TELEX Application Note

Kenwood Radio Series
TK-x80, -x90, -x150, -x180, and TK-5x10
To IP-224 Remote Adapter Panel

VOIProven TELEX Radio Dispatch

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Kenwood Radio Series TK-x80, -x90, -x150, -x180, and TK-5x10 to IP-224 Remote Adapter Panel

1.0 General

This application note is intended to assist technical staff with the creation of an IP-224 interface to the Kenwood TK-x80, TK-x90, TK-x150, TK-x180, and TK-5x10 series radios. This application note applies to all versions of IP-224 and supports the following features:

- Channel selection, 1 to 1000 with C-Soft, 1 to 100 with IP-2002, 1 to 16 with C-6200 and IP-1616
- ANI IDs
- Emergency Decode
- Scan On/Off with option to add and remove channels from scan list

The following optional Telex cables are available to speed installation:

Part Number	Description	Radio series supported
F01U165540	IP224 Kenwood TK-x150	TK-x150, TK-x180, and TK-5x10
F01U165541	IP224 Kenwood TK-x90	TK-x90

2.0 Cable Assembly

2.1 TK-x80 Model Cable Assembly

Table 1 shows connectivity for the IP-224 to TK-x80 audio cable. This cable is manufactured from a Kenwood KCT-16 accessory cable.

Signal	IP-224 DB-37	KCT-19 Accessory Connector
Ground	29	6
PTT Common	5	6
PTT	24	8
COR	15	11
RX+	20	12
TX+	1	5
TXD	17	14
RXD	36	15

TABLE 1. IP-224 to TK-x80 Audio Cable

2.2 TK-x90 Model Cable Assembly

Table 2 shows IP-224 to TK-x90 audio and serial cable connections.

Signal	IP-224 DB-37	TK-x90 Radio DB-25
Ground	29	7
PTT Common	5	7
PTT	24	2 Aux Input (Programmable)
COR	15	20 AOI (Programmable)
RX+	20	17
TX+	1	13
TXD	17	10
RXD	36	9

TABLE 2. DB-25 Audio Cable Assy—TK-x90

2.3 TK-x150/-x180/-5x10 Model Cable Assembly

Table 3 shows connectivity for the IP-224 to TK-[XXXX] audio cable.

Signal	IP-224 DB-37	TK-x90 Radio DB-25[a]
Ground	29	7
PTT Common	5	7
PTT	24	12 Aux Input 4 (Programmable)
COR	15	20 Aux Output 1 (Programmable)
RX+	20	17
TX+	1	6
TXD	17	2
RXD	36	3

TABLE 3. DB-25 Audio Cable Assy–TK-x150

a. There are differences between the TK-x150 and TK-x180 radio's DB-25 connectors:

- If COR is used, then pin 20 (TK-x150 an output only) is programmed for that function and the cable routes that signal to the IP-224.
- On the TK-x180 the same pin is a general purpose I/O and has an additional 470 Ohm series resistance added. This requires the IP-224 internal pull-up voltage must be removed. Auto configuration feature will adjust hardware settings.

3.0 IP-224 Configuration

These configuration instructions use **TSM** (Telex System Manager) to configure the IP-224; however the IP-224 can also be configured using web browser configuration windows. TSM application and manual can be downloaded at http://www.telex.com/us/dispatch/downloads or is included in the product CD received with the IP-224

With the IP-224 attached to the network and powered up, login and process settings from the desired unit using TSM.

3.1 Setting for Auto Configuration

The **General** page, shown in Figure 1, is used to view basic information about the IP-224 and turn on or off the Auto Configuration feature in the unit.

To **configure the Auto Configuration**, do the following:

1. From TSM, click the **General** tab.
   The General page appears.
2. Select the **Auto Configuration** check box.

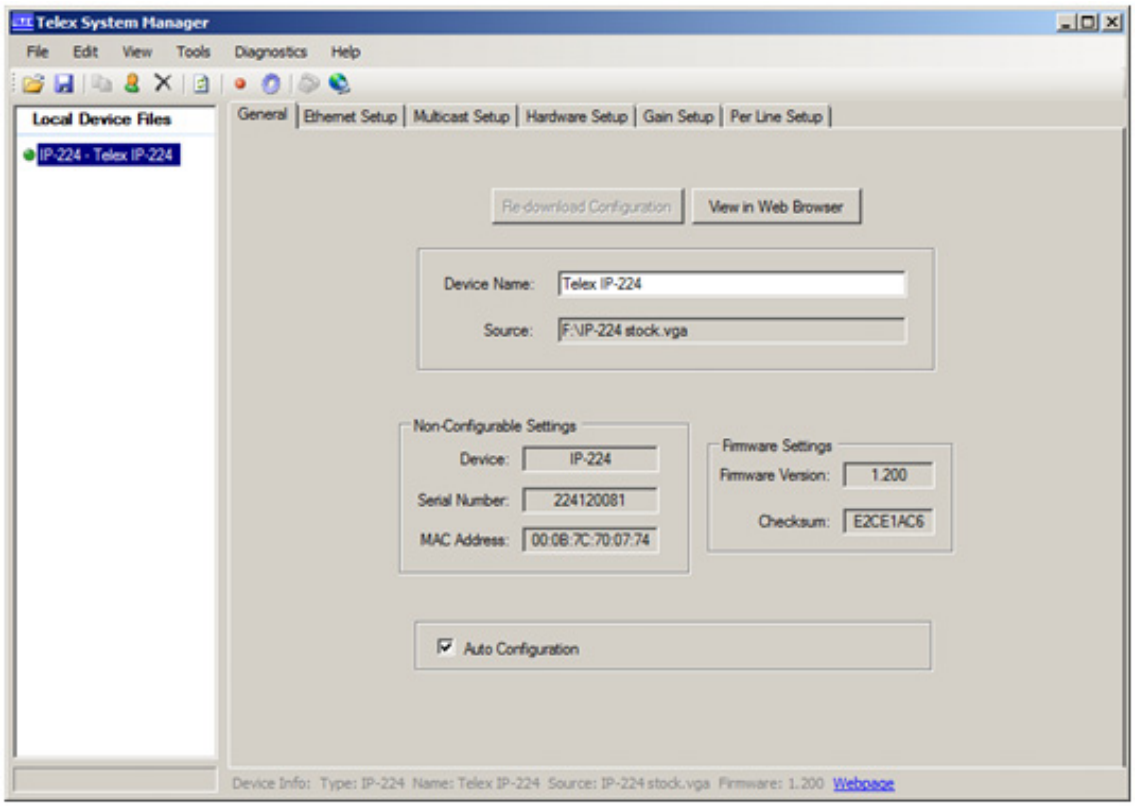

FIGURE 1. General Page

3.2 Multicast Configuration

The **Multicast** page, shown in Figure 3, is used to configure the line type and the Multicast addresses used.

To **configure Multicast settings**, do the following:

1. From TSM, click the **Multicast Setup** tab.
   The Multicast page appears.
2. Select the **Enable** check box for the lines you are configuring.
3. In the Line Name field, enter a **name (up to 19 characters)** for the line you are configuring.
4. From the Line Type drop down menu, select **Local Mode**.
5. From the Serial Type drop down menu, select the **appropriate Kenwood radio series** you are configuring (Figure 2).

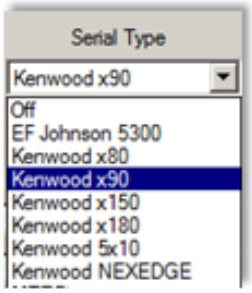

FIGURE 2. Serial Type Drop Down Menu

6. Configure the **correct Multicast address and port numbers** to match your system layout.

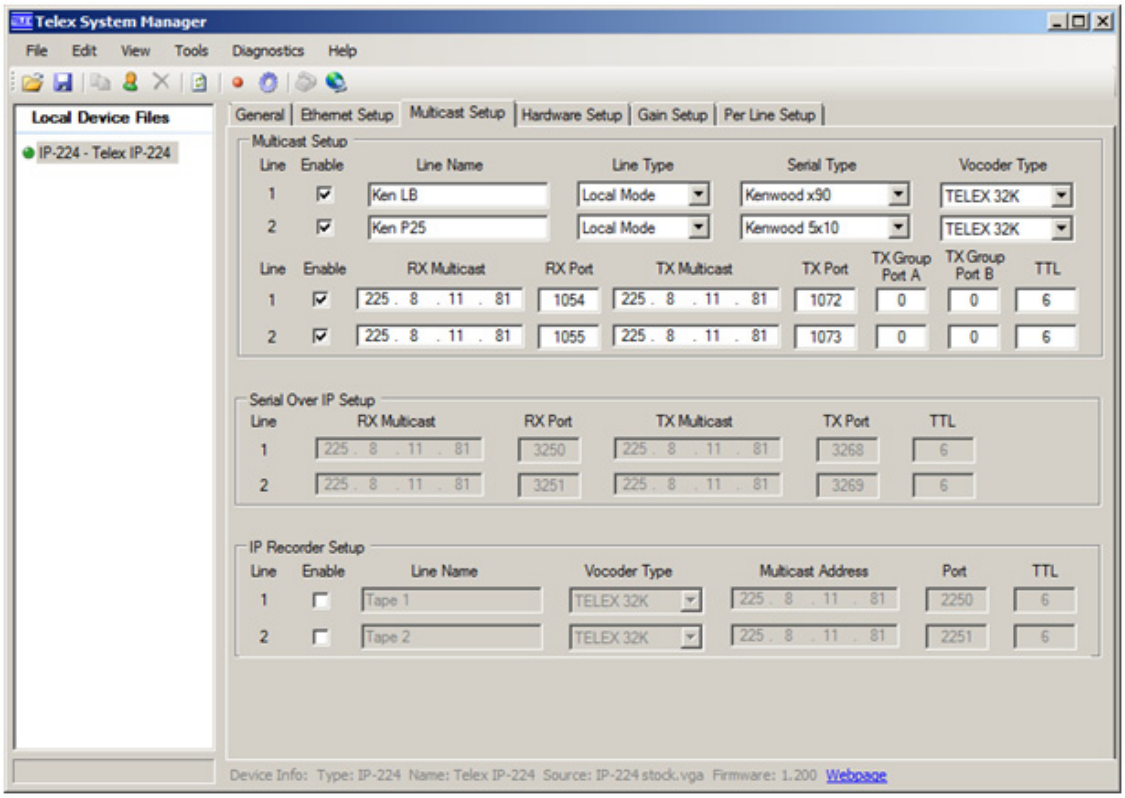

FIGURE 3. Multicast Setup Page

3.3 Hardware Configuration

The **Hardware Setup** page, shown in Figure 4, is used to configure the Line I/O connector. Because the Auto Configuration is enabled on the General page, all I/O settings have been configured as needed to control the Kenwood radio selected by the Serial Type drop down menu on the Multicast Setup page.

NOTE: No additional steps are required on this page.

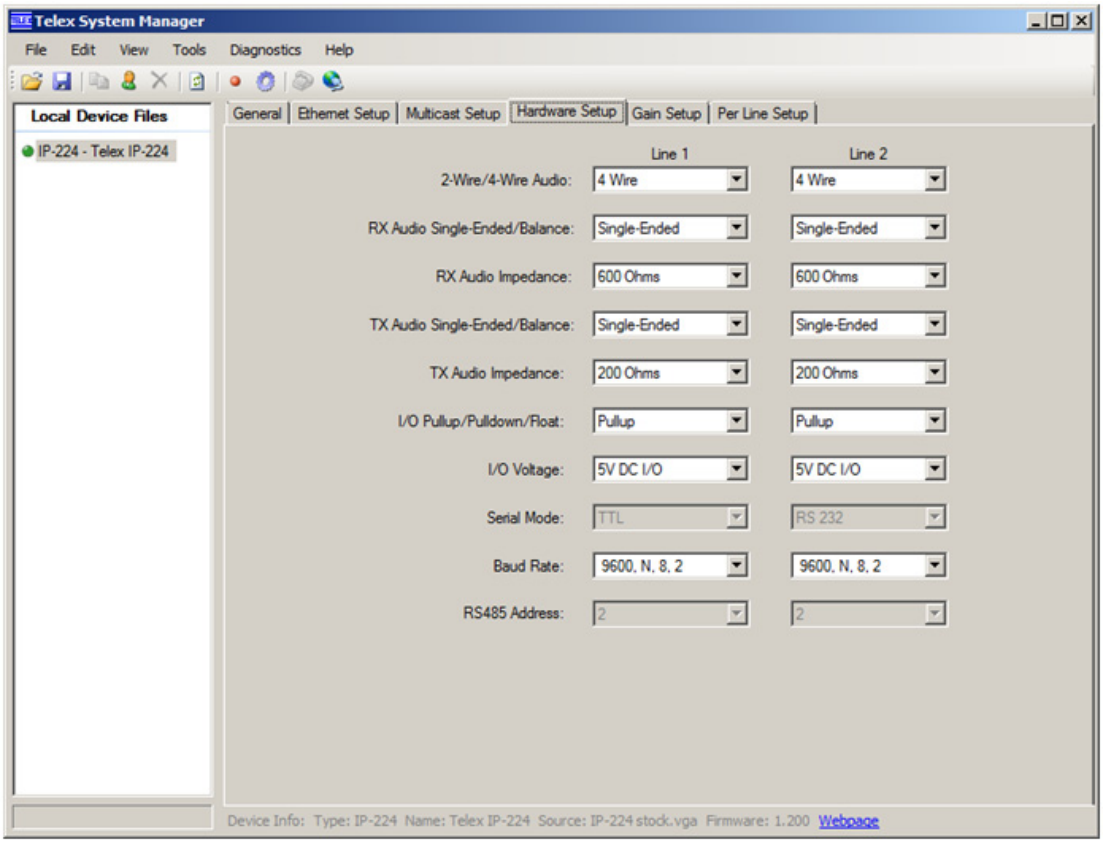

FIGURE 4. Hardware Setup Page

3.4 Per Line Configuration

The **Per Line Setup** page, shown in Figure 5, is used to view line type and serial port mode. Pressing either configure button enters the individual line's configuration pages.

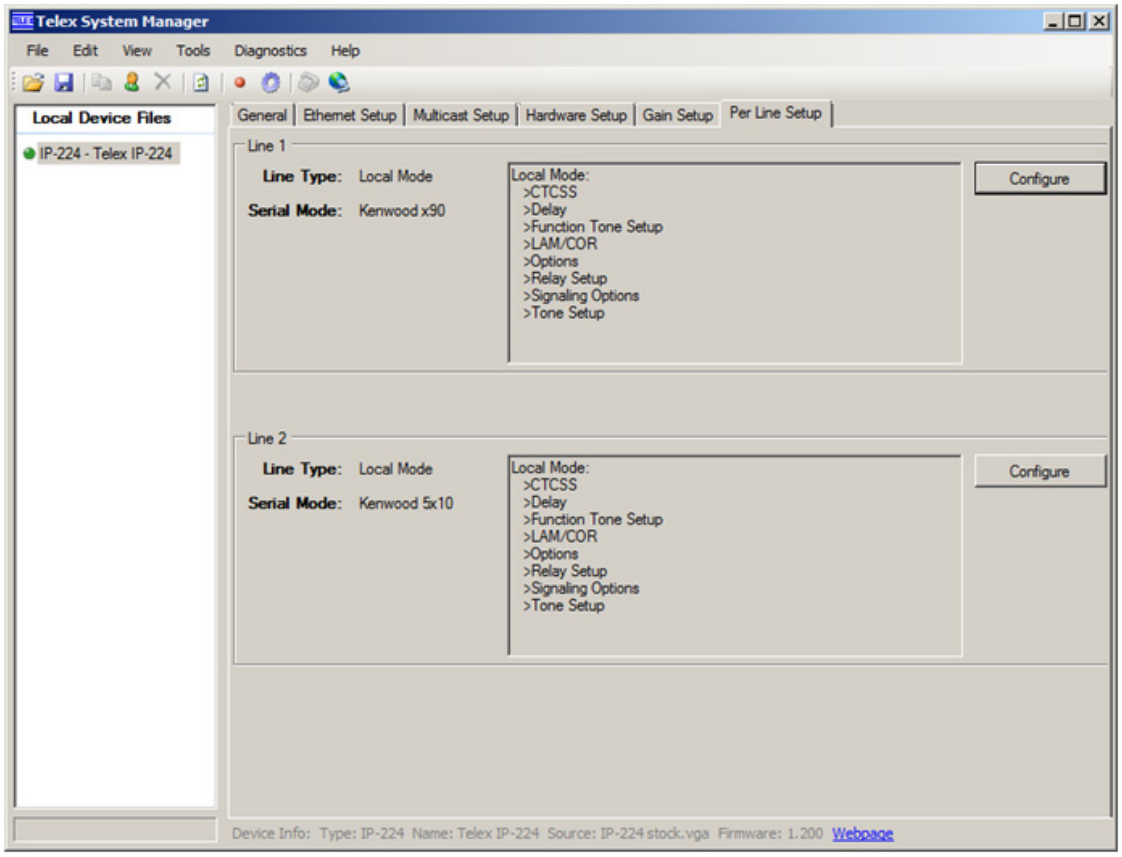

FIGURE 5. Per Line Setup Page

3.4.1 Per Line Function Tone Configuration

The **Function Tone** page, shown in Figure 6, is used to enable the function tones and configure what System/Zone and channel information should be serial sent to the radio.

To **configure the Per Line Function Tone**, do the following:

1. From TSM, click the **Function Tone** tab.
   The Function Tone page appears.
2. Select the **Enable** check box for all channels to be accessed by the IP-224.

NOTE: Each page supports 10 channels. There are 100 pages to support 1000 channels.

3. Program the **System and Channel information**. This information should correspond with the radio programming.

The example shown in Figure 6 indicates function tones 1 through 4 are mapped to system 1 channels 1–4, function tones 5 through 8 are mapped to system 2 channels 1–4 and function tones 9–-10 to system 3 channels 1–2, respectively.

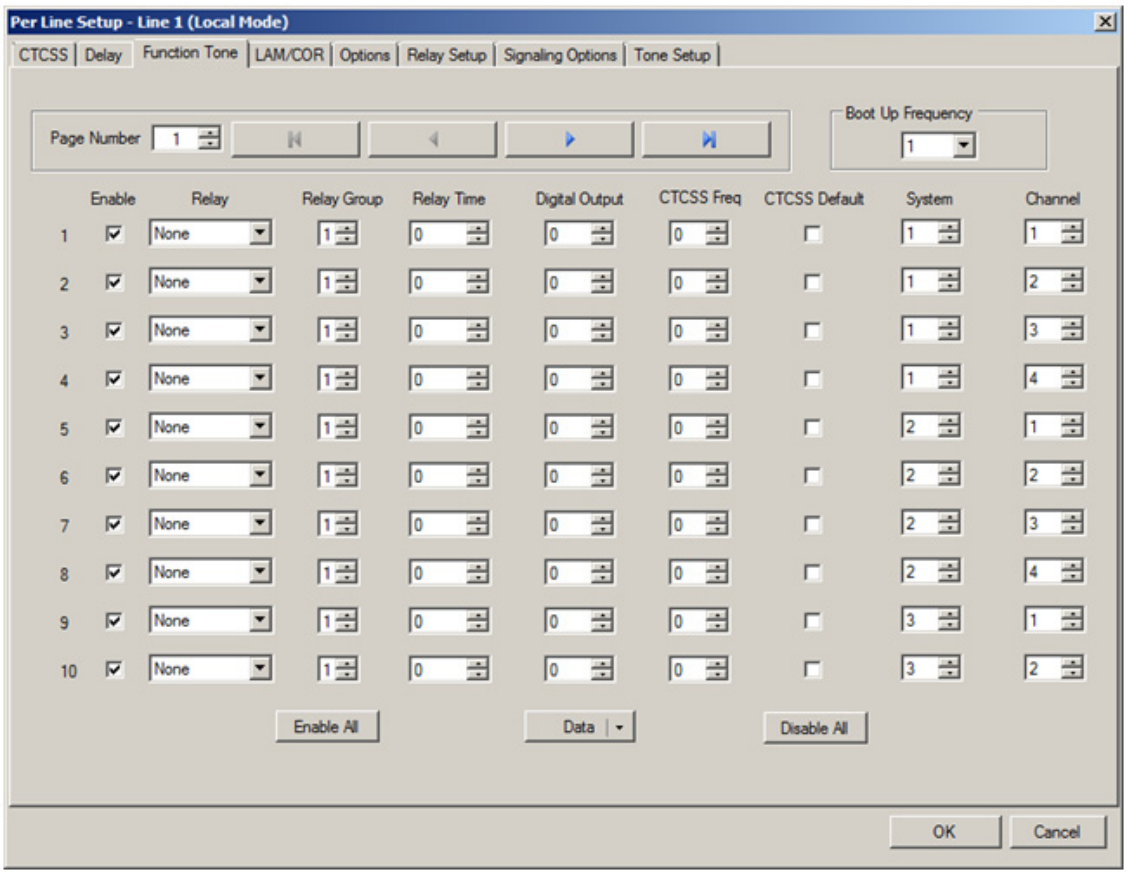

FIGURE 6. Function Tone Page

3.4.2 LAM/COR Configuration

The **LAM/COR** page, shown in Figure 7 and Figure 8, is used to configure the COR and LAM (VOX) operation. COR is the preferred method for generating RX packets but when the radio is configured for a trunking format and go-ahead tone are needed to be heard at dispatch. LAM is the only alternative.

To **configure COR or LAM settings**, do the following:

1. Select the **LAM/COR** tab.
   The LAM/COR page appears.
2. Select the **COR Enabled** check box.
   OR
   Select the **LAM Enabled** check box.

NOTE: Selecting both options creates an AND function, both COR and LAM would need to be achieved before generation of RX packets to consoles.

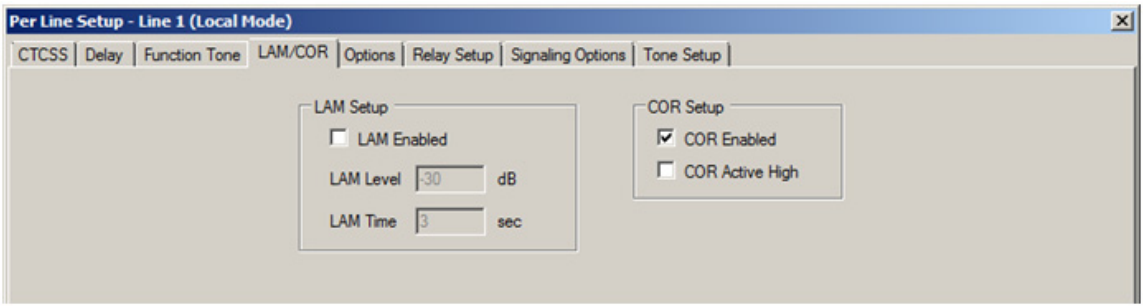

FIGURE 7. LAM/COR Page–COR View

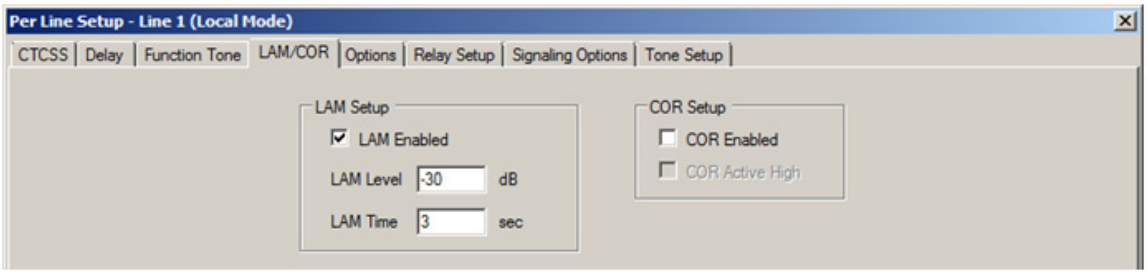

FIGURE 8. LAM/COR Page–LAM View

3.4.3 Options Configuration

The **Options** page, shown in Figure 9, is used to configure the various options supported by the radio type.

Included below are descriptions of what each optional check box performs and select desired features.

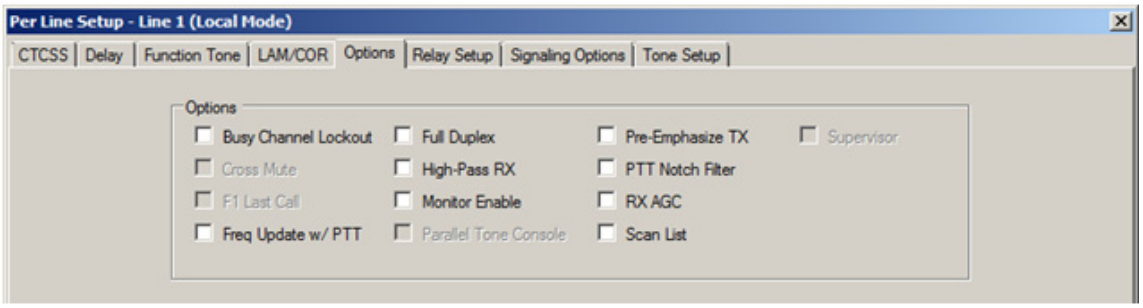

FIGURE 9. Options Page

Freq Update w/ PTT Check Box The Freq Update w/PTT check box indicates a channel change is forced with each PTT. If cleared, channel changes occur only when the incoming channel is different than the previous channel.

Full Duplex Check Box The Full Duplex check box indicates full-duplex audio is supported. If selected, full-duplex (simultaneous TX and RX transmission) audio allowed.

NOTE: COR settings can affect Full-Duplex operation. Trunked radio systems with go-ahead beeps typically require COR to be turned off.

Hi-Pass RX Check Box The Hi-Pass RX check box is used to enable a 300Hz Hi-Pass filter for the RX audio.

Monitor Enable Check Box The Monitor Enable check box indicates serial monitor commands can be sent to the radio.

Pre-Emphasize TX Check Box The Pre-Emphasize TX check box is used to enable a 6dB octave pre-emphasis filter for the TX audio.

PTT Notch Filter Check Box The PTT Notch Filter check box indicates the PTT notch filter is enabled. When selected, the PTT frequency is filtered from the RX audio.

Scan List Check Box The Scan List check box, if selected, indicates C-Soft's scan list is synchronized with the radio's scan list.

NOTE: All models can be used in scan mode, but the TK-x90 does not pass the active channel number back to the console.

3.5 Gain Set Up Configuration

The **General** page, shown in Figure 10, is used to configure the input and output audio levels for line 1 and 2 I/O ports.

To **configure the general gain**, do the following:

1. Open **TSM**.
2. Click the **General** tab.
   The General Gain page appears.
3. Configure the **RX Gain slider to 0dB** for the line(s) to configure.
4. Configure the **TX Gain slider to -22dB** for the line(s) to configure.

NOTE: Fine tuning of these gain stages may be required once the system is deployed.

5. Record **updated configuration** to IP-224.

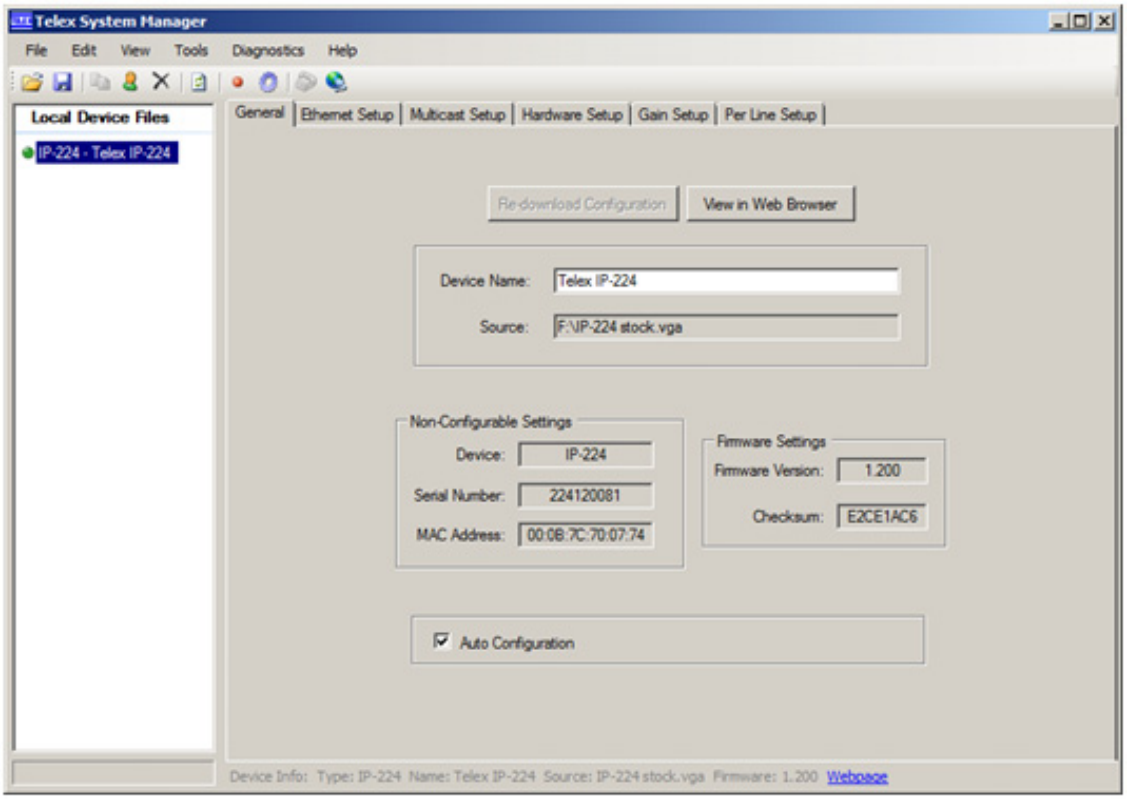

FIGURE 10. General Page

4.0 Radio Configuration

4.1 TK-x80 Series Radio Configuration

To **configure the radio**, do the following:

1. Program **Com 1 for DATA** (Figure 11).

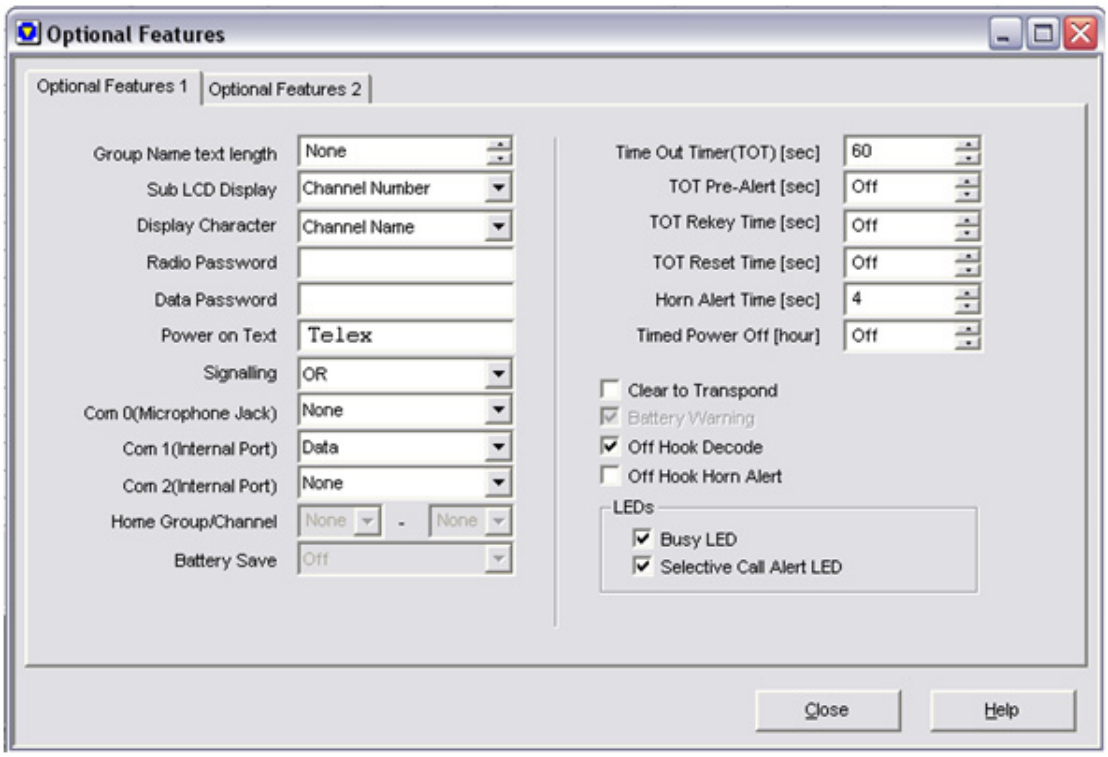

FIGURE 11. Program Com 1 for DATA

2. Using Figure 12, configure the **Scan Information window** to set up the scan functionality.

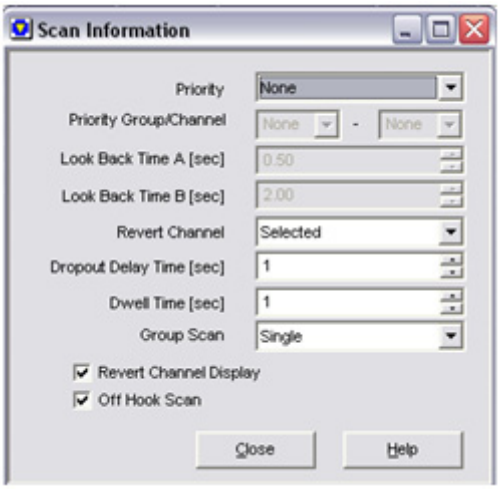

FIGURE 12. Scan Programming

4.1.1 TK-x80 Series Radio Modifications

To **modify the radio settings**, do the following

1. Move **R94 to R24 position** (for more information, see the Kenwood TK-80 series manual, section 1.3).

4.2 TK-x90 Series Radio Configuration

To **configure the radio**, do the following:

1. Program the **Function Port window for Ext PTT in Radio 1 AI1** (Figure 13).

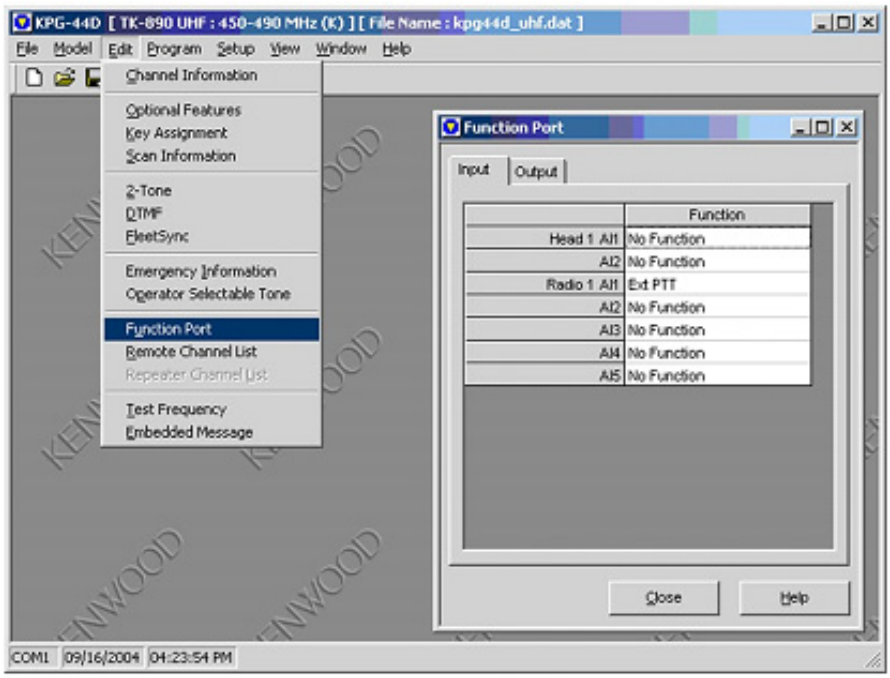

FIGURE 13. TK-x90 Function Port Input

2. Program the **Function Port window for COR in Radio 1 AO1** (Figure 14).

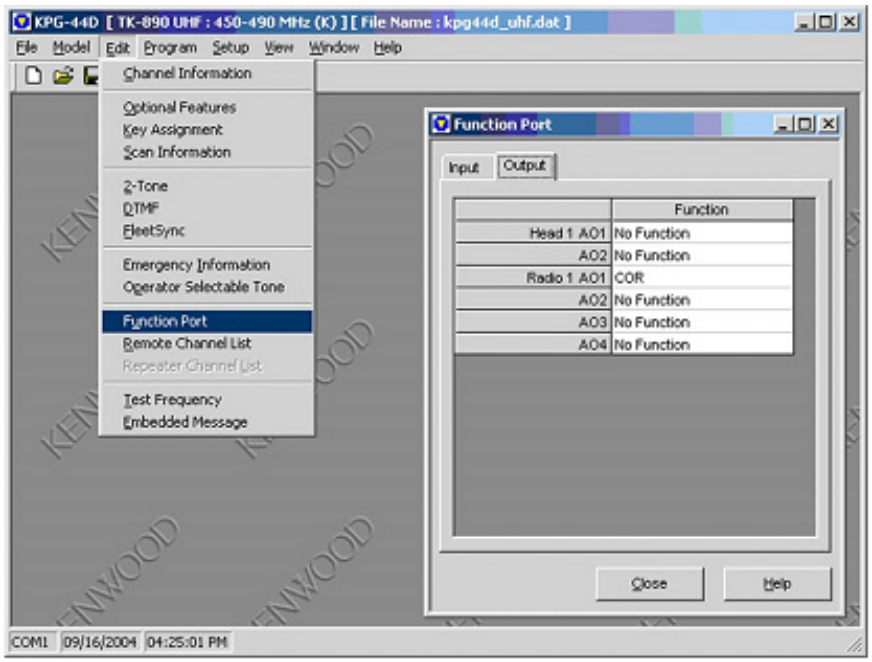

FIGURE 14. TK-x90 Function Port Output

4.2.1 TK-x90 Series Radio Modifications

The radio ships with pin 13 in DATA. The internal configuration for pin 13 must be modified.

To **modify the radio settings for pin 13**, do the following:

1. Set **pin 13 by relocating R641 to R640 for mic signal input**.

REFERENCE: For more information, see the manufacture's technical manual Accessory Terminal Function section (R640 R641 Function).

4.3 TK-x150/180 Series Radio Configuration

To **configure the radio**, do the following:

1. Program **Function Port, Aux Input for External PTT in AUX Input 4 location** and COR in **AUX Output 1** (Figure 15).

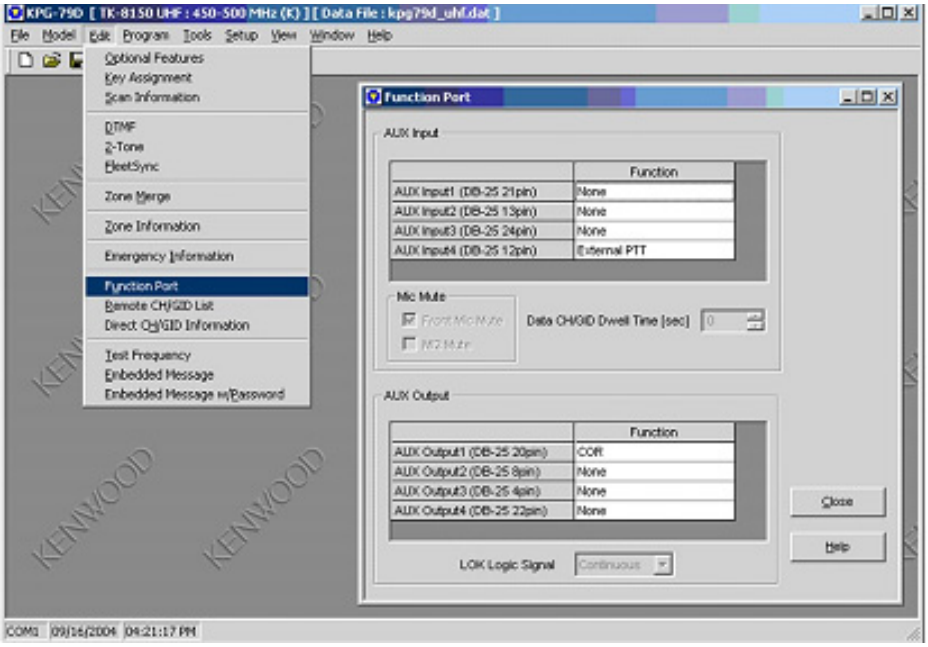

FIGURE 15. TK-x150/180 AUX Input

2. Program **Com 1 for DATA** (Figure 16).

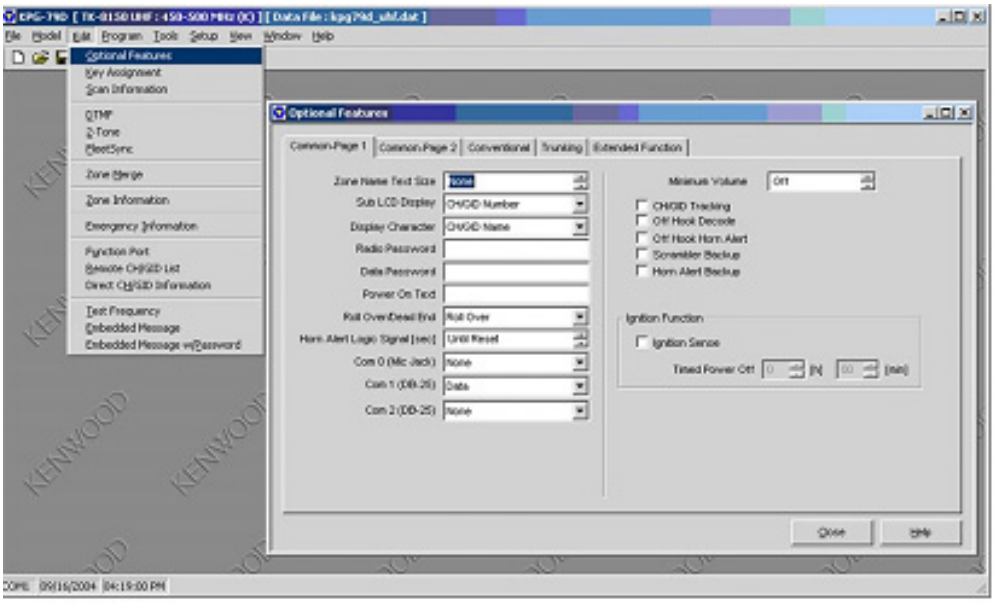

FIGURE 16. TK-x150/180 Com 1

NOTE: For the TK-x180, the AUX programming window is different. The same interface cable is used for both the TK-x150 and the TK-x180 radios. If COR is used, IP-224 jumper 8 (Line 1) or Jumper 30 (Line 2) needs to be placed in a neutral position for the Aux port pin 20 on the TK-x180 to function properly as COR (Figure 17).

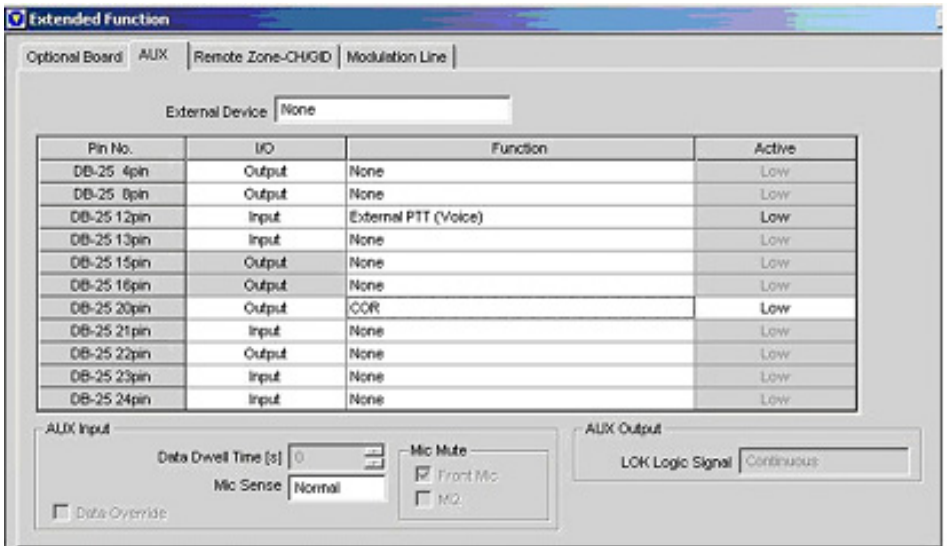

FIGURE 17. TK-x180 AUX Setup

4.4 TK-5x10 Series Radio Configuration

The TK-5x10 series radios must be configured using Kenwood version 5 or higher.

4.4.1 Extended Functions Configuration

To **configure extended functions**, do the following:

NOTE: Use Figure 18 with the following instructions.

1. Open the **Kenwood KPG-95D (version 5) configuration software**.
2. From the menu bar, select **Tools|Extended Functions**.
   The Extended Function window appears.
3. From the Extended Function window, select the **AUX** tab.
   The AUX window appears.
4. In the function field for pin 12, enter **Eternal PTT (Voice)**.
5. In the function field for pin 20, enter **COR**.
6. Click **Close**.

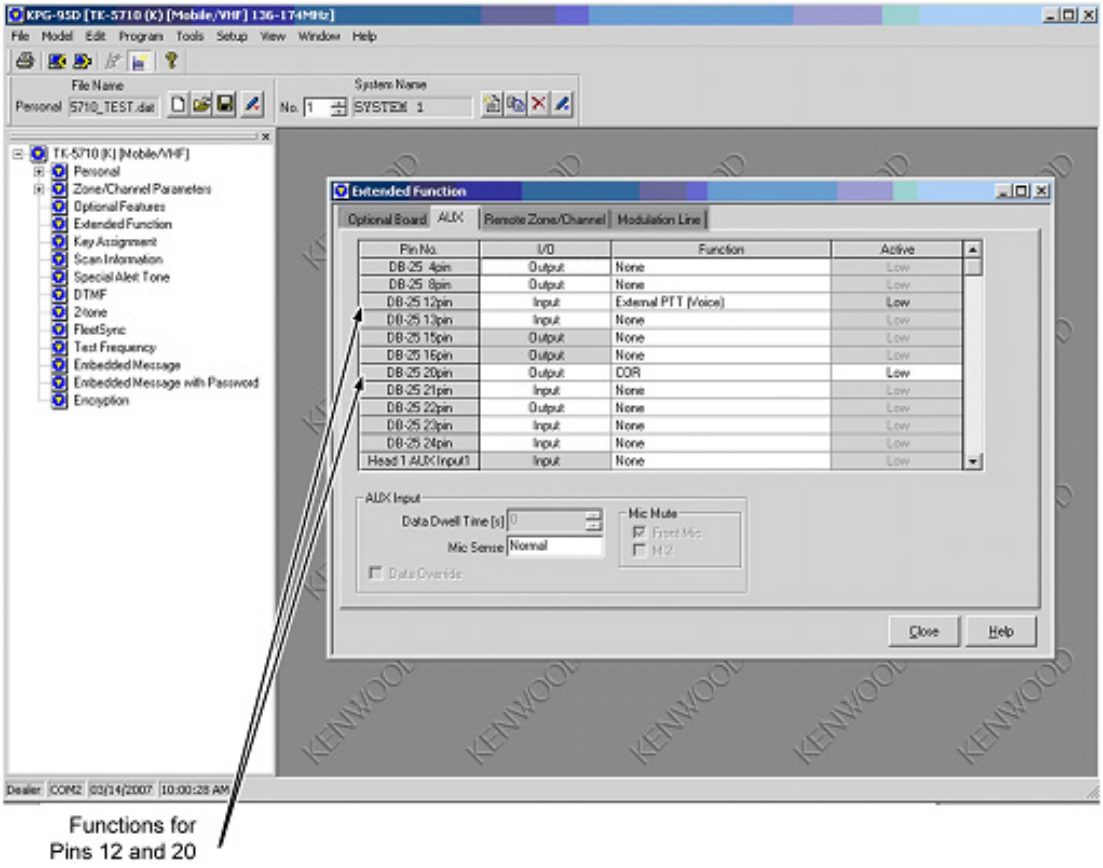

FIGURE 18. Extended Function Window

4.4.2 Optional Features Configuration

To **configure optional features**, do the following:

NOTE: Use Figure 19 with the following instructions.

1. Open the **Kenwood KPG-95D (version 5) configuration software**.
2. From the menu bar, select **Tools|Extended Functions**.
   The Extended Functions window appears.
3. Select the **Common Page 3** tab.
4. In the Function field for COM port 1, enter **Data**.
5. In the Polarity field for COM port 1, enter **Normal**
6. In the Stop it field for COM port 1, enter **2**.
7. In the Baud Rate field for COM port 1, enter **9600**.
8. Click **Close**.

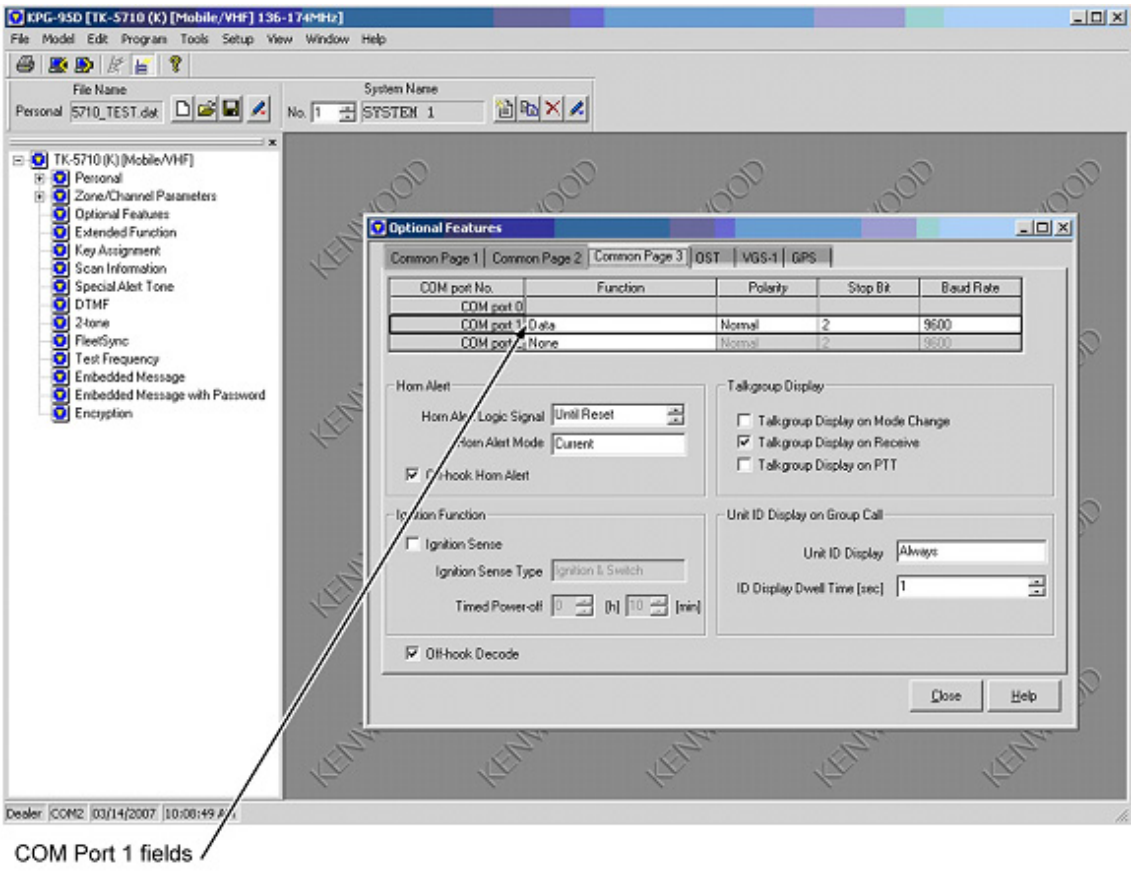

FIGURE 19. Optional Features Window

4.4.3 Configure Scan Information

To **configure scan information**, do the following:

NOTE: Use Figure 20 with the following instructions.

1. Open the **Kenwood KPG-95D (version 5) configuration software**.
2. From the menu bar, select **Edit|Scan Information**.
   The Scan Information window appears.
3. Select the **Options** tab.
4. Configure the **fields** using Figure 20.
5. Click **Close**.
6. Write the **new configuration** to the radio.

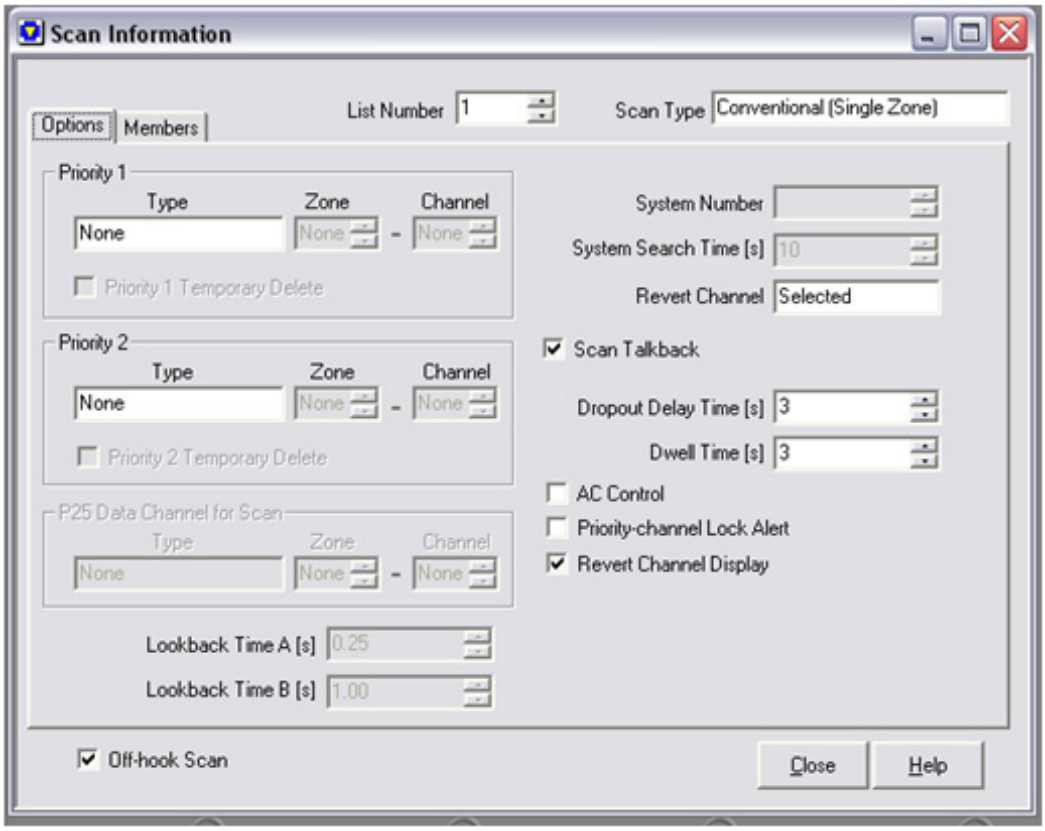

FIGURE 20. Scan Information Window

Notes:

Revision History		
Document Title: Kenwood Radio Series TK-x80, -x90, -x150, -x180, and TK-5x10 to IP-224 Remote Adapter Panel		
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Revision	**Change Description**	**Date**
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Suggestions or comments:
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