

TETRA Dispatch Solutions via Sepura Terminal Interface

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TETRA Dispatch Solutions via Sepura Terminal Interface

1.0 General

This application note describes Telex Dispatch solutions available via direct interface to Sepura TETRA terminal equipment. A detailed description of the interface between the Telex IP-223 Remote Radio Adapter Panel and the Sepura terminal is included using the SRM2000/3500 Mobile TETRA radio terminal as an example. Physical connections and diagrams, IP-223 Remote Radio Adapter setup and configuration, SRM2000/3500 basic setup, and Telex Dispatch console setup are all covered. Telex Dispatch solutions via Sepura SRP/H portable terminals are briefly discussed at the end of the document. Information pertinent to all interface implementations is covered early in this application note using the SRM and an example.

The IP-223 to Sepura TETRA terminal interface gives the console operator the ability to control a TETRA radio asset from a remote IP-based hardware or PC dispatch console. This Telex Dispatch solution provides console operator access to TETRA digital trunked systems, via an air-interface. This is ideal for tactical mobile operation, or small scale dispatch requirements, where an infrastructure interface would be inappropriate.

We recommend you read through this entire application note before starting work.

2.0 Hardware Requirements

2.1 SRM 2000/3500 Interface

The following items are required to connect IP-223 and SRM2000/3500 devices:

TABLE 1. IP-223

Item	Telex Part Number
IP-223 Ethernet Remote Panel	0101240
IP-223 SRM2000/3500 Interface Assembly	301961000
IP-223 DB-9 Splitter Cable	301953000 ^a

- a. The IP-223 offers serial data connectivity to two (2) separate radio devices via a single DB-9 port connector. If both IP-223 radio ports are interfaced to serial data controlled devices such as the SRM2000/3500, the DB-9 splitter cable is required to distribute data from the DB-9 port

2.2 SRP 2000/3500 Interface

Telex does not offer pre-formed cable assemblies for the SRP interface.

See “Sepura SRP2000/3500 Interface” on page 46 for IP-223 to SRP cable (direct terminal or indirect [car kit] interface) assembly instructions.

3.0 IP-223 Configuration

3.1 IP-223 Jumper Settings

TABLE 2.

Line 1	Jumper Setting	Line 2
J33, J34	B = 4-Wire	J5, J6
J16, J21	A = Single Ended	J19, J20
J14	Hanging on Center Pin = 10K Ohm	J24
J3, J9, J11	A = Single Ended	J25, J28, J29
J13	B = High	J27
J17, J22	B = 600 Ohms	J10, J15
J35	A = RS232 Serial Data	J26
R377	Solder bridge the pads together	R381

3.2 IP-223 Software Setup

The IP-223 configuration is shown using the standard web browser configuration windows. Interrogation and configuration of this unit can also be carried out using the **TSM** (Telex System Manager).

REFERENCE:

- For more information, see the IP-223 Technical Manual (P/N 803641). This document is available for download at www.telex.com/Downloads/.
- For more information, see the Telex System Manager Technical Manual (P/N LIT000259000). This document is available for download at www.telex.com/Downloads/.
- The Telex System Manager software is available for download at www.telex.com/Downloads/.

3.2.1 IP-223 Multicast Address Setup

To enable the line for TETRA, do the following:

1. From the IP-223's web browser, select **Multicast Setup**.
2. From the Line Type drop-down menu, select **Tetra Radio** for the appropriate line.
3. Click **Submit**.
The configuration is temporarily saved.
4. Click **Save to EEPROM**.
The EEPROM window appears.
5. Click the **Save Parameters**.
The configuration is sent and permanently save to the IP-223.

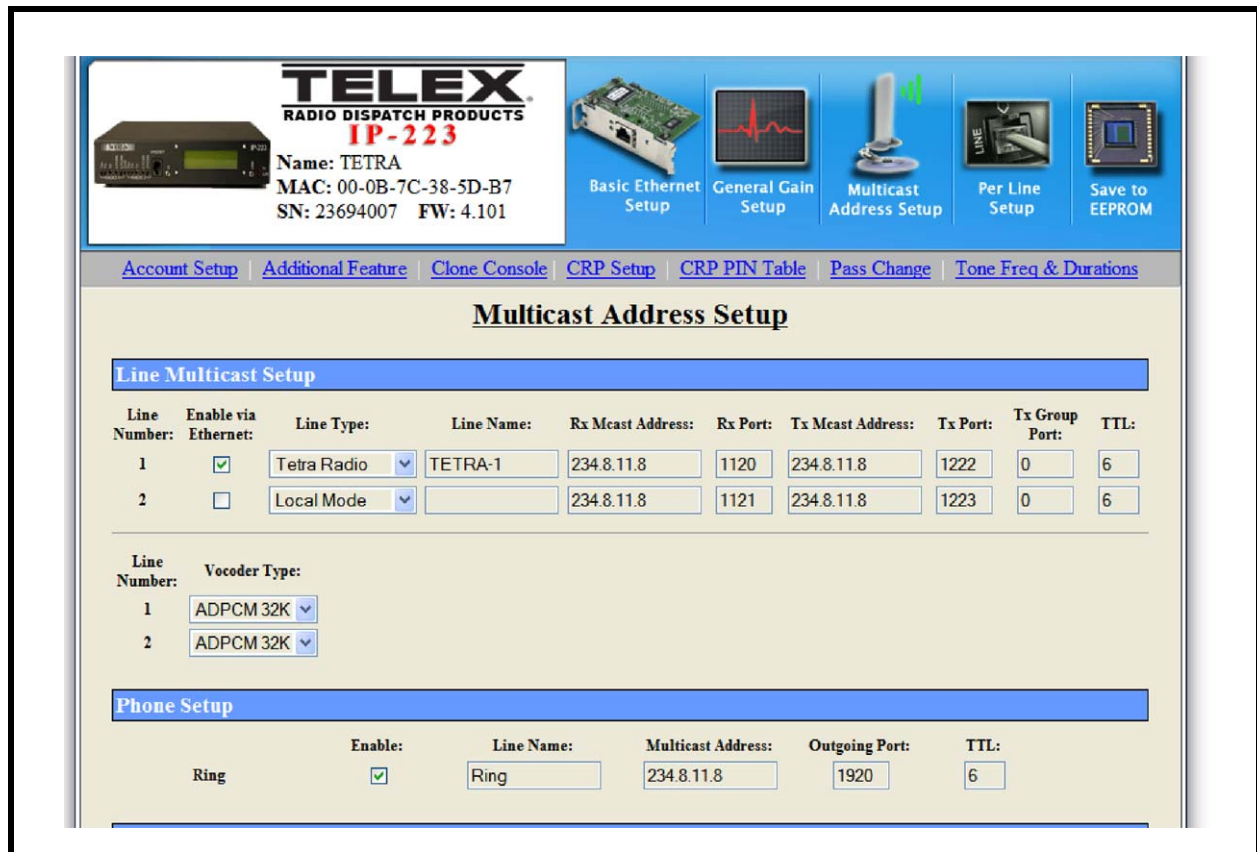


FIGURE 1. Multicast Address Setup—Tetra Radio Line Type

3.2.2 IP-223 Per Line Setup Overview

Once Tetra Radio line type is enabled in the Multicast Setup, the Per Line Setup window, see Figure 2, displays only those items necessary to configure the IP-223 for a TETRA radio interface.

The IP-223 associates a call to a function tone. Function tones are used to control remote radio resources in conventional analog radio systems. A dispatch console sends a function tone (or an **IP** [Internet Protocol] representation of a function tone), to an IP-223 in order to set up the desired call.

The IP-223 can respond to up to 100 function tones, each accommodating four (4) call types trunked direct **GCs** (Group Calls), and **HDPCs** (Half Duplex Private Call). If one (1) or more **UDSLs** (User-Defined Scan List) are specified, then those lists occupy a call location (function tone allocation). However, no call is made on a UDSL, just on one (1) of its contained talk groups.

Per Line Setup - Line 1

Line 1 Submit Line 2

Line Mode Status: Tetra Radio (Change in Multicast Address Setup) **Port Enabled:**

Function Tone Setup

Jump to Entry:

Tone	Enable	Relay	Relay Group	Relay Time (ms)	Digital Output	Type	ISSI/GSSI Number
1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	1	Trunked GC	00800801
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	3	Trunked GC	00800802
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	7	Trunked GC	00800803
4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	15	Trunked GC	00800804
5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	31	Trunked GC	00800805
6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	63	Trunked UDSL	1,2,3,4,5
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	127	Trunked HDPC	02000345
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	0	Trunked HDPC	02000346
9	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	1	Trunked HDPC	02000347
10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	0	3	Direct GC	00000001

Delay Setup

TX Delay: ms **RX Delay:** ms
Squelch Tail Delay: ms

LAM Setup

LAM Level: dB **LAM Time:** sec

Monitor Relay

Reset with PTT On except PTT Timed ms

Options

Supervisor Cross Mute Full Duplex RxAGC
 Hi-Pass RX Pre-Emphasize TX TX Monitor 2 Wire
 Fl Last Call Parallel Tone Console PTT Notch Filter iR1600 Modem
 Busy Channel Lockout

FIGURE 2. Per Line Setup Window

3.2.2.1 Type Drop Down Menu

The (ISSI/GSSI) Type drop down menu contains the following options:

Trunked GC - A Trunked Group Call uses TMO (Trunked Mode of Operation); this is a half-duplex point to multi-point call between the caller and pre-defined group of users.

Direct GC - A Direct Group Call uses DMO (Direct Mode of Operation); this point-to-multi-point call is made between radio terminals, without infrastructure access required.

Trunked UDSL - A Trunked User Defined Scan List uses TMO mode, the IP-223 scans selected talk groups, enabling a console operator to monitor and answer calls on multiple talk groups. The UDSL must be pre-defined within the radio terminal and the IP-223.

NOTE:

- If a function tone number in the UDSL is not assigned to a trunked GC, then the scan list is invalid and the IP-223 does not change to that function tone.
- If the function tone is correctly configured and in a UDSL, but the group number assigned to the function tone's trunked GC is invalid, the IP-223 changes to that function tone, but the invalid group number is not scanned.

A UDSL defaults to the first talk group in the list (TG 801 in our example). If listening out on the Trunked UDSL channel (tone 6), a console operator can receive calls on all talk groups in that list. Having received a call, the console operator can reply, and continue a radio conversation, while the call remains active.

Call activity time is set within the TETRA network. Once the call drops, the IP-223 defaults back to the first group in the list (TG801). When the console operator presses the PTT, with the UDSL selected, a group call is created on this talk group (TG801).

Trunked HDPC - Trunked Half-Duplex Private Call is a trunked call to a single terminal, rather than a group, allowing a console operator to make point-to-point private radio calls.

3.2.2.2 *ISSI/GSSI Number Field*

The **ISSI** (Individual Short Subscriber Identifier) /**GSSI** (Group Short Subscriber Identifier) Number field is used to specify the ISSI/GSSI number for the call types available via the IP-223.

Place groups in the ISSI/GSSI Number field by tone allocation number, separated by semi-colons. In the example shown in Figure 2, function tone 6 is configured for a group in the format 1;2;3;4;5.

3.3 IP-223 to SRM2000 Interface Cable Drawing

Pin connections and hardware assembly are shown in Figure 3.

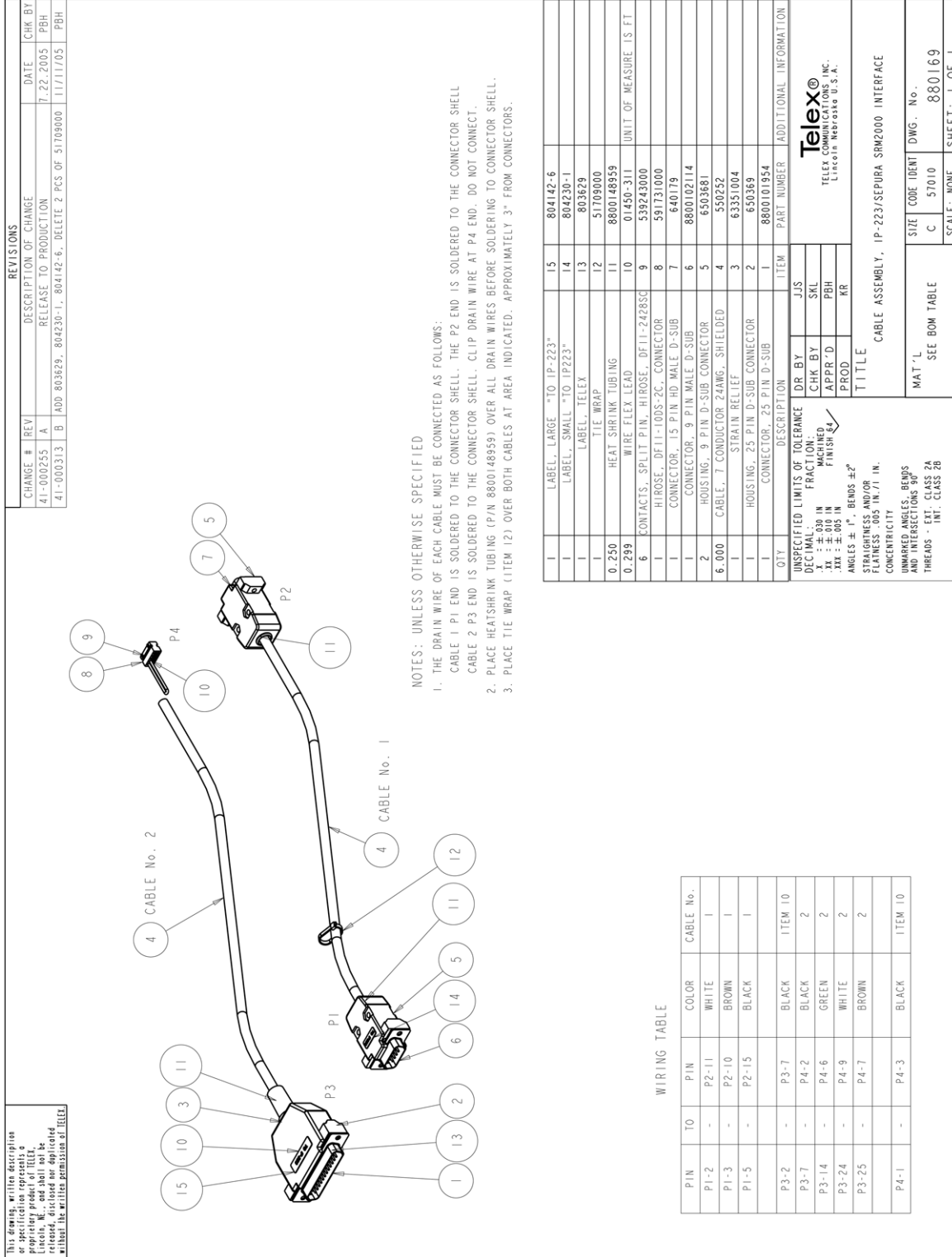


FIGURE 3. IP-223 to Sepura SRM2000 Interface Cable Assembly

4.0 Radio Information

4.1 Radio Terminal Configurations

Sepura SRM2000/3500 terminal settings are discussed below.

The **PEI** (Peripheral Equipment Interface) port is used to configure the radio to allow direct control of the radio from the IP-223.

4.1.1 Allow Direct Control

To **configure the radio to allow IP-223 direct control**, do the following:

1. Click the **Parameters** tab.
The Parameters page appears.
2. From the Serial Port Usage drop down menu, select **Normal (AT on the first physical port)**.
3. From the default **Hays Baud Rate** field enter 19200.

REFERENCE: For more information, see the Sepura Manager manual and Sepura help files.

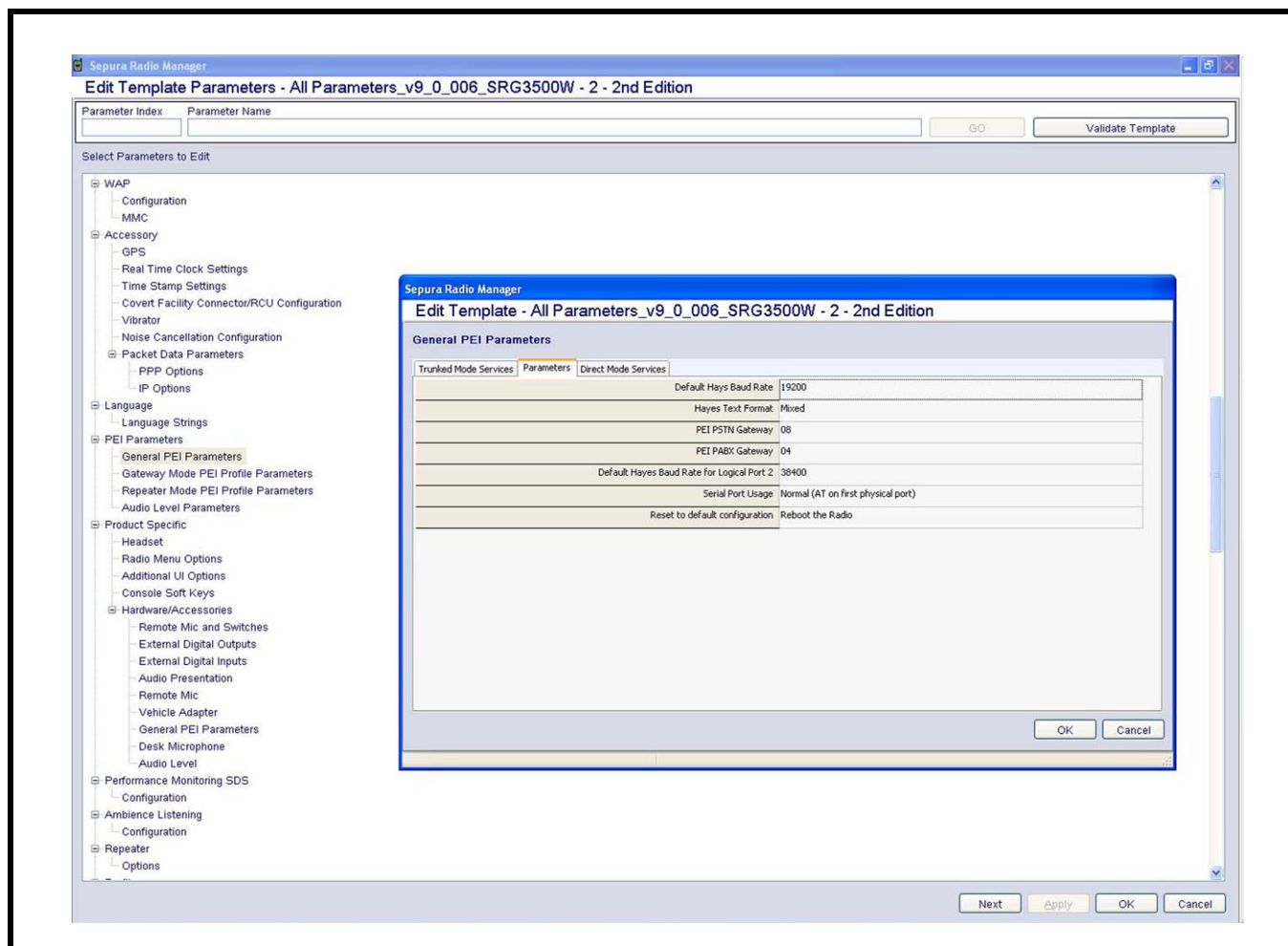


FIGURE 4. SRM2000/3500 Serial Port Setup

4.1.2 Route Voice and Data to External Ports

To configure the radio to route voice and data to external PEI ports, do the following:

1. Click the **Direct Mode Services** tab
The Direct Mode Services page appears.
2. From the **CC Voice** drop down menu, select Route to PEI1.
3. From the **CC Data** drop down menu, select Route to PEI1.
4. From the **SDS Status** drop down menu, select Route to PEI1.
5. From the **SDS-TL** drop down menu, select Route to PEI1.
6. Click the **Trunked Mode Services** tab.
The Trunked Mode Services page appears.
7. From the **CC Voice** drop down menu, select Route to PEI1.
8. From the **CC Data** drop down menu, select Route to PEI1.
9. From the **SDS Status** drop down menu, select Route to PEI1.
10. From the **SDS-TL** drop down menu, select Route to PEI1.

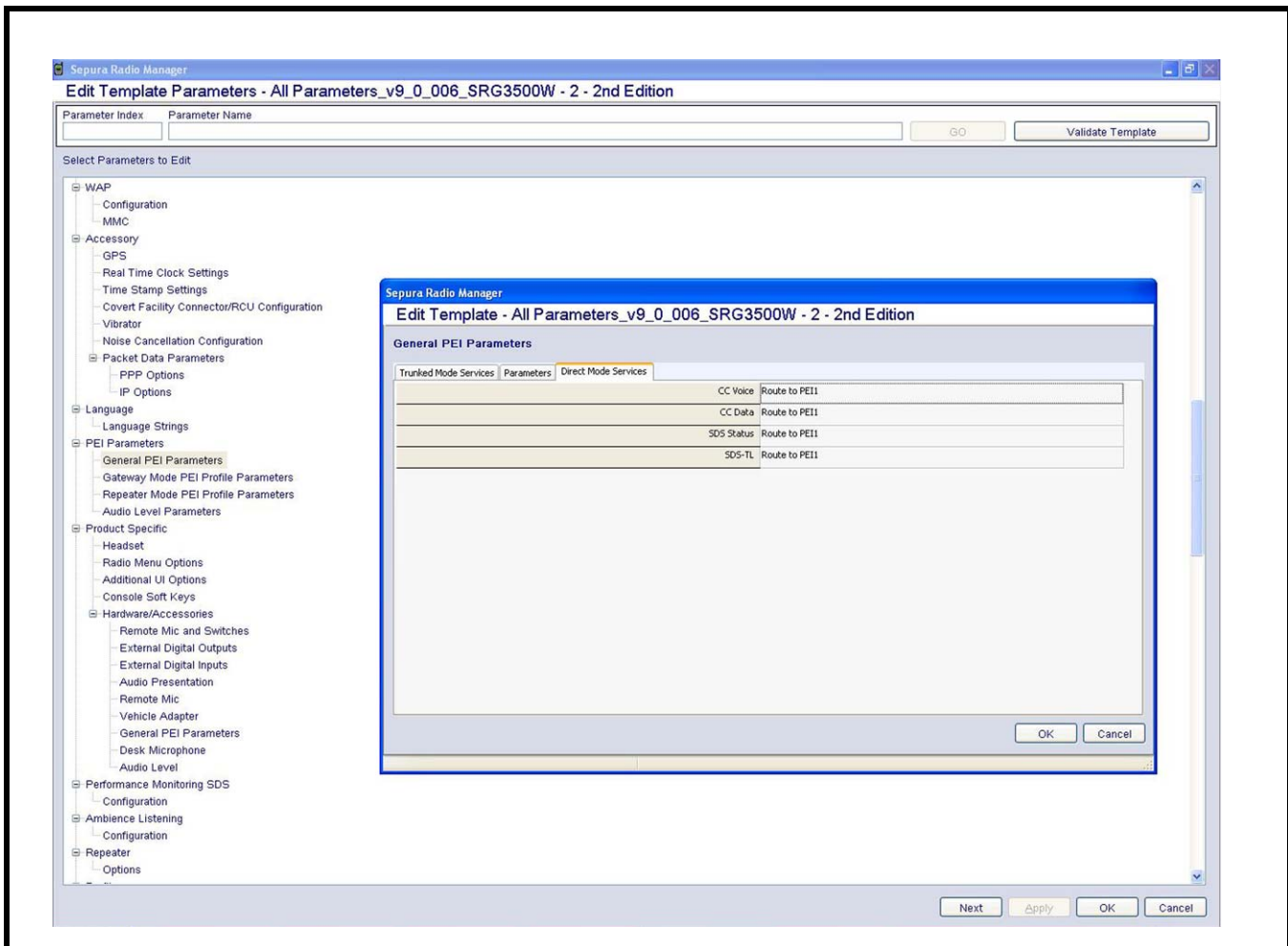


FIGURE 5. SRM2000/3500 Serial Port Routing Setup—Direct Mode Services

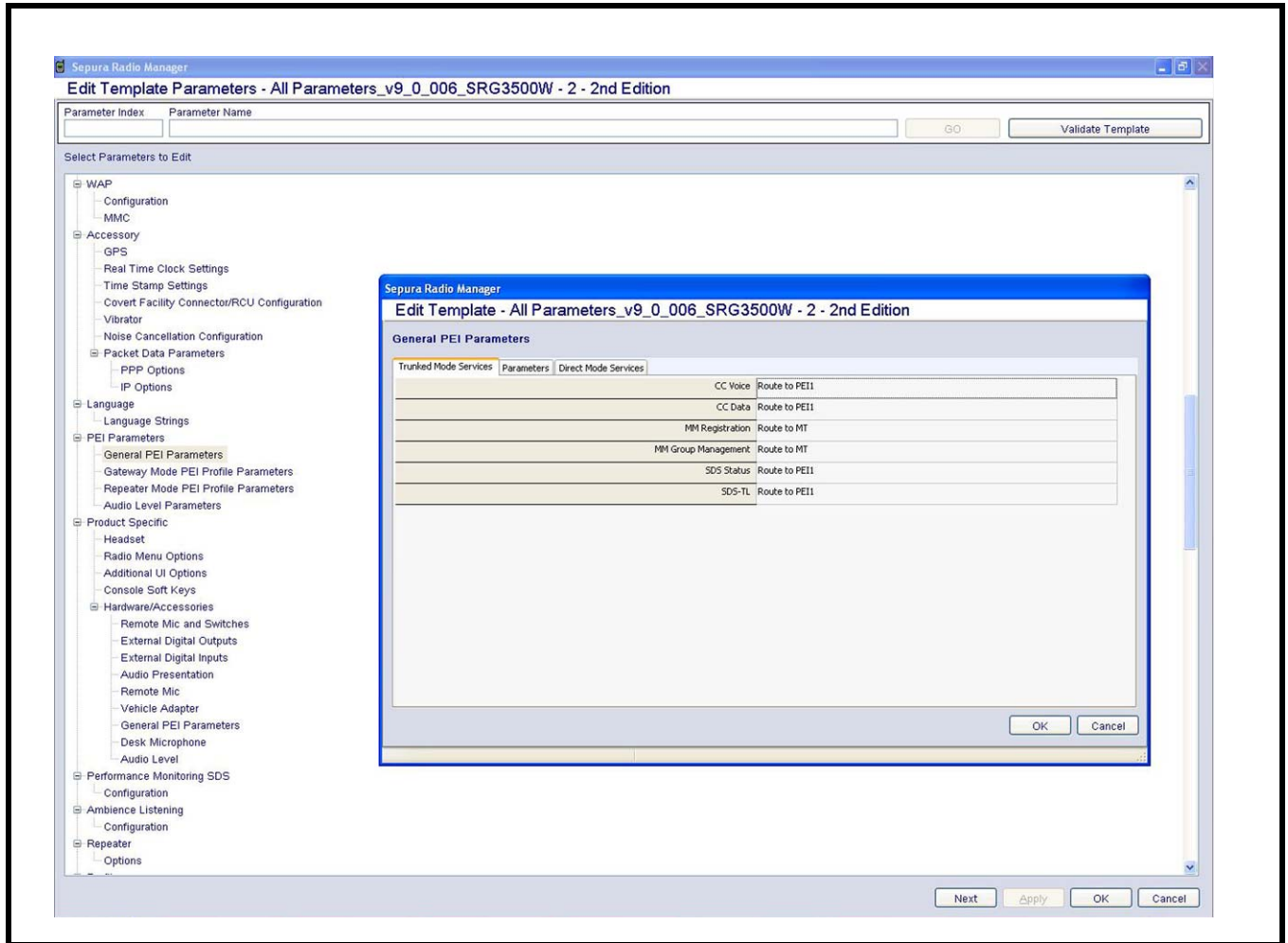


FIGURE 6. SRM2000/3500 Serial Port routing Setup–Trunked Mode Services

4.1.3 TMO Group Parameters

To define the TMO talk group parameters, do the following:

- > Configure the **talk group fields for TMO** per your custom configuration.

NOTE: See example shown in Figure 7.

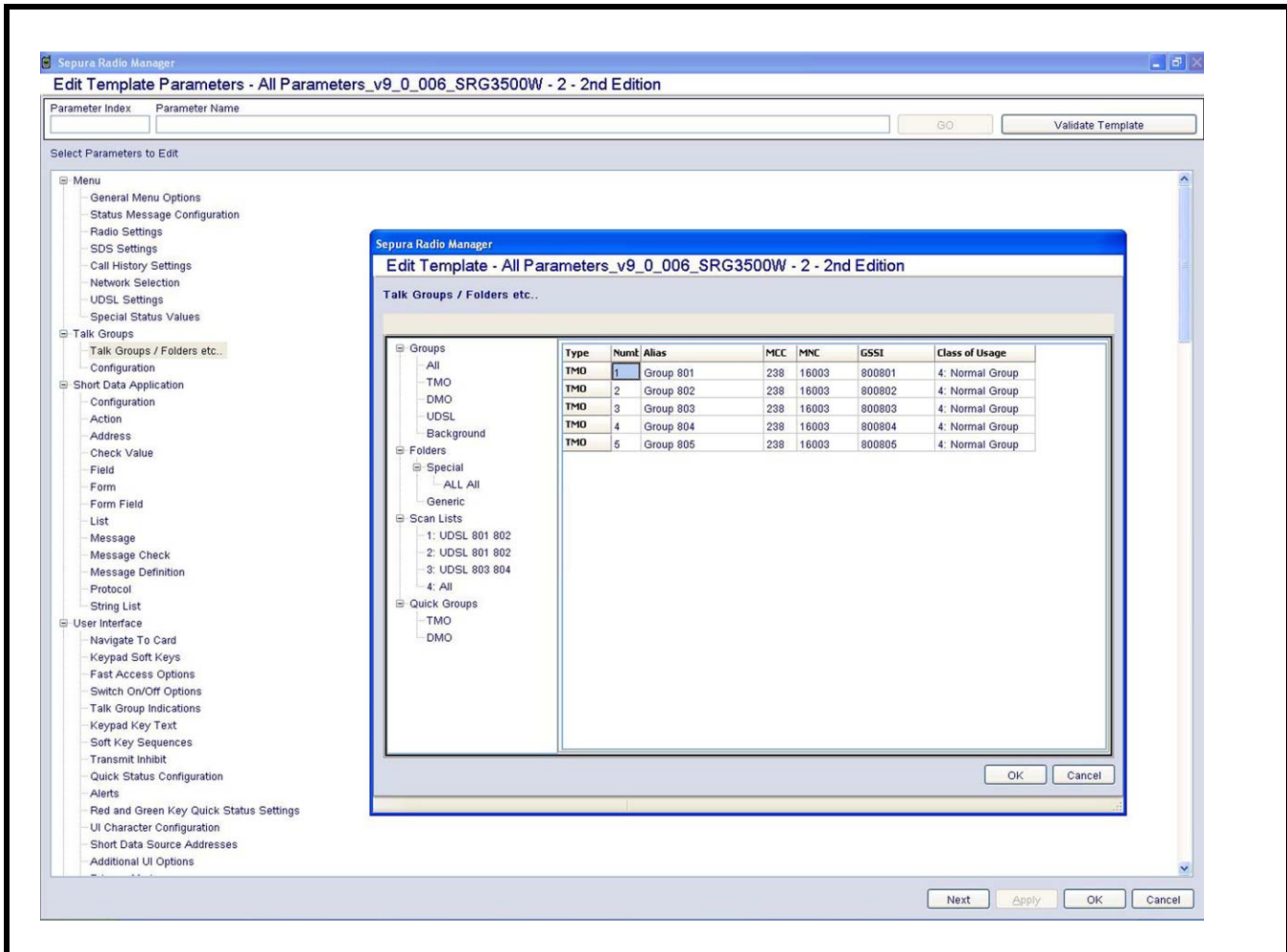


FIGURE 7. Example of Trunked Mode Talk Group Setup

4.1.4 DMO Group Parameters

To define the DMO talk group parameters, do the following:

- > Configure the **talk group fields for DMO** per your custom configuration.

NOTE: See example shown in Figure 8.

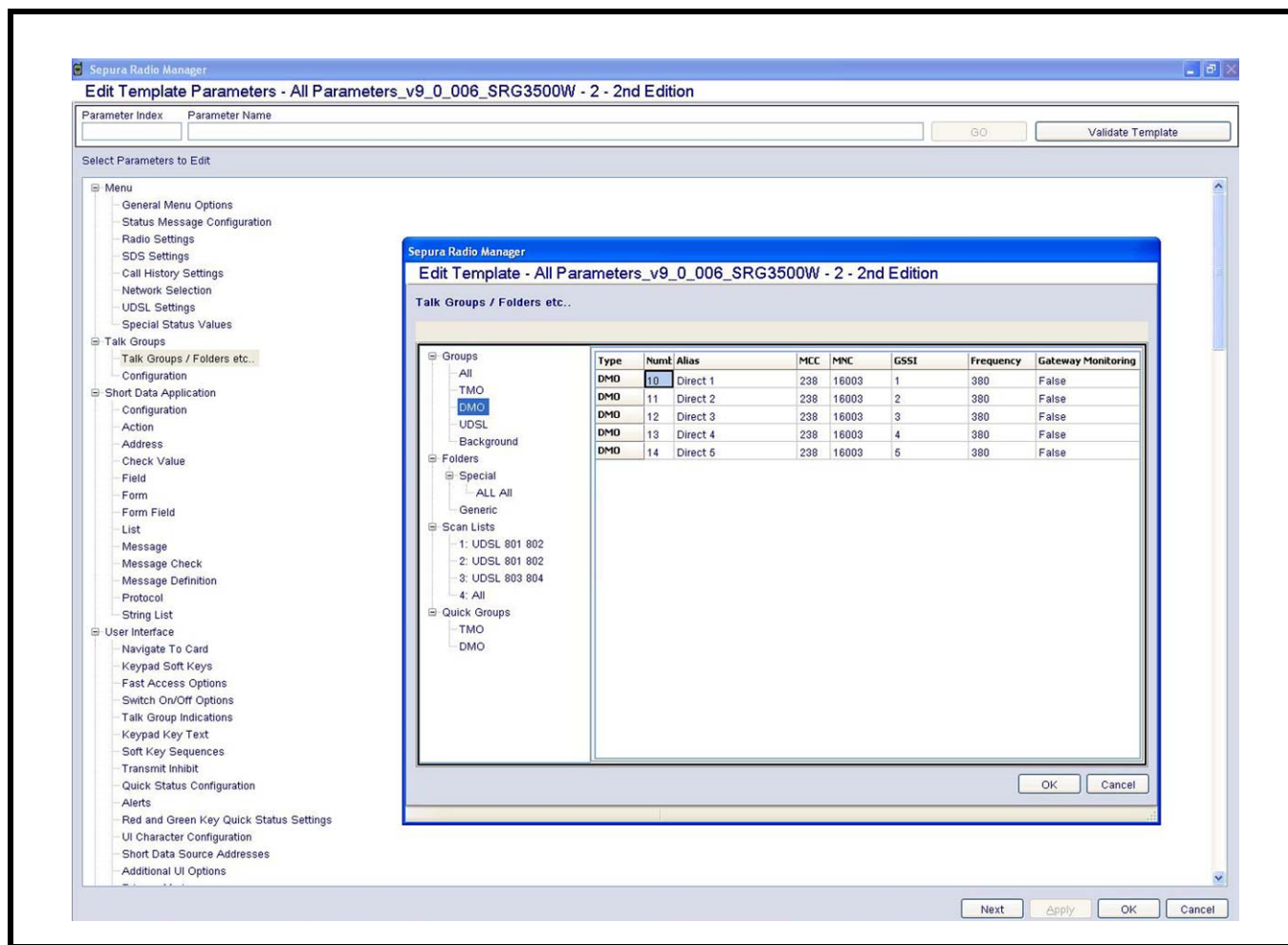


FIGURE 8. Example of Direct Mode Talk Group Setup

NOTE: Talk group configurations shown in Figure 7 and Figure 8 are provided as a guide and to aid later discussions. Guidance given here does not replace the authoritative documents and all terminal configurations should be made in accordance with the relevant Sepura Radio Manager manuals. Terminals requiring infrastructure access should be configured as directed by the local TETRA network manager.

4.1.5 TMO Alarm Priority

To define the TMO alarm priority parameter, do the following:

1. Click the **Alarm Priority** tab.
The Alarm Priority page appears.
2. From the **Alarm Call Priority** drop down menu, select 15.

NOTE: See example shown in Figure 9.

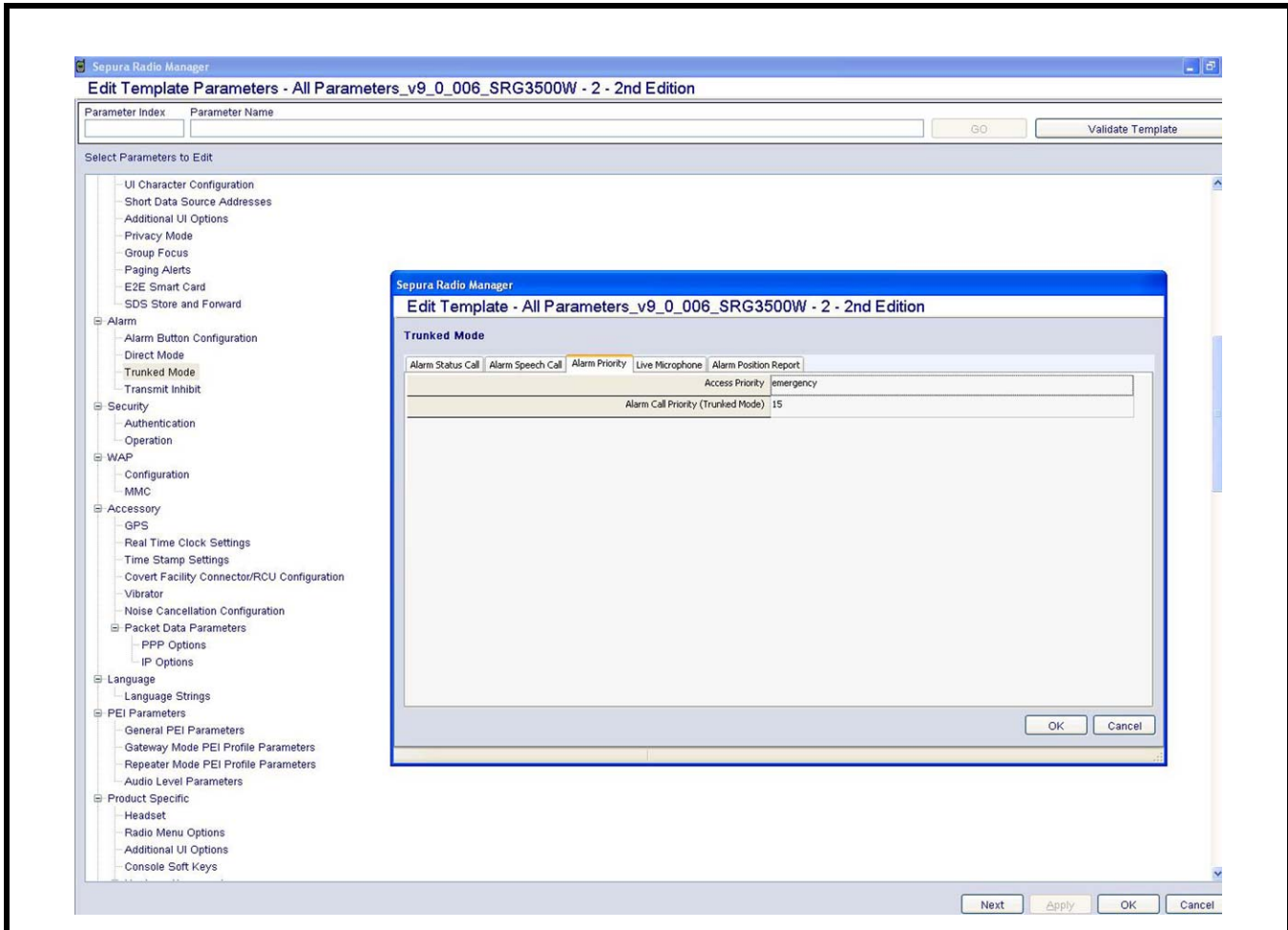


FIGURE 9. Example Trunked Mode Alarm Priority Setup

5.0 Connecting the IP-223 and SRM2000/3500

IP-223 and SRM radio cable assembly connection instructions follow.

5.1 Cable Connections Overview

The IP-223's DB-25 is connected to the SRM-2's remote control panel 10-pin auxiliary socket, routing audio from the IP-223 to the SRM-2.

The DB-25 can be connected to either Radio 1 or Radio 2 ports.

NOTE: If radio 2 is employed, a serial splitter cable must also be used for serial data connectivity, see "Hardware Requirements" on page 6.

The 10-pin auxiliary connector must be connected into Audio Accessory Interface 1, see Figure 11 and Figure 12.

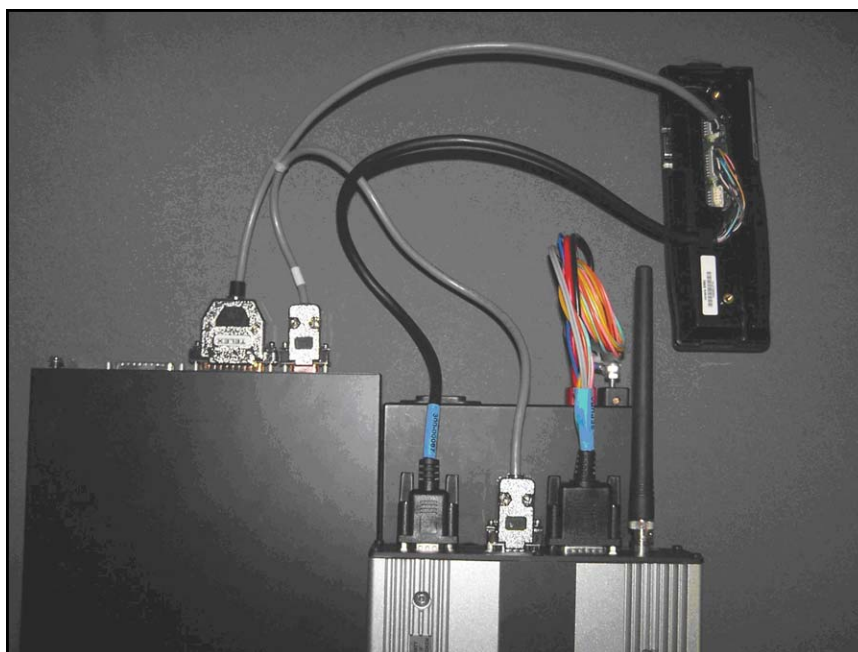


FIGURE 10. Complete Cable Assembly with SRM-2 Console Panel

5.2 SRM Radio Cable Connections

The IP-223 and the SRM radio terminal connections are shown in Figure 11.

The serial cable is connected between the SRM Interface-1 and the IP-223 Serial Port (DB-9).

The Sepura transceiver cable (black) connects SRM Interface-2, to the SRM-2 Transceiver Port (middle connector in Figure 11).

NOTE: DC power connections are not shown here.

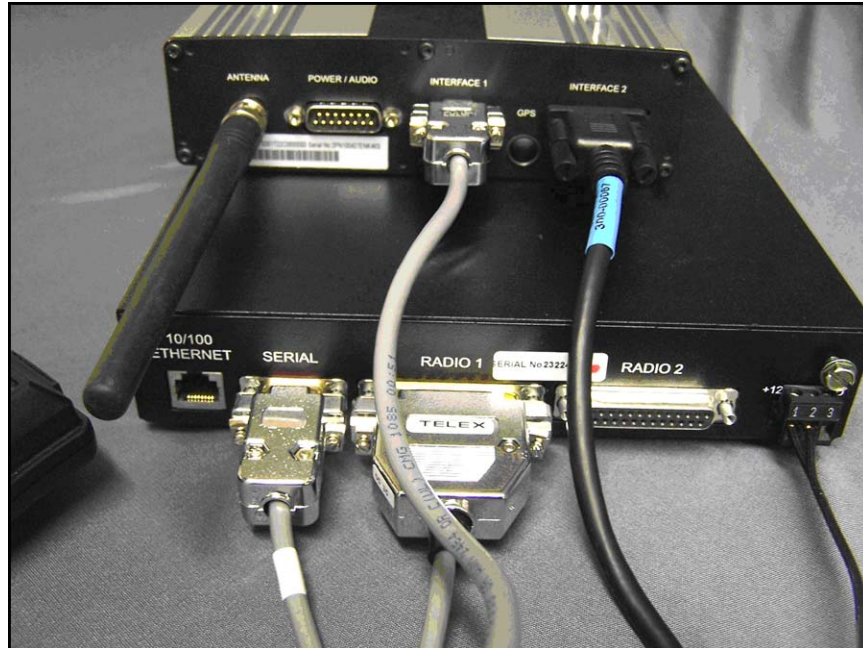


FIGURE 11. Rear View Cable Connections

5.3 SRM-2 Console Panel Connectors

The SRM console panel connector details are shown in Figure 12.

The middle connector is the radio transceiver connection. Audio and serial data are routed to the radio from this port.

The far right connector is the Audio Accessory Interface-1. Audio from the IP-223 is routed to this connector.

The left most connector, the Audio Accessory Interface-2, is not used in the installation.

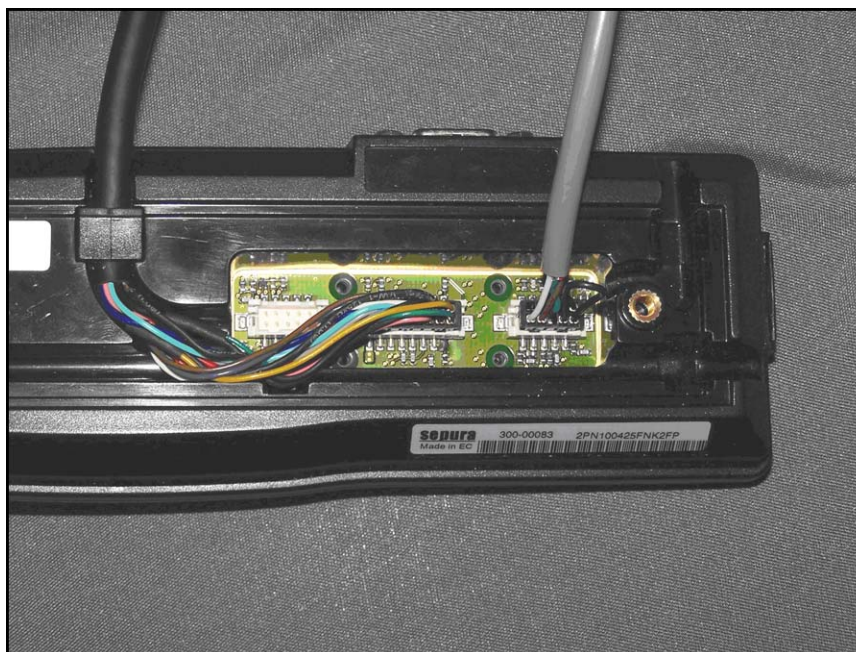


FIGURE 12. Cable Connections to SRM-2 Console Panel

5.4 Application Interface Unit Connectors

The AIU (Application Interface Unit) connector is shown in Figure 13.

The AIU can be used instead of the SRM-2 console panel. Pin outs are identical for both installations.

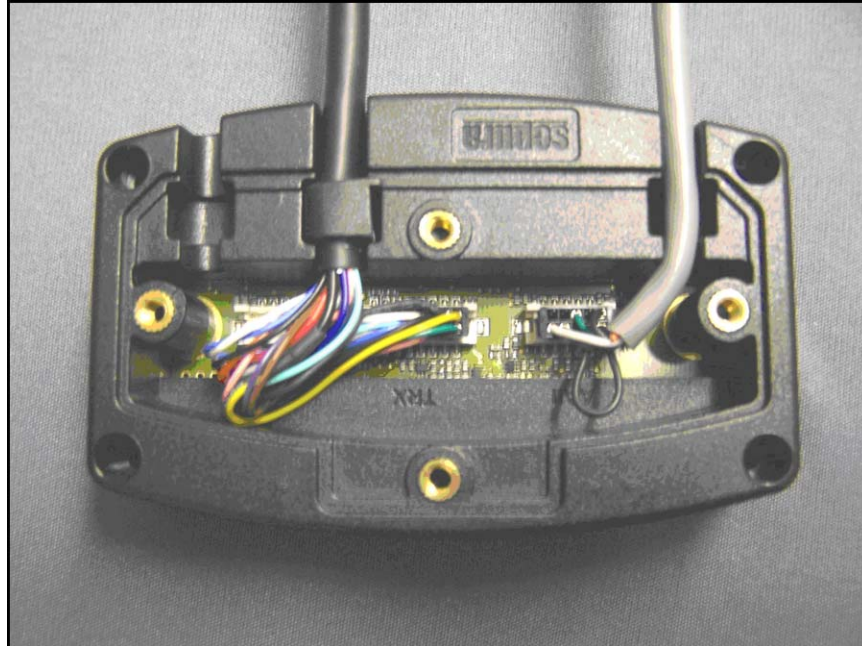


FIGURE 13. Cable Connections to the AIU

5.5 IP-223 Front Panel Display

The IP-223 Front Panel Display is shown in Figure 14.

At boot up the IP-223 creates a serial link with the SRM terminal. If correctly configured and cabled, the IP-223 displays *Sapura* at the completion of this initial communication.

The IP-223 top row displays radio 1 information and the bottom row displays radio 2 information.

After the first IP-223 transmission, *Sapura* is cleared from the display and the indication reappears only when the IP-223 is rebooted.



FIGURE 14. IP-223 Display

6.0 Dispatch Console Options

The IP-223 works directly with all Telex IP-based consoles (IP-2002, IP-1616, C-6200, and C-Soft). All these consoles make the Telex TETRA air interface solution available to console operators. Radio functions offered by Telex IP-based consoles: group calls, HDPCs, and the UDSL, have already been discussed. Telex IP-based consoles can also make Full-Duplex Private Calls, via the air interface. This is at the cost of one (1) line, allocated to telephony, at the console.

6.1 Trunked FDPC (Phone Mode) Overview

The IP-223 configuration software does not offer a specific programming dialog for trunked **FDPC** (Full-Duplex Packet Cascading).

Configuring trunked FDPC is completed by adding a phone line to the dispatch console. If one (1) or more phone lines already exist on the console, then another line for the TETRA Trunked FDPC must be added. This line should not use the phone pooling function to select a phone asset for making calls. Instead, select the specific line connected to the Sepura radio terminal as instructed in “Per Line Function Tone Setup” on page 27.

Once the line is configured for Tetra Radio line type, normal phone calls to TETRA radio subscriber units can be made. If attempting to make an FDPC, the function tone the IP-223 TETRA interface last used cannot be associated to a Direct GC, as this makes the phone line appear unavailable. Thus, the Sepura terminal must be in TMO to make an FDPC.

We will discuss standard TETRA radio configuration, followed by the FDPC option. The same screen shots are used to illustrate both.

NOTE: Some TETRA networks do not support or allow, FDPCs, or restrict access to certain terminals. Confirm access rights with the local TETRA network manager before attempting to implement FDPC functions.

7.0 Hardware Console Configuration

Console configuration is demonstrated in the following instructions using a Telex IP-2002 Radio Dispatch Console. The configuration recommendations also apply to the IP-1616 and C-6200 Radio Dispatch consoles; however, specific configuration windows vary depending on model.

NOTE: Console configuration is shown using the TSM application. Alternatively, the web browser configuration windows can be used to view the configuration and update all Telex IP-based consoles.

REFERENCE:

- For more information, see the Telex System Manager Technical Manual (P/N LIT000259000). This document is available for download at www.telex.com/Downloads/.
- For TSM firmware download, go to www.telex.com/Downloads/.

7.1 Multicast Configuration

Multicast is used to configure the console to communicate with the IP-223. A standard Radio/TETRA configuration on line 1 is shown in Figure 15.

To **configure the Multicast on the console**, do the following:

1. While in TSM, select the **Multicast** tab.
The Multicast page appears.
2. Configure an **appropriate line** with the same Base IP Address as the IP-223 line connected to the TETRA terminal.
3. Configure the **line** with the same Multicast Addresses as the IP-223.
4. Configure the **line** with the same Multicast Port numbers, as the IP-223.

NOTE: If the console operator is limited to group calls and HDPCs, then Multicast Address Setup is complete.

7.2 FDPC Multicast Configuration

If access to FDPCs are required, a second phone line must be configured, see Figure 15.

To set up **FDPC Multicast access**, do the following:

1. While in TSM, select the **Multicast** tab.
The Multicast page appears.
2. Select the **Enable** check box for an appropriate line.
3. From the Line Type drop down menu select **Phone**.
4. In the Line Name field enter a **name** for the line.
5. Enter the same **Base IP Address** as the IP-223 line connected to the TETRA terminal.
6. Enter the same **Multicast IP Address** as the IP-223 line.
7. In the Port field, enter a **unique (arbitrary) port number**.
8. Select the **Phone Enabled** check box.

NOTE: *Ring Signal appears in the Line Type field by default.*

9. In the Rx Multicast field, enter the same **Rx Multicast** address as the IP-223 line.
10. In the Port field, enter a **unique (arbitrary) port number**.

NOTE: Telex System Manager's access to the IP-2002 is also enabled on this page, see Figure 15

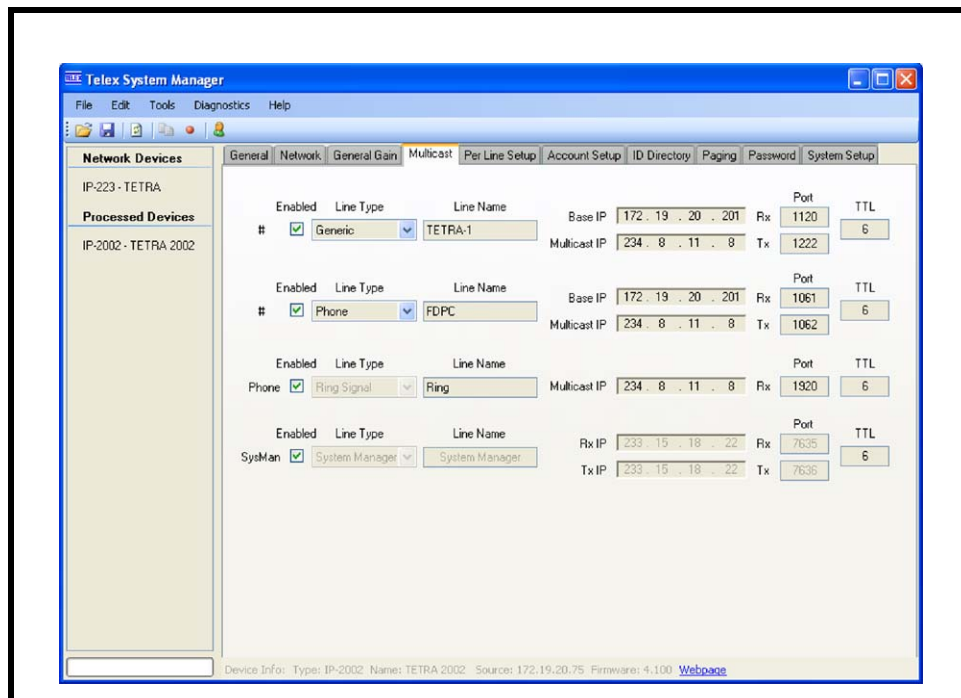


FIGURE 15. Multicast Page—IP-2002

7.3 Per Line Function Tone Setup

To configure the TETRA radio per line settings, do the following:

1. While in TSM, select the **Per Line Setup** tab.
The Per Line page appears.
2. In the Channel (1 or 2) group box for the line, select the **Generic** radio button.
3. Click **Configure**.
The Per Line notebook appears.
4. Click the **Function Tone** Tab.
The Function Tone page appears.
5. Select the **Enable** check box.
6. In the AlphaNumeric field enter a **label** for the function tones to correspond with those defined within the IP-223 (see Figure 2).

NOTE:

- Like the IP-223, the IP-2002 tone list can contain up to 100 separate function tone allocations, allowing various talk groups, HDPC's and UDSL's to be selected.
- The IP-1616 and C-6200 operate using 16 function tones and restricted to access only the first 16 tone allocations in the IP-223.

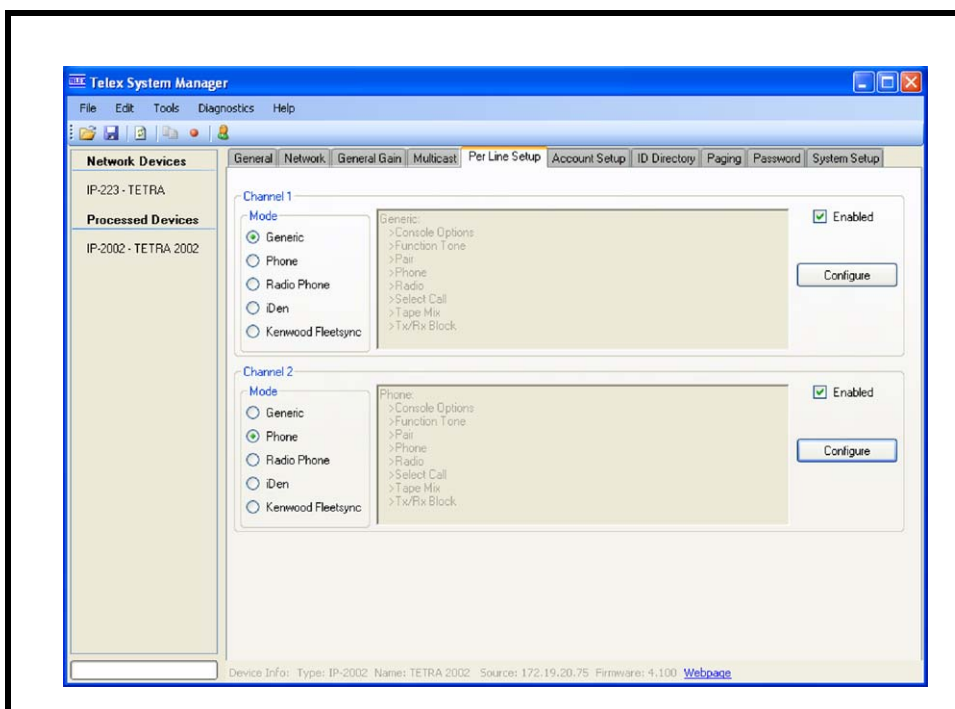


FIGURE 16. IP-2002 Per Line Setup Page—IP-2002

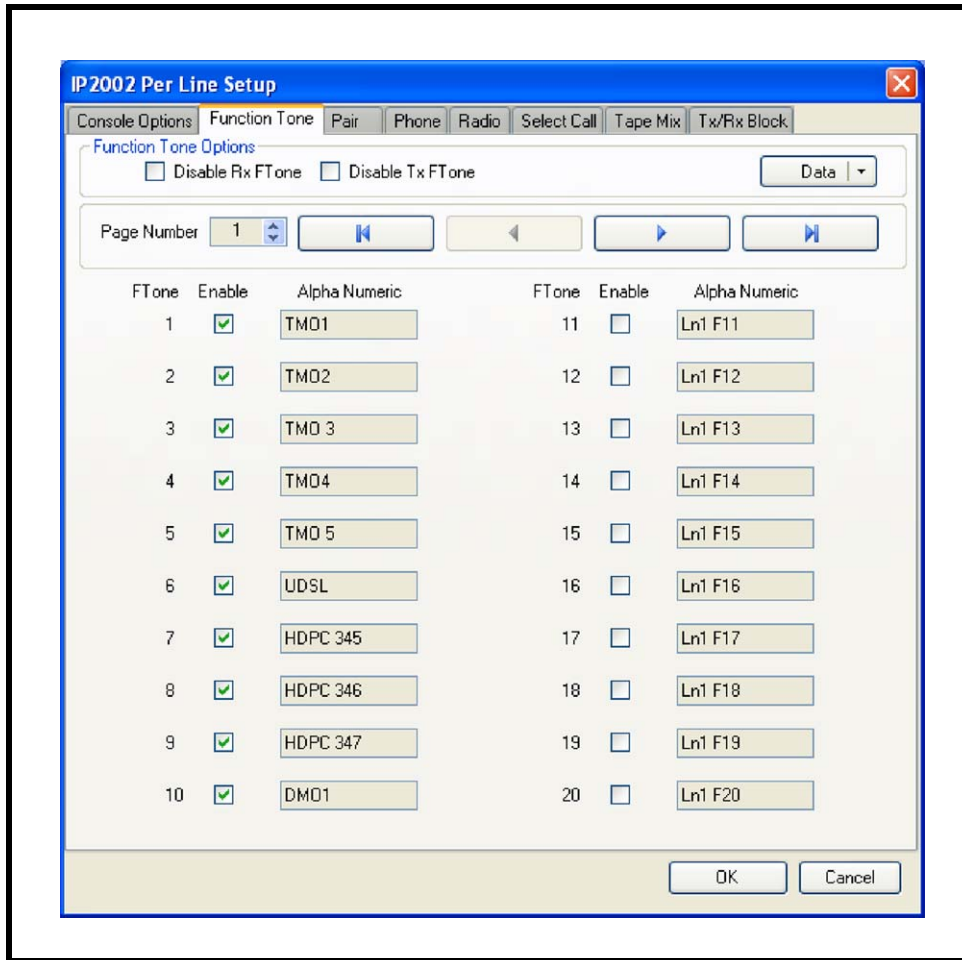


FIGURE 17. Function Tone Page—IP-2002

7.4 FDPC Function Tone Setup

To set up FDPC function tones, do the following:

1. From the Per Line Setup page, select **Channel 2's Phone** radio button.
The line is configured for phone and the phone tab appears.
2. Click **Configure** for Channel 2.
The IP-2002 Per Line Setup notebook appears.
3. Click the **Phone** tab.
The Phone page appears.
4. Within the phone setup, set the **console** to seize the appropriate local phone line.

NOTE: The local phone line is the IP-223 line connected to the TETRA terminal (in our example line 1).

5. Select the **Nextel Phone Line** check box.

NOTE: Nextel signaling protocol accompanies dialed subscriber numbers in order to affect call setup.

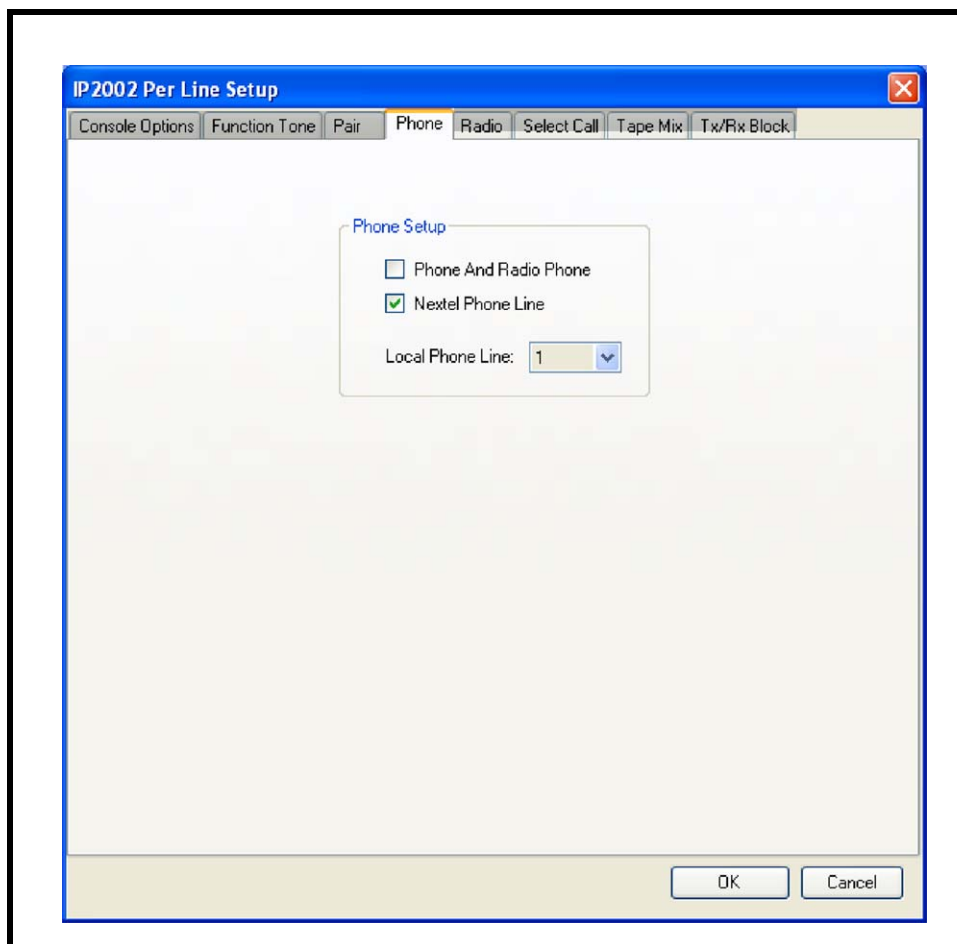


FIGURE 18. Phone Page—IP-2002

7.5 ID Directory

To create the **ID Directory**, do the following:

1. From the Per Line Setup notebook, click the **ID Directory** tab.
The ID Directory page appears.
2. From the ID Type drop down menu select **Phone** for each ID you want to configure.
3. In the ID field, enter the **fleet ISSIs** for each ID.
4. In the Name field, enter the **associated alias** for each ID.
5. From the menu bar, select **Edit|Record Configuration To Device**.
The Record Configuration window appears.
6. From the Destination Device pane, select the **device** to record the configuration to.
7. Click **Record**.
The configuration is permanently saved and the device reboots.

NOTE: The IP-2002 ID directory has a capacity to hold up to 500 entries. The IP1616 and C-6200 can accommodate up to 100 entries.

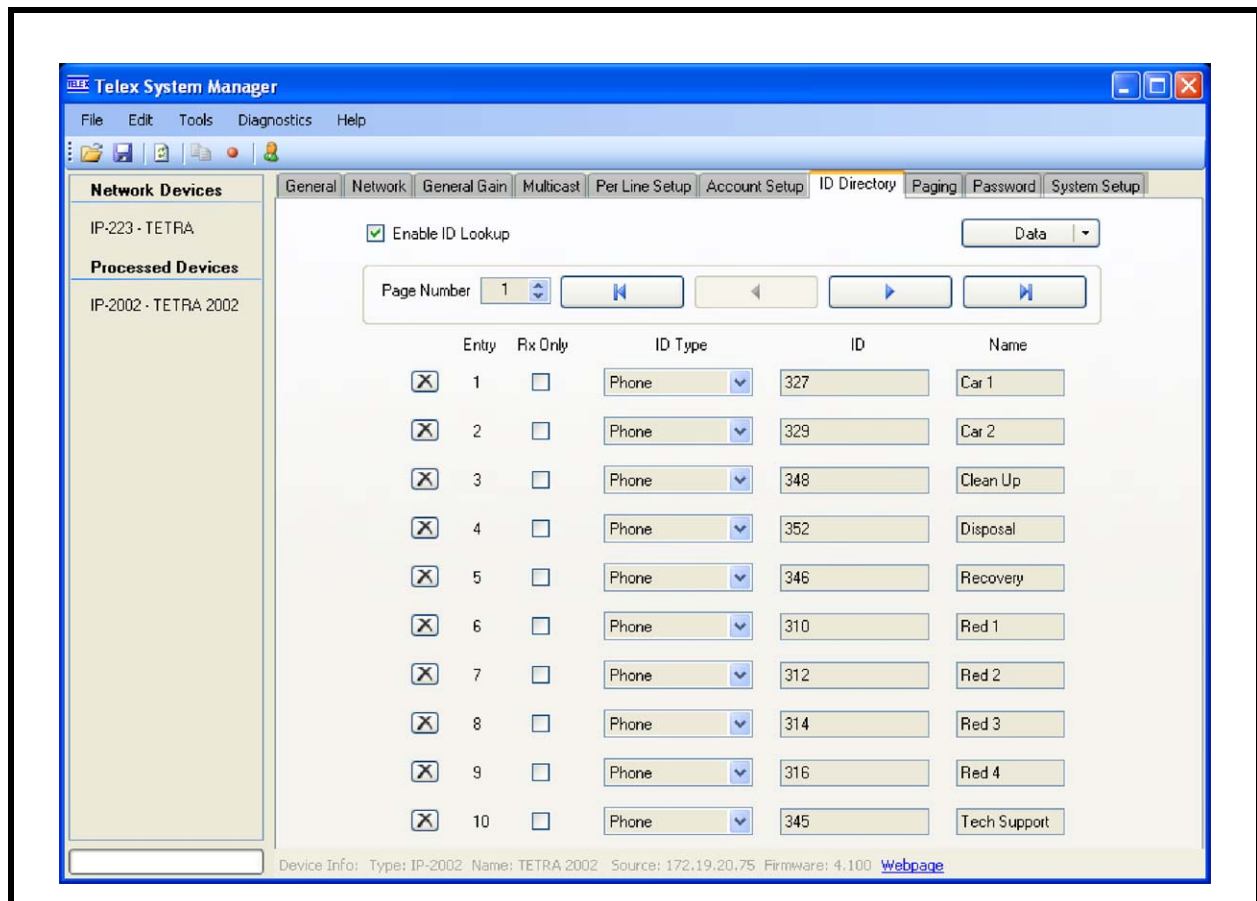


FIGURE 19. ID Directory Setup—IP-2002

NOTE: As illustrated by the ID list, shortened dialing can be used for intra-fleet calls; in our example, all terminal ISSIs for the entire fleet are differentiated by the last three (3) digits. As a result, only the last three (3) digits are required to make a call.

7.6 Making Calls

7.6.1 HDPC Group Calls

To make a group call or an HDPC, do the following:

1. From the console, press the TETRA radio line's **Select** button.
2. From the Call List (function tone list), select the **required call**.
3. Press a **PTT** button and wait for go-ahead tone.

NOTE:

- Go-ahead tones are generated by the connected terminal to indicate the call is set up and clear to send audio.
- Call activity time is a function of the TETRA network. Group calls and HDPCs clear according to TETRA network parameters.

REFERENCE: Consult the terminal programming guide and TETRA network manager for appropriate alarm activation.

7.6.2 FDPC Call List

To **make an FDPC using the Call List**, do the following:

1. Ensure that the **a group call** or **HDPC** is preselected, or is the last call received, for the TETRA radio line
2. Press the TETRA Phone line's **Select** button (line 2 in the example).
3. Press the **CLST** (call list) soft key.
4. Press the **PHN** (phone) soft key.
5. Using the channel up/down (**C▲** & **C▼**) buttons, select the **required number** or **alias**.
6. Press the **DIAL** soft key, and continue as per standard telephone call.
7. Release the **line**, or replace the **IP-2002 handset**, to clear the call.

To **make an FDPC using the console's keypad**, do the following:

1. Ensure a **group call** or **HDPC** is preselected, or was the last call, on the TETRA radio line.
2. Press the TETRA phone line's **Select** button (line 2 in the example).
3. Using the console keypad, enter the **number** of the party to be called, followed by the **letter B**.
4. Continue the **call** as normal.
5. Press the console's **REL** (release) button or **replace the handset** to clear the call.

The console is able to receive group calls, HDPCs and FDPCs.

7.6.3 Answering Calls

To **answer a call**, do the following:

- > Select the **appropriate line's Select** button when an incoming call is indicated.

NOTE: In our example, line 1 is set up for group calls and HDPCs, and line 2 is set up for FDPCs.

8.0 C-Soft Console Configuration

8.1 Configure Per Line Parameters

The C-Soft Per Line Parameters window is used to configure C-Soft to IP-223 communication. Figure 20 illustrates the standard Radio/TETRA configuration for line 1.

To **configure C-Soft Per Line Parameters**, do the following:

NOTE: See “IP-223 Multicast Address Setup” on page 8 to reference our example.

1. While in C-Soft Designer, select **Edit|Setup Per Line Parameters**.
The Per Line Parameters window appears
2. Configure an **appropriate line** with the same Base IP Address as the IP-223 line connected to the TETRA terminal.
3. Configure the **line** with the same Multicast Addresses as the IP-223.
4. Configure the **line** with the same Multicast Port numbers, as the IP-223.
5. Click **Close**.

NOTE:

- If the console operator is limited to group calls and HDPCs, then Multicast Address Setup is complete.
- In other console configurations, all address fields must be filled, though some, like the Tx Port number, are disregarded. The ring signal will be directed the phone *Ring Signal* global multicast address. See “Global Parameters” on page 39.

8.2 Define an FDPC Phone Line

If access to FDPCs are required, a second phone line must be configured. In the example shown in Figure 20, line 8 is defined as the FDPC phone line

To **define a phone line to access FDPCs**, do the following:

1. Click **Per Line Parameters**.
2. Select the **Enable** check box for an appropriate line (line 8 in the example).
3. From the Line Type drop down menu select **Phone**.
4. In the Line Name field enter a **name** for the line
5. In the Rx Port field, enter a **unique (arbitrary) Rx port number**.
6. In the Base IP Address field, enter the same **Base IP Address** as the IP-223 line connected to the TETRA terminal.
7. Click **Close**.

NOTE:

- In other console configurations all Address fields must be filled, though some, like the Tx Port number, are disregarded.
- The ring signal is configured on the Global Parameters Setup window. See “Global Parameters Setup (Ring Signaling)” on page 39.

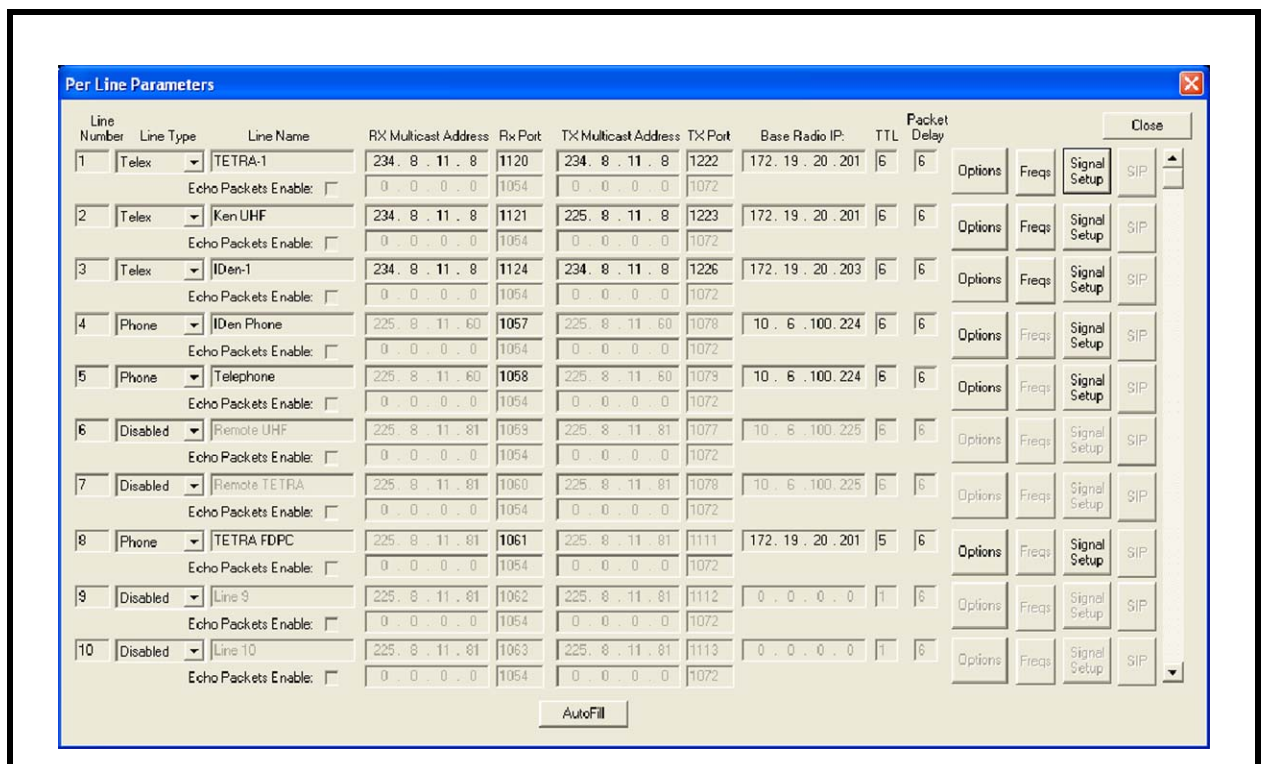


FIGURE 20. Per Line Parameters—C-Soft Multicast Address Setup

8.3 Configure Frequencies

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

1. Click the **Freqs** button for the TETRA Radio line.
The Frequency Parameters window appears.
2. Select **Enable** check boxes for each function tone.
3. Enter **labels** in the Frequency Names field to be associated with the IP-223's function tone allocation.
The console operator is able to select the various call types defined within the IP-223 Per Line Setup.

NOTE: For more information, see “IP-223 Per Line Setup Overview” on page 9.

4. Click **Close**.

NOTE: The C-Soft frequency list has a maximum of 100 entries, so all 100 IP-223 function tones/calls can be addressed.

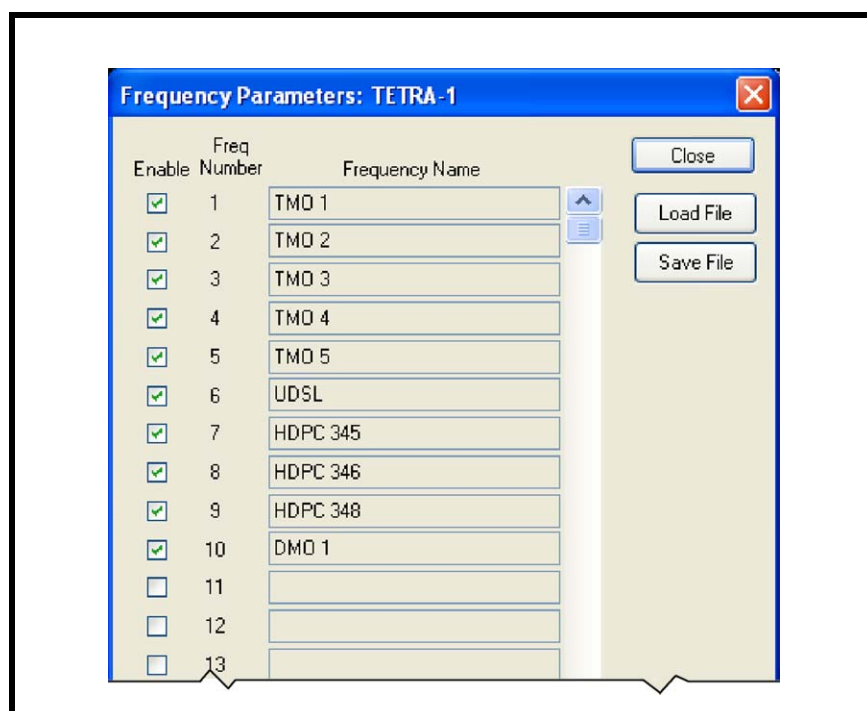


FIGURE 21. Frequency Parameters—C-Soft

8.4 General Signal Setup

1. From the Per Line Parameters Setup window, click **Signal Setup**.
The General Signal Setup page appears in the Signaling Parameters window.
2. From the System Type drop down menu, select **5-6Tone/DTMF ANI**.
The 5-6 Tone/DTMF ANI Setup tab appears.
3. Click the **5-6Tone/DTMF ANI Setup** tab.
The 5-6 tone/DTMF ANI Setup page appears.

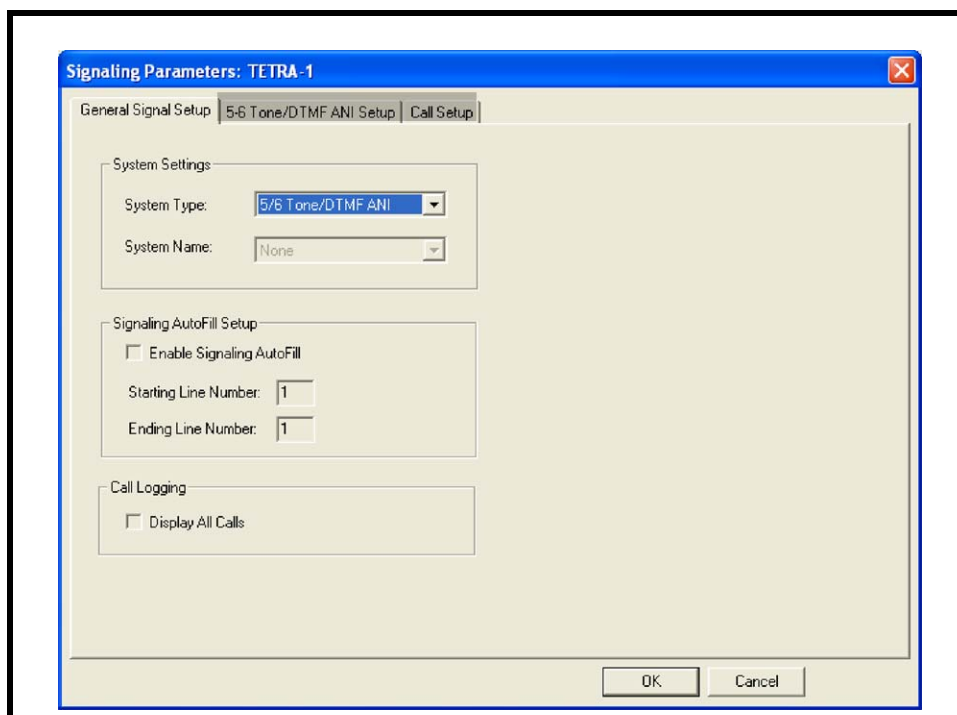


FIGURE 22. General Signal Setup—C-Soft

4. In the Unit ID field, enter the **8-digit unit ID** of the TETRA terminal connected to the associated IP-223.
5. From the Signaling Type drop down menu, select **DTMF**.
6. In the Digit Duration field, enter **100ms**.
7. In the Interdigit Duration field, enter **100ms**.
8. In the Pause Duration field, enter **200ms**.
9. In the Preamble Duration field, enter **100ms**.
10. In the Level field, enter **-3dB**.
11. In the Twist Level field, enter **0dB**.
12. In the Group Digit field, enter **A**.
13. From the Auto Ack drop down menu, select **Disabled**.
14. In the Initial Delay field, enter **0ms** (required).
15. In the End Delay field, enter **100ms**
16. Click **OK**.

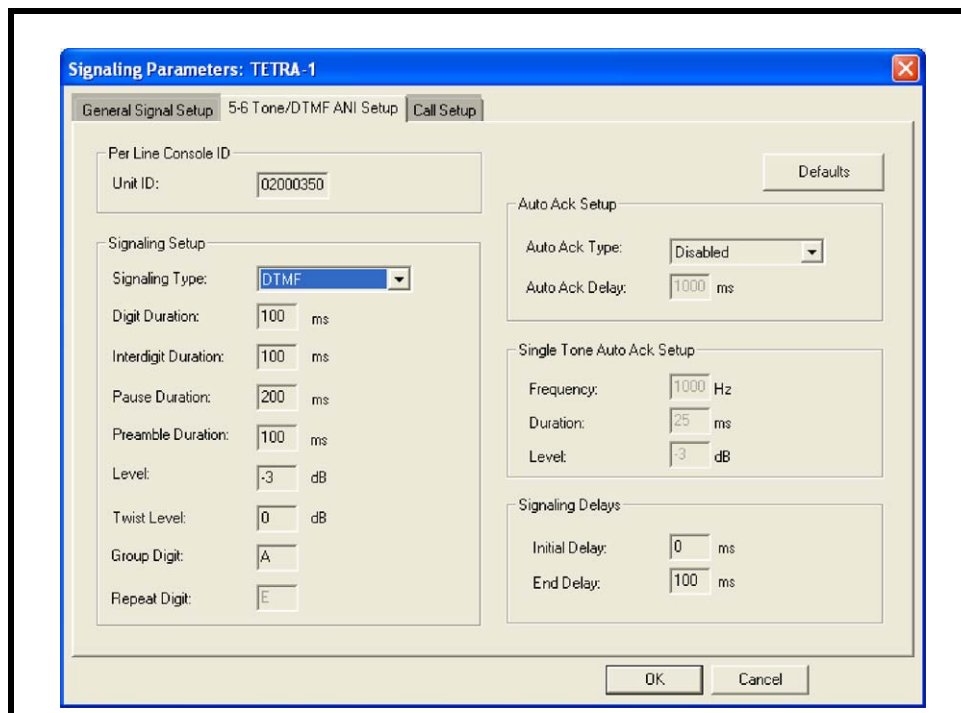


FIGURE 23. 5-6 Tone DTMF ANI Setup—C-Soft

8.5 HDPC Call Setup

The Call Setup page, see Figure 24, is used to define a call setup button creating an HDPC when associated to the TETRA Radio line. The button appears in the Call History, Manual Call List and Call List windows when the appropriate line is selected. When this button is activated, the *K* loads the contents of the User ID or Call List window and the *D* creates an HDPC.

To set a single call setup button that can create an HDPC, do the following:

1. From the Signaling Parameters notebook, click the **Call Setup** tab.
2. In the Call 1 field, enter **KD**.
3. In Call 1's Label field, enter **HDPC**.
4. Click **OK**.

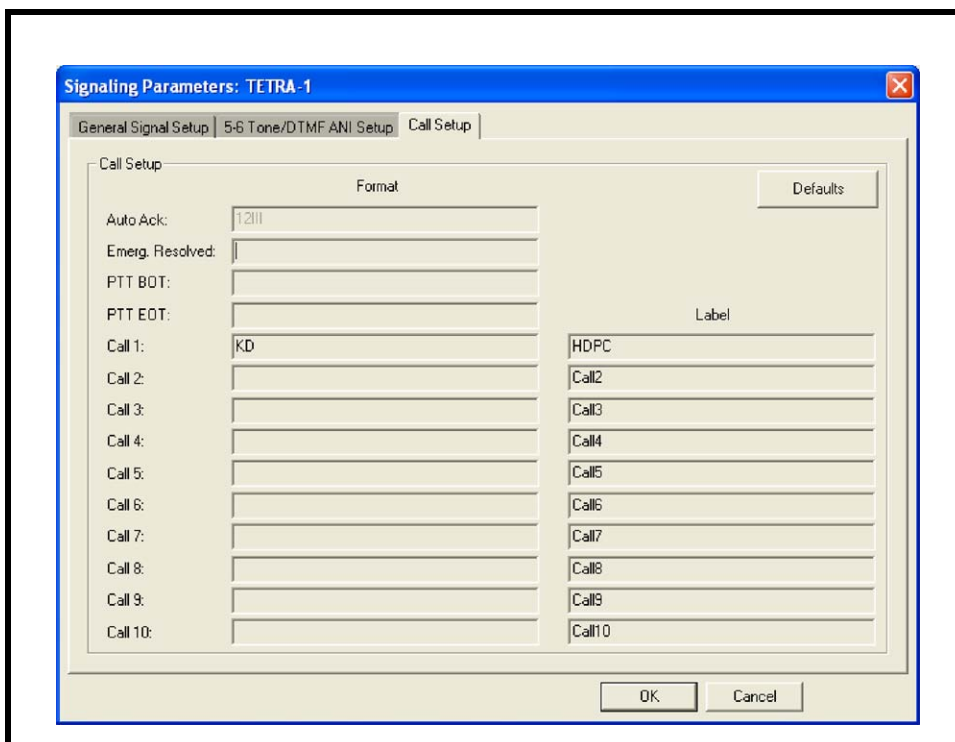


FIGURE 24. Call Setup—C-Soft

8.6 FDPC Call Setup

The Call Setup page is also used to define a call setup button that can create an FDPC when associated to the TETRA Radio line. This button appears in the Call History, Manual Call List and the Call List windows when the appropriate line is selected.

When this button is activated, the *K* loads the contents of the User ID or Call List window and the *B* creates an FDPC.

To set a single call setup button that can create an FDPC, do the following:

1. From the Signaling Parameters notebook, click the **5-6 Tone/DTMF ANI Setup** tab.
The 5-6 Tone/DTMF ANI Setup page appears.
2. In the Initial Delay field, enter **500ms**.
3. Click the **Call Setup** tab.
The Call Setup page appears.
4. In the Call 1 field, enter **KB**.
The call is distinguished as an FDPC.
5. In Call 1's Label field, enter **FDPC**.
6. Click **Close**.
7. From the Per Line Parameters window, click **Close**.
8. From the menu bar, select **File|Save** to save the configuration.
The Save window appears.
9. Click **Save**.
The configuration is saved to the file.

8.7 Global Parameters

8.7.1 Global Parameters Setup (Ring Signaling)

If utilizing FDPC, the telephone ring signal must be routed from the IP-223 to the C-Soft console. In the IP-223 multicast setup, a Multicast Addresses (238.8.11.8) is defined for the ring signal, see Figure 1.

To **configure the ring signaling**, do the following:

NOTE: See “IP-223 Multicast Address Setup” on page 8 for reference.

1. From the menu bar, select **Edit|Global Parameters** from the menu bar.
The Global Parameter Setup window appears.
2. In the Ring Multicast field, enter the same **Multicast Address** as configured on the IP-223.
3. In the Ring Port field, enter the same **Port number** as configured on the IP-223 (see Figure 2).
4. In the Ring Sound drop down menu, select a **ring (Ring 1–Ring 4) sound**.
5. Click **OK**.

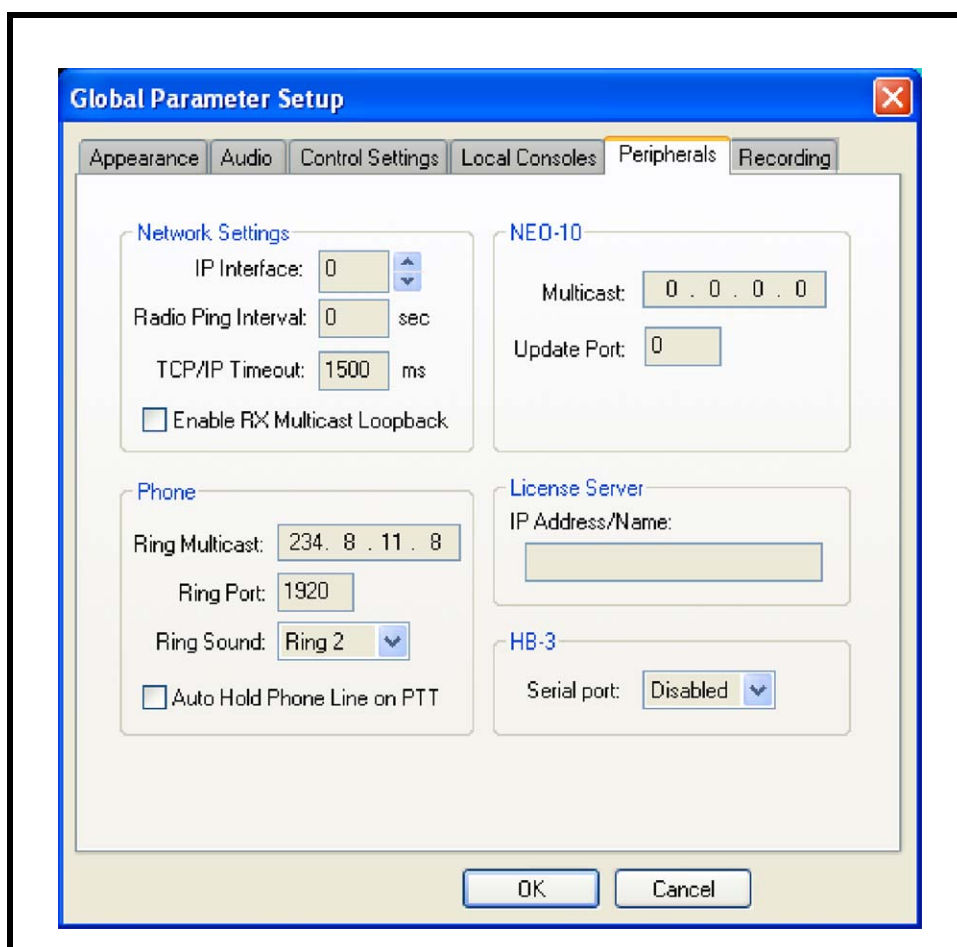


FIGURE 25. Peripheral—C-Soft Ring Signaling Setup

8.7.2 ID List

The C-Soft User ID List is used to translate IDs and aliases for ANI display and call history logging, in addition to forming the consoles call directory.

To **configure a TETRA User ID List for HDPC and FDPCs**, do the following:

1. From the menu bar, select **Edit|Edit User ID List** from the menu bar.
The User ID List window appears.
2. In the Name field, enter an **alias** for the User ID.
3. In the User ID, enter the **ID number**.
4. In the Type drop down menu, select **Generic**.
5. Click **Close**.

NOTE:

- This list can contain up to 5000 entries.
- Shortened dialing can be used here, if specified within the attached TETRA radio, see Figure 26.

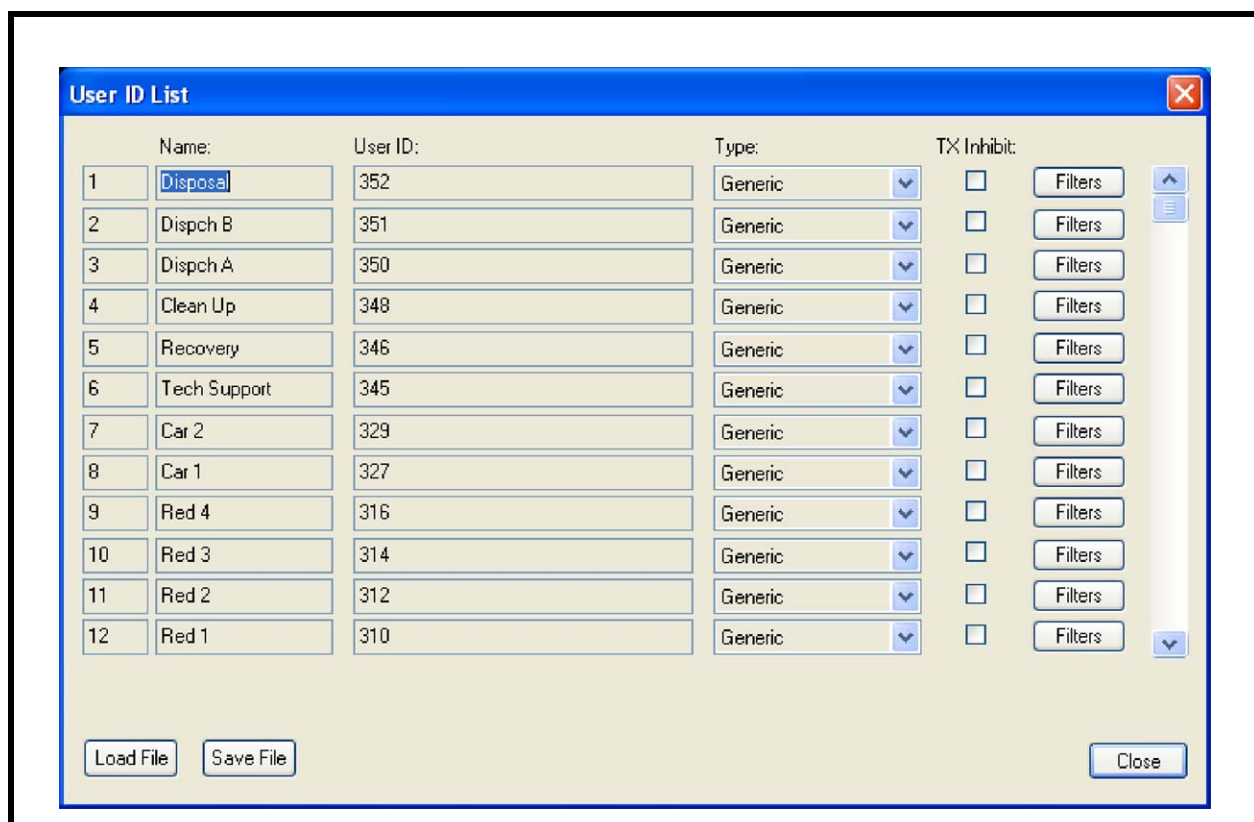


FIGURE 26. User ID List—C-Soft

8.8 Console Design Overview

The console operator requires relevant buttons associated with the TETRA Radio line, to use TETRA Radio functions.

The console example, shown in Figure 27, contains per line user interface elements: select, mute, call history, frequency change, individual PTT and volume control.

The console operator should use the Call List to make calls. If a user is not contained in the User ID List the console operator can use the Manual Call List.

A phone on/off hook button must be associated to the TETRA's phone line to make an FDPC.

NOTE: Active Emergency and Emergency History buttons, used to access the emergency windows have also been added so the console operator can manage emergency calls.

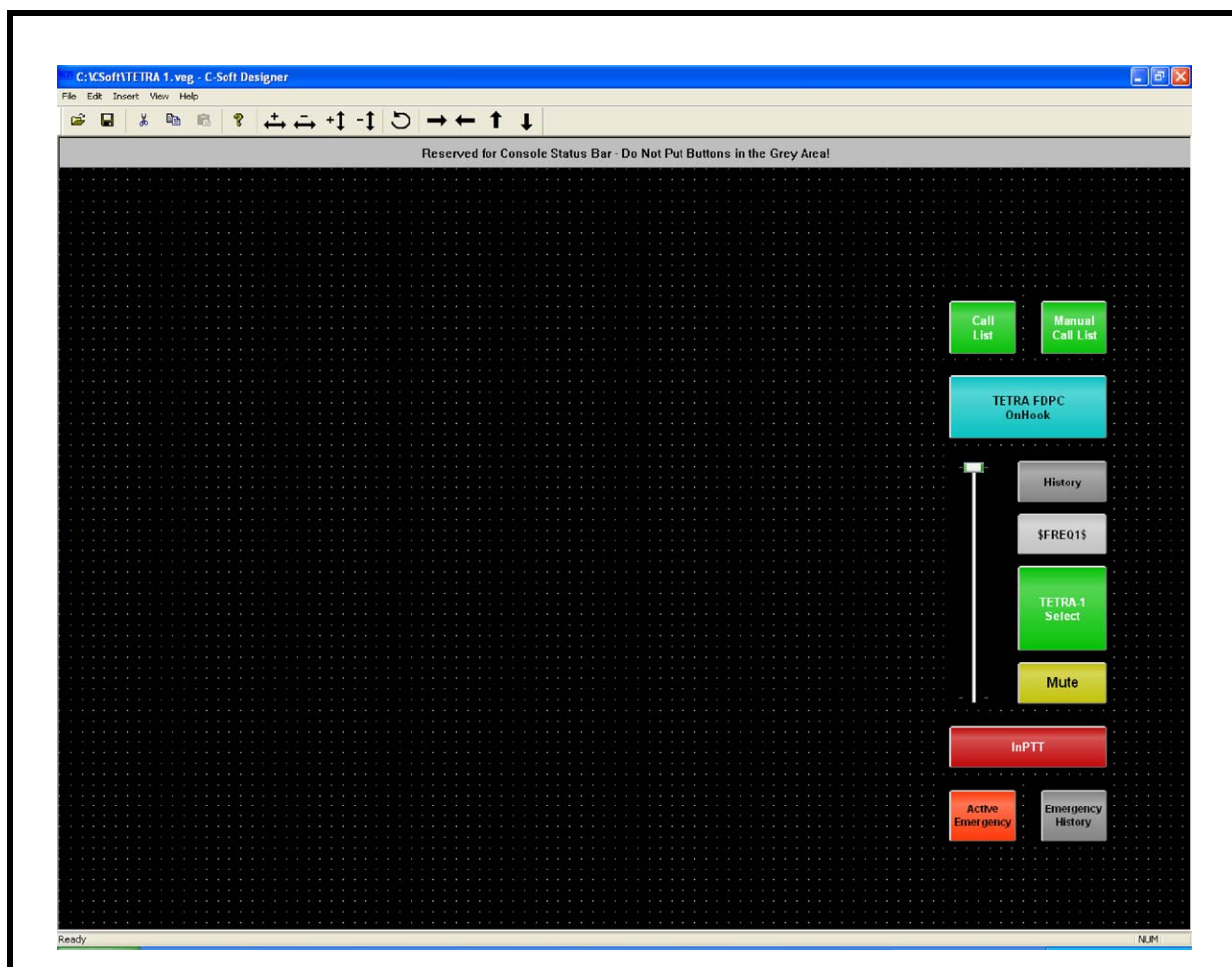


FIGURE 27. Console Design—C-Soft

8.9 Making Calls Overview

If scanning talk group, the console operator can select the appropriate UDSL, using the frequency change pop-up button.

The console operator can replay to group calls, as they are received, using the PTT. No other frequency/channel/group selection is needed. Incoming calls are accompanied by ANI display (alias or ID of calling terminal) within the select button.

If call history windows are employed then calls are logged with an indication of: date, time channel/frequency, calling ID, called ID, and a status message (if present).

8.9.1 Make an HDPC Group Call

To **make a group call or HDPC**, do the following:

1. From the C-Soft console, click the (**\$freq\$**) button, (where *\$freq\$* is the default C-Soft button name or the user-defined name for the button).
The frequency change pop-up window appears.
2. From the pop-up window, click the required **call type**
3. Select the TETRA Radio line's **Select** button.
The line is Selected.
4. Click **PTT** to initiate a call.
The call is in progress.

Figure 28 illustrates an example dispatch console. The Manual Call List and Call List are shown for completeness.

NOTE: These windows would generally be closed when not in use, and would not normally be present on the same screen simultaneously.

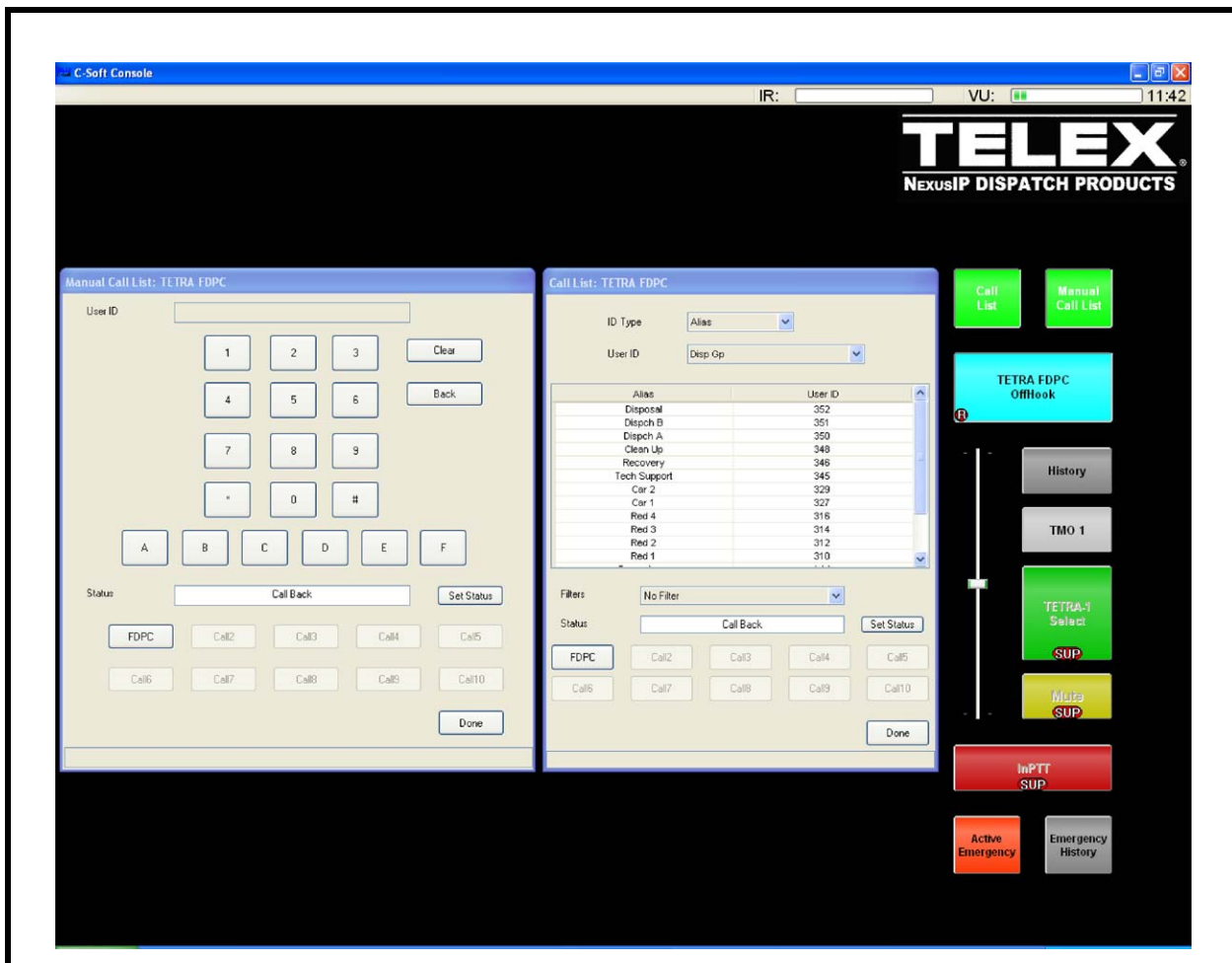


FIGURE 28. C-Soft Dispatch Console—Call List Operation

8.9.2 Manual Call List

The Manual Call List or the Call List can be used to make an HDPC.

To **make an HDPC from the Manual Call List or Call List**, do the following:

1. From the C-Soft console, click the **Manual Call List** button.
The Manual Call List window appears.
OR
From the C-Soft console, click the **Call List** button.
The Call List window appears.
2. Using the console's keyboard, enter a **number**.
3. Select the **TETRA Radio** line.
The HDPC button, created earlier, appears in the window.
4. Click the **HDPC** button.
5. Listen for DTMF tones going out; once tones are finished, click **PTT** to initiate the call.
An HDPC is created.

NOTE: The Status field can be ignored because a status cannot be sent on a TETRA line.

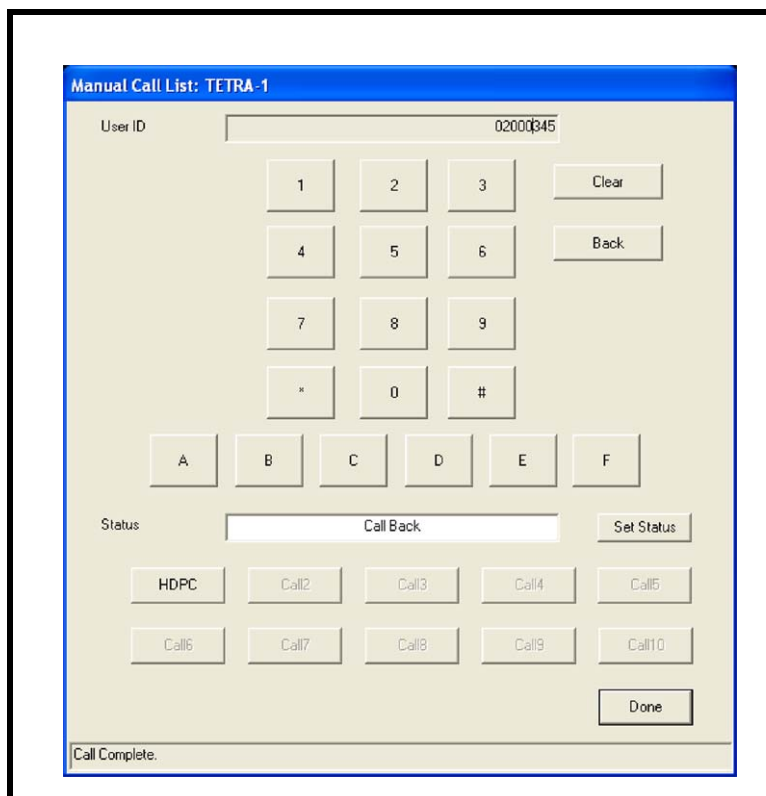


FIGURE 29. Manual Call List—C-Soft

8.9.3 Call List

The Call List can be used to make an FDPC call.

To **make an FDPC from the Call List**, do the following:

1. From C-Soft console, click the **Call List** button.
The Call List window appears.
2. Highlight the **alias** you want to call.
3. Take the **TETRA FDPC** button off-hook.

NOTE: The FDPC (phone) line takes precedence over the radio line, so even if the TETRA Radio line was selected, the FDPC function seizes control of the Call List, presents the FDPC button, and places the TETRA Radio line under supervision (disabled), see Figure 28.

4. Click the **FDPC** button to create the call.
5. Press a **PTT** button to initiate the call.

NOTE: On call completion, placing the TETRA FDPC button on hook clears down the call. The TETRA Radio line is also released for normal use.

9.0 Sepura SRP2000/3500 Interface

The SRM mobile radio interface can be replaced with an SRP2000/3500, to offer true interoperability for tactical mobile and disaster management operations. This can instantly yield dynamic access for console operators into any TETRA network, and multiple disparate networks, via SRPs assigned to those networks.

The SRP2000/3500 can be interfaced to the Telex Dispatch solution in two (2) ways: with a car kit ancillary connection, or a facilities cable connection.

The car kit interface offers all the functionality of the SRM and the console configurations remain unchanged.

The facilities connector provides access to basic radio functions (Tx/Rx audio and PTT). This yields no call/talk-group selection, HDPC or FDPC, it passes no ANI information, or status messaging.

Each option requires a different physical connection and IP-223 configuration. See “Car Kit, Ancillary Connection” on page 46 and “Facilities Connector” on page 48.

9.1 Car Kit, Ancillary Connection

9.1.1 Cable Connections

The car kit is supplied with a remote microphone, a PTT keypad, and a loudspeaker. It is via the connection to these devices that the IP-223 is interfaced.

Telex does not offer a pre-formed cable for this interface option. Make analogue connections in accordance with Table 3, and serial data connection in accordance with Table 4.

To **connect the IP-223**, do the following:

- > Turn off the **remote microphone**, the **PTT keypad**, and the **loudspeaker**, leaving sufficient cable to connect the IP-223 DB-25 to their respective plug connectors.

REFERENCE: For more information, see the Car Kit Installation and User Guide (SRP2000).

TABLE 3. Cable Connections Rear Panel

Car Kit Interface Unit, Rear Panel	IP-223 Radio DB-25
Loudspeaker Black	12
Loudspeaker White	24
Remoter Mic Tip	13
Remote Mic Sleeve	25
PTT Key Pad Tip	14
PTT Key Pad Ring	Not Connected
PTT Key Pad Sleeve	2

TABLE 4. Cable Connections Data Port

Car Kit Interface Unit, Data Port	IP-223 Serial DB-9
2 RxD	3 TxD
3 TxD	2 RxD
5 Gnd	5 Gnd
Chassis	Chassis via cable screen

9.1.2 SRP Configuration

For our interface purposes, the SRP is programmed in the same manner as the SRM. For more information see “Radio Terminal Configurations” on page 13.

9.1.3 IP-223 Configuration

The IP-223 jumper configuration is detailed in Table 5 and the IP-223 software configuration is detailed in “IP-223 Software Setup” on page 7.

9.1.3.1 IP-223 Jumper Settings

Use Table 5 to configure the IP-223 jumpers.

TABLE 5. IP-223 Jumper Settings

Line 1	Jumper Setting	Line 2
J33, J34	A = 4-Wire	J5, J6
J16, J21	A = Single Ended	J19, J20
J14	B = 8 Ohm Speaker	J24
J3, J9, J11	B = Tx Output Balanced	J25, J26, J29
J13	B = High	J27
J17, J22	B = 600 Ohms	J10, J15
J35	A = RS232 Serial Data	J26
R377	Solder bridge the pads together.	R381

9.1.4 Console Configuration

Set up consoles appropriately to the functions made available by the interfaced TETRA terminal, see “Hardware Console Configuration” on page 25, or “C-Soft Console Configuration” on page 32 for details.

9.2 Facilities Connector

The Sepura Facilities Cable (Sepura P/N. 300-00089) can be used to connect a remote speaker/mic or headset directly onto the SRP terminal. It can also be used to access Tx/Rx audio and PTT function from an IP-223.

This application guide assumes no digital I/O is made available via the facilities connector. This is a basic radio interface which offers no talk-group selection, ANI information, or status messaging.

NOTE: Facilities cables do not generally provide serial I/O connectivity.

REFERENCE: For more information, see the Sepura Hand-Held Accessories Interface Specification.

9.2.1 Cable Connections

To **connect cables**, do the following:

- > Connect in accordance with Table 6.

NOTE: Telex does not offer a pre-formed cable for this interface option.

TABLE 6. IP-223 to SRP Connector

SRP Facilities Connector			IP-223 Radio DB-25
12	Gray	LS rtn	12
13	Orange	LS+	24
14	White	Mic I/P	25
15	Red	Mic rtn	13
16	Brown	Ext PTT	14
17	Yellow	Acc-ID	7 via 22k Ohm resistor (see note 1.1)
22	Green	Gnd	7 and 2 optional see note 1.2
Chassis		E Gnd	Chassis via cable screen

9.2.2 SRP Configuration

For interface purposes, the SRP is programmed in the same manner as the SRM, see “Radio Terminal Configurations” on page 13.

9.2.3 IP-223 Configuration

The IP-223 jumper configuration is detailed in Table 6 and the IP-223 software configuration is detailed in “IP-223 Software Setup” on page 7.

NOTE: However, if the Facilities connector does not connect digital I/O, call types do not need to be specified in the Per Line Setup (Function Tone Setup), as call selection is not available at the console.

9.2.3.1 IP-223 Jumper settings

Use Table 7 to configure the IP-223 jumpers.

All other aspects and functions of this installation are as per the SRM2000/3500 Telex Dispatch solution.

TABLE 7. Jumper Settings

Line 1	Jumper Setting	Line 2
J33, J34	B = 4-Wire	J5, J6
J16, J21	A= Single Ended	J19, J20
J14	B = 8 Ohm Speaker	J24
J3, J9, J11	B = Tx Output Balanced	J25, J28, J29
J13	B = High	J27
J17, J22	B = 6 Ohms	J10, J15
J35	Null = No serial data connection	J26
R377	Solder bridge the pads together.	R381

NOTE:

- 33k Ohm resistor with tolerance of $\pm 2\%$ (or better), must be used.
- Shorting IP-223 DB-25 pins 7 and 2 provides the PTT earth, via the PTT relay return path. This negates the need to bridge pads R377 or R381 on the IP-223 main board.

9.2.4 Console Configuration

Set up consoles appropriate to the functions made available by the interfaced TETRA terminal, see “Hardware Console Configuration” on page 25, or “C-Soft Console Configuration” on page 32 for details.

10.0 Limitations of this Document

This application note is presented to advise an implementation strategy for Telex Dispatch solutions into TETRA networks. It does not supersede or replace the current Telex technical or user manuals, and should be used in conjunction with those manuals. Consult the relevant Sepura user and programming manuals for Sepura specific issues.

Seek advice from the local TETRA network manager, regarding the functions and services available to your Sepura terminal interface device.

Revision History		
Document Title: TETRA Dispatch Solutions via Sepura Terminal Interface		
Document Number: AN-DISPATCH-011		
Revision	Change Description	Date
A	Initial release	05-MAY-2006
B	Update to version 4.200. New document number. (AN-DISPATCH-11)	05-SEP-2008
C	Update brand, format and new document number (AN-DISPATCH-011).	30-OCT-2009
D	Revise section: 4.1.	01-DEC-2009

Suggestions or comments:

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