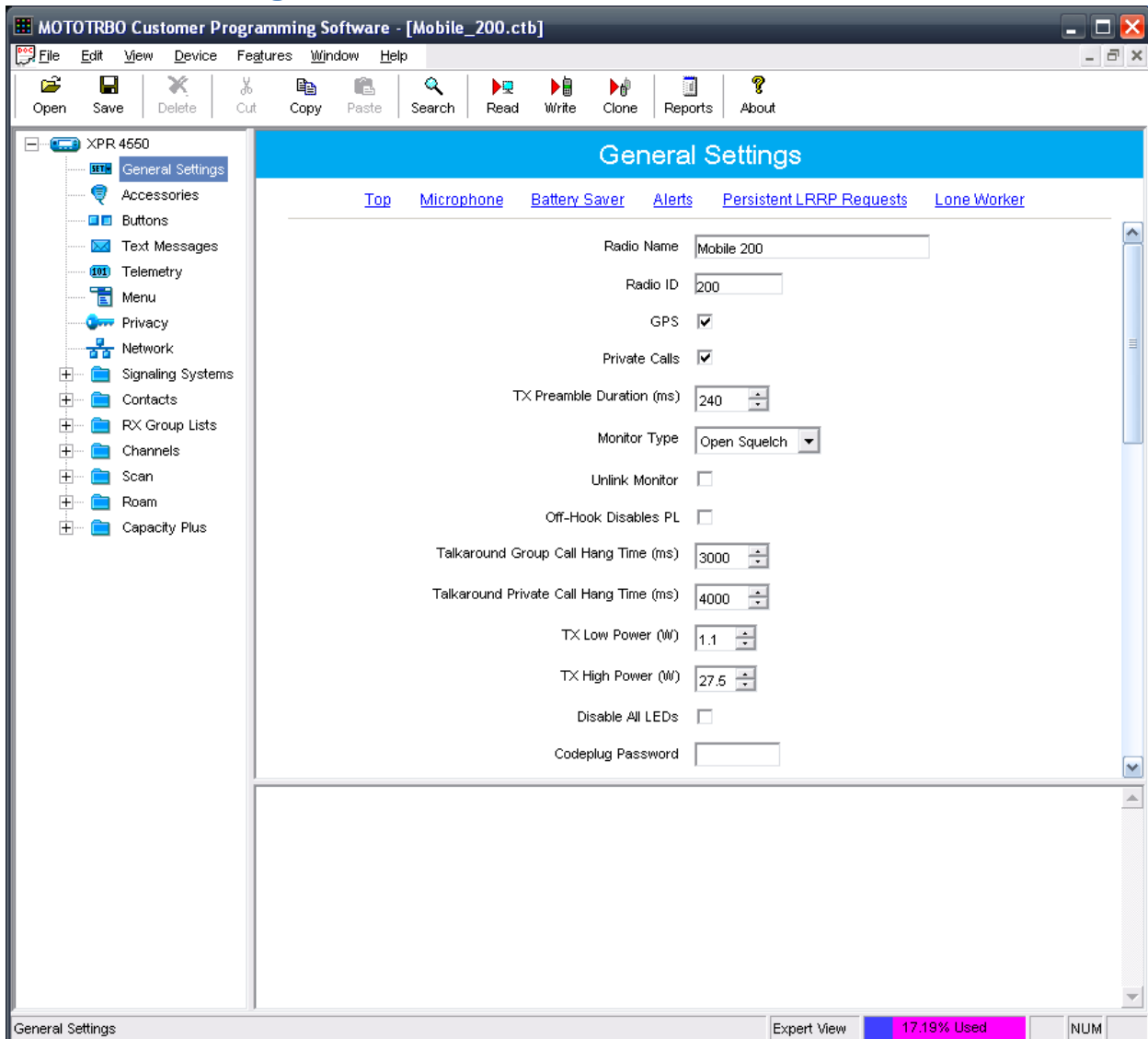


Figure 9

- Fill in the Radio ID.
- In devices with GPS receivers, the GPS function must be activated.

5.1.2 Accessories

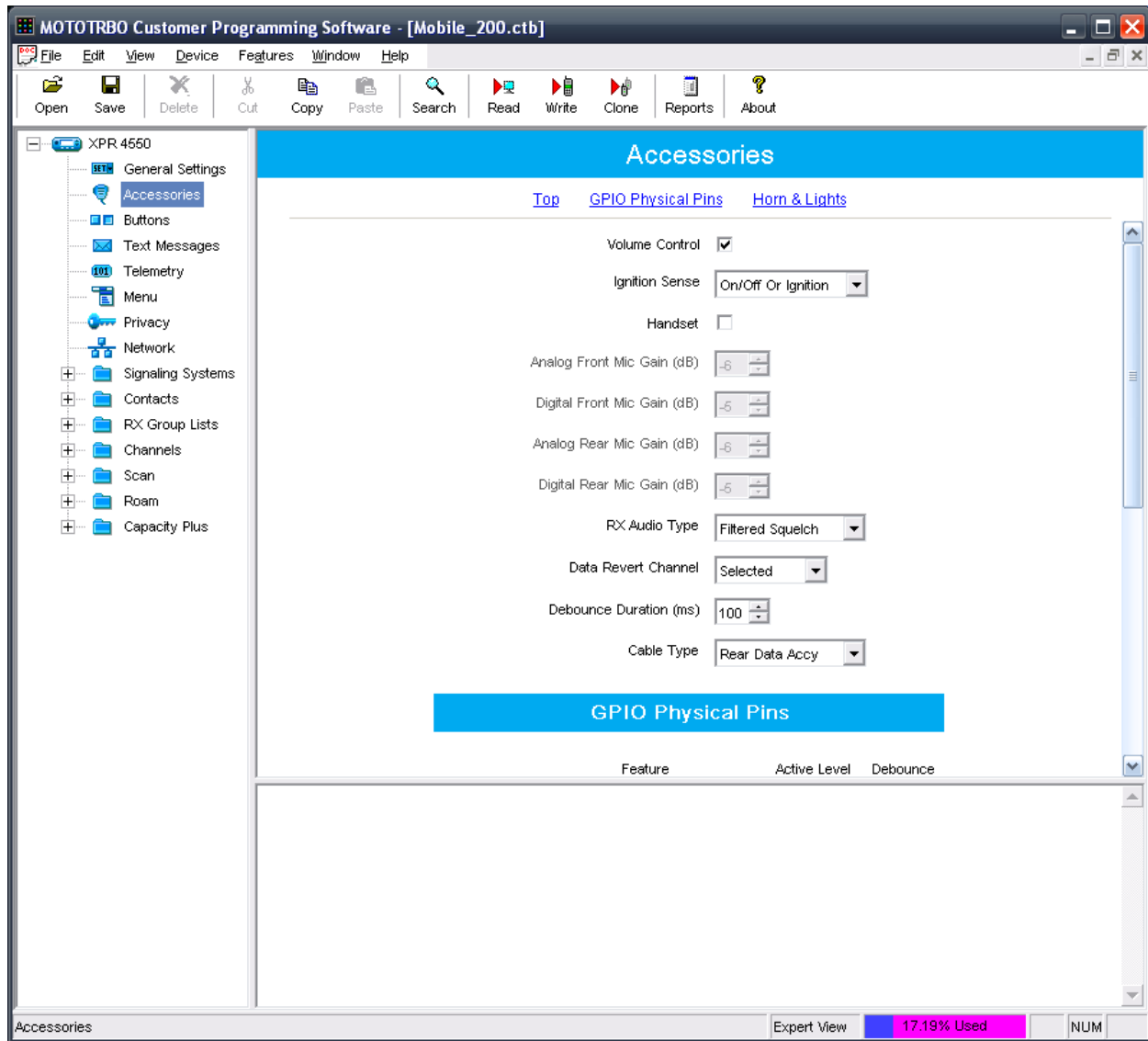


Figure 10

- For a mobile radio set cable type to "Rear Data Accy". Factory setting for cable type is typically "Motorola".

5.1.3 Menu

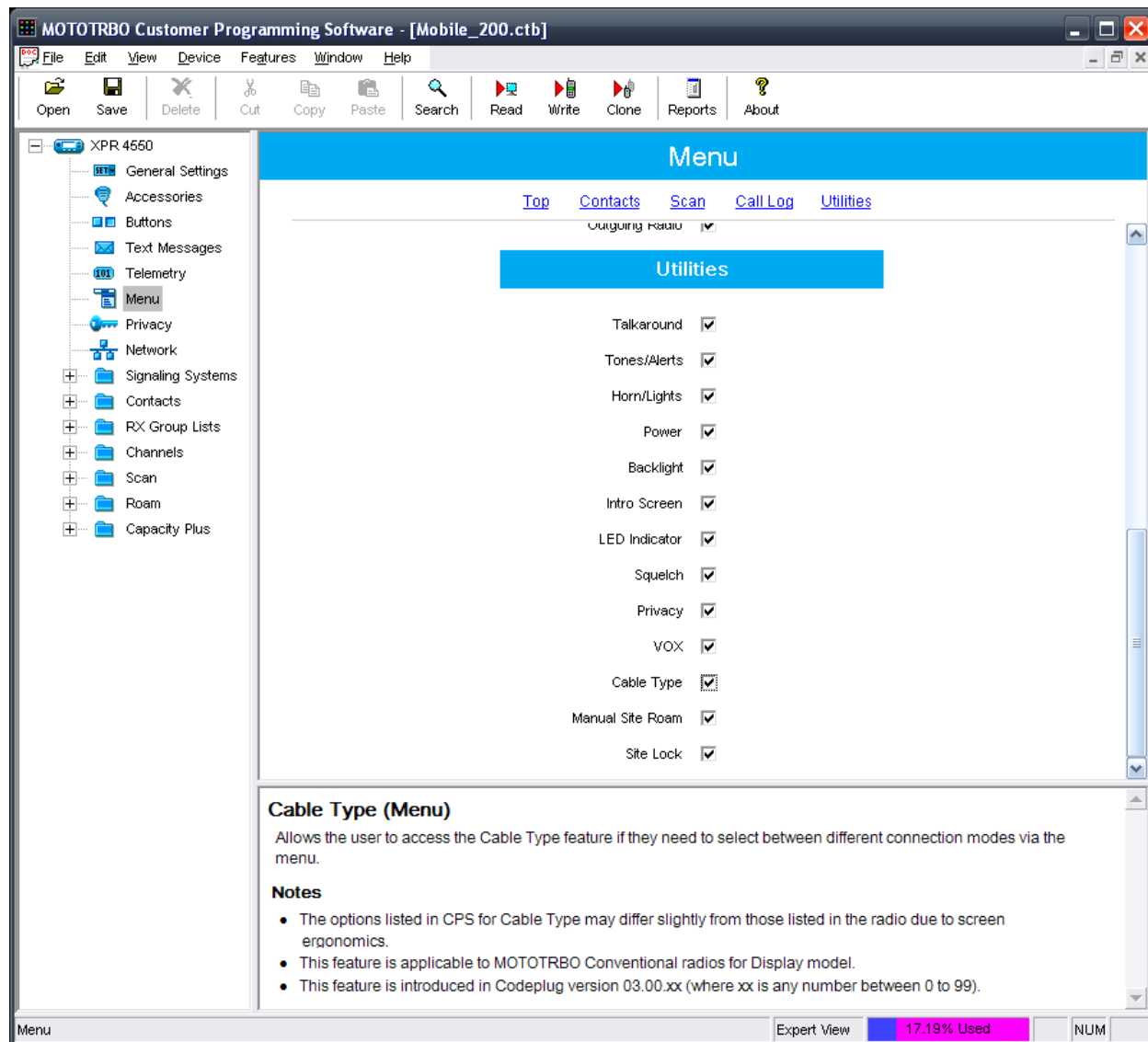


Figure 11

- For mobile radios with a display the cable type can be activated in section service program of the menu.

5.1.4 Network

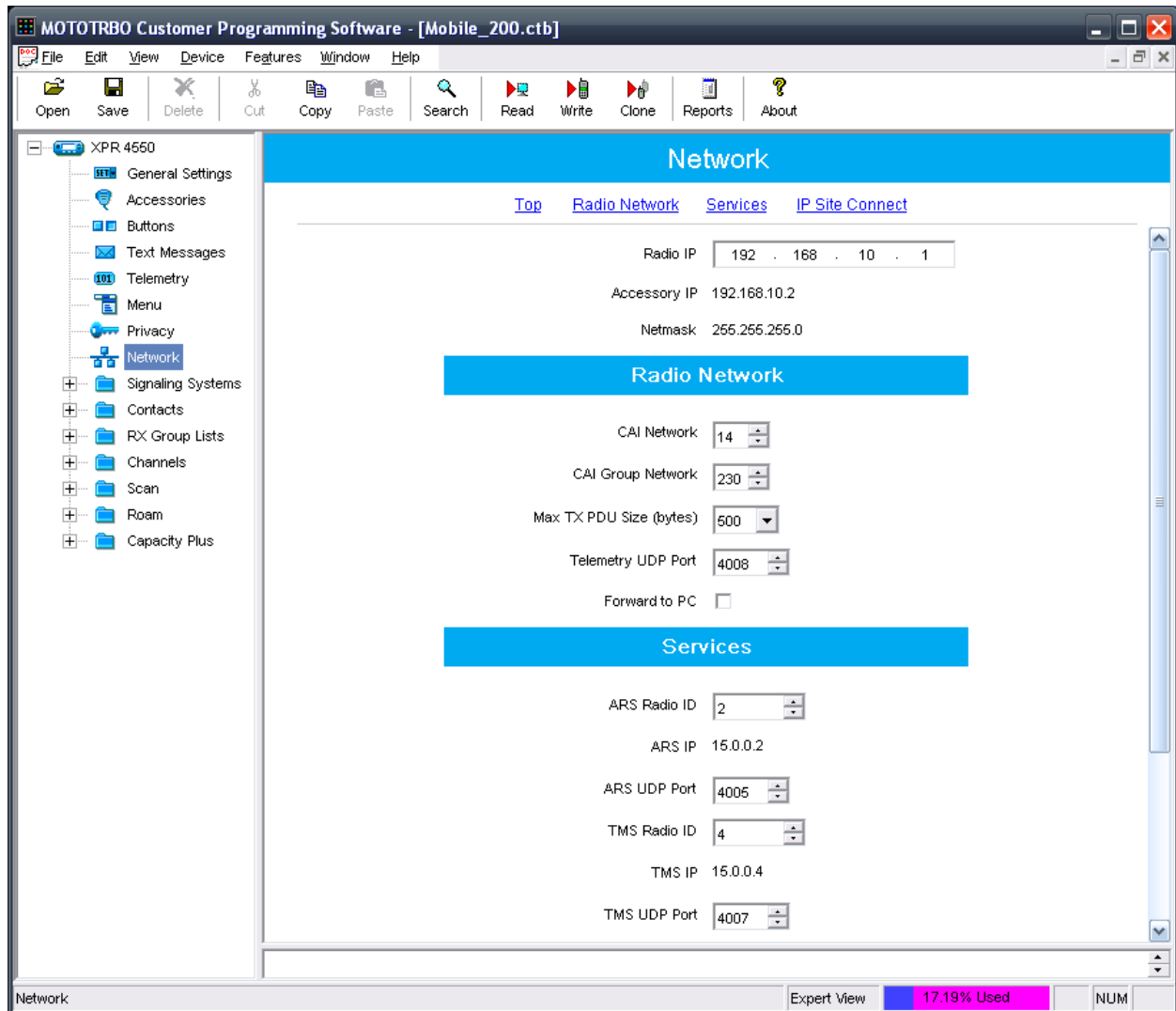


Figure 12

- The CAI Network and CAI Group Network need to match all the MOTOTRBO radios in a system. It also needs to match the Line setup in C-Soft Designer as shown in [6.2](#).
- These values need to be entered as follows:
 - ARS UDP Port = 4005
 - TMS UDP Port = 4007
 - Telemetry UDP Port = 4008

5.1.5 Digital Emergency

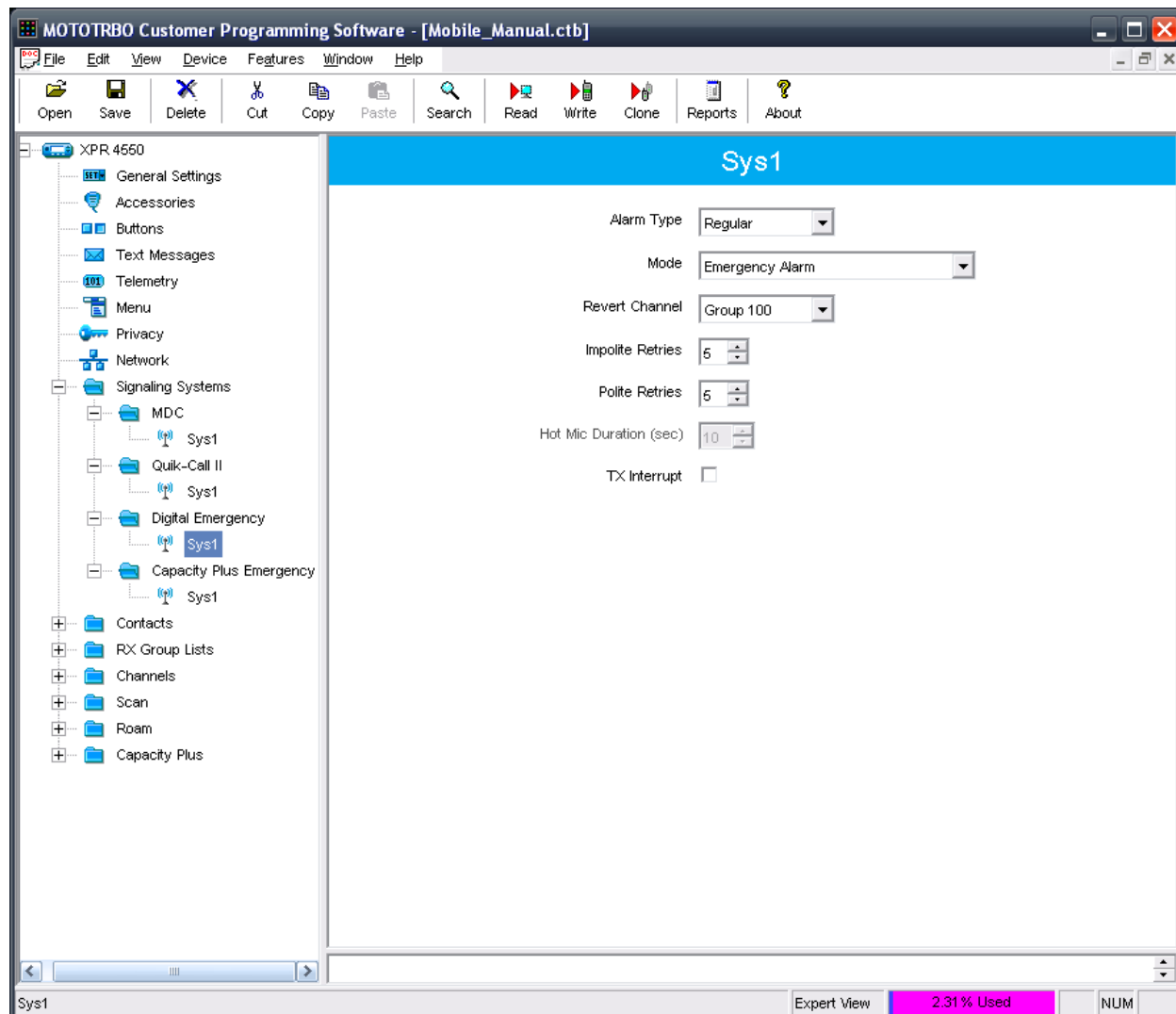


Figure 13

- This is an example of how to setup an Emergency.

5.1.6 Contacts

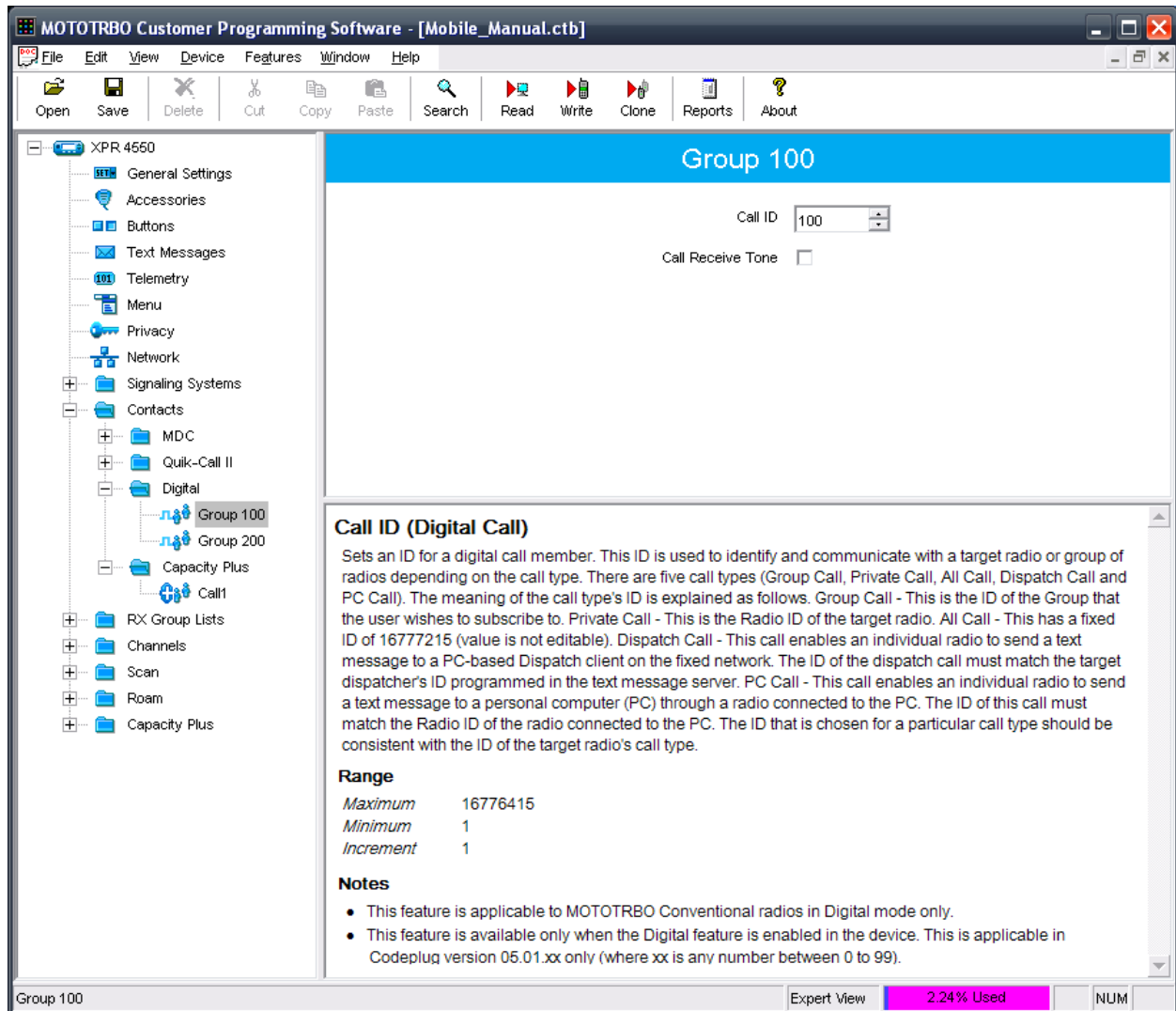


Figure 14

- Groups must be defined if group calls are to be triggered using C-Soft. For example, if a Group ID of 300 is setup in C-Soft Designer but not in the MOTOTRBO CPS then that group call will not work in C-Soft Runtime.

5.1.7 RX Group Lists

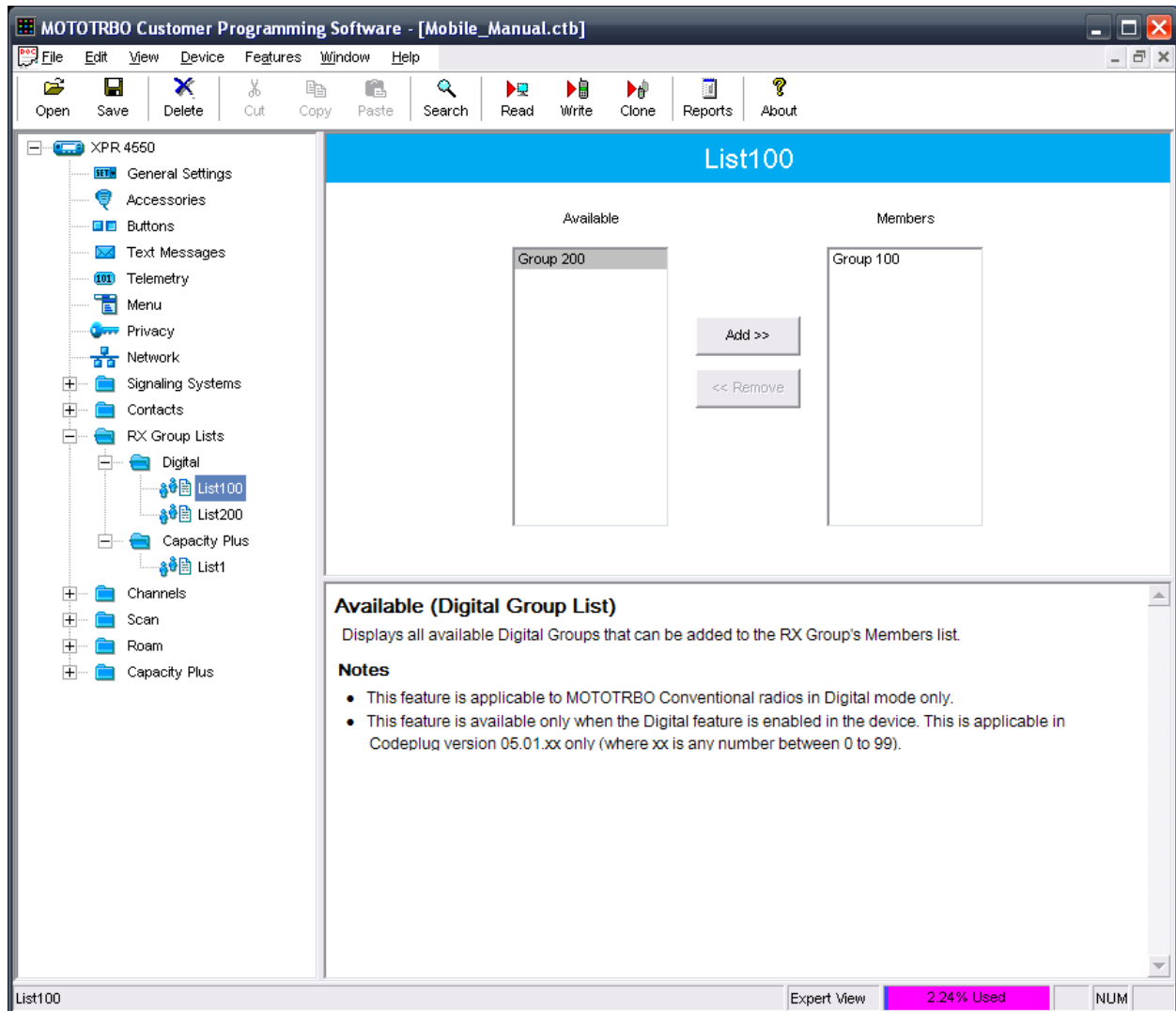


Figure 15

- This is an example of how to setup receiver group lists.

5.1.8 Channels

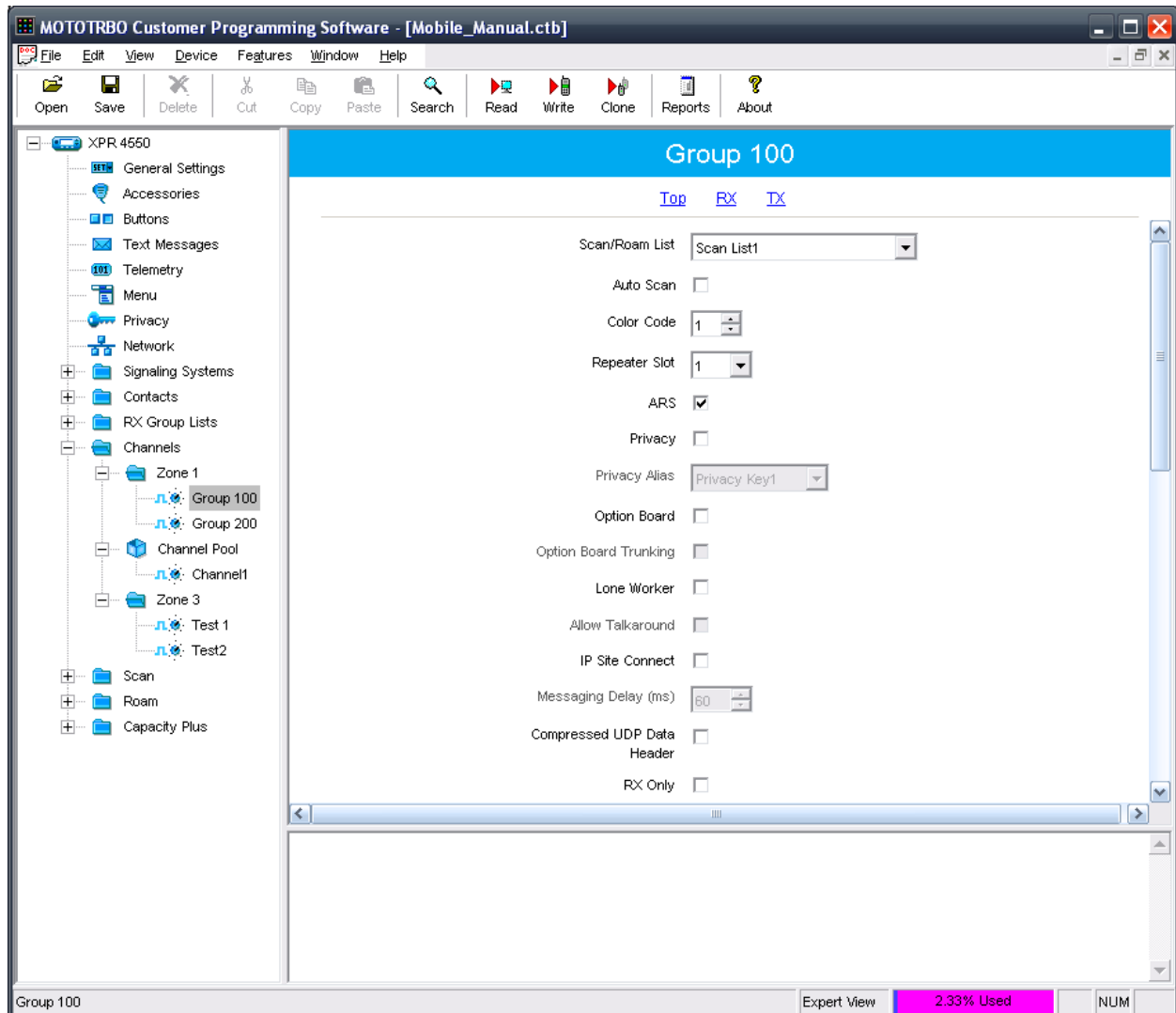


Figure 16

- In order to execute scan control a scan list must be entered.
- The **ARS** option must be activated in the case of devices with GPS so that the GPS position will work.
- The **ARS** option must also be activated in the case of devices without GPS in order to perform Text Messaging.

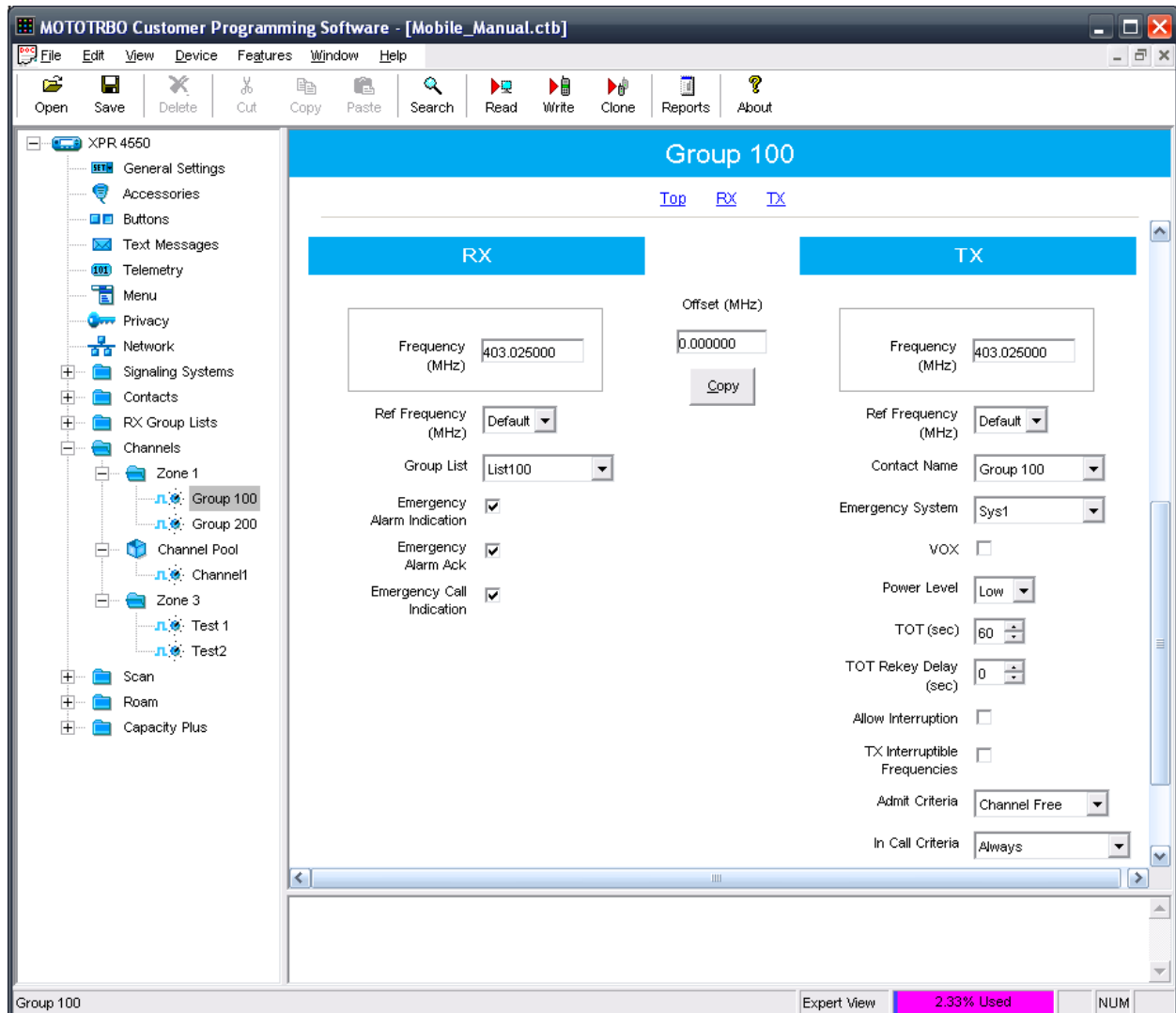


Figure 17

- Without a PTT contact name this channel cannot be selected as an acknowledgment channel for the digital emergency call. At least one acknowledgement channel must be present in order to be able to make digital emergency calls.
- The radio device can only send an emergency if the Emergency System is setup here.

5.1.9 Scan

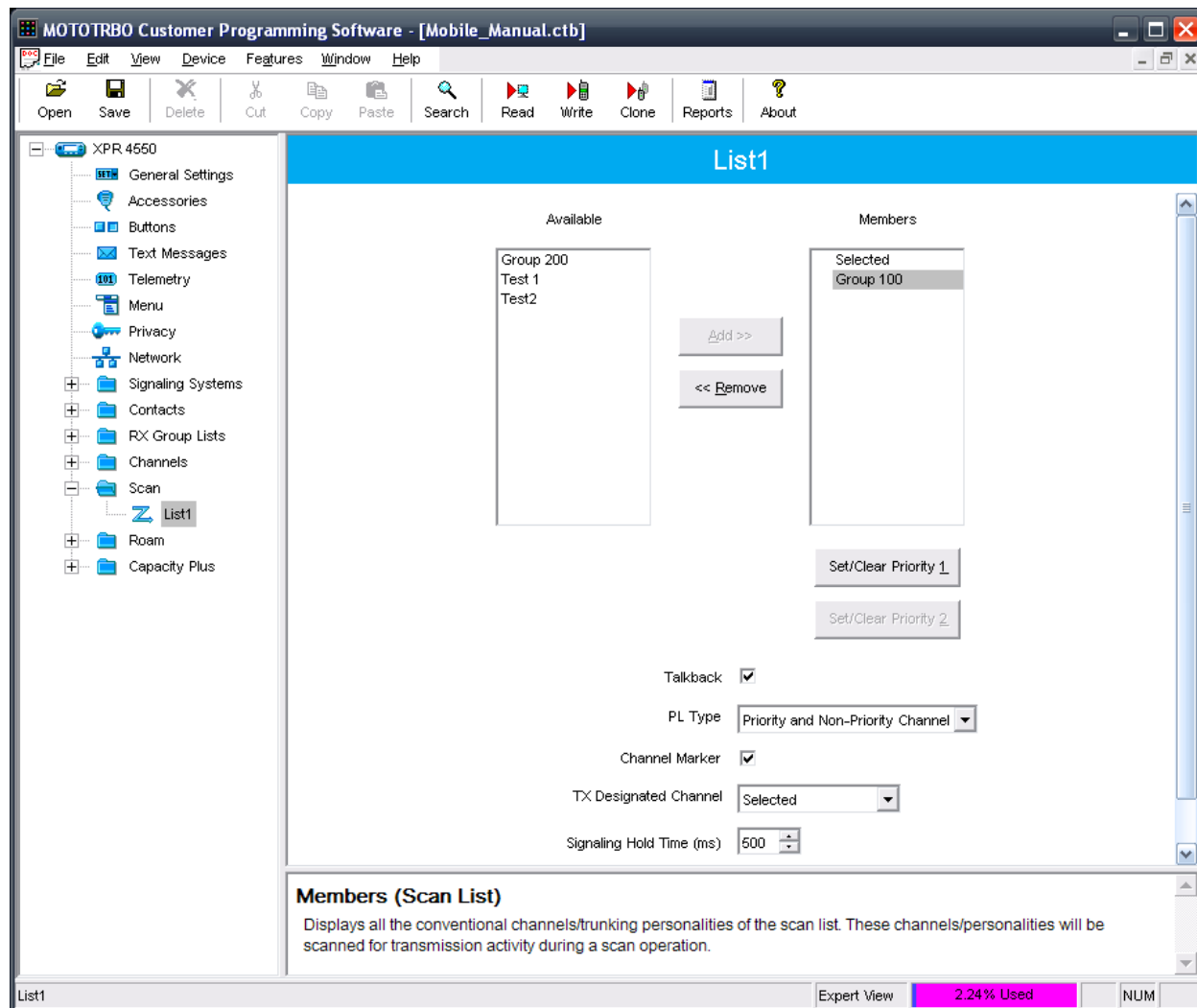


Figure 18

- At least one scan list is required in order to execute scan control.

5.1.10 Mobile Radio GPIO Setup

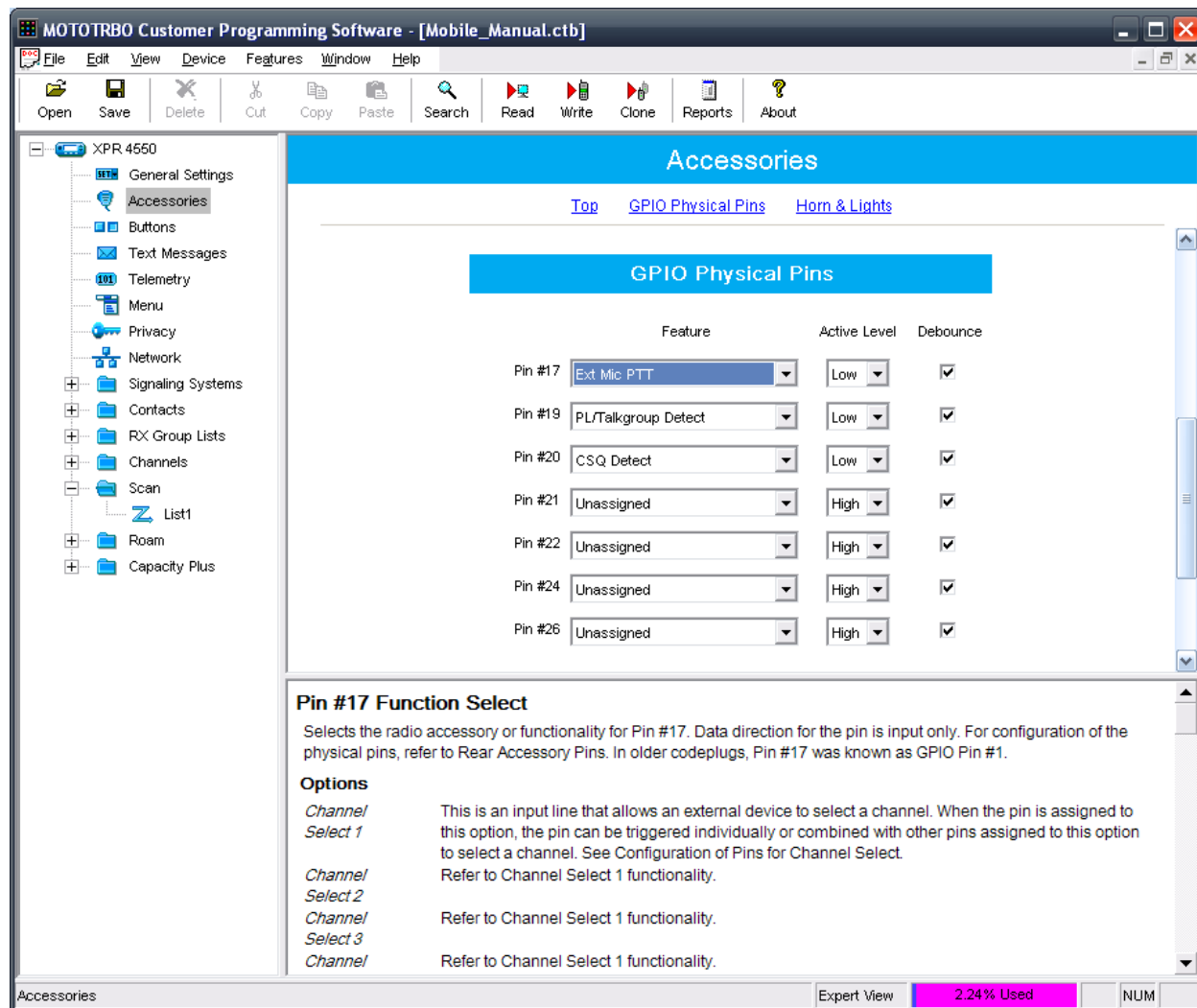


Figure 19

➤ Set these Pin values as follows to access these features in the MTRBi:

- Pin #17 – Ext Mic PTT
- Pin #19 – PL/Talkgroup Detect
- Pin #20 – CSQ Detect

6 C-Soft Designer Setup

This section will give basic information on how to setup C-Soft Designer for MOTOTRBO. For the design at least a MOTOTRBO Window Button and Select Button must be created in designer. For a more detailed explanation refer to the C-Soft Manual.

6.1 System Type Setup

For Signal Setup the System Type is selected as "Mototrbo".

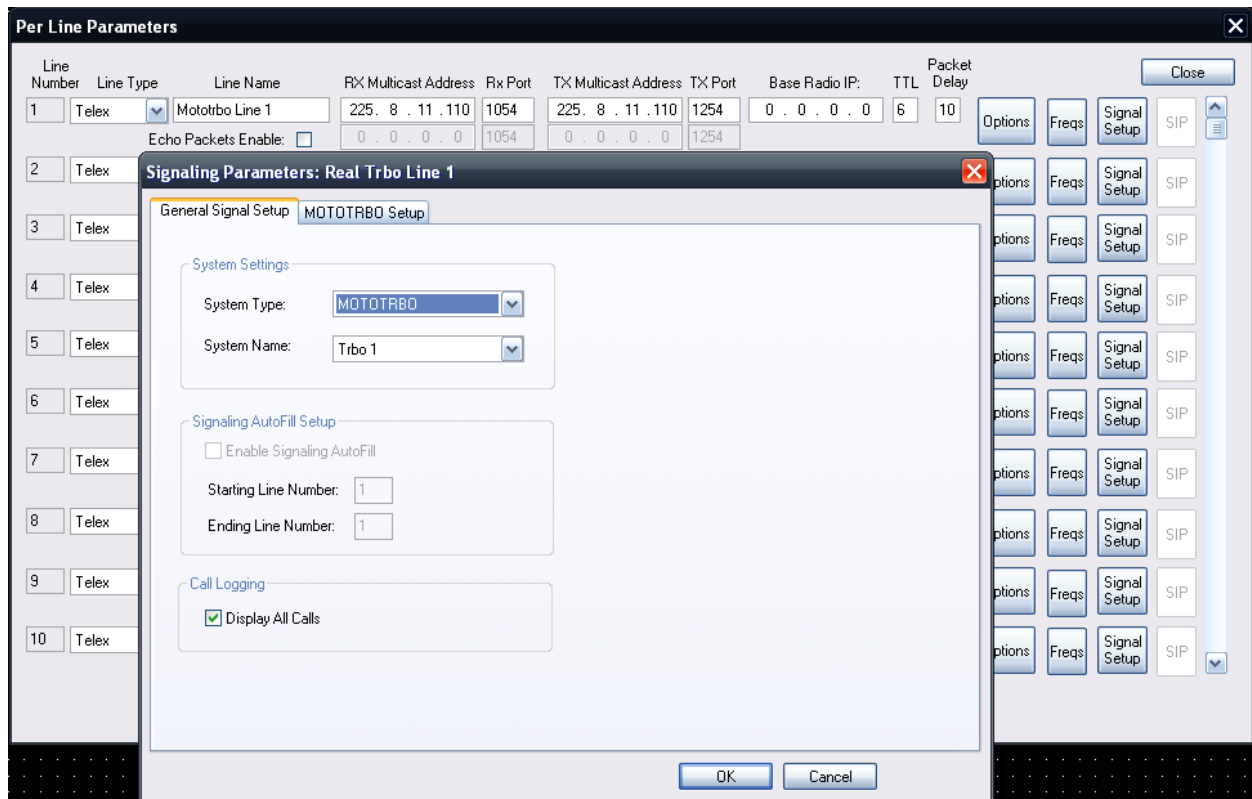


Figure 20

6.2 MOTOTRBO Setup Tab

Signaling Parameters: Real Trbo Line 1

General Signal Setup MOTOTRBO Setup

SOIP Setup

RX Multicast Address RX Port
225.8.11.110 3055

TX Multicast Address TX Port
225.8.11.110 3255

Control Line Setup

Multicast Address Control Port
225.8.11.110 2254

☒ Default

Network Setup

CAI Network: 14

CAI Group Network: 230

OK Cancel

Figure 21

- The SOIP Setup section must match the setup for the IP223 as shown in section [4.2.2](#).
- The Control Line Setup section is used for multiple C-Soft Consoles communicating with the same MOTOTRBO Mobile radio. The Multicast Address cannot be changed and is the same as the TX Multicast Address of the Telex Line that was setup. The Control Port default value is 1000 more than the value of the TX Port of the Telex Line that was setup. If that value needs to be changed clicking on the “Default” check box will enable the box and that value can be changed.
- The Network Setup section contains the CAI Network and CAI Group Network. These values are first setup in the MOTOTRBO Mobile radio. For Text Messaging and GPS to work in the C-Soft Console these values need to match the setup in the MOTOTRBO Mobile radio, as seen in [5.1.4](#).

6.3 MOTOTRBO Dispatch Window Setup

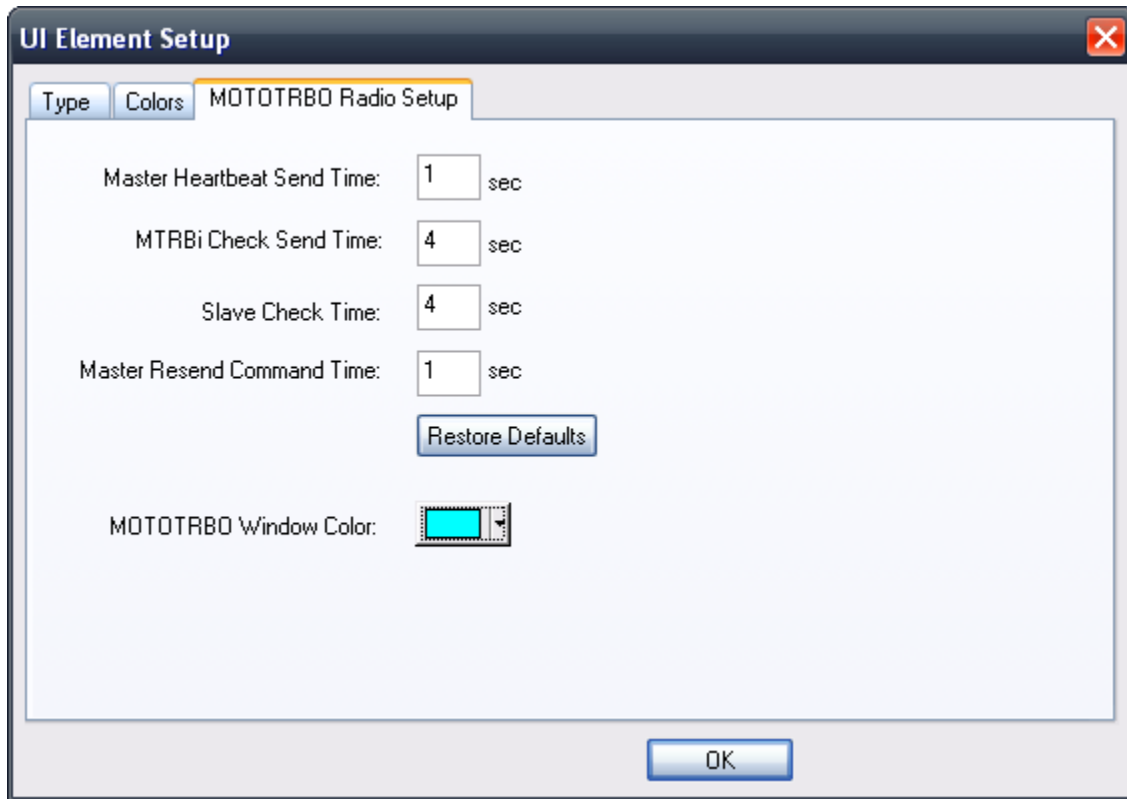


Figure 22

- **Master Heartbeat Send Time:** This is the frequency in which the Master will send its heartbeat out in seconds to all other consoles on the Control Line. This example shows 1 second.
- **MTRBi Check Send Time:** This is the frequency C-Soft will check if the MTRBi on a certain line is alive. Example, every 4 seconds it will send an MTRBi Check Command, it will then wait for (4-1) seconds or 3 seconds for a response.
- **Slave Check Time:** Time the Console line will wait to receive a heartbeat from the Master before it turns into the Master. Example, at startup it waits 4 seconds for a heartbeat, if nothing received it turns into the Master, if it gets a heartbeat it stays as Slave and resets timer back to 4 seconds.
- **Master Resend Command Time:** If C-Soft sends a MOTOTRBO command and does not get a response in 1 second it will send again, wait 1 second, if nothing sends again, wait 1 second, if nothing after 3 tries the command is cleared and goes to the next command to send in the buffer. 3 tries max.

7 Google Earth Installation for C-Soft Runtime

The GPS locations of the MOTOTRBO radios can be mapped using Google Earth and C-Soft at the same time. To install Google Earth go to <http://earth.google.com/> and download the latest version. When installing Google Earth all the default locations of the installation must be used for C-Soft and Google Earth to work correctly together.

8 Successful Boot Up

Turn on the IP223, MTRBi, and MOTOTRBO mobile radio at the same time. On the IP223 in the top left of the display it will say SOIP as shown in Figure 23.

IP223 Display



Figure 23

Open C-Soft Runtime, click on a Select Button setup for a MOTOTRBO Line, and click on the MOTOTRBO Window button. If everything has been setup correctly and all the components have been turned on the dispatch window should look like Figure 24. The Zone and Channel combo boxes will be enabled and filled with the all the Zones read in from the radio. The circle next to the Status Information will be green to indicate the MTRBi is working. Figure 25 shows what it will look like if something is not setup correctly, the Zone and Channel combo boxes will be disabled and the circle will be red.



Figure 24

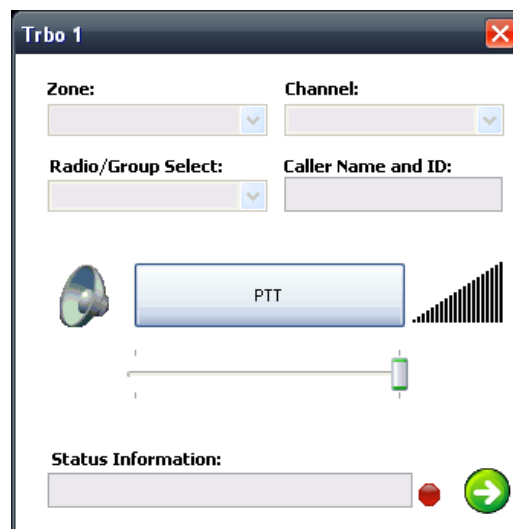


Figure 25