TELEX
RADIO DISPATCH PRODUCTS

Application Guide

# PowerTrunk TETRA Interface for IP-224

VOIProven

TELEX
Radio Dispatch

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### Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Do not open the unit. No user serviceable parts are contained within. Bosch cannot be responsible for damage. If the unit is opened, the warranty can be voided.

### OpenSSL Project

This product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). This product includes cryptographic software written by Eric Young (eay@cryptosoft.com). This product includes cryptographic software written by Tim Hudson (tjh@cryptsoft.com).

# Table of Contents

# 1.0 Introduction

The PowerTrunk TETRA radio interface is designed as an add-on option in the Telex Radio Dispatch system. This application guide describes the Telex Radio Dispatch PowerTrunk TETRA feature set and how to configure the interface for the IP-224 and C-Soft.

# 2.0 Hardware Requirements

- IP-224 Ethernet Adapter Panel (P.N. F.01U.306.547)
- IP-224 to PowerTrunk TETRA Interface Cable (P/N F.01U.306.540)
- PowerTrunk DT-410 TETRA Radio

# 3.0 Software Requirements

- C-Soft version 6.500 or later
- IP-224 version 2.300 or later
- IP-224 Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key
- Telex System Manager (TSM) 2.300 or later
- Windows 7 (32-bit or 64-bit)
- Windows 8.1

# 4.0 Supported Features

| PowerTrunk TETRA Supported Features | | | | | |
|---|---|---|---|---|---|
| **Feature** | **DMO Support** | **TMO Support** | **Feature** | **DMO Support** | **TMO Support** |
| Channel/Talkgroup Change | Yes | Yes | ANI Decode | No | Yes |
| Zone Change | No | No | Emergency Decode | No | Yes |
| | | | Status Message Decode | No | Yes |
| Group Call | Yes | Yes | Text Message Decode | No | No |
| Private Call | No | Yes | User Defined Scan List | No | Yes |

# 5.0 Cable Diagram

The IP-224 to PowerTrunk TETRA Interface Cable allows the IP-224 to serially control a PowerTrunk DT-410 TETRA radio.

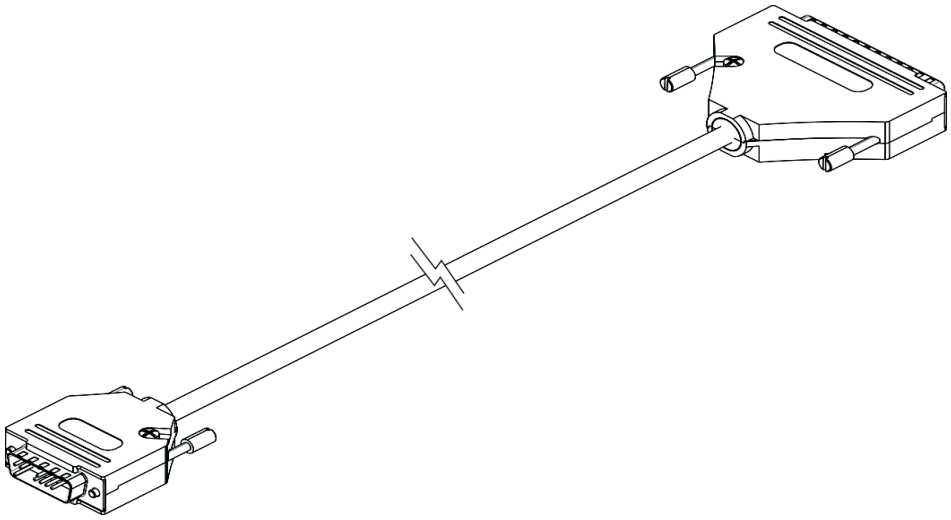


FIGURE 1. PowerTrunk TETRA Serial Interface Cable

| Cable diagram for PowerTrunk TETRA Radio and IP-224 Interface | | | |
|---|---|---|---|
| **Function** | **PowerTrunk** | **IP-224** | **Function** |
| RXD_PEI | PIN 1 | PIN 17 | RS-232/TTL TXD |
| TXD_PEI | PIN 2 | PIN 36 | RS-232/TTL RXD |
| GND_PEI | PIN 5 | PIN 29 | GROUND |
| GND_PEI | PIN 5 | PIN 5 | PTT RELAY COM CONTACT |
| IN_LINE_1 | PIN 14 | PIN 1 | TX+ AUDIO |
| IN_LINE_1 | PIN 15 | PIN 2 | TX- AUDIO |
| OUT_LINE_1 | PIN 16 | PIN 20 | RX+ AUDIO |
| OUT_LINE_2 | PIN 17 | PIN 21 | RX- AUDIO |
| IN4-2 | PIN 19 | PIN 24 | PTT RELAY N.O CONTACT |

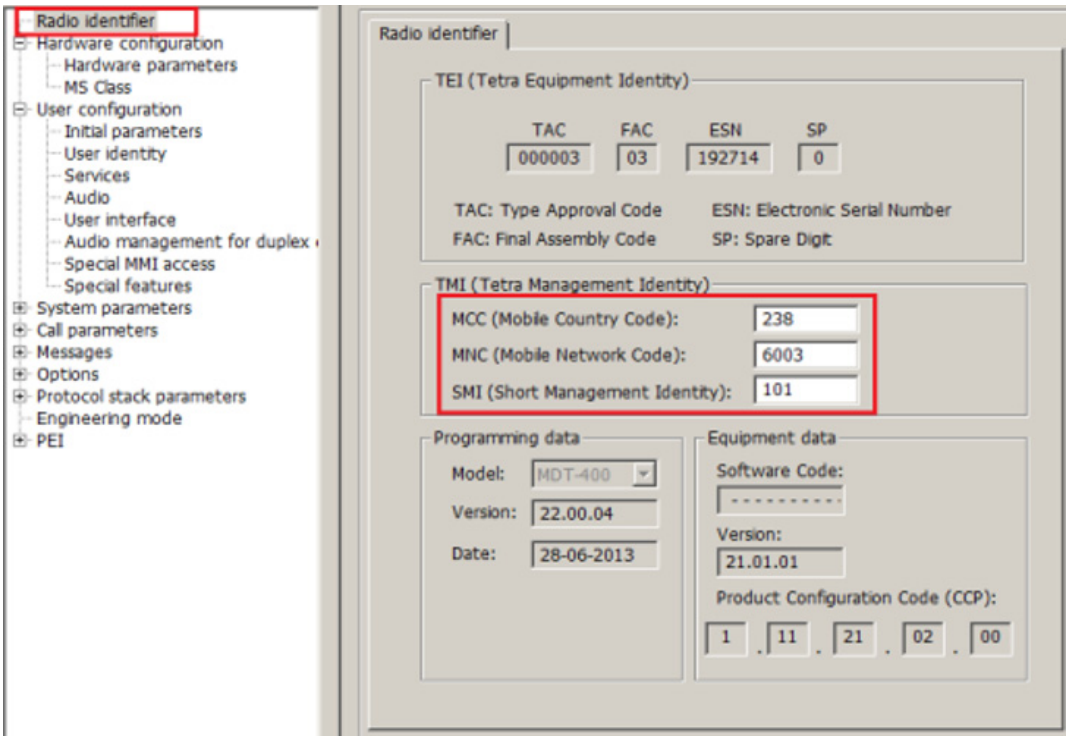
# 6.0 Radio Programming Application Setup

The PowerTrunk TETRA Programming Software is used to configure the PowerTrunk TETRA radio to interface properly with the IP-224.

## 6.1 Radio System Parameters Setup

To **configure the Radio System Parameters**, do the following:

1. From the left navigation, select **Radio identifier**.
   *The Radio identifier window appears.*




**Under TMI (TETRA Management Identity)**

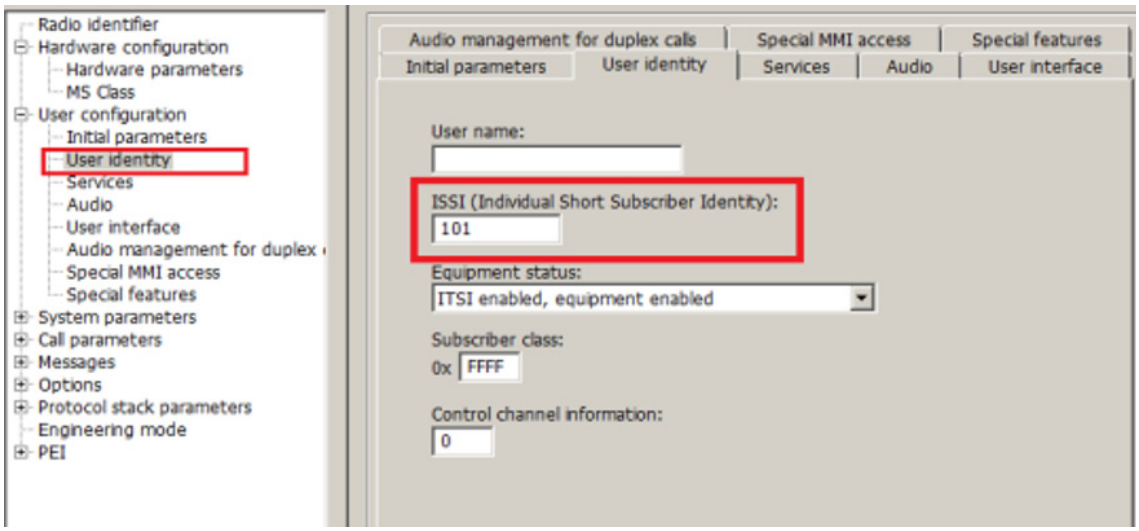
2. In **MCC** (Mobile Country Code) field, enter the **MCC number**.
   *The MCC is a 3-digit number determined by country and region.*
3. In **MNC** (Mobile Network Code) field, enter the **MNC number**.
   *The MNC is 2- to 4-digit number determined by network carrier.*
4. In **SMI** (Short Management Identity) field, enter the **SMI number**.

**NOTE:** The MCC, MNC, and SMI numbers must match the TETRA network for the mobile radio to connect to the system and operate in trunked mode.

## 6.2 ANI Setup

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

1. From the left navigation, select **User configuration**.
2. From the User configuration options, select **User identity**.
   *The User identity window appears.*




**Under User identity**

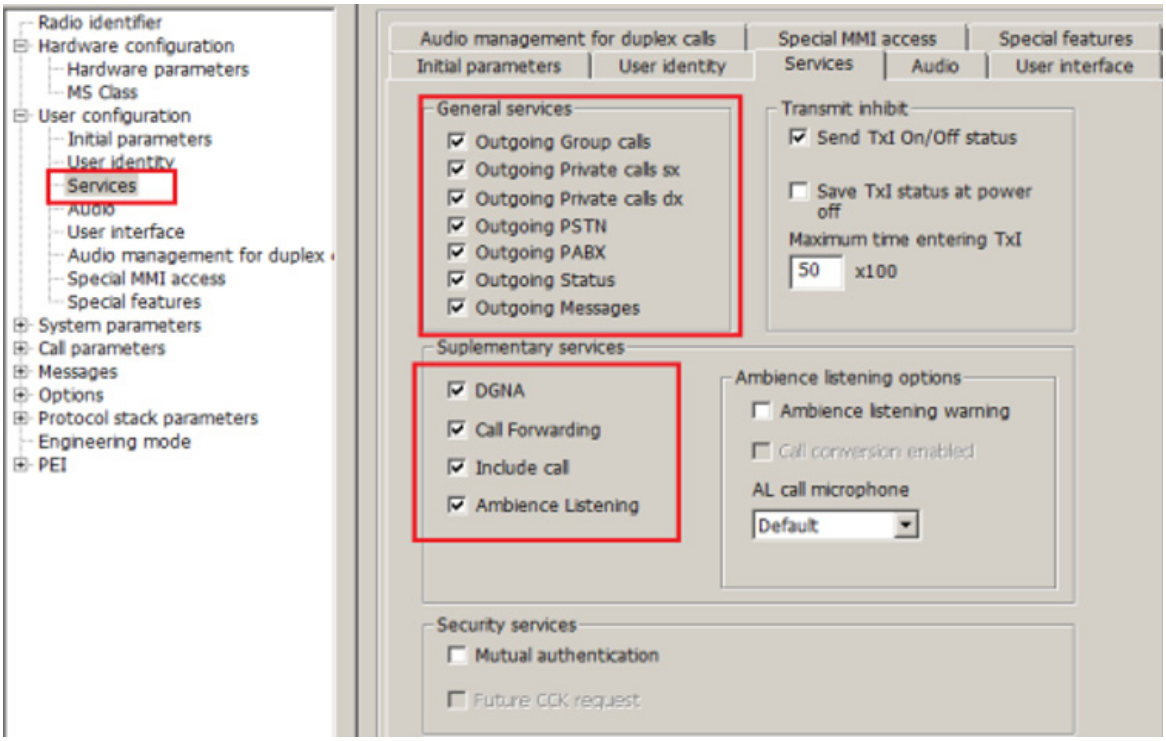
3. In the **ISSI** (Individual Short Subscriber Identity) field, enter the **ISSI number**.

**NOTE:** The ISSI number is a unique ID of the PowerTrunk terminal within a TETRA network. This ID should match the SMI number.

## 6.3 Radio Services Setup

To **configure the Radio Services**, do the following:

1. From the left navigation, select **User configuration**.
2. From the User configuration options, select **Services**.
   *The Services window appears.*




**Under General services**

3. Select **ALL the General services check boxes**.

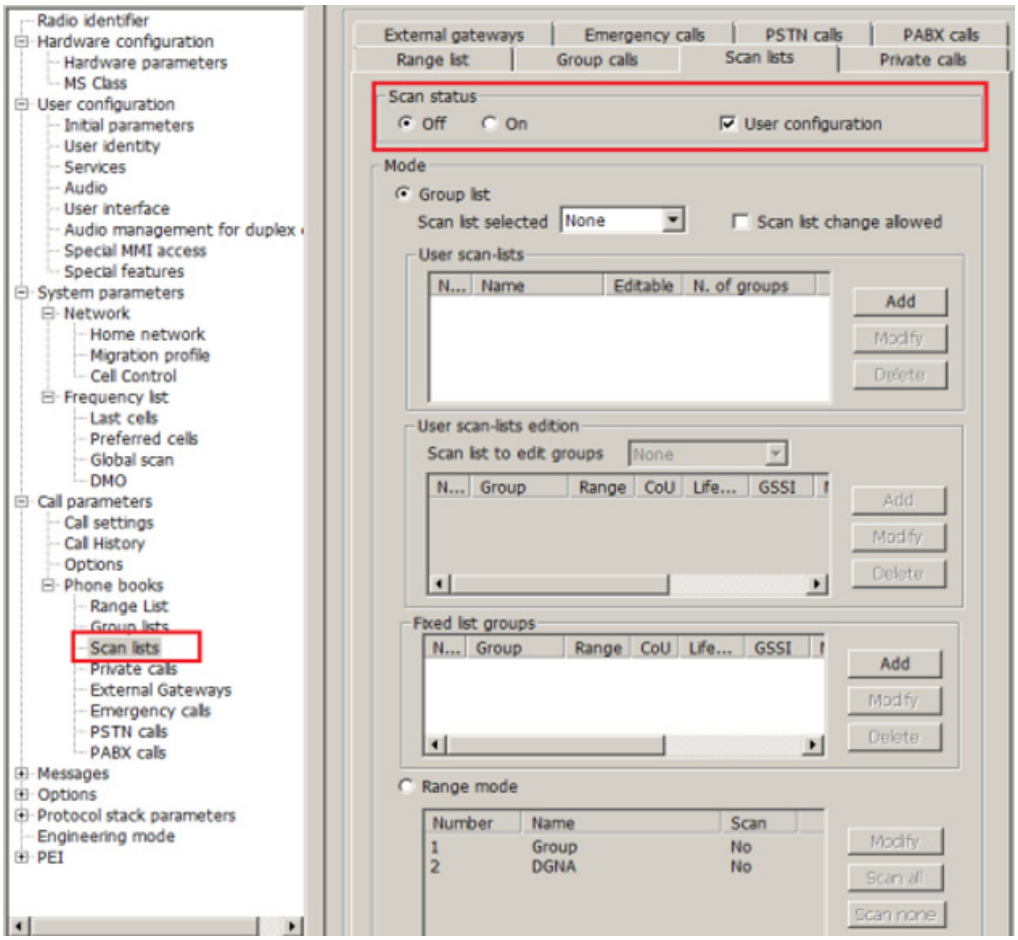
**Under Supplementary services**

4. Select **ALL the Supplementary services check boxes**.

## 6.4 Scan Setup

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

1. From the left navigation, select **Call parameters**.
   *The Call parameters options appear.*
2. From the Call parameters options, select **Phone books**.
   *The Phone books options appear.*
3. From the Phone books options, select **Scan lists**.
   *The Scan lists window appears.*



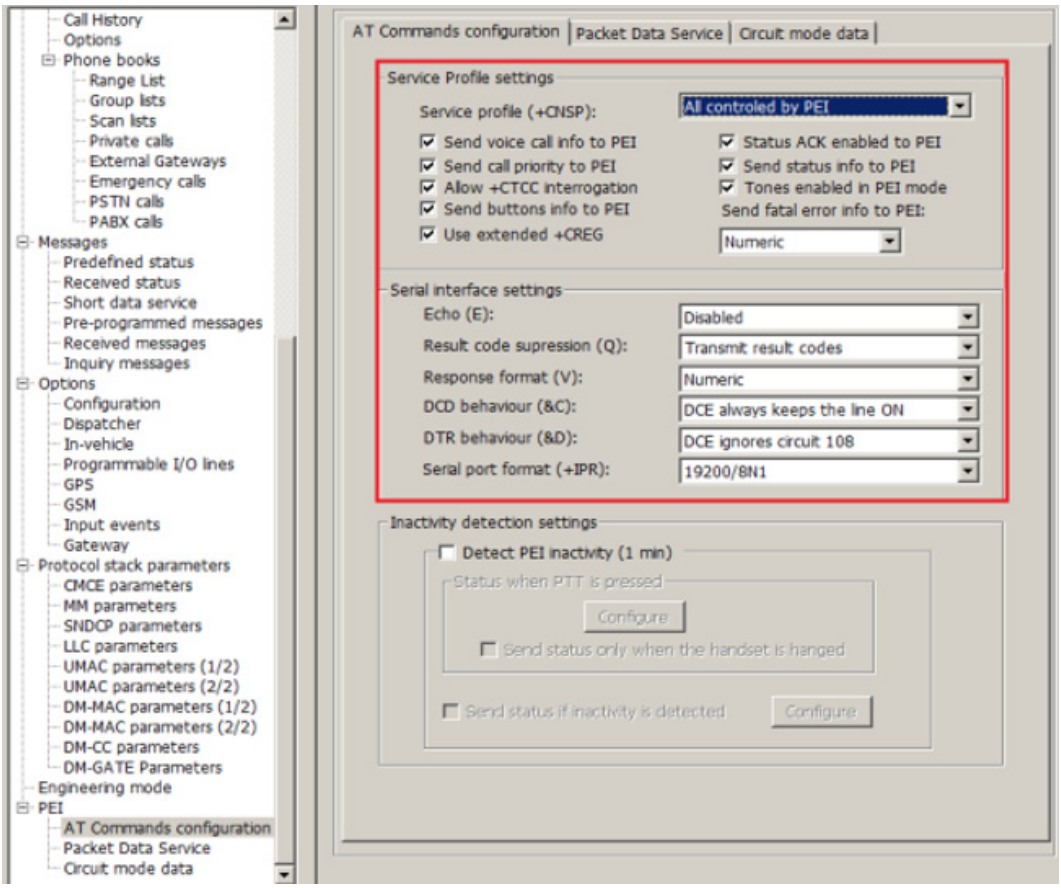

**Under Scan status**

4. Select the **Off radio button**.
5. Select the **User configuration check box**.

## 6.5 Serial Communications Setup

To **configure the Serial Communications**, do the following:

1. From the left navigation, select **PEI**.
   *The PEI options appear.*
2. From the PEI options, select **AT Commands configuration**.
   *The AT Commands configuration window appears.*




### Under Service Profile settings

3. From the Service profile (+CNSP) drop down menu, select **All controlled by PEI**.
4. Select **ALL the Service Profile settings check boxes**.
5. From the Send fatal error info to PEI drop down menu, select **Numeric**.

### Under Serial interface settings

6. From the Echo (E) drop down menu, select **Disabled**.
7. From the Result code suppression (Q) drop down menu, select **Transmit result codes**.
8. From the Respond format (V) drop down menu, select **Numeric**.
9. From the DCD behaviour (&C) drop down menu, select **DCE always keeps the line ON**.
10. From the DTR behaviour (&D) drop down menu, select **DCE ignores circuit 108**.
11. From the Serial port format (+IPR) drop down menu, select **19200/8N1**.

# 7.0 IP-224 Access Key Installation

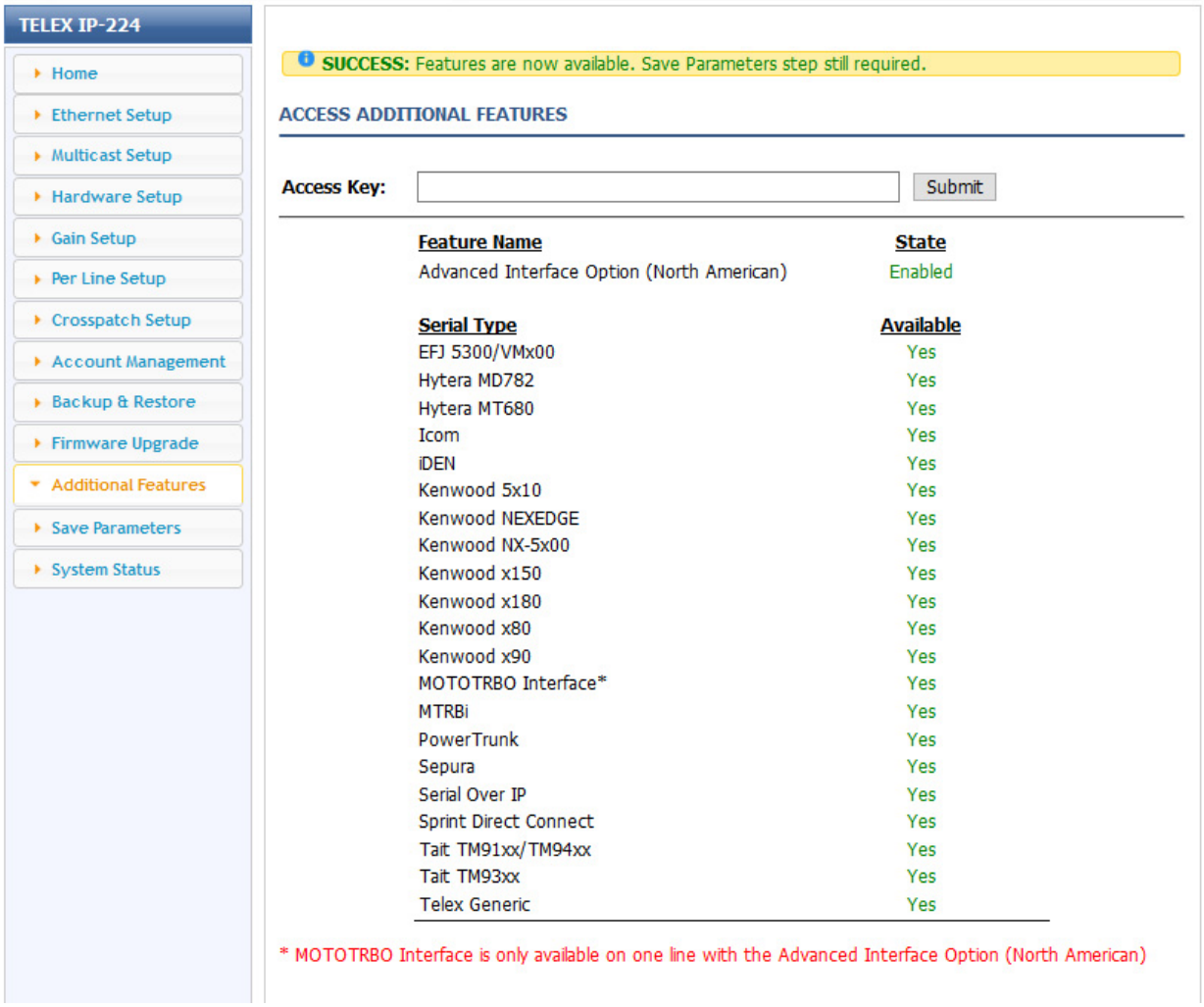
The PowerTrunk TETRA radio interface requires an additional Advanced Interface Option (Export) or Advanced Interface Option (North American) on the IP-224.

**NOTE:**

- The Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key must be purchased before you can activate the PowerTrunk Serial Type. The Advanced Interface Option (Export) or Advanced Interface Option (North American) requires an access key to be generated specifically for each IP-224.
- If the Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key was purchased as a factory installation [(F.01U.347.906) IP-224 Radio Gateway Advanced Options Export or (F.01U.347.907) IP-224 Radio Gateway Advanced Options NA (factory installed)], the access key was activated by the factory prior to shipping.
- Activating the Advanced Interface Option (Export) or Advanced Interface Option (North American) via the IP-224 web interface is only required if this is a field installation [(F.01U.343.868) IP-224 Field Code Advanced Options Export or (F.01U.343.869) IP-224 Field Code Advanced Options NA (customer purchased option)].

To **activate the Advanced Interface Option (Export) or Advanced Interface Option (North American) Access Key**, do the following:

1. Open the **IP-224 webpage**.
2. From the left navigation, select **Additional Features**.
   *The Additional Features page appears.*
3. In the Access Key field, enter the **32-character access key**.
4. Click the **Submit button**.
   *The changes are sent to the IP-224 in temporary storage.*

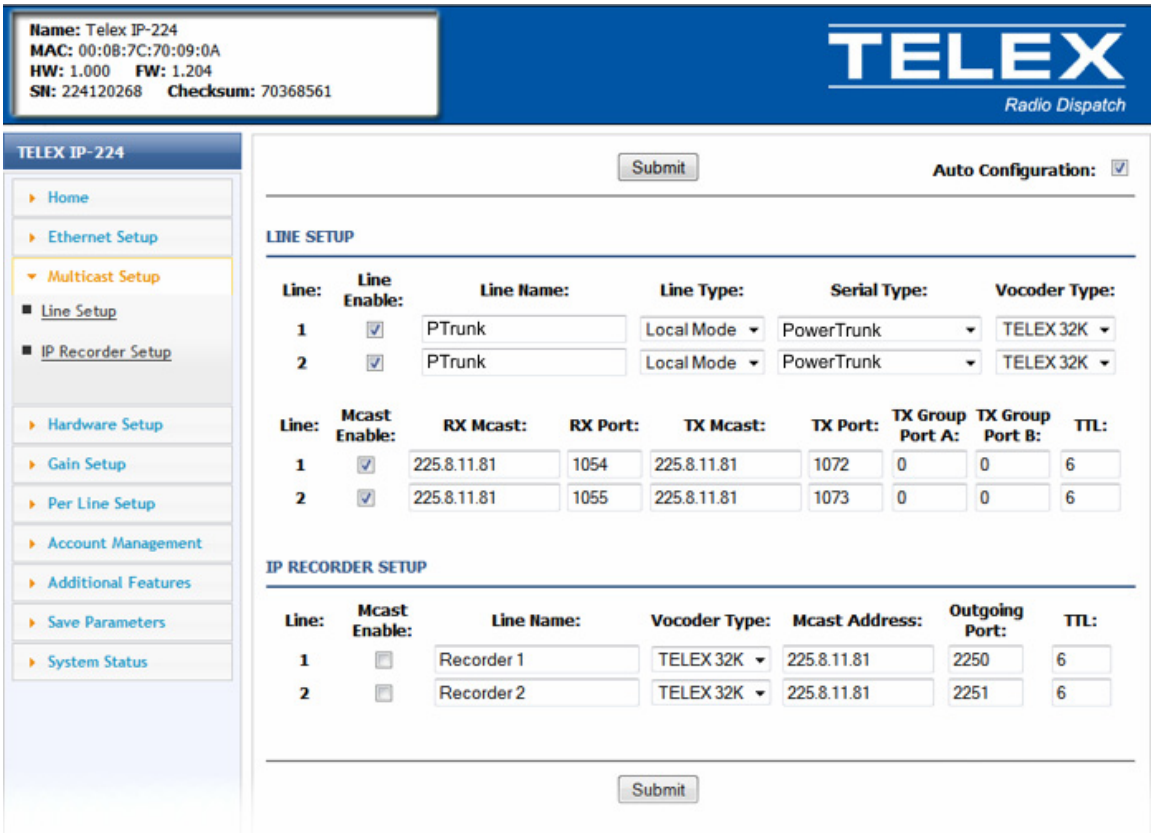



5. From the left navigation, select **Save Parameters**.
   *The Save Parameters page appears.*
6. Click the **Save Parameters button**.
   *Changes are now permanently saved to the IP-224 console.*

# 8.0 IP-224 Setup

To **configure the IP-224**, do the following:

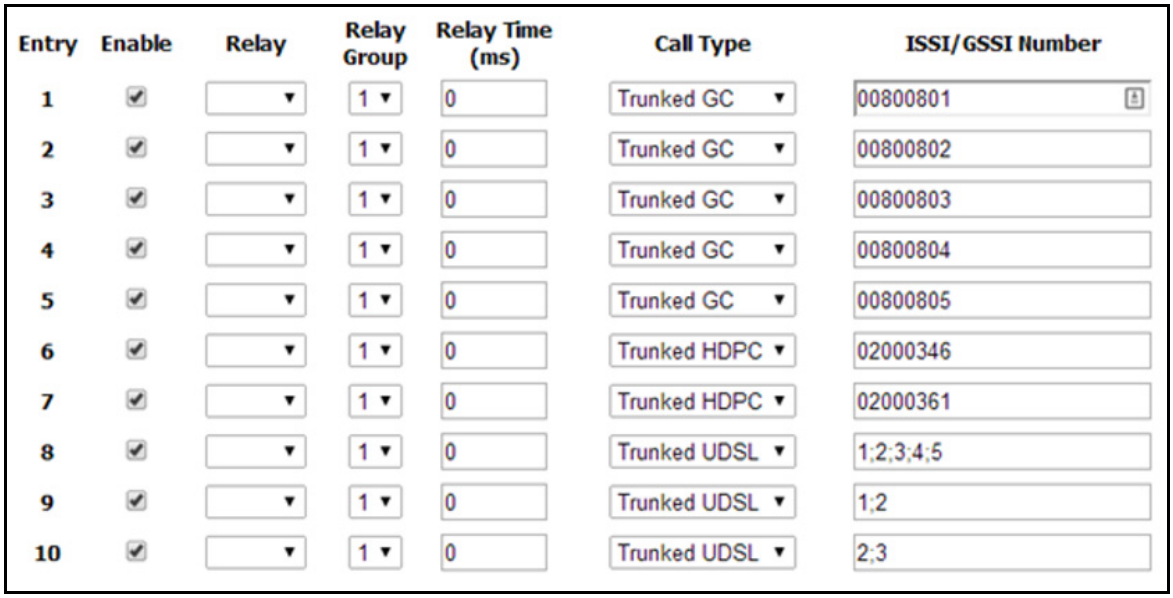
1. Open the **IP-224 web application**.
   *The IP-224 Window appears.*
2. From the left navigation, select **Multicast Setup**.
   *The Multicast Setup window appears.*




3. Select the **Auto Configuration check box**.

### Under LINE SETUP

4. From the Serial Type drop down menu, select **PowerTrunk**.
5. In the RX Mcast field, enter **Receive Multicast IP Address**.
6. In the RX Port field, enter the **Receive Multicast Port number**.
7. In the TX Mcast field, enter the **Transmit Multicast IP Address**.
8. In the TX Port field, enter the **Transmit Multicast Port number**.
9. Click the **Submit button**.
   *The changes are sent to the IP-224 in temporary storage.*
10. From the left navigation, select **Per Line Setup**.
    *The Per Line Setup page appears*



| Entry | Enable | Relay | Relay Group | Relay Time (ms) | Call Type | ISSI/GSSI Number |
|---|---|---|---|---|---|---|
| 1 | ☑ | | 1 | 0 | Trunked GC | 00800801 |
| 2 | ☑ | | 1 | 0 | Trunked GC | 00800802 |
| 3 | ☑ | | 1 | 0 | Trunked GC | 00800803 |
| 4 | ☑ | | 1 | 0 | Trunked GC | 00800804 |
| 5 | ☑ | | 1 | 0 | Trunked GC | 00800805 |
| 6 | ☑ | | 1 | 0 | Trunked HDPC | 02000346 |
| 7 | ☑ | | 1 | 0 | Trunked HDPC | 02000361 |
| 8 | ☑ | | 1 | 0 | Trunked UDSL | 1;2;3;4;5 |
| 9 | ☑ | | 1 | 0 | Trunked UDSL | 1;2 |
| 10 | ☑ | | 1 | 0 | Trunked UDSL | 2;3 |

## Under FUNCTION TONE SETUP

11. From the Call Type drop down menu, select desired **Call Type**.
12. In the ISSI/GSSI Number field, enter the **ISSI/GSSI Number**.
13. Click the **Submit button**.
    *The changes are sent to the IP-224 in temporary storage.*
14. From the left navigation, select **Save Parameters**.
    *The Save Parameters page appears.*
15. Click the **Save Parameters button**.
    *Changes are now permanently saved to the IP-224 console.*

**NOTE:** The ISSI/GSSI Number is an 8-digit number. This field only accepts numbers and is cleared if the user enters alpha characters and then clicks Submit.

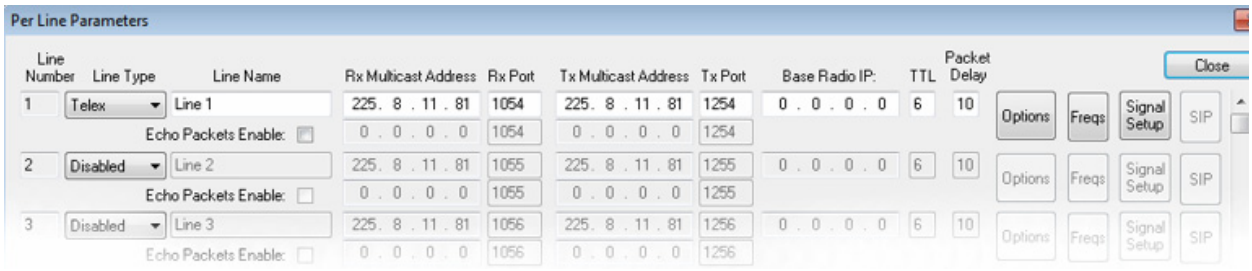
# 9.0 C-Soft Designer Setup

## 9.1 Configure Per Line Parameters

The **Per Line Parameters** window is used to configure C-Soft to IP-224 communications.

To **configure Per Line Parameters**, do the following:

1. Open **C-Soft Designer**.
2. From the Edit drop down menu, select **Setup Per Line Parameters**.
   *The Per Line Parameters window appears.*




3. In the Rx Multicast Address field, enter the **Receive Multicast IP Address** of the connected IP-224.
4. In the Rx Port field, enter the **Receive Multicast Port number** of the connected IP-224.
5. In the Tx Multicast Address field, enter the **Transmit Multicast IP Address** of the connected IP-224.
6. In the Tx Port field, enter the **Transmit Multicast Port number** of the connected IP-224.
7. In the Base Radio IP field, enter the **IP address** of the connected IP-224.
8. Click the **Close button**.

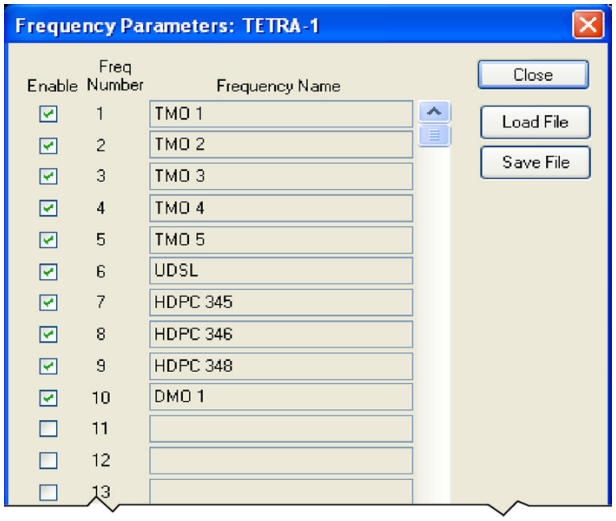
**NOTE:** The Multicast settings of the IP-224 and C-Soft must match for the interface to function properly. Verify that the RX and TX Multicast Addresses match, as well as the RX and TX Ports.

## 9.2 Configure Frequencies

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

1. From the Per Line Parameters window, select the **Freqs button** for the TETRA Radio line. 

*The Frequency Parameters window appears.*




2. Select the **Enable check box** for each frequency.
3. In the Frequency Name field for each frequency, enter a **name** to be associated with the IP-224's function tone allocation.

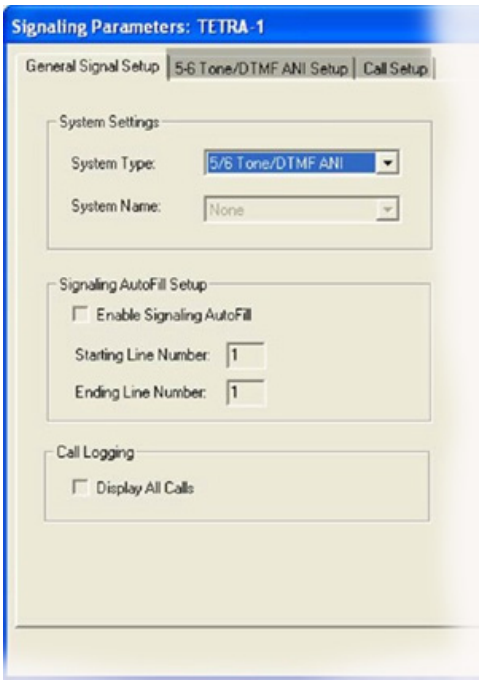
**NOTE:** The console operator is able to select the various call types defined within the IP-224 Per Line Setup.

4. Click the **Close button**.

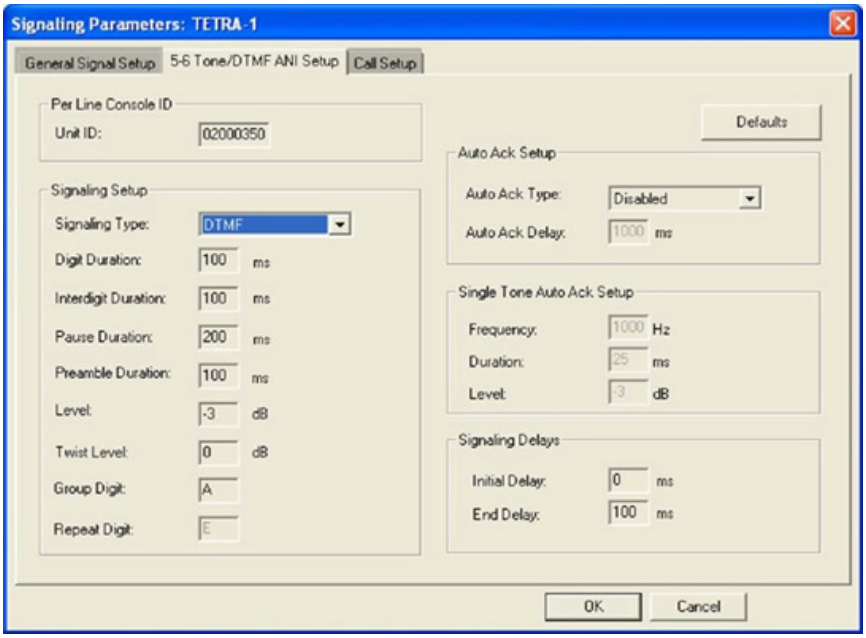
**NOTE:** The C-Soft frequency list has a maximum of 1000 entries, so all 1000 IP-224 function tones/calls can be addressed.

## 9.3 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 **5/6 Tone/DTMF ANI**.



3. From the Signaling Parameters window, click the **5-6 Tone/DTMF ANI Setup tab**.
   *The 5-6 Tone/DTMF ANI Setup tab appears.*




4. In the Unit ID field, enter the **8-digit unit ID** of the TETRA terminal connected to the associated IP-224.
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 Type drop down menu, select **Disabled**.
14. In the Initial Delay field, enter **0ms** (required).
15. In the End Delay field, enter **100ms**.
16. Click the **OK button**.

## 9.4 Call Setup

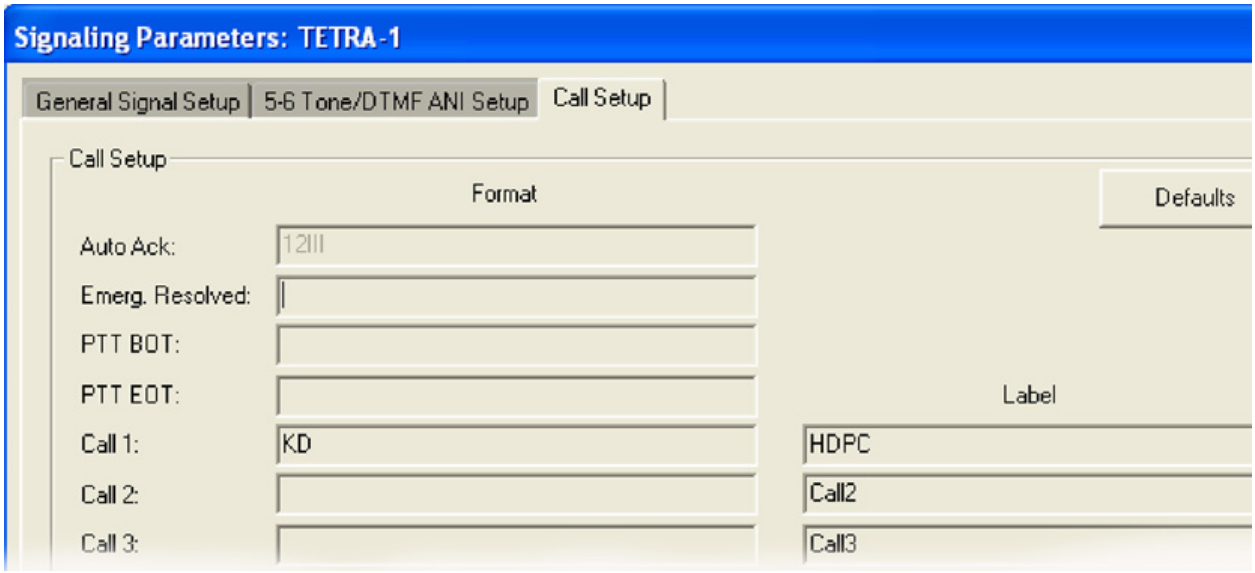
The **Call Setup** page is used to define a call button to make a Half-Duplex Private Call (HDPC) on the TETRA radio line. The button appears in the Call History, Manual Call List, and Call List windows when the appropriate line is selected.

To **setup a call button for HDPC**, do the following:

1. From the Signaling Parameters window, click the **Call Setup tab**.
   *The Call Setup window appears.*
2. In the Call 1 Format field, enter **KD**.

**NOTE:** When this button is activated, the *K* loads the contents of the currently selected User ID and the *D* creates the HDPC.

3. In the Call 1 Label field, enter **HDPC**.
4. Click the **OK button.**

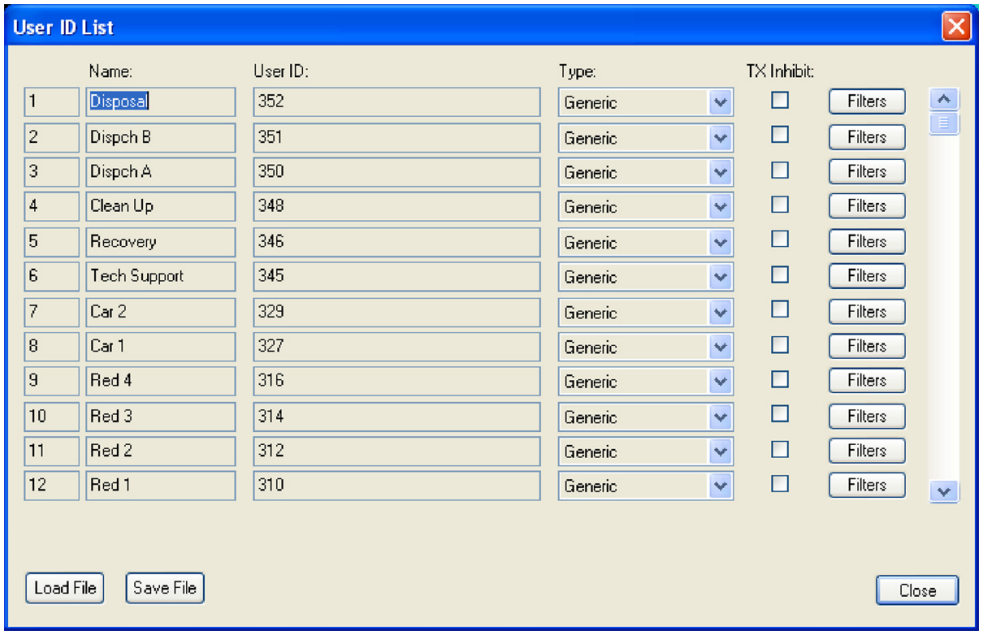


## 9.5 User ID List

The **User ID List** is used to translate IDs and aliases for ANI display and call history logging, in addition to forming the console's call directory.

To **configure a TETRA User ID List**, do the following:

1. From the Edit drop down menu, select **Edit User ID List**.
   *The User ID List window appears*.




2. In the Name field, enter a **Name** for the User ID.
3. In the User ID, enter the **ID number**.
4. In the Type drop down menu, select **Generic**.
5. Click the **Close button**.

**NOTE:**

- The User ID List can contain up to *6000 entries*.

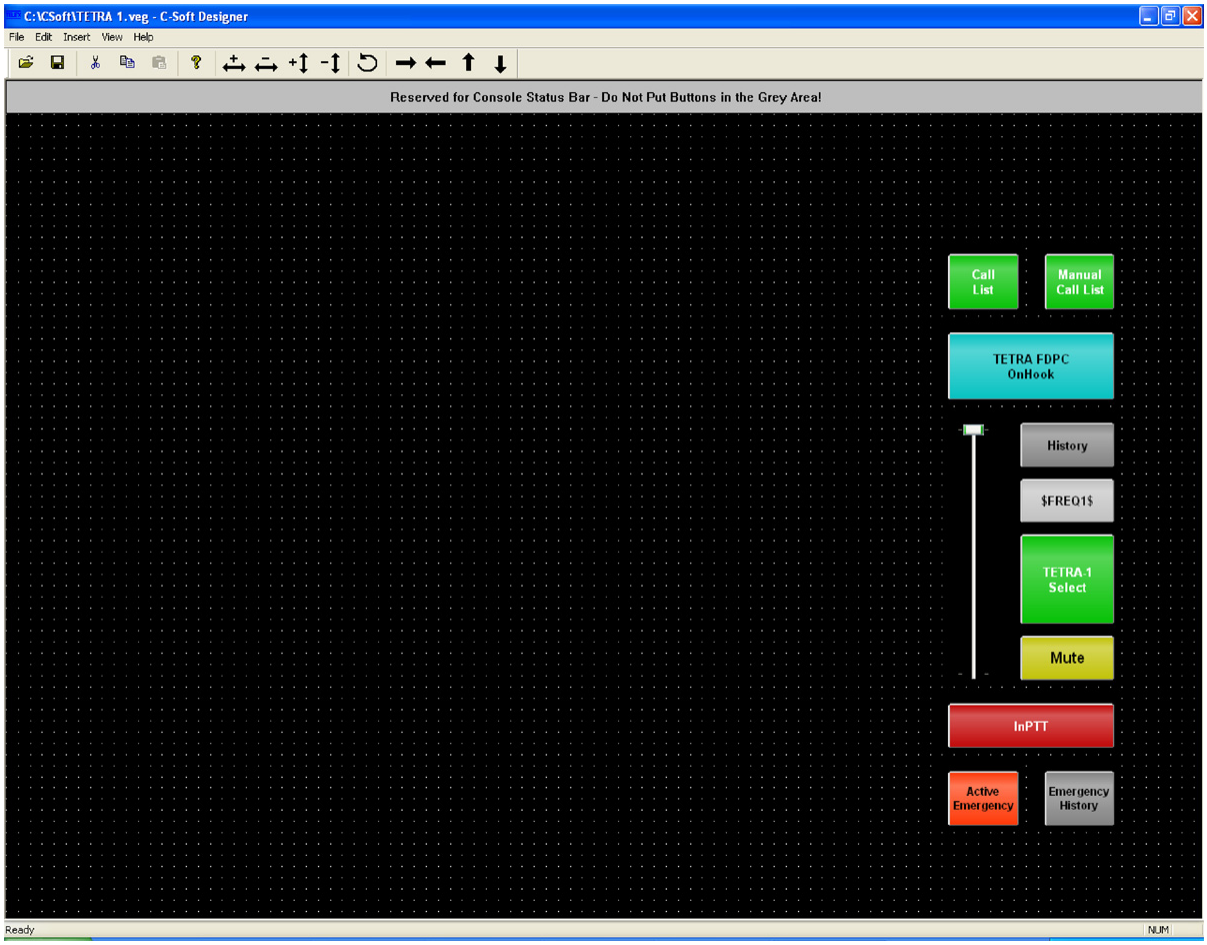
## 9.6 Console Design Overview

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

The console example contains per line user interface elements, such as 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.

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



**Notes:**

**Suggestions or comments**:
Contact technical support with suggestions or comments concerning this application guide.

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