PC850

Version 3.2x

Operating Instructions

HM ELECTRONICS, INC.
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Table of Contents

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CAUTION: Changes or modifications made by the user could void the user's authority to operate PRO850 equipment.

MANDATORY SAFETY INSTRUCTIONS
TO INSTALLERS AND USERS

Use only manufacturer or dealer supplied antennas.

Base Station Antenna minimum safe distance: 9.54 inches (24.24 cm) at 100% duty cycle.

Base Station Antenna gain: zero dBi referenced to a monopole.

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy, which is below the OSHA (Occupational Safety and Health Act) limits.

Antenna mounting: The antenna supplied by the manufacturer or radio dealer must not be mounted at a location such that during radio transmission, any person or persons can come closer than the above indicated minimum safe distance to the antenna, i.e. 9.54 inches (24.24 cm) at 100% duty cycle.

To comply with current FCC RF exposure limits, the antenna must be installed at or exceeding the minimum safe distance shown above, and in accordance with the requirements of the antenna manufacturer or supplier.

Antenna substitution: Do not substitute any antenna for the one supplied or recommended by the manufacturer or radio dealer. You may be exposing person or persons to excess radio frequency radiation. You may contact your radio dealer or the manufacturer for further instructions.

WARNING: Maintain a separation distance from the base station transmit antenna to a person(s) of at least 9.54 inches (24.24 cm) at 100% duty cycle.

You, as the qualified end-user of this radio device must control the exposure conditions of bystanders to ensure the minimum separation distance (above) is maintained between the antenna and nearby persons for satisfying RF exposure compliance. The operation of this transmitter must satisfy the requirements of Occupational/Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

Hereby, HM Electronics, Inc. declares that the PRO850 is in compliance with the essential requirements and other relevant provisions of EMC Directive 89/336/EEC.

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SECTION 1.   INTRODUCTION

PC850 Description:

PC850 is a Microsoft Windows® application which allows the user to edit PRO850 System Base Station (base) and Beltpac configuration settings from a PC and save the settings to files. PC850 is also used to monitor audio and RF activity within the PRO850 system and perform system diagnostics. An RS-232 serial interface cable must be used to connect the PRO850 base to the PC in which PC850 software is installed.
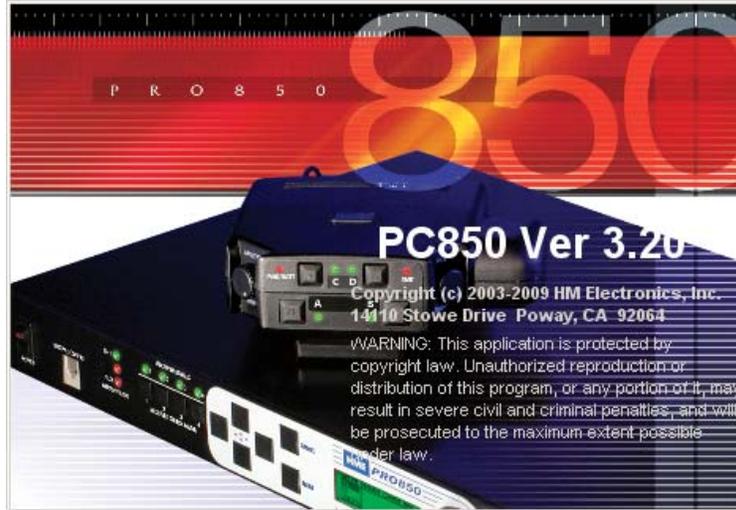
PRO850 General Description:

The PRO850 is a wireless intercom system designed primarily for the professional entertainment industry (TV, movie, and live stage productions). It is compatible with and interfaces to standard hardwired intercom systems from Telex (RTS) and Clear-Com. Its key features are frequency agility, audio quality, multi-channel operation, and flexibility. The figure below shows an example of how the PRO850 system can be used.
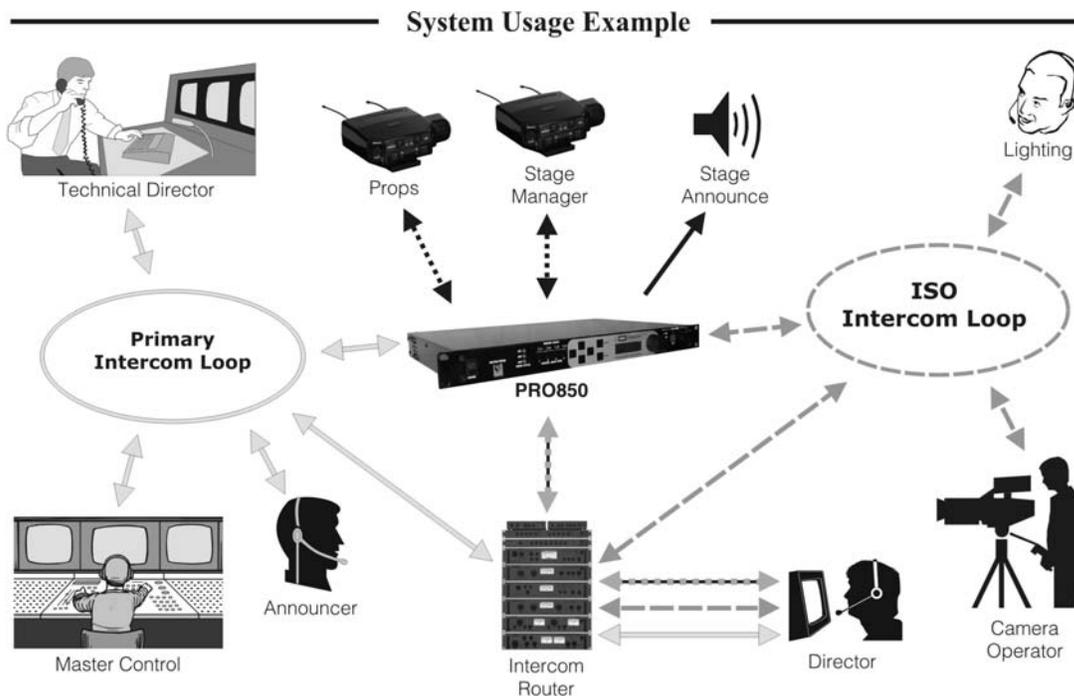
The base is the hub of the system, combining the functions of the base transmitter and receiver(s), cabled system interfaces, and control center in one unit. The base transmits to all Beltpacs on one or more UHF frequencies and receives individual UHF transmissions from the respective Beltpacs. The composite modulating signal transmitted by the base and Beltpac consists of an FM audio channel and one low-data-rate data channel on a subcarrier.

PRO850 equipment operates in the UHF band from 470 MHz to 697.825 MHz in 18 MHz subsets. Transmitters and receivers operate in different, non-adjacent 18 MHz bands. Synthesized frequencies can be selected in 25 kHz increments over each 18 MHz band, for 720 transmit and 720 different receive frequencies. The occupied bandwidth for base or Beltpac transmissions is 180 kHz.

Base and Beltpac use corresponding band pairs: 0 & 8, 1 & 9, 2 & A, 3 & B, 4 & C, 5 & D, 6 & E Antenna marking colors are shown in parentheses.

Base Transmit Bands

Ch 14	Ch 15	Ch 16	Ch 17	Ch 18	Ch 19	Ch 20	Ch 21	Ch 22	Ch 23	Ch 24	Ch 25	Ch 26	Ch 27	Ch 28	Ch 29	Ch 30	Ch 31	Ch 32	Ch 33	Ch 34
			BAND 1 (blue)			BAND 2 (none – black)						BAND 4 (red)								

470 MHz   488   506   524   542   560   578   596

Beltpac Transmit Bands

Ch 38	Ch 39	Ch 40	Ch 41	Ch 42	Ch 43	Ch 44	Ch 45	Ch 46	Ch 47	Ch 48	Ch 49	Ch 50	Ch 51
			BAND 9 (orange)			BAND A (white)						BAND C (yellow)	

614 MHz   632   650   668   686   697.825

Base stations can be configured with up to four receivers and two transmitters, supporting up to four Beltpacs in full-time transmit, full-duplex operation. Two or three bases interconnected can support up to twelve Beltpacs operating at once. The Push-to-Transmit-Shared (PTS) feature supports several Beltpacs sharing the same frequency. In this mode, one Beltpac user on a shared frequency can transmit at a time. If one user is already transmitting on that frequency, and another user attempts to transmit, the second user will hear a "busy" signal. A maximum of sixteen Beltpacs can be used with a system (one to three bases).

All audio received by the base is routed to the base audio processor for further distribution to external connections, and to the base transmitter for rebroadcast to each Beltpac. DSP-based audio processing allows audio to be mixed and routed completely under firmware control.

All communication is full-duplex, so a Beltpac user can talk and listen at the same time. The base transmits to all the Beltpacs on one or two RF channels. Beltpacs can transmit on separate RF channels so more than one user can talk at a time, or some Beltpacs may share the same RF channel, in which case only one user sharing the channel may talk at a time. When Beltpacs transmit on separate RF channels, they can transmit either continuously in Push-To-Enable (PTE) mode or intermittently in Push-To-Transmit (PTT) mode.

The base receives each of these transmissions, mixes the audio, and rebroadcasts to each Beltpac as appropriate. Each Beltpac user hears the rebroadcast of his own transmission, confirming his message has been received. At least three systems can be daisy chained to allow additional channels to operate simultaneously. When Beltpacs operate in PTE or PTT mode, they automatically update their status to the base periodically.

When several Beltpacs share the same frequency, they operate in PTS mode. When one PTS user is talking on a particular frequency, all other users of that frequency are locked out so they cannot interfere with the transmission. When operating in PTS mode, Beltpacs only update their status to the base while their user is talking.

For increased flexibility, combinations of shared frequencies and individual frequencies can be combined. A single base can address up to sixteen (16) Beltpacs in various combinations of PTE, PTT, and PTS modes. Some receiver modules can be configured for PTS operation while others are left for PTT or PTE operation. In a system with daisy chained bases, even more combinations are possible.The cabled system interface provision on the base allows a cabled intercom system to be used with wireless stations. Both 2-wire and 4-wire interfaces can be active at the same time for wiring flexibility.

An Auxiliary input and output are provided to allow connection to other audio systems such as program audio sources or an additional 4-wire intercom connection.

PRO850 Other Features:

A feature can be selected for scanning through all available intermodulation-free frequency groups to automatically configure the system for the best available set of frequencies. Specified frequencies can be saved for quick recall.

The PRO850 can be configured for fixed power output levels or automated output power control. With the automated feature selected, the PRO850 senses how far a Beltpac is from the base and automatically determines at what power level the Beltpac should be operating, eliminating base receiver overload and increasing Beltpac battery life.

Two hardwired intercom channels provide simultaneous 2-wire and 4-wire operation.

The base headset interface automatically detects and accommodates dynamic or electret microphones. It provides direct access to intercom channels 1 and 2, Beltpacs only or all channels.

Any Beltpac button can be configured to activate the base paging relay and, at the same time, audio is routed to the paging output.

The base can be configured to initiate an alert for various conditions, including low battery condition or a Beltpac alert-button press.

The PRO850 is fully compatible with RTS® and Clear-Com® hard-wired intercom systems.

With PC850 software, the base and Beltpacs can be configured on a PC, and configuration settings can be saved to files. An RS-232 serial port on the rear panel of the base provides PC interface capability. Beltpacs can also be configured using a Palm-OS PDA with the optional PDA850 software.

The base can operate from a standard 12-14VDC power source or from an external DC source such as a vehicle electrical system for mobile operation.

NOTE: For additional PRO850 Equipment Data and Operation, see Sections 14 and 15.

SECTION 2.   PC850 INSTALLATION

PC850 Minimum Requirements:

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Minimum Requirements for Use of PC850 Software

- IBM® compatible PC with a Pentium® microprocessor
- Minimum of 32 megabytes RAM
- Minimum of 100 megabytes available hard disk space
- One available RS-232 serial port or a USB to serial adapter cable
- Serial interface cable appropriate for your PC (See Section 2.1)
- Microsoft Windows® 98, Windows® NT4.0 Service Pack 3, Windows® 2000, Windows® ME or Windows® XP
- Familiarity with Windows® operating system
- Internet Explorer 5.5 or later

</div>

CAUTION: Before installing PC850, close all other programs that are open.

To install PC850 under Windows® 98, Windows® NT4.0 Service Pack 3, Windows® 2000, Windows® ME or Windows® XP, follow the instructions below.

To install PC850 for Windows® NT/2000/XP, you must be a System Administrator. For Windows® NT/2000/XP, if you have installed this product for multiple users, you may give authorization to all PC850 users at once. To do this, log into the computer as System Administrator and install PC850 according to these instructions. After successful installation, all users will have access to PC850. To be able to run PC850, each user must have "Read, Write and Execute" permission for the **ProgramFiles\HME\PC850Wizard** directory.

NOTE: It is not necessary to uninstall Version 2.0x of PC850 before installing Version 3.1x or above. By default, PC850 Version 3.1x or above will be installed in a separate directory.

1. Insert the CD into a selected CD-ROM drive.
2. In Windows® Explorer, double click on the CD-ROM drive where the CD is inserted.
3. Double click on the **setup.exe** file, and the PC850 installation will begin.

Proceed as instructed on the installation screens. When the installation has been completed, select "Finish" ending the installation process. A PC850 Icon will be installed on the Windows® desktop, which will allow you to run the PC850 application.

COMPATIBILITY NOTE: PC850 Versions 3.1x and above are not compatible with Base Station software prior to Version A.3.1x. If you have older base stations that you do not wish to upgrade, you will need to keep PC850 Version 2.00 installed on your computer. Base stations with Version A.1.1x or Version A.2.0x software can be upgraded. Contact your PRO850 distributor for more information.

SECTION 3.   PC850 OPERATION

To open the PC850 software, double click on the PC850 icon on your desktop screen.
When the PC850 opens, the screen below will appear on your PC.
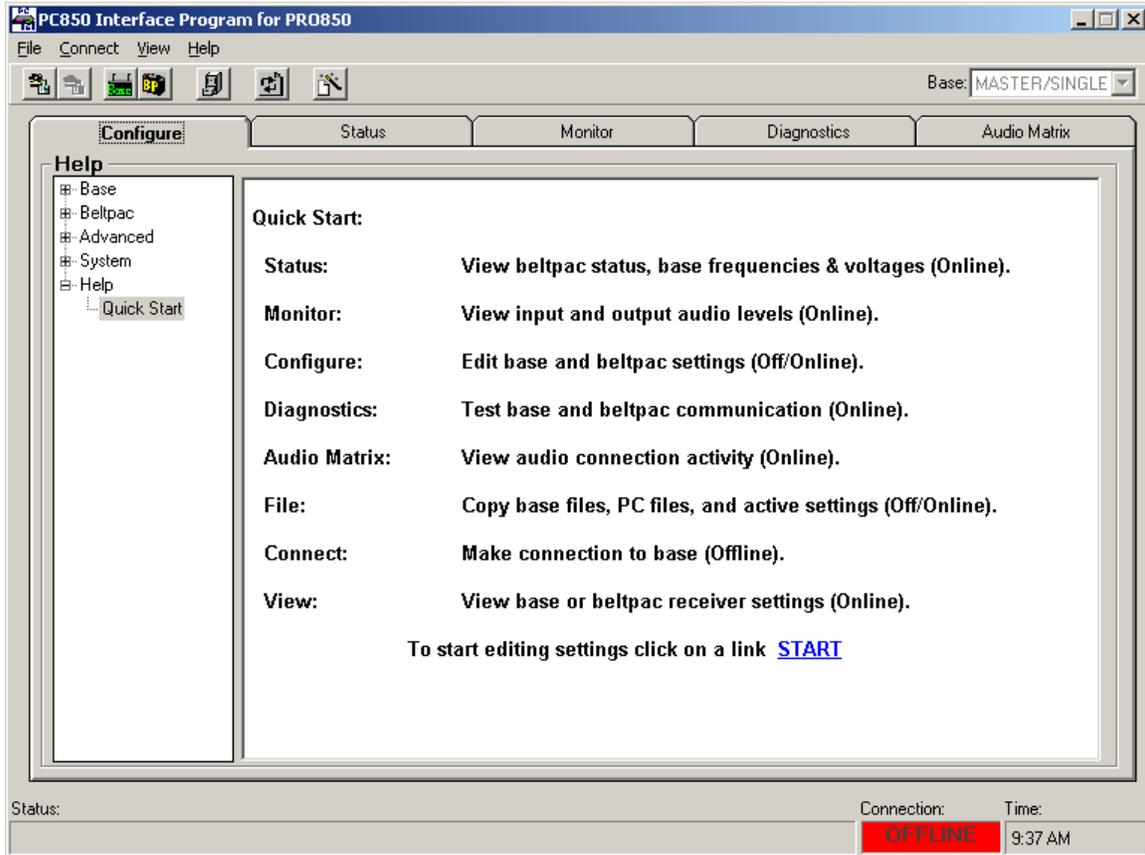
Select the **Configuration**, **Status**, **Monitor**, **Diagnostic** or **Audio Matrix** tab with your cursor. The respective screen will appear with all the same functions and system settings that are available on the PRO850 base. Place your cursor over the desired setting on the screen and a drop-down menu will appear with the applicable selections or information. **You must be connected and online with a base station to access the Status, Monitor, Diagnostics, or Audio Matrix tabs.** If you are offline, clicking on these tabs will cause the help screens for these tabs to be displayed.

PC850 Offline and Online Modes:

PC850 can be operated in either of two modes: Offline or Online.

- Offline means the program is operated without connection to a PRO850 base station. In this mode, the only menus that can be accessed are under the Configuration tab. This allows a user to set up configurations and save them to disk, to be loaded into the base later. While offline, the connection status indicator on the status bar at the bottom of the window will be red.
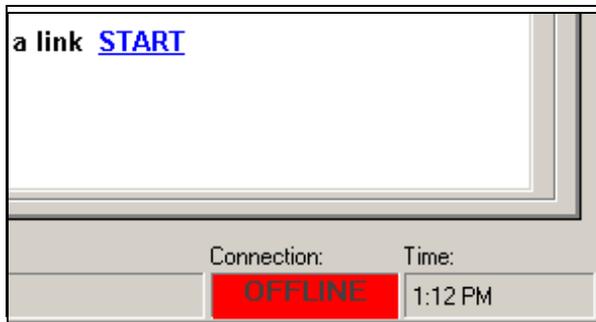
- Online means the base is connected to the PC and communication between them has been established. While online, the connection status indicator on the status bar at the bottom of the window will be green.

Connecting to the Base Online:

To switch to online mode, first be sure an appropriate cable is connected between the base and the PC. Then select Connect from the **Connect>Connect to Sys850** menu or press the Connect button on the toolbar.
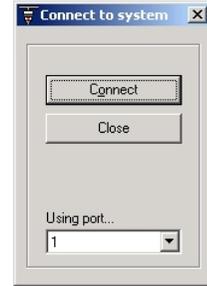
This will open the Connect to System dialog box as shown below.

Choose the appropriate PC serial communication port and click Connect.   Once online, the connection status indicator in the lower-right corner will turn green.

A USB serial adapter may be used to add a serial communication port to your computer if one is not available.   These adapters typically show up as COM5 or higher. Use the Windows Device Manager to identify USB adapter-to-com port assignment.

It is possible to run multiple copies of PC850 as shown to the right by repeating the previous steps for starting PC850, but selecting a different com port for each stand-alone or master base station.

Com Port 2
Base Station (Stand-Alone)

Com Port 3
Base Station (Stand-Alone)

Com Port 4
Base Station (Stand-Alone)

Com Port 1
Base Station (Master)

Base Station (Slave)

Base Station (Slave)
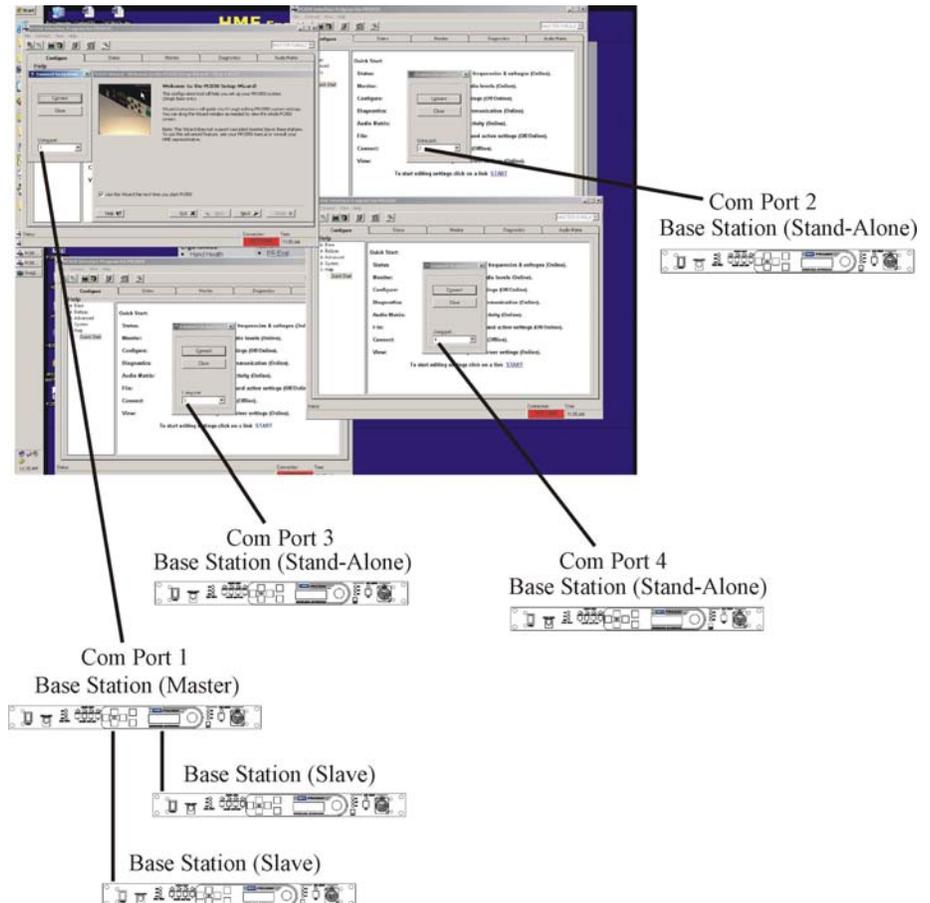
Connecting to Cascaded Base Configurations Online:

When two or three bases are tied together in a cascaded configuration (Master/Slave), the computer must be connected to the Master base. PC850 can access the settings of each base by selecting the appropriate base from the drop-down list in the upper right portion of the screen.

Cascading Multiple Base Stations

Two or three base stations may be cascaded to effectively increase the number of available receivers without increasing the number of base transmitters. Cascaded bases behave like a single base with up to twelve receivers.

In a cascaded system, one base is configured as the Master and the additional bases as Slaves. Only the transmitters in the Master are used. Any transmitters present in the Slaves need to be disabled to prevent interference with this or other systems. Because only the Master transmitters are used, receiver audio from the Slaves must be distributed to the Master for retransmission to other Beltpacs through one or more audio cables. Also, a data cable connected between the Master and Slaves allows audio routing requests and status to be communicated.

The PRO850 supports two methods of distributing audio from the Slaves to the Master. These are called "Aux Distributed" and "2-Wire Distributed". Each approach has its own advantages and disadvantages. For a quick temporary setup where not all features are required, "Aux Distributed" is the simplest choice. In a permanent installation where most features are needed, "2-Wire Distributed" is the preferred method.

Common Configuration

Some aspects of a cascaded base system are common to both types of audio distribution. These include the data cable connection and parts of the system configuration. Connect a data cable from the external control connector of the Master to the Slaves (see wiring diagram on page 7 of the PRO850 Operating Instructions manual). If there is only one Slave, a standard Ethernet crossover cable may be used to connect the Master to Slave1. Note that the external port is an RS422 serial connection not Ethernet. For this reason, an Ethernet hub cannot be used. It is important that the correct number of Slaves be specified in the Master configuration. If this number is incorrect, the system may not function correctly or may have degraded response times.

If a PC is going to be used for configuration, connect it to the Master base station. All Slave base settings are accessible through the Master.

Once the connections are made, configure the receivers on each base and save the settings separately on each base station. Then configure the transmitter and Beltpac settings at the Master base. Be sure to disable the transmitters in the Slave(s) by turning them off in the base transmitter screen (see page 30). Do not make Beltpac configuration changes at the Slaves, as they will be overwritten by the settings from the Master. Once all settings are complete, save them again and upload them to the Beltpacs (from the Master base). Then synchronize the settings from the Master (see page 42) and save the settings at the Slaves.

If paging will be used, connect the page outputs of each base to separate inputs on the paging amplifier and connect page relays in series or parallel as required. If only Beltpacs on a single base will be allowed to page, it is only necessary to connect that base to the paging amplifier.

Aux Distributed Set Up

The Aux Distributed configuration is simpler than 2-Wire Distributed, but has more feature limitations. ISO+ is not supported in an Aux Distributed configuration. Also, there are restrictions on simultaneous conversations from multiple Beltpacs. For instance, if one Beltpac user on a Slave base is currently talking on intercom channel 1, other users on Slave bases will be unable to talk on channel 2. They will be restricted by the system until the first user finishes. However, they may join in on the conversation on channel 1 or listen to channel 2 without restriction. These restrictions are because only a single audio path exists between the Slaves and the Master. Restrictions are enforced automatically by the system. A user attempting to talk on a restricted channel will hear a busy tone upon pressing the Beltpac button.

To set up the system for Aux Distributed operation, configure one base as Mstr: Aux Dist n Slave(s) (see page 24) and select correct number of Slaves (one or two). Then configure one Slave base as Slave1: Aux Dist. If there is a third base, configure it as Slave2: Aux Dist. Note that there can only be one Slave1 and one Slave2. Connect an audio cable from the Auxiliary input of the Master base to the Auxiliary output of Slave1. If Slave2 is present, connect an audio cable from the Auxiliary input of Slave1 to the Auxiliary output of Slave2.

2-Wire Distributed Set Up

When a system is configured for 2-Wire Distributed operation, it has most of the features of a stand-alone base. However, the wiring is somewhat more complex and there are still some feature limitations. In this mode, receiver audio from the Slave bases is distributed by way of the Auxiliary inputs and outputs as well as the 2-wire intercom lines. This means that the Auxiliary inputs and outputs cannot be used for other purposes. Since these inputs and outputs are not available, ISO+ operates differently in this configuration. Only the Master is configured for Mstr: 2-Wire ISO+ 1 Slave or Mstr: 2-Wire ISO+ 2 slvs. The Slaves are left as Slave1 (2): 2-Wire. As soon as the Master is set for this mode, the local headset switches and LED's are disabled and the Aux wired status LED lights. An external 4-wire interface (with appropriate levels) can then be connected to the front panel headset connector. The headset amplifier and microphone preamp are still used. Therefore, the audio levels may need to be matched to the 4-wire line through external devices.

To set the system up for 2-Wire Distributed operation, configure the Master base as either Mstr: 2-Wire or Mstr: 2-Wire ISO+ (with the appropriate number of Slaves). Then configure the Slaves as Slave1 (2): 2-Wire. **NOTE:** Be sure to save settings separately on the Master and Slave bases. Connect audio cables to the Auxiliary inputs and outputs as described for Aux Distributed set up. Connect 2-wire lines between the bases as needed. Two lines are required if Clear-Com lines are used, but only one is needed for RTS. If the system is to be connected to a hardwired intercom system through the 2-wire interface, do that as well. Be sure that all bases are configured for the same type of 2-wire line (Clear-Com or RTS).

If no hardwired system is to be used or the hardwired system uses the 4-wire interfaces, it will be necessary to terminate the 2-wire lines. External 200-Ohm terminators may be used or the line may be terminated internally on the Master. To do this, remove the base station cover and move the jumpers at JP4 and JP5 to short pins 1 and 2. Be sure to restore them to their original positions before connecting the base to an existing 2-wire system. With a 4-wire system, it will also be necessary to connect the 4-wire lines (outputs only) of the Slave bases to the intercom system.

PC850 Copy Files (Online):

The PC850 and the base both use files to save and retrieve base and Beltpac configuration settings. In the case of the PC850, these files are saved as PC Files while in the base, these files are saved in memory, and are not lost when the power is turned off.

PC850 can be used to copy configuration settings files, online:

- Between the PC and the base (in either direction)
- Between different files on the base (in either direction)
- Between different files on different bases in a cascaded configuration.

To copy files, select **File>Copy Settings** or click the filing cabinet button 🗄️ on the tool bar. The screen shown below will appear:
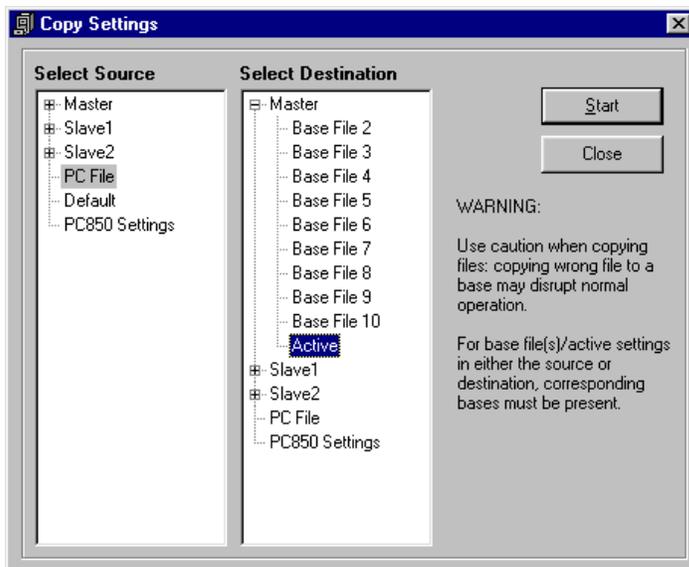
Select the source of the settings on the "Select Source" side and the destination on the "Select Destination" side and then click Start. If a PC File has been chosen for source or destination, another dialog box will open for you to choose the source or designation file.

NOTE: The file listed as "Active" at the bottom of the list of base files contains the settings in use by the base at the present time. Active settings are reloaded from the current base file (2 through 9) each time the power is turned on. Loading settings from one of the numbered base files to "Active" makes that file the one that will be loaded automatically at power on.
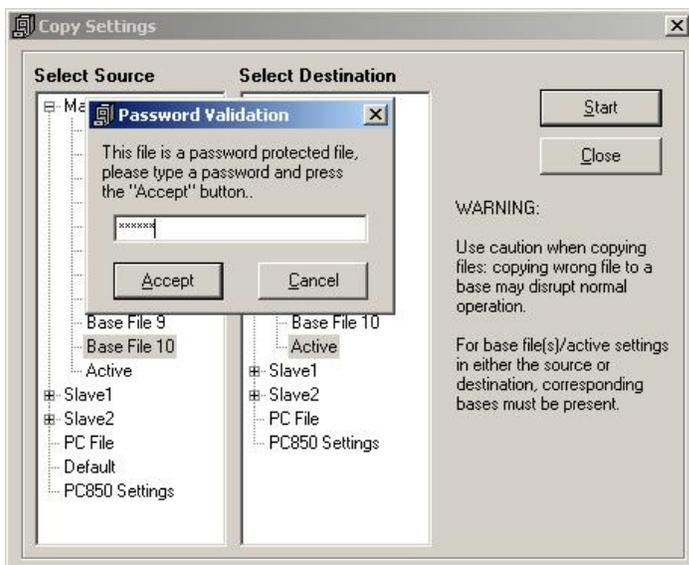
NOTE: Base File 10 is a password-protected file. Load or save operations for this file will be allowed only with a valid password. If settings are loaded from File 10, they will overwrite the current file. File 10 does not ever become the current file.

PC850 Load/Save Files (Offline):

PC850 can be used to load/save PC Files containing configuration settings for offline editing. These files can be copied to the base at a later time, when it is online.

To load a file, select **File>Open File**.
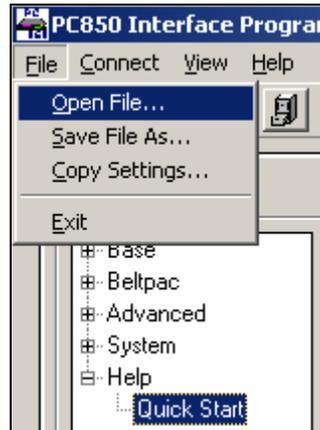
 A file dialog box will appear, to allow you to select the file to open, as shown below.
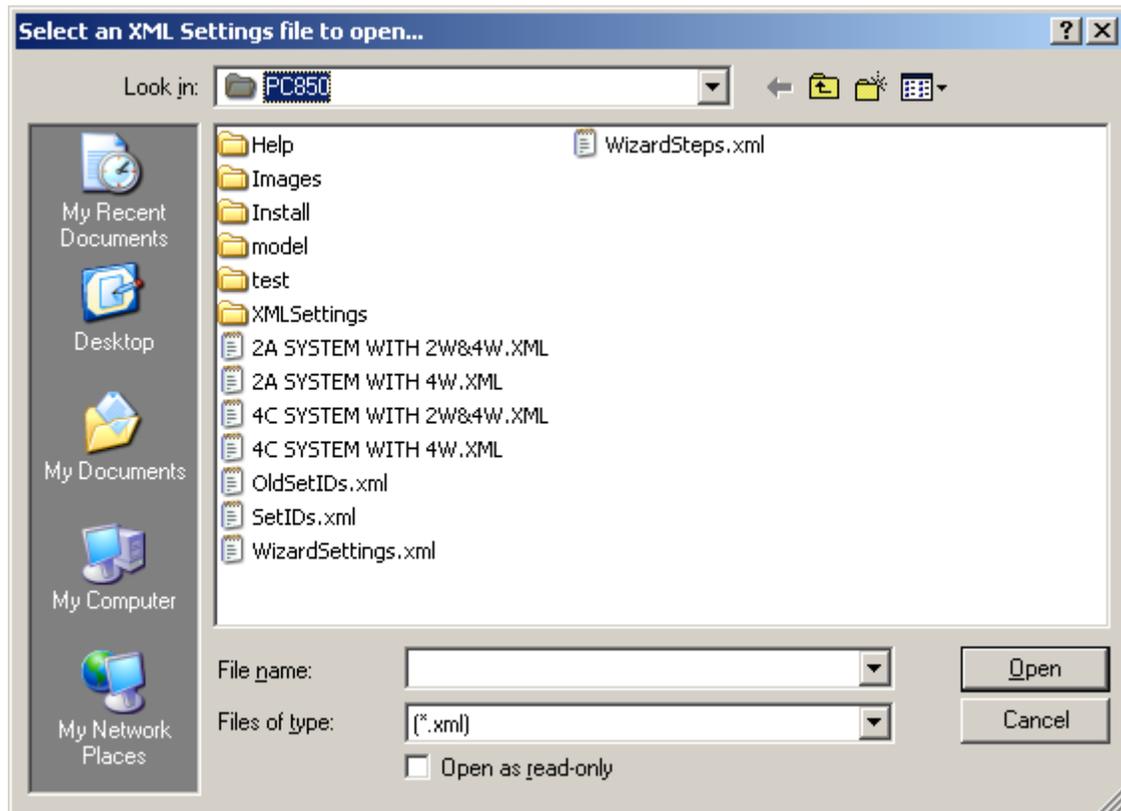
To save files, select **File>Save File As**.
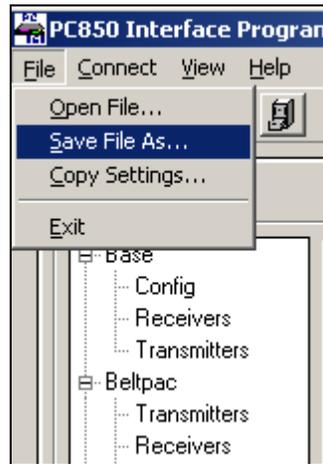
A file save dialog box will appear, as shown below.
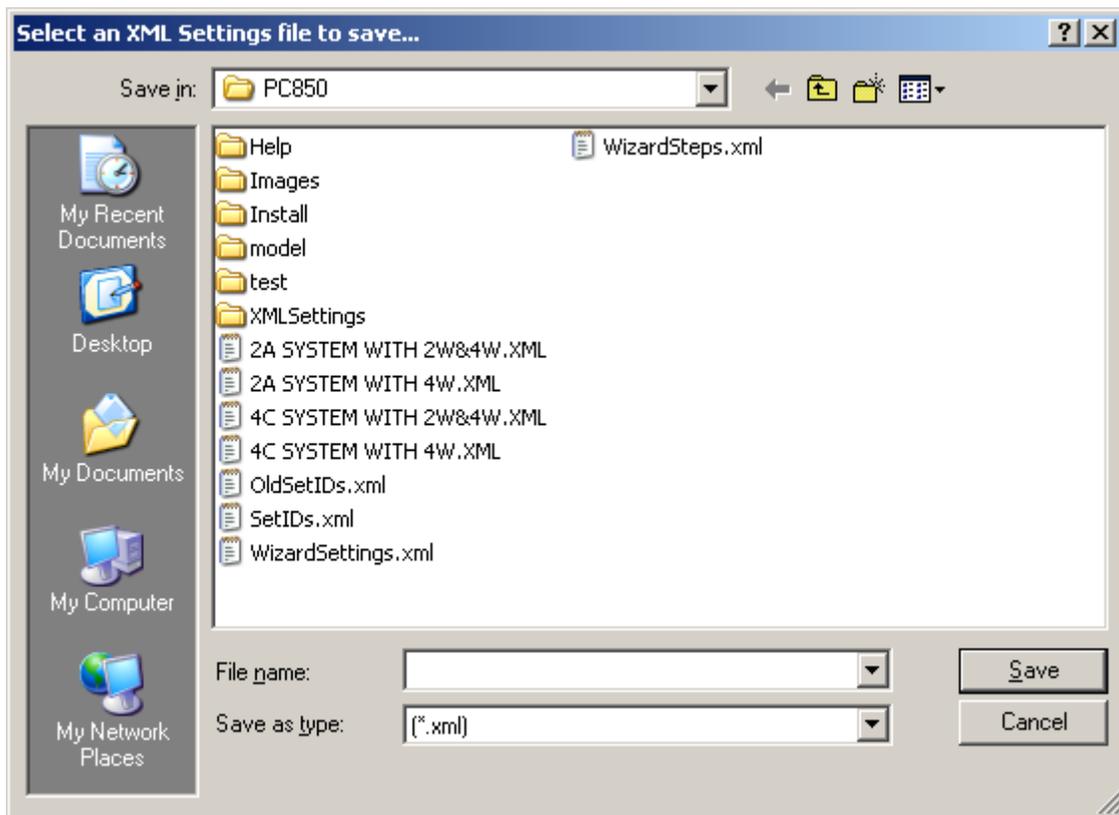
PC850 Factory Settings Files:

PC850 may be used to default the PRO850 system to a factory configuration which includes coordinated base and Beltpac frequencies, all receivers and transmitters turned ON, and transmitter power levels set to maximum.

PC850 is installed with three factory settings files (for Band ID 1-9, Band ID 2-A, and Band ID 4-C). You need to know the band ID for your system: (see SECTION 14).

When you have determined the Band ID, you can select the factory settings PC File from the "Select Source" (located in the XMLSettings folder in the PC850 install directory) and copy it to the Base Active Settings by selecting "Active" in the "Select Destination" side.
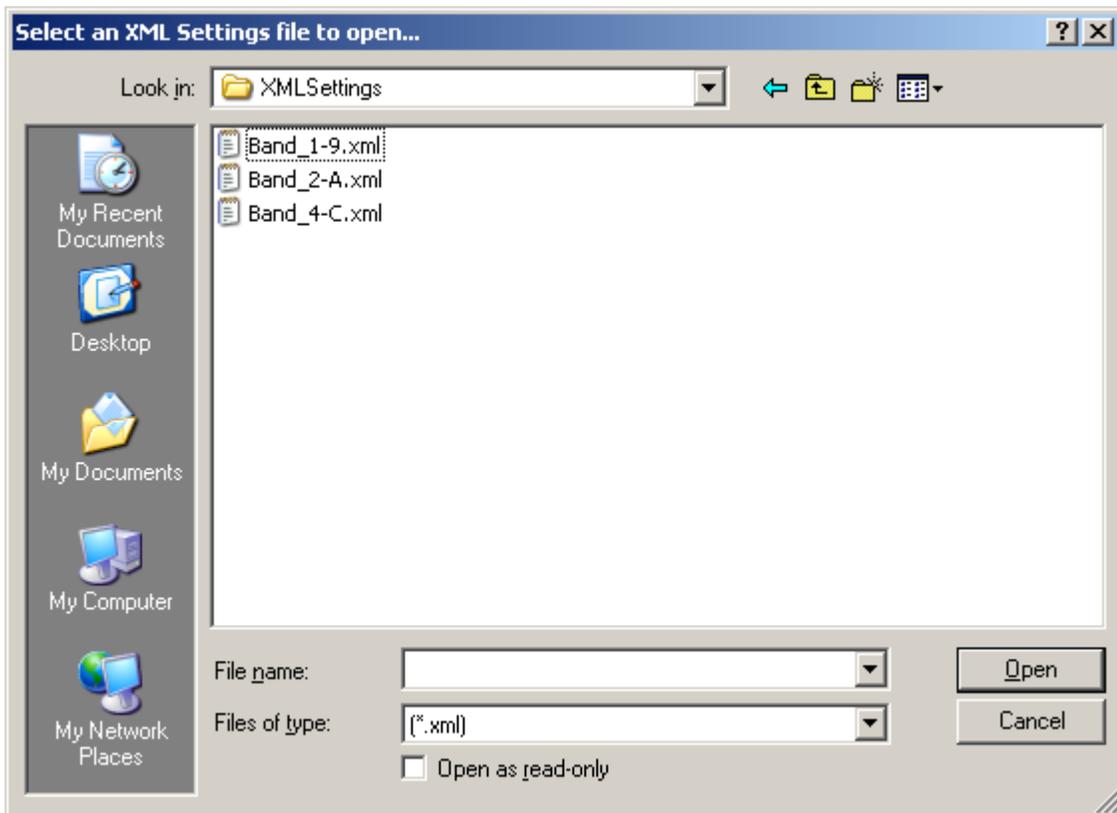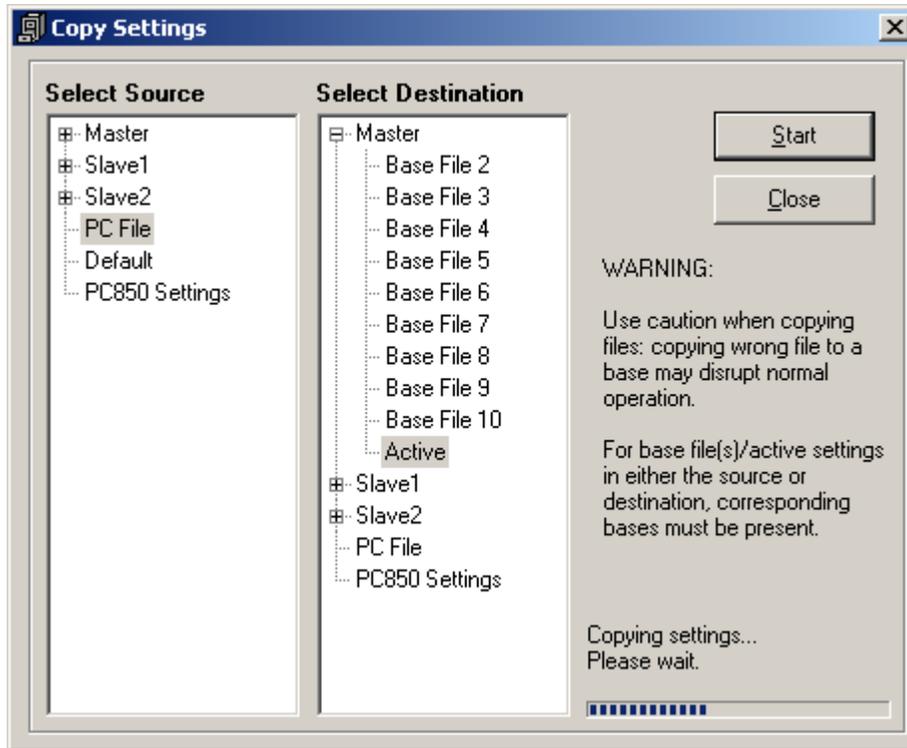
NOTE: This operation can only be performed online. Note: once you have the base settings uploaded, you will need to upload the Beltpac settings to each Beltpac using the front panel configuration port in order for the system to function properly.

SECTION 5.   PC850 BASE CONFIGURATION

PC850 Base Configuration Settings:

The PC850 Configure tab allows you to view and edit base and Beltpac settings, including:

- Configuration – Base Configuration (wiring configuration), Base Identifier, Scan Frequencies Intercom Configuration Input Level and LCD Contrast Level.

- Receivers – frequency, squelch, audio level, enable

- Transmitters – frequency, power, transmitter mode, output mix levels

- Beltpac functions – buttons, frequencies, transmitter power and mode, LED operation

Base Station Mode Configuration:

You can select the Base Station mode from the **Configure Tab >Edit Base Configuration Box >Base>Config>Base Configuration Section** as shown below:
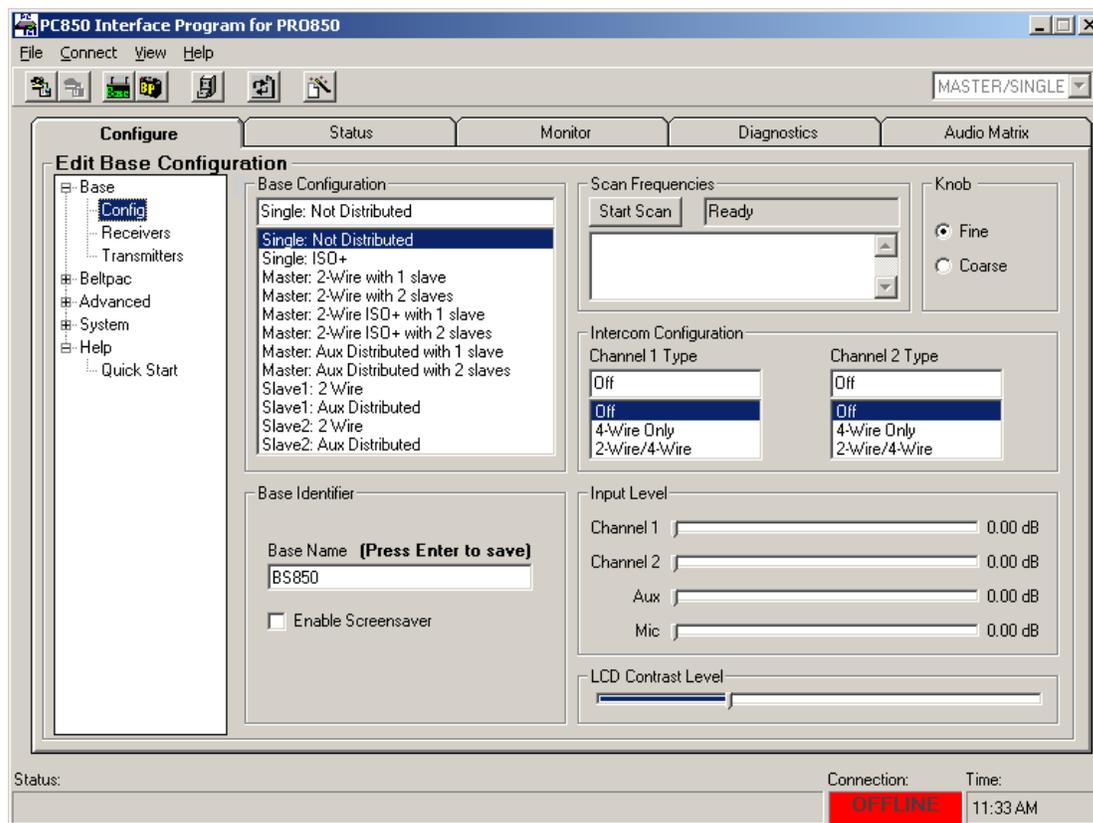
- **Single**

  Select **Single: Not Distributed** for a single base without the ISO+ feature for ISO communication only among Beltpacs.

  Select **Single: ISO+** for a single base with the ISO+ feature for ISO communication among Beltpacs and Auxiliary input and output (Aux In/Out) connections.

- **Master / Slaves**

  If Master and Slave base stations will be used, there can only be one Master base station, with one or two Slaves. Select Master, Slave 1 or Slave 2, then select the multi-base wiring configuration; 2-Wire, 2-Wire ISO+ or Aux Dist.

  NOTE: Slaves must be configured for the same type of audio distribution as the Master.

- **Master**

  In the **2-Wire ISO+** mode, Beltpacs having a button configured for Talk Aux must transmit on frequencies for the Master base station for the feature to work.

- **Slaves**

  In the **Aux Dist** mode, Beltpacs on Slave base stations can only talk on the same channel at once. If they try to talk on a different channel than the user already talking, they will hear a busy signal in their Beltpac headset.

Base Station Intercom Configuration:

You can set up intercom configurations from the **Configure** tab **>Edit Base Configuration** box **>Base>Config>Intercom Configuration** section:
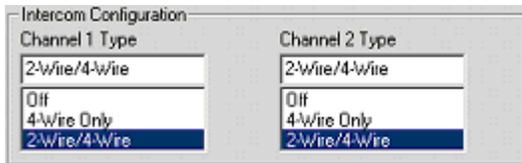
Select intercom configuration (OFF, 4-Wire Only or 2-Wire/4-Wire) for Channel 1 or Channel 2.

NOTE: If the Mode is set to OFF, the input and output of that intercom will be off. For 2-wire, set to "2-wire/4-wire." Both will be active. If set for 4-wire, only 4-wire interface will be active. Even when "4-wire only" is selected, the line null control(s) on the rear panel must be properly adjusted to avoid excessive retransmit levels. When 2-wire interfaces are active, the base must be connected to a terminated 2-wire line.

Base Station Auxiliary Input Level:

You can change the Auxiliary input level using the slider from the **Configure** tab **>Edit Base Configuration** box **>Base>Config>Input Level** section. Any change made here will be reflected in the Monitor Input display for Aux Input.

```
┌─ Input Level ──────────────────────────────────┐
│  Channel 1  ┌───────────────────────  0.00 dB  │
│  Channel 2  ┌───────────────────────  0.00 dB  │
│       Aux   ┌───────────────────────  0.00 dB  │
│       Mic   ┌───────────────────────  0.00 dB  │
└────────────────────────────────────────────────┘
```
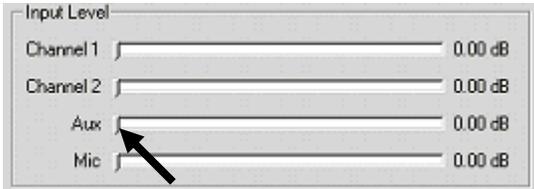
Base Station Microphone Input Level:

You can change the headset microphone input level using the slider from the **Configure** tab **>Edit Base Configuration** box **>Base>Config>Input Level** section. Any change made here will be reflected in the Monitor Input display for the Mic Input.

```
┌─ Input Level ──────────────────────────────────┐
│  Channel 1  ┌───────────────────────  0.00 dB  │
│  Channel 2  ┌───────────────────────  0.00 dB  │
│       Aux   ┌───────────────────────  0.00 dB  │
│       Mic   ┌───────────────────────  0.00 dB  │
└────────────────────────────────────────────────┘
```
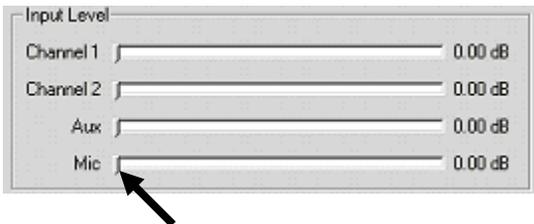
Base Station Intercom Input Levels (Ch1 & Ch2):

You can change the Channel1/Channel2 input levels using the slider from the **Configure** tab **>Edit Base Configuration** box **>Base>Config>Input Level** section.

```
┌─ Input Level ──────────────────────────────────┐
│  Channel 1  ┌───────────────────────  0.00 dB  │
│  Channel 2  ┌───────────────────────  0.00 dB  │
│       Aux   ┌───────────────────────  0.00 dB  │
│       Mic   ┌───────────────────────  0.00 dB  │
└────────────────────────────────────────────────┘
```

Base Station Name:

You may assign an identifying name or number of up to nine characters to the base from the **Configure** tab **>Edit Base Configuration** box **>Base>Config>Base Identifier** section.

```
┌─ Base Identifier ──────────────────┐
│                                    │
│  Base Name  (Press Enter to save)  │
│  BS850                             │
│                                    │
│  ☐ Enable Screensaver              │
│                                    │
│                                    │
│                                    │
└────────────────────────────────────┘
```
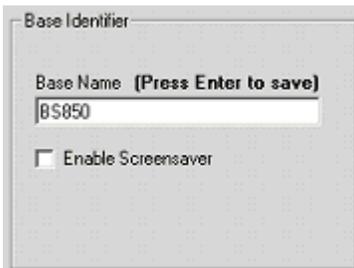
To enable the display of the name as a screen saver when other operations are not being performed, check the **Enable Screensaver** box. The base name will be displayed a few minutes after no button presses have occurred.

Base Station LCD Display Contrast Level:

You can change the contrast level of the Base using the **LCD Contrast Level** from the **Configure** tab **>Edit Base Configuration** box **>Base>Config>LCD Contrast Level** section.

Base Station Knob Adjustment Setting:

You can select Fine or Coarse for the base control knob, for mix level dial adjustments from the **Configure** tab **>Edit Base Configuration** box **>Base>Config>Knob** section. In the Fine mode, mix level adjustments made by the control knob occur in 0.25dB increments. In the Coarse mode, they occur in 2.25dB increments.

Base Frequency Scan:

The PRO850 system gives you the ability to automatically scan for the best available preprogrammed frequencies, which it will assign to the Base transmitters and receivers. This feature can only be used online, and with a Beltpac connected to the base.

From the **Configure** tab **>Edit Base Configuration** box **>Base>Config>Scan Frequencies** section, click on the Start Scan button to start the scan process.
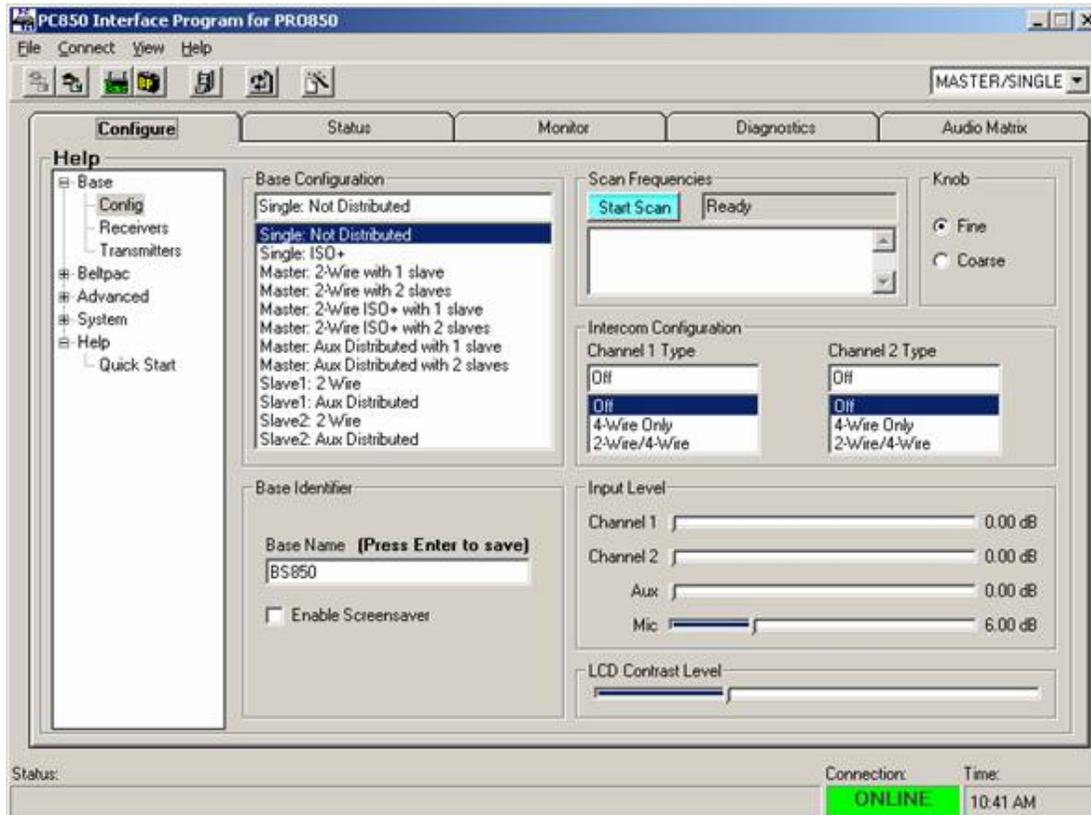
NOTE: Only preprogrammed frequencies are scanned. Scanning does not guarantee the frequencies are not in use. DTV signals confuse the scan.

Connect a Beltpac to the BELTPAC CONFIG connector on the front panel of the base to enable scanning of base transmit frequencies.

In this operation, the Beltpac and base receivers are scanned to find the cleanest group of frequencies for the base to transmit on, and they are assigned to Tx1 and Tx2 in the base. Also, based on the number of receivers in the system (up to 12), it determines the best group of frequencies for the base(s) to receive on. Those frequencies are distributed (first-come, first-served) to the Beltpacs (assuming 16 Beltpacs will be used) as Beltpac transmit frequencies. Beltpac receiver frequencies are always the same as the base Tx1 and Tx2 frequencies.

Beltpac frequency settings will not be operational until they are uploaded to the Beltpacs, which should be done after completion of Beltpac configuration settings.

These settings will automatically be saved to **File 1** as active settings for the base until the frequencies are scanned again. They can also be saved to another file name for future use.

NOTE: In a Master/Slave configuration, always perform frequency scans at the Master base. The Master will automatically save its settings in File 1. However, the Slave(s) will not. Slave settings must be saved manually at each Slave, or with PC850 using Copy Files menu (SECTION 4)

Base Receiver Settings:

You can set up the base station receivers from the **Configure** tab **>Edit Base Receivers** box **>Base>Receivers** as shown below:
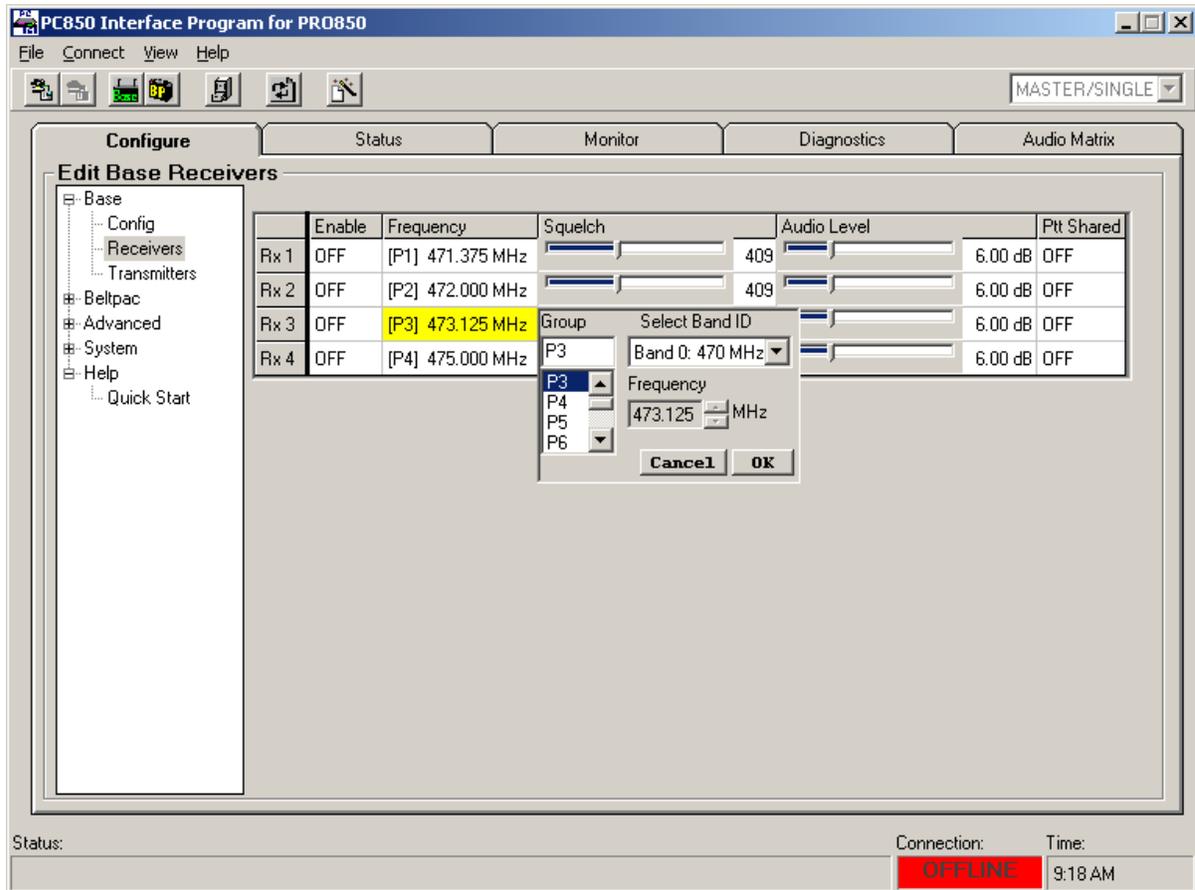
As shown above in the **Enable** column, you can select a receiver to be **Off** or **On**. You can also use the Audio Level slider to adjust receiver audio levels and the receiver squelch.

NOTE: The amount of gain applied here to receiver audio level at input of DSP will also be shown on the Monitor Input display screen for that receiver.

Base Station Receiver Frequency:

As shown above in the **Configure** tab **>Edit Base Receivers** box **>Base>Receivers**, you can click on the Frequency field of the table to reveal the frequency editing form. Click on the Group to select frequencies P1 – P4, S1 – S4 and T1 – T4 (presets in the system that cannot be changed). Frequencies U1 – U16 can be adjusted and saved by the user. If you select a user frequency, U1 – U16, move the cursor to the frequency box and use the up and down arrow buttons together with the control knob to select a frequency. User frequencies can be selected in 25 kHz increments. **You must click on OK to save your frequency changes.**

For multiple Beltpacs to share a receiver frequency (PTS), check the **PTT Shared** box. If you turn on **PTT Shared** you must also set the Beltpac transmitters to **PTS mode** (See page 33).

NOTE: Frequencies within the same group (P, S or T) are compatible with each other and free of intermodulation. Never choose frequencies closer to each other than 375 kHz.

Base Transmitter Settings:

You can set up the base transmitters from the **Configure** tab **>Edit Base Transmitters** box **>Base>Transmitters** as shown below:

Base Station Transmitter Power:

For the particular transmitter, Tx1 or Tx2, you can set the power level at 1, 10, 100 or 250mW from the **Configure** tab **>Edit Base Transmitters** box **>Base>Transmitters >**upper table**>Power** column. To change the Off/On status of the transmitter, select the Off, On, or IFB button (to enable IFB mode only usable with dual receiver Beltpacs) in the corresponding upper table**> Enable** column.

NOTE: Use the lowest power level that provides sufficient range. Using too much power when Beltpacs are close to the base will decrease performance.

Base Station Transmitter Frequency:

As shown above in the **Configure** tab **>Edit Base Transmitters** box **>Base>Transmitters>**upper table**>Frequency** column, you can click to reveal the frequency editing form. Click on the Group to select frequencies P1 – P4, S1 – S4 and T1 – T4 (presets in the system that cannot be changed). Frequencies U1 – U16 can be adjusted and saved by the user. If you select a user frequency, U1 – U16, move the cursor to the frequency box and use the up and down arrow buttons to select a frequency. User frequencies can be selected in 25 kHz increments.
You must click on OK to save your frequency changes.

NOTE: Frequencies within the same group (P, S or T) are compatible with each other and free of intermodulation. Never use frequencies closer to each other than 500 kHz. Because base transmitters share the same antenna and are more powerful than those in the Beltpacs, the frequencies must be further apart.

Base Station Transmitter Output Mix Levels:

From the **Configure** tab **>Edit Base Transmitters** box **>Base>Transmitters>**lower table shown above you can edit the Transmitter Output Mix Levels. Select the particular Transmitter's (Tx1 or Tx2) output level move the associated slider to adjust that level in 1.5dB increments.

Select the Enable box for the particular input to enable allow that signal to be combined into the Tx1 or Tx2 output mix.   Mic is a standard input, and does not have a check box. Use the individual sliders to adjust the audio mix for each transmitter in increments of .25dB (fine) or 2.25dB (coarse). It is not necessary to check the Rx 1-4 boxes in normal operation. They will be controlled automatically.

	Tx1			Tx2		
	Enable	Level		Enable	Level	
Tx Out			0.00 dB			0.00 dB
Ch1 In	☑		-6.00 dB	☐		-6.00 dB
Ch2 In	☐		-6.00 dB	☑		-6.00 dB
Rx1 In	☐		-3.00 dB	☐		-3.00 dB
Rx2 In	☐		-3.00 dB	☐		-3.00 dB
Rx3 In	☐		-3.00 dB	☐		-3.00 dB
Rx4 In	☐		-3.00 dB	☐		-3.00 dB
Aux In	☐		-12.00 dB	☐		-12.00 dB
Mic In			-6.00 dB			-6.00 dB

Single Transmitter Two-Channel Operation

If desired, a single transmitter may be used to distribute both intercom channels to Beltpac users. This allows users to listen to both intercom channels simultaneously and still be able to select talk on a particular channel. Because the mixing takes place inside the base station, all users hear the two channels in the same combination (Beltpac Auxiliary volume controls are not used). If users need to adjust the two channels separately, two transmitters and optional second receivers in the Beltpacs are required.

To configure the system for single transmitter operation, first disable one transmitter by selecting Off in the Base Tx Setup screen. Then configure all Beltpacs so that both receiver frequencies are set to the one transmit frequency. For example: If the base transmitter is set to 508.250 MHz, set both Beltpac Rx1 and Rx2 to 508.250 MHz. The indicator LED's on the Beltpacs will continue to indicate which channel is the user's talk channel. The base station DSP will automatically mix both intercom channels into the one transmitter.

IFB Transmitter Operation

In a PRO850 system equipped with dual receiver Beltpacs, the system may be configured to act as an IFB transmitter. When configured in this way, dual receiver Beltpac users will hear all intercom audio through the primary receiver and IFB audio through the second receiver. Users with single receiver Beltpacs will hear all intercom audio, but will not hear the IFB channel.

To configure the system for IFB operation, first set Transmitter 2 by selecting IFB in the Base Station Transmitter Power screen. Second, choose an audio source for Transmitter 2 and enable it in the Base Station Transmitter Output Mix Levels screen. Then configure any single receiver Beltpacs for single frequency operation as described under *Single Transmitter Two-Channel Operation*. Finally, configure the dual receiver Beltpacs so that Rx1 is tuned to the same frequency as base transmitter 1 and Rx2 is tuned to the same frequency as base transmitter 2.

Once a base transmitter has been set to IFB mode, all intercom audio will be automatically routed through the remaining transmitter. The transmitter set to IFB mode, will only transmit program audio manually assigned to it.

On dual receiver Beltpacs, use the Aux volume control to adjust the relative level of the IFB channel. Press and hold the Aux volume control to mute the IFB channel.

SECTION 6.   PC850 BELTPAC CONFIGURATION

PC850 Beltpac Configuration Settings:

The PC850 Configuration Tab allows you to view and edit Beltpac settings as well as perform Beltpac-related functions including:

- Transmitters – Power and Frequency
- Receivers – Frequency and Squelch Control
- Buttons/LED – Buttons A, B, C and D and LED functions
- Tones – Tones for Alert, Confirmation, Error, etc.
- Identification – Beltpac Name and ID
- Upload – Upload Beltpac settings using the Beltpac configuration port on the base
- Copy – Copy Beltpac settings from one Beltpac to all others

NOTE: In all of the Beltpac menus described below, the Cnfg Beltpac refers to a Beltpac that is connected to the Configuration Port on the front panel of the base. If the PC850 is connected to the base, online, changes to parameters associated with Cnfg will take effect on the connected Beltpac immediately.

Beltpac configuration settings are stored in the base, but do not become effective until they are uploaded into individual Beltpacs. In a Master/Slave configuration, all Beltpac setting changes must be made at the Master. Uploading is also done at the Master. Be sure to SYNC bases after making setting changes at the Master.

NOTE: Settings for Beltpacs BP1-BP16 are stored in the base. Changes to Beltpac settings will not be effective until they are uploaded to the Beltpacs. BP Cnfg is the Beltpac that is plugged into the base, therefore changes to its settings are effective immediately and are not saved in the base.

Beltpac Transmitter Frequency:

You can change the Beltpac transmitters from the **Configure** tab>**Edit Beltpac Transmitters** box>
>**Beltpac>Transmitters** path as shown below:
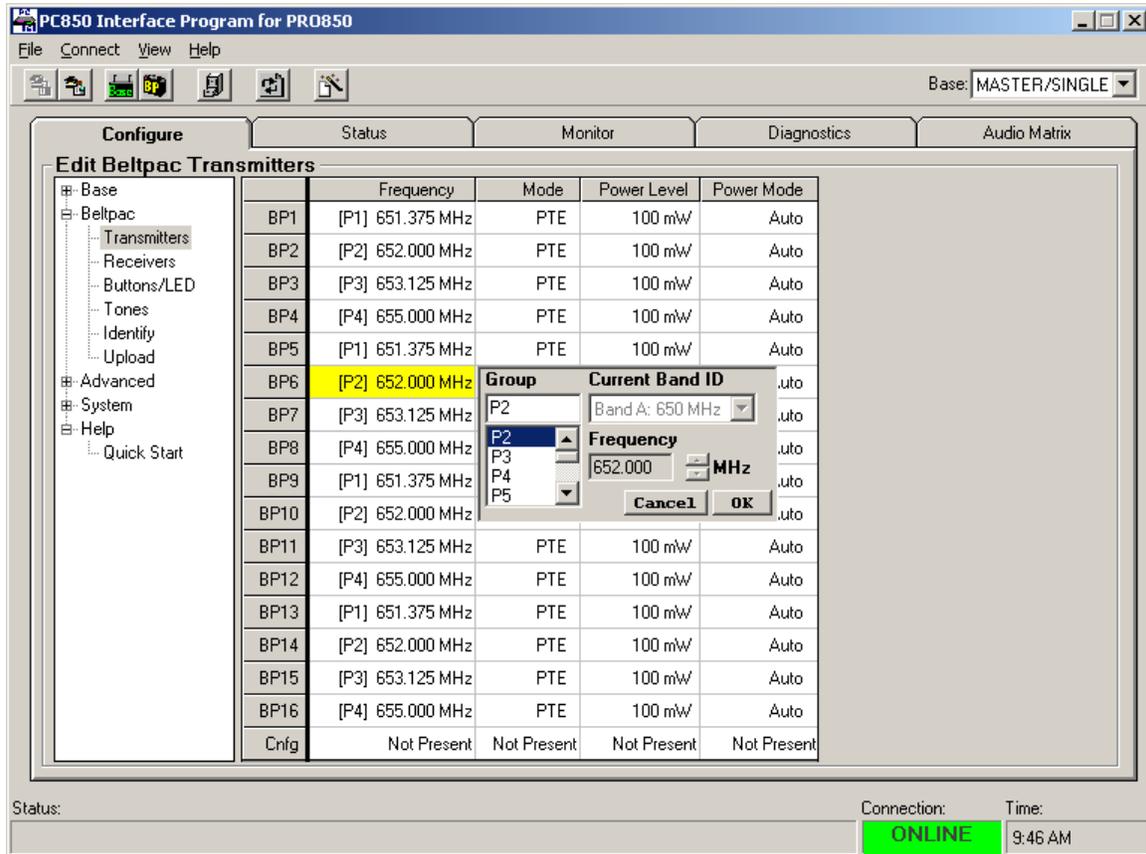
You can click on the Frequency field of the table to reveal the frequency editing form. Click on the Group to select frequencies P1 – P4, S1 – S4 and T1 – T4 (presets in the system that cannot be changed). Frequencies U1 – U16 can be adjusted and saved by the user. If you select a user frequency, U1 – U16, move the cursor to the frequency box and use the up and down arrow buttons to select a frequency. User frequencies can be selected in 25 kHz increments. However, frequencies should not be set closer than 375 kHz. **You must click on OK to save your frequency changes.**

Beltpac Transmitter Mode:

As shown above in the **Mode** column, you can select the transmit mode. If you select **PTT**, the Beltpac transmitter will be on briefly every few seconds to transmit status or while a user is talking.

If you select **PTS**, the Beltpac will only transmit while a user is talking. If you select **PTE**, the Beltpac will transmit constantly, and only the audio will be controlled by the talk button(s).

If Beltpacs are going to share the same transmit frequency, select **PTS**. If you select **PTS**, you must also select **PTT Shared** in the Base Receiver Frequency Setup (See page 16).

Beltpac Transmitter Power Level:

As shown above in the **Power Level** column, you can select the Beltpac transmitter power level (1, 10, 50 or 100mW). The level selected will be the maximum power used in auto power mode.

Beltpac Transmitter Power Mode:

From the **Power Mode** column, you can select the power mode as automatic or fixed. In the **auto** mode, transmitter power will be automatically controlled by the base, changing between 1 and the specified maximum power level. In the **fixed** mode, the setting you select will not change.

Beltpac Receiver Frequency:

You can change the Beltpac receivers from the **Configure** tab>**Edit Beltpac Receivers** box>
>**Beltpac>Receivers** path as shown below:

You can click on the Frequency field of the table to reveal the frequency editing form. Click on the Group to select frequencies P1 – P4, S1 – S4 and T1 – T4 (presets in the system that cannot be changed). Frequencies U1 – U16 can be adjusted and saved by the user. If you select a user frequency, U1 – U16, move the cursor to the frequency box and use the up and down arrow buttons together with the control knob to select a frequency. User frequencies can be selected in 25 kHz increments. **You must click on OK to save your frequency changes.**

Remember that the occupied bandwidth is over 180 kHz. This means frequencies must not be closer to each other than 500 kHz.

NOTE: When only one receiver is present on a given Beltpac, it will switch between the two frequencies as needed. When two receivers are present, the primary receiver is Rx1 and the second receiver is Rx2. Normally, Rx1 is for intercom Ch1. Rx2 is for intercom Ch2, unless base Tx2 is off or in IFB mode. In that case, both intercom channels go through base Tx1 and thus Beltpac Rx1. Normally, Beltpac Rx1 is the same as base Tx1, and Beltpac Rx2 is the same as base Tx2.

Beltpac Receiver Squelch Level:

As shown in the **Rx1 Squelch** and **Rx2 Squelch** columns, you can change the receiver squelch for each receiver on a given Beltpac.

NOTE: You should not normally need to adjust Beltpac squelch. Adjustment of Beltpac receiver squelch can only be made when the base transmitters are off. It is normal for the Rx2 squelch setting to be less than half that of Rx1 to achieve the same sensitivity. Rx2 squelch adjustment is reserved for a second receiver, when a Beltpac has two receivers.

Beltpac Buttons A and B Setup:

You can change the functions of Beltpac A and B buttons from the **Configure** tab>**Edit Beltpac Button and LED Configuration** box>**Beltpac>Buttons/LED** path>**Primary Buttons** section as shown below:
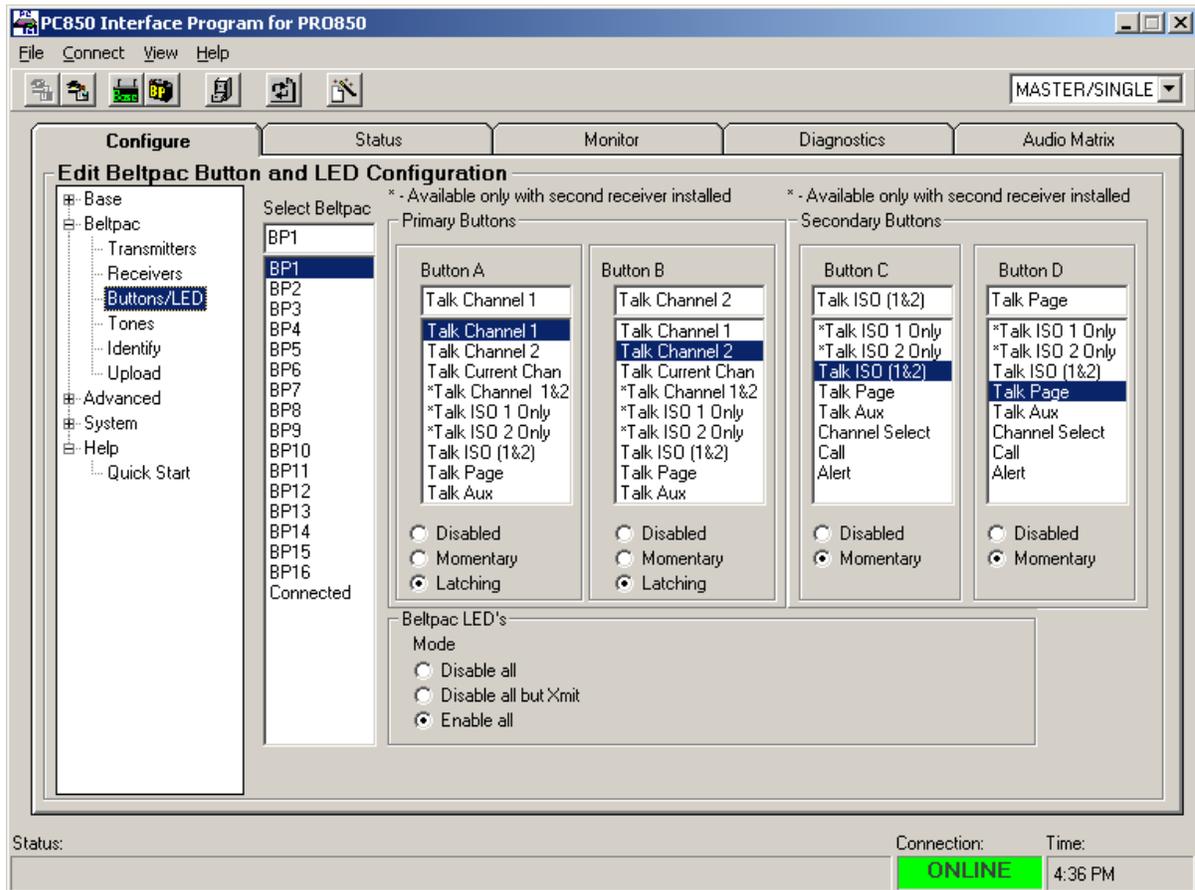
From the Primary Buttons section, you can select the Beltpac Mode (Disabled, Momentary or Lock) and function for Buttons A and B on each Beltpac.

Ch1	=	Talk, Channel 1
Ch2	=	Talk, Channel 2
Curr	=	Talk, Current Channel selected
Both	=	Talk, both Channels 1 and 2 *
ISO1	=	Talk, to Beltpacs receiving only Tx1 *
ISO2	=	Talk, to Beltpacs receiving only Tx2 *
ISO	=	Talk, to Beltpacs receiving both Tx1 and Tx2
Page	=	Talk, Page (stage announce)
Aux	=	Talk, Auxiliary Out

* Valid only for dual-receiver Beltpacs.
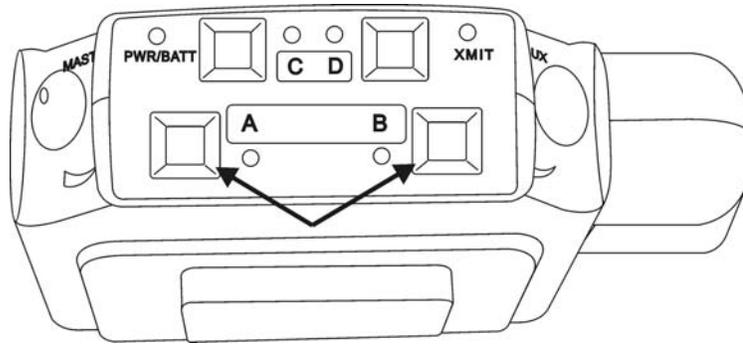
Buttons A and B modes

- If Beltpac button is set up for **Latching** function, press and release button in less than one second to lock on. Press and hold for momentary mode, to remain on only while button is held.
- If set up for **Momentary** mode, button will remain on only while held. Lock feature cannot be used.
- Either or both of these buttons can be **Disabled** (turned off) in Beltpac setup.
- "A" LED turns red while user is talking on intercom Channel 1.
- "B" LED turns red while user is talking on intercom Channel 2.

Beltpac Dual-Receiver Operation

A Beltpac equipped with the optional second receiver operates a little differently from a single-receiver Beltpac. When a user switches from Channel 1 to Channel 2 on a single-receiver Beltpac, the microcontroller inside the Beltpac automatically switches the receiver frequency from Rx1 to Rx2. That means that it is not normally possible for the user to hear both intercom channels at the same time. With a dual-receiver Beltpac, there is no need to change frequencies and the primary receiver always stays tuned to Rx1 and the second receiver stays tuned to Rx2. The user is then able to hear both intercom channels at the same time and adjust the relative volume between them.

This difference makes the operational characteristics of a dual-receiver Beltpac slightly different from those of a single-receiver Beltpac. On a single-receiver Beltpac, only one of the A or B indicator lights will be on indicating the current channel. On a dual-receiver Beltpac, both A and B indicator lights will be on indicating that both receivers are active. If one of the buttons is programmed to toggle between channels, the current channel indicator will blink. An additional feature of the dual-receiver Beltpacs is the ability to talk on both intercom channels at the same time.

Beltpac Buttons C and D Setup:

As shown in the Secondary Buttons area of the button and LED configuration window, you can select the Mode (Disabled or Momentary) and function for Buttons C and D on each Beltpac.

ISO1	=	Talk, to Beltpacs receiving only Tx1 *
ISO2	=	Talk, to Beltpacs receiving only Tx2 *
ISO	=	Talk, to Beltpacs receiving both Tx1 and Tx2
Page	=	Talk, Page (stage announce)
Aux	=	Talk, Auxiliary Out
Chan	=	Toggle Ch1/Ch2
Call	=	Call Signal
Alert	=	Alert Signal

* Valid only for dual-receiver Beltpacs.
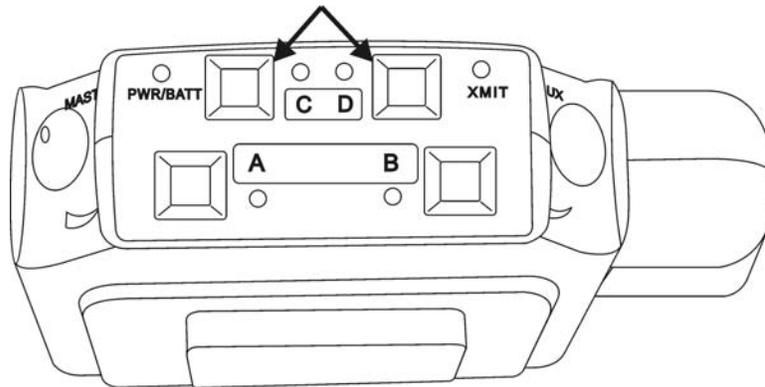
NOTE: Call Signal only functions when the Talk function is active, and only from a Beltpac to other Beltpacs which have been preset to produce a tone upon receipt of a call signal.

Buttons C and D modes

- Only **Momentary** mode can be used. If set for momentary function, button will remain on only while held. C and D buttons have no lock function

- The button mode can be **Disabled** (turned off) in Beltpac setup.

Beltpac LED Settings:

As shown above in the Beltpac LED's area of the window, you can select the desired functions for the LEDs on each Beltpac:

Disable All – In this mode, all LED's flash on momentarily when the Beltpac power is turned on. After that, they will all remain off. Note that a user can temporarily reactivate them by holding both the A and B buttons while turning on the power. When the power is turned off and on again, the LED's will go back to being disabled.

Disable All but Xmit – In this mode, the transmit (XMIT) indicator functions normally. All other LED's are off. Note that a user can temporarily reactivate them by holding both the A and B buttons while turning on the power. When the power is turned off and on again, the LED's will go back to being disabled.

Enable All – This is the default mode of operation for the Beltpac LED's. A user can temporarily disable the LED's by holding the C and D buttons while turning on the Beltpac. When the power is turned off and on again, the LED's will resume normal operation.

Indicator Lights
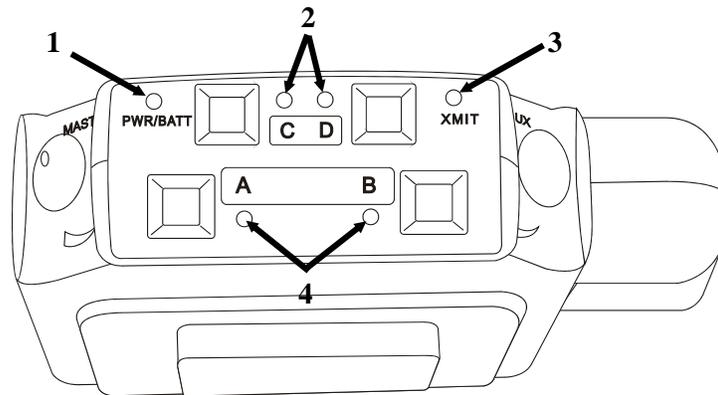
4. **Power/Battery Light**

   Remains lit when power is on.　　Green = good batteries
   Amber = low batteries
   Red = nearly dead batteries

5. **C and D Lights**

   On while any functions programmed into C and D buttons are activated.

6. **Transmit Light**

   On steady red while Beltpac is transmitting.

7. **A and B Channel Indicator Lights**

   A-green while listening on Channel 1.

   A-red while talking on Channel 1.

   B-green while listening on Channel 2.

   B-red while talking on Channel 2.

   A & B both green while listening to both channels (requires optional second receiver).

   A or B blinking green indicates current channel on dual-receiver Beltpac.

Beltpac Tone Settings:

You can change the Beltpac Tones from the **Configure** tab>**Edit Beltpac Tones** box>**Beltpac>Tones** path as shown below:
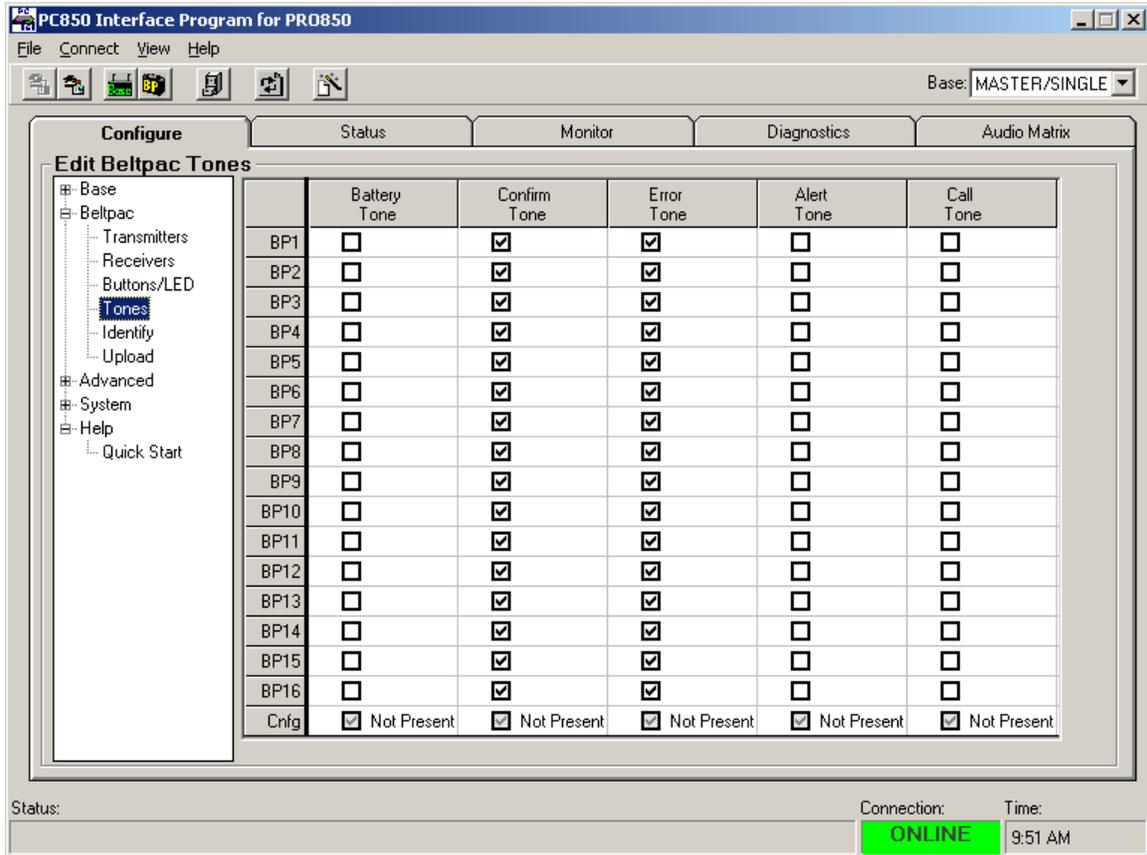
Select the events for which you would like tones to sound in that Beltpac user's headset. Each Beltpac can have its own tone configuration.

- **Battery tone** – When enabled, low battery warning tones will be heard.
- **Confirm tone** – Not presently used; leave enabled.
- **Error tone** – When enabled, busy signals and connection rejection tones will be heard. This should be left enabled for normal operation, especially when Beltpacs are sharing frequencies (PTS mode).
- **Alert tone** – When enabled, an alert tone will be heard as confirmation that the alert was received by the base.
- **Call tone** – When enabled, call tones will be heard when sent by other users.

Beltpac User Identifier Settings:

You can change the Beltpac Identifier from the **Configure** tab**>Edit Beltpac Identification** box**> Beltpac>Identify** path as shown below:
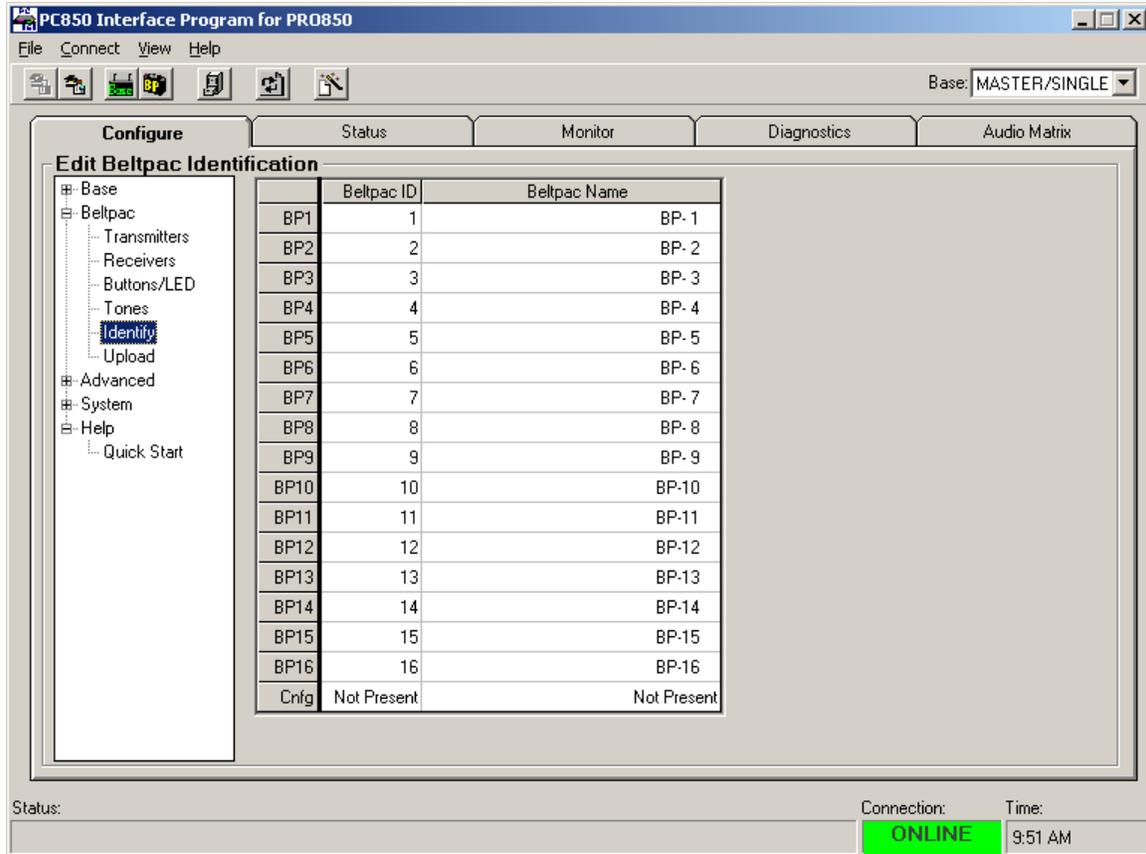
To assign identification to a Beltpac, such as a user's name, select a Beltpac and assign a name and ID number to each Beltpac.

NOTE: Each Beltpac <u>must have a different ID number</u>, and each assigned number must be programmed into the base, or the base will not recognize the Beltpac. Beltpacs with firmware version A.2.01 and newer can use any ID in the range 1 – 65000. Older Beltpacs with firmware version A1.xx can only use certain ID's. See Beltpac ID Restrictions application note for details. Beltpac names are optional and are used by the system when displaying Beltpac status. Name changes do not have to be uploaded to Beltpacs to be displayed on the base or PC850. They only need to be uploaded if PDA850 is used to access Beltpacs remotely.

Upload Beltpac Settings:

You can upload Beltpac settings from the base to a Beltpac (connected to the configuration port of the base) using the **Configure** tab**>Upload Beltpac** box**> Beltpac>Upload** path> **Upload** button. Before pressing the Upload button, be sure the correct Beltpac has been selected from the Select Beltpac Settings box.

NOTE: A Beltpac must be connected to the BELTPAC CONFIG connector on the base front panel to enable uploading of Beltpac settings. To ensure new settings are properly activated, turn the Beltpac off and disconnect it after uploading. Beltpacs will not accept settings changes while a talk button is held or latched.
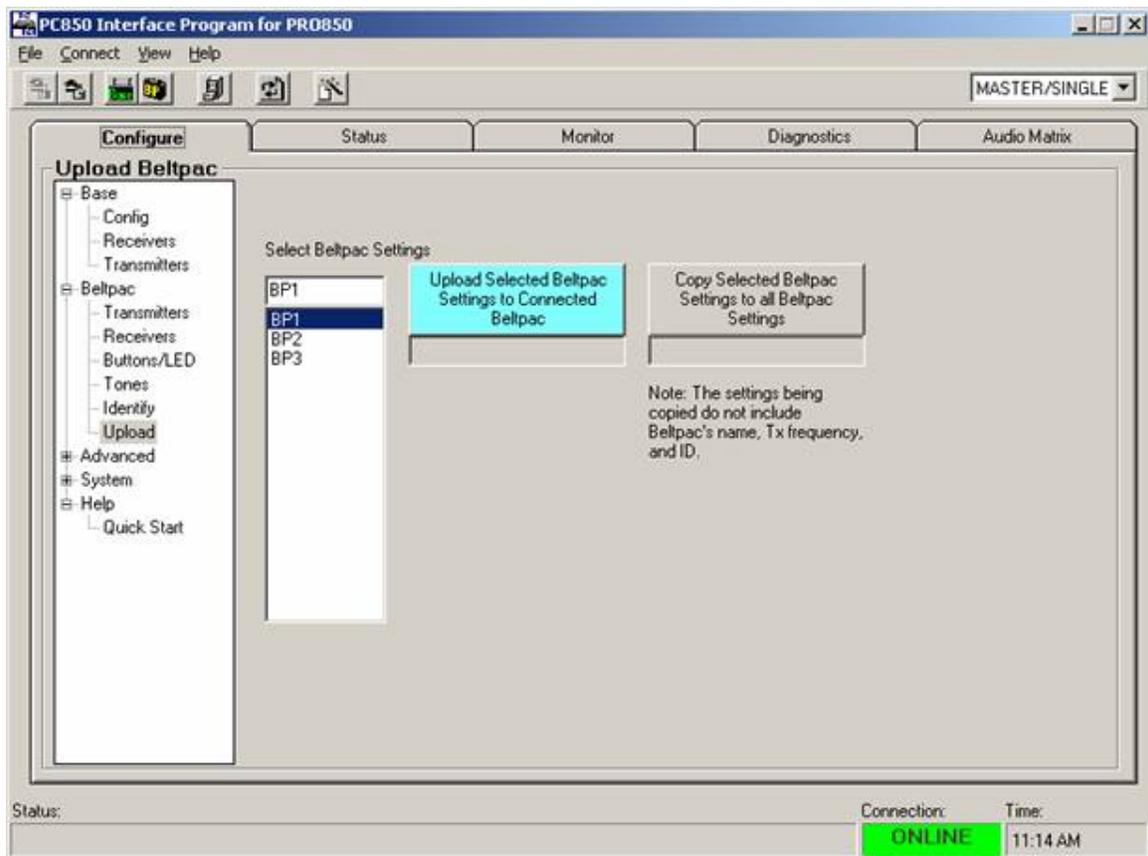
Copy Beltpac Settings:

As shown above from the **Configure** tab**>Upload Beltpac** box**> Beltpac>Upload** path> **Copy** button, you can copy settings from one Beltpac to all others (for all settings except ID numbers, names and transmit frequencies).

NOTE: This copy does not change ID numbers, names and transmit frequencies. All other settings will be copied from the selected Beltpac to all other Beltpacs (BP1 – BP16).

SECTION 7.   PC850 ADVANCED CONFIGURATION

Audio Mix Settings:

Each audio output in the system has a master output level adjustment and a set of mix-level adjustments. The master sliders can be adjusted between –37.5 dB and +12 dB in 1.5 dB steps. In each case, 0 dB is considered to be nominal. Each mix-level slider is an attenuator and has a range from –90 dB to 0 dB in 0.25 dB steps.

You can change the Base Audio Mix levels from the **Configure** tab**>Edit Advanced Base Configurations** box**> Advanced>Audio Mix** path as shown below:
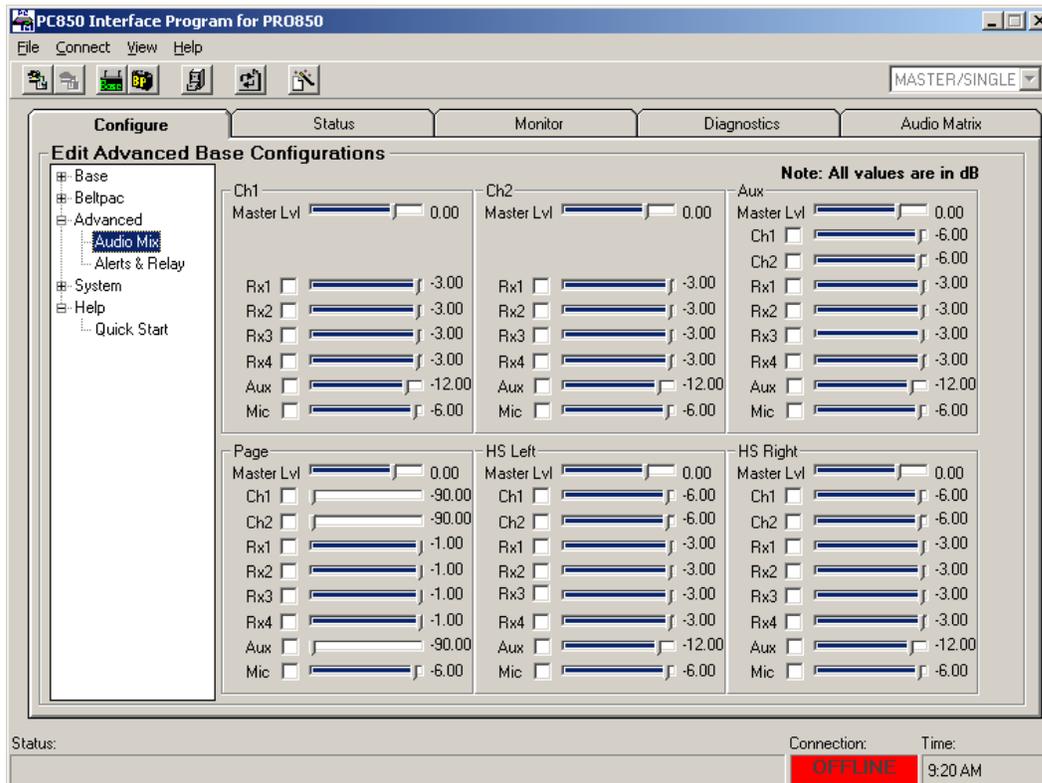
Intercom Output Mixing

Select Ch1 or Ch2 and then select the box next to Rx1-Rx4, Aux and/or Mic to enable input. Use the corresponding slider to adjust output level in 0.25dB increments for the desired mix.

Check the boxes for Rx1-Rx4 only if you want receiver audio continuously fed to the Intercom Output. Leave them unchecked for normal operation. Likewise, leave Mic unchecked for normal operation.

Adjust the Master slider if necessary to match levels between the PRO850 and the external audio system.

Auxiliary Output Mixing

Select the box next to Ch1, Ch2, Rx1-Rx4, Aux and/or Mic to enable input and then use the corresponding slider to adjust output level in 0.25dB or 2.25dB increments for the desired mix.

Check the boxes for Rx1-Rx4 only if you want receiver audio continuously fed to the Aux Output. Leave them unchecked for normal operation.

Adjust the Master slider if necessary to match levels between the PRO850 and the external audio system.

NOTE: With the Master slider in the 0 dB position, a 0 dBFS signal will produce a +20 dBu level at the output (unloaded).

Auxiliary Input and Output Functions

The base station Auxiliary input and output are used for different purposes depending on the system configuration. In Single, Not Distributed mode, the Auxiliary input can be mixed with other sources and delivered to any output. This allows an input such as program audio to be fed to all Beltpac users, wired intercom users, or simply monitored by the local headset. In this mode, the Auxiliary output may be used as a secondary paging channel (without relay contacts) when Beltpacs are configured for Talk Aux, or as an output to monitor any combination of inputs.

When the base is configured for Single, ISO+ mode, the Auxiliary input and output work together as an additional isolated four-wire intercom channel. Any input is delivered to all Beltpac users on both transmitters. Any Beltpac user pressing an ISO button will be heard through the Auxiliary output.

In Master/Slave modes, the Auxiliary input and output are used to distribute receiver audio from the Slaves up to the Master. See the section on Cascading Bases for more information. In that situation, be sure to leave the Master slider in its 0 dB position.

Page Output Mixing

Select the box next to Ch1, Ch2, Rx1-Rx4, Aux and/or Mic to enable input, then use the corresponding slider to adjust output level in 0.25dB increments for the desired mix.

Check the boxes for Rx1-Rx4 only if you want receiver audio continuously fed to the Page Output. Leave them unchecked for normal operation.

Adjust the Master slider to match the audio level from the PRO850 to the paging amplifier.

Headset Output Mixing

Separate mixers are provided for left and right earpieces. When a single-earpiece headset (4-pin) is used, the left and right signals are combined at the output.

Select HSL (headset left) or HSR (headset right), then select the box next to Ch1, Ch2, Rx1-Rx4, Aux and/or Mic to enable input. Use the corresponding slider to adjust output level in 0.25dB increments for the desired mix.

Check the boxes for Rx1-Rx4 only if you want receiver audio continuously fed to the Headset Output. Leave them unchecked for normal operation.

Master Level slider adjusts the overall headset audio output level in 1.5dB increments.

NOTE: the headset volume control (front panel knob) adjusts the outputs to both HSL and HSR simultaneously.

Alerts and Page Relay Settings:

Unlike the dedicated page relay, the alert relay is configurable for various functions. It can be configured to signal an alarm when an undesirable condition exists such as high temperature in the base station or a low battery in a Beltpac. It can also be used as a general purpose output controlled by a button on a Beltpac. The relay can be enabled for any combination of these actions.

The Page relay can be used to activate an external paging amplifier when a Beltpac user presses the Page button. The enable setting on this page enables or disables paging for all users.

You can change the Base Alerts and Page Relay settings from the **Configure** tab**>Edit Advanced Alerts** box**> Advanced>Alerts & Relay** path as shown below:
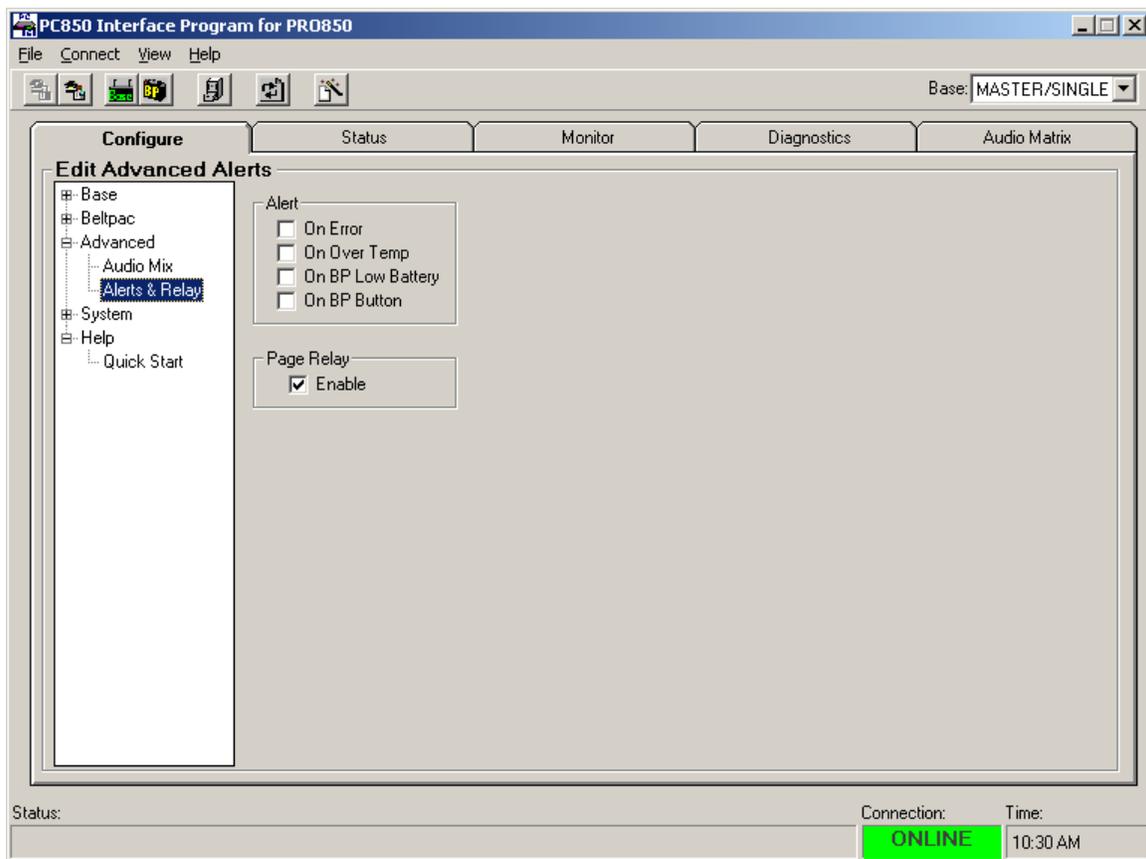
Alert Settings

To set the **Alert** relay to close under the desired conditions select any or all of the boxes in the Alert frame. If no boxes are checked, the alert relay will not be used.

- **Error** indicates the base detects a catastrophic error condition.
- **Over Temp** indicates the internal base temperature is excessive.
- **BP Low Battery** indicates that any Beltpac in the system has a low battery.
- **BP Button** indicates any Beltpac button that has been programmed as an alert button.

As an over temperature alarm, the relay is energized whenever the base station internal temperature exceeds 60°C. It remains energized until the temperature falls below 55°C. **The base will not shut down automatically due to over temperature conditions.** However, operating the system above the specified ambient temperatures may result in improper operation or damage.

When enabled to alert on low battery conditions, the relay will energize when any Beltpac reports a low battery condition. It will remain energized until all Beltpacs report good battery voltage. Thus, even if the battery runs down completely and the Beltpac stops operating, the alert condition will still exist until the battery is replaced and that Beltpac resumes operation.

If a general purpose Beltpac triggered output is desired, the BP Button condition should be enabled. In this case, the relay will energize whenever a user presses their alert button. The relay remains energized until the user releases the button. As confirmation, the Beltpac user will hear the alert tone (if enabled) in the headset while pressing the button.

NOTE: Beltpac firmware prior to version A.2.00 requires that the unit be in talk mode prior to pressing the Alert button. Newer models do not have this requirement.

The relay can also be enabled to signal fault conditions in the base. Faults of this type are catastrophic and require cycling power or repair.

Page Settings

To activate the page feature, click on **Enable** box. Disabling the relay disables the page function for all Beltpacs.

NOTE: If the page relay is not enabled and a Beltpac page button is pushed, a reject tone will be heard in the Beltpac's headset

SECTION 8.   PC850 SYNCHRONIZE BASES

Synchronize Base Station Settings:

You can synchronize settings for the Beltpacs in cascaded Base configuration of the PRO850 System from the **Configure** tab**>Sync Beltpac Settings with Slaves** box**> System>Sync Bases** path as shown below:
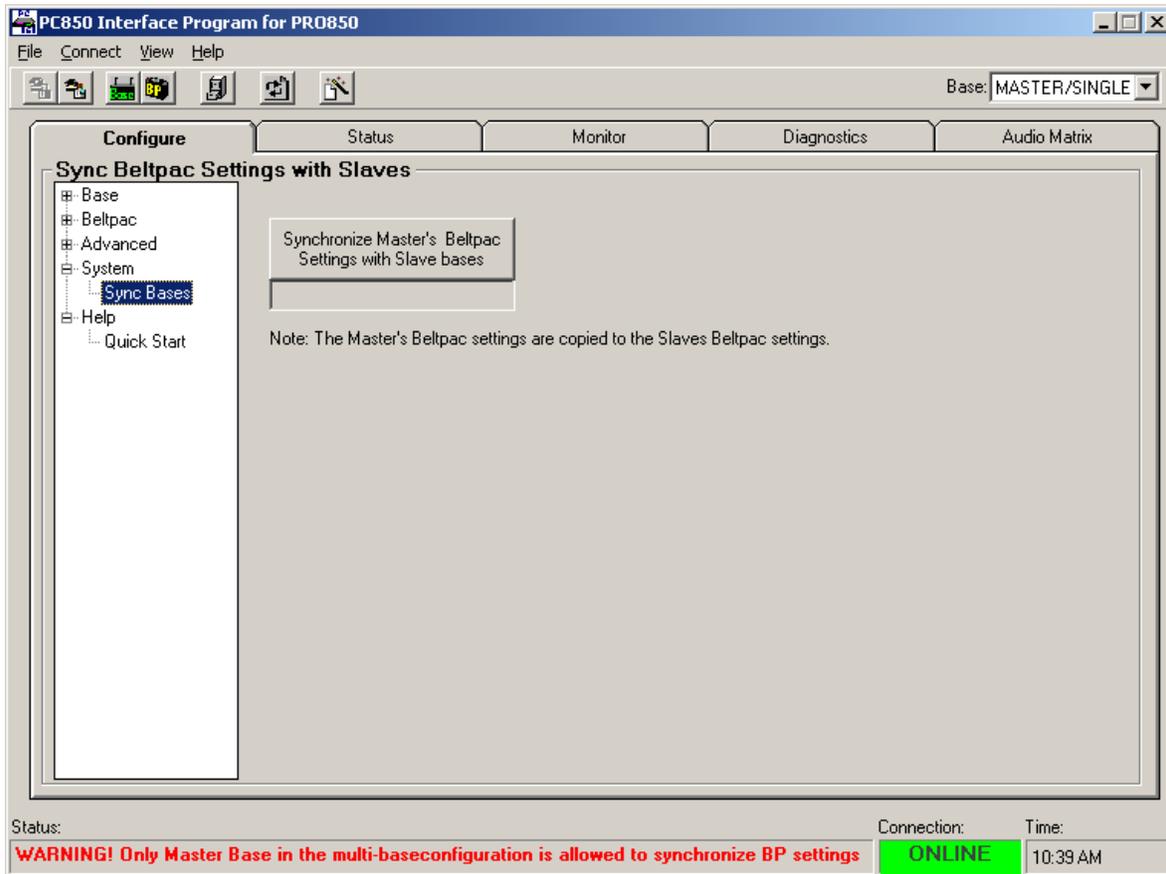
To configure synchronized base station settings, press the **Synchronize Master's Beltpac Settings with Slave bases** button.

NOTE: This only pertains to systems with Master and Slave base stations. All Beltpac settings are configured in the Master base station. Synchronizing the Slave bases will cause all Beltpac settings from the Master base station to be transferred to the Slaves.

This function also serves as a quick check of the communication between the Master and Slaves. If there are any communication problems, an error message is displayed in the status window under the button. The message will indicate the synchronization was successful, or will indicate which slave failed to respond.

System Status:

The Status screen shows the operational status of the entire PRO850 system. Status information is available on this screen for the base station and all of the Beltpacs. In a master/slave configuration, only the status for the selected base is displayed. Other base(s) can be selected from the list in the upper left. The status for all Beltpacs is displayed no matter which base is selected.

NOTE: You can only access this display while connected to a Base station, and online.

NOTE: To move this screen relative to the other windows on the desktop, press the "Freeze Screen" button. This will pause communication from the base station until the button is unlatched.

Receiver Status

Receiver status shows current Rx Signal and Rx Tuning levels for all BS850 receivers.

There are separate signal-strength and tuning meters for each receiver module in the base. Signal-strength meters fill in from left to right with increasing signal strength.

When a signal is being received, the tuning indicator should be near the zero at the center of the scale. The absolute position is not critical. When no signal is being received, the tuning indicator may be offset to the left or right. If a tuning indicator is far to one side, it indicates the presence of a strong signal on an adjacent frequency. In that case, it is advisable to change to a different frequency to avoid interference or range problems.

Transmitter Status

Transmitter status shows current Power mode, Power Level and Frequency settings for both BS850 transmitters.

44

System (Voltages and Temperature) Status

Base station power supply voltages are shown. The **12V** box shows the actual input voltage supplied to the base station. Each of the other voltages should be within ±10% of the marked value. The **T°C** box shows base station internal temperature in degrees Celsius.

Beltpac Status

Beltpac status shows Beltpac Name, assigned Base, current Beltpac Talk status, Beltpac Battery level, Beltpac Tx Power level and Beltpac transmit signal level.

- The **BASE** box shows which base in a master/slave configuration is actually receiving that particular Beltpac.
- The **Talk** box shows if Beltpac user is pressing Talk button.
- The **Batt** box shows battery status of the selected Beltpac (OK, Low or Dead).
- The **Tx Pwr** box shows the current transmitter power level of the selected Beltpac.
- The **Signal** box indicates how well the Beltpac is receiving transmission (Low, OK or High) from the base station.

Beltpac transmit can be aborted by clicking on the corresponding row of the Beltpac status table and pressing on Stop Tx button. This will stop a latched-on Beltpac from transmitting.

Name	BASE		Talk	Batt	Tx Pwr	Signal
BP-1	Stop Tx	X	On	OK	1 mW	High
BP-2	UNKNOWN		Off	Unknown	Unknown	Unknown
BP-3	UNKNOWN		Off	Unknown	Unknown	Unknown

When a Beltpac's status is shown as unknown, that indicates the Beltpac is either turned off or in PTS mode, and not currently transmitting. Status will always be displayed for all Beltpacs that are on and in PTT or PTE modes. Status for Beltpacs in PTS mode is only shown while those Beltpacs are in Talk operation.

SECTION 10.   PC850 MONITOR

Monitor Audio:

The Monitor displays provide visual indications of audio input/output levels and input level adjustments for all audio paths into the base station. Audio meters display both the instantaneous and last peak audio levels. The meters are calibrated relative to 0 dBFS. That is the maximum audio level supported by the DSP.

NOTE: You can only access this display while connected to a Base station, and online.
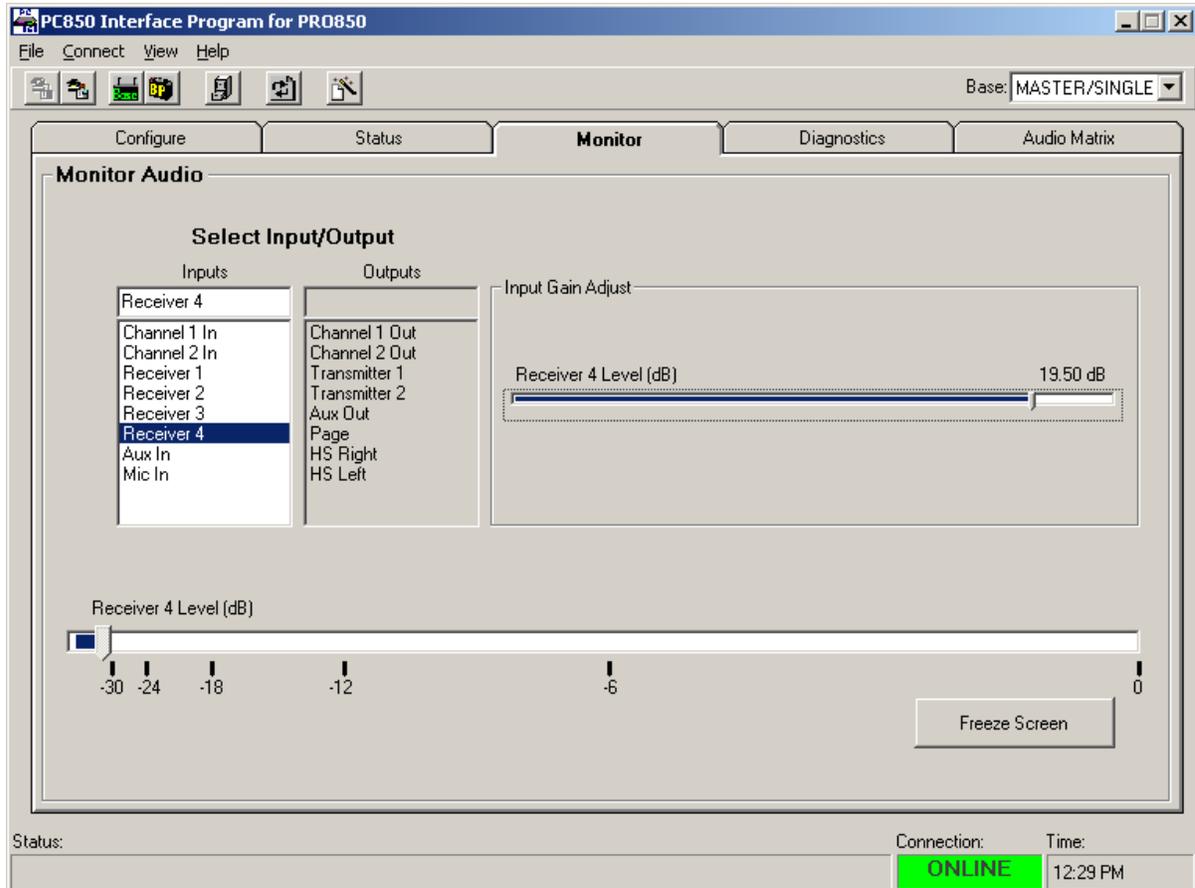
NOTE: To move this screen relative to the other windows on the desktop, press the "Freeze Screen" button. This will pause communication from the base station until the button is unlatched.

Monitor Audio Levels at Base Station Inputs

Select the desired input source from the Inputs box and then use the Input Gain Adjust slider to adjust the audio input level from the selected source in 1.5dB increments. Each input has its own independent adjustment that has a gain range from 0 dB to 22.5 dB. To avoid clipping, do not allow the bar to hit the 0 dB mark repeatedly.

Monitor Audio Levels at Base Station Outputs

Select the desired output source from the Outputs box to view the output level from the DSP of the desired output to be monitored. This reading is taken prior to the output level adjustment and therefore does not reflect its setting.

SECTION 11.   PC850 DIAGNOSTICS

Diagnostic Tests:

Selected diagnostic tests and signals are available from the Diagnostics tab. Data communication between the base and the Beltpacs can be tested using the Subcarrier Tx and Rx Tests.

A built-in tone generator is provided to test or adjust audio circuits. The generator can provide a low-distortion sine wave, triangle wave or square wave signal to any output.

NOTE: You can only access this display while connected to a Base station, and online.
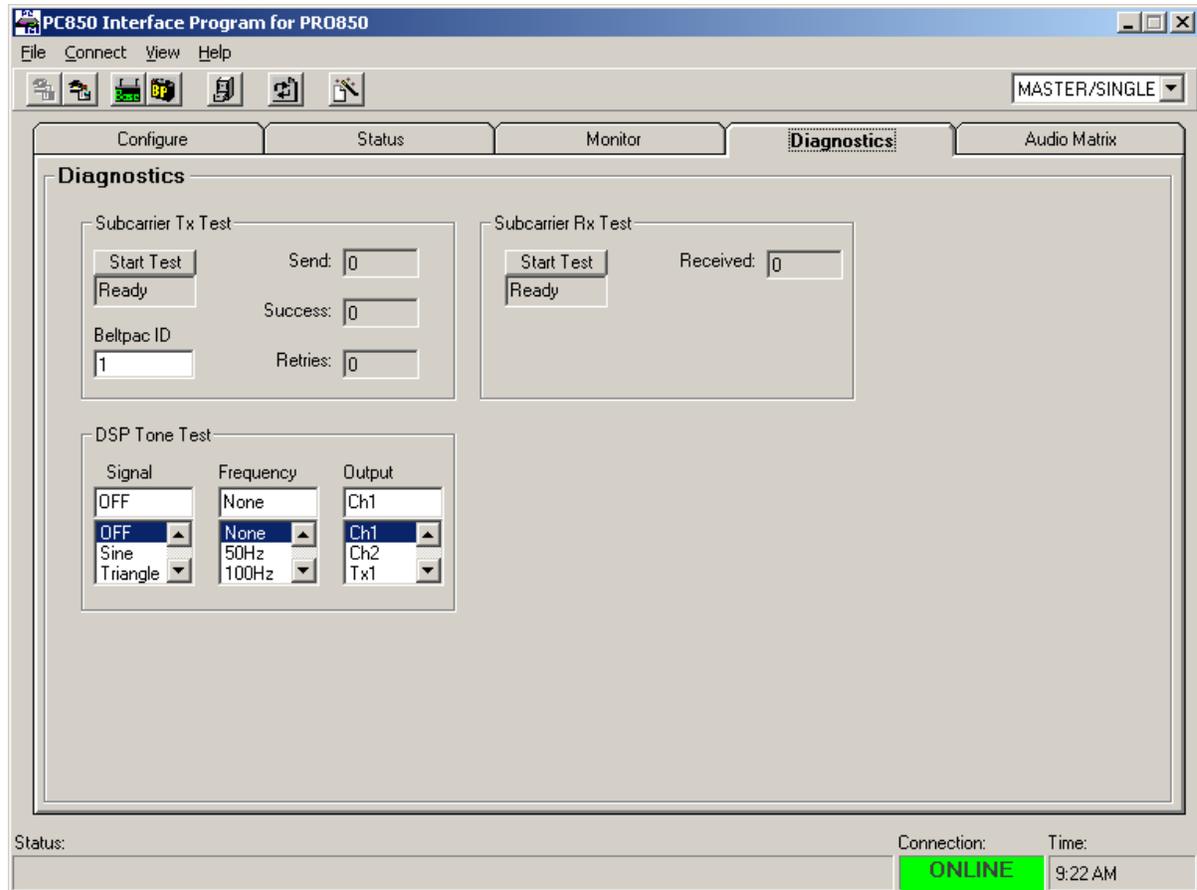
Subcarrier Transmitter (Tx) Test

The Subcarrier Tx Test is used to verify two-way data communication with a particular Beltpac. This test can be used to check the operation of Beltpac receivers and transmitters. It can also be used to verify operation at the fringe of the range.

NOTE: This test can be run at any time for Beltpacs in PTT or PTE mode without impacting normal operation. Users will not even be aware the test is running. Test results for Beltpacs in PTS mode may be unpredictable because the test will be interrupted any time another user on that frequency talks.

To perform a **Sub Carrier Transmitter Test**:

- Select the Beltpac ID number for the specific Beltpac you wish to test with the Beltpac ID box.
- Press **Start Test** button.
- Let the test run for a period of time, then press the **Stop Test** button to stop it. The results will be shown at the right side of the display. The longer the test is allowed to run, the higher the number of sounds.

NOTE: The Beltpac must be turned on. It is normal for the number of successes to be 1 less than the number of sends, even with 0 retries. This happens when the test is stopped before the Beltpac responds to the last send.

Subcarrier Receiver (Rx) Test

The Subcarrier Rx Test is used to simply verify the Base is receiving data from the Beltpacs. It would normally only be used if the Subcarrier Tx Test fails.

To perform a **Sub Carrier Receiver Test**:

- Press simultaneously the Beltpac C and D buttons. The C and D LEDs will both light and stay on.

- Press **Start Test** button.

After completing the test, be sure to turn off the Beltpac. It will remain in the test mode until it is turned off.

Tone Generator Tests

Use the tone generator to produce full-amplitude audio tones for testing or adjusting audio circuits or connections. The test tone can be applied to any or all audio outputs, including the base transmitters and the wired intercom system.

To operate the internal tone generator, use **DSP Tone Test** function:

- Select the waveform type in the Signal box (Off, Sine, Triangle, Square or Impulse)

- Select Frequency in the Frequency box (50, 100, 300, 400, 700, 1kHz, 3kHz, 4kHz, 7kHz, 10kHz or 12kHz). The impulse signal is unaffected by the frequency setting.

- Select Output in the Output box (Ch1, Ch2, Tx1, Tx2, Aux OUT, Page, HSR, HSL, All HS, All Tx or All).

To turn off the internal **DSP Tone** generator, select **Off** in the Signal waveform type list.

NOTE: Due to the digital sampling approach, the triangle waveform will not be smooth above 1 kHz. The square waveform will have jitter above 4 kHz and always has some ringing on the edges. Use caution when sending a tone into the wired intercom system. Excessive levels could damage headsets or user's hearing.

SECTION 12.   PC850 AUDIO MATRIX

PC850 Audio Connection Matrix:

NOTE: You can only access this display while connected to a Base station, and online.

A particularly useful feature of PC850 is the ability to display (and alter) the audio connection matrix. This window shows all possible and active audio connections. To open the window, click on the Audio Matrix Tab. Once open, the window will display all active connections as check marks beside a green square. As connections change, the screen will be updated with the new information. To force a manual connection, simply check the desired box(es). To break a connection, uncheck the desired box(es). Note that two types of connections are shown: Manual connections and dynamic connections. Manual connections result from configuration settings or functions. Dynamic connections result from Beltpac operations or the front panel Talk button. Checking a box in the window always results in a manual connection. Manual connections are not overridden by dynamic operations. However, clearing a connection manually does not prevent a later dynamic or manual connection from being established.
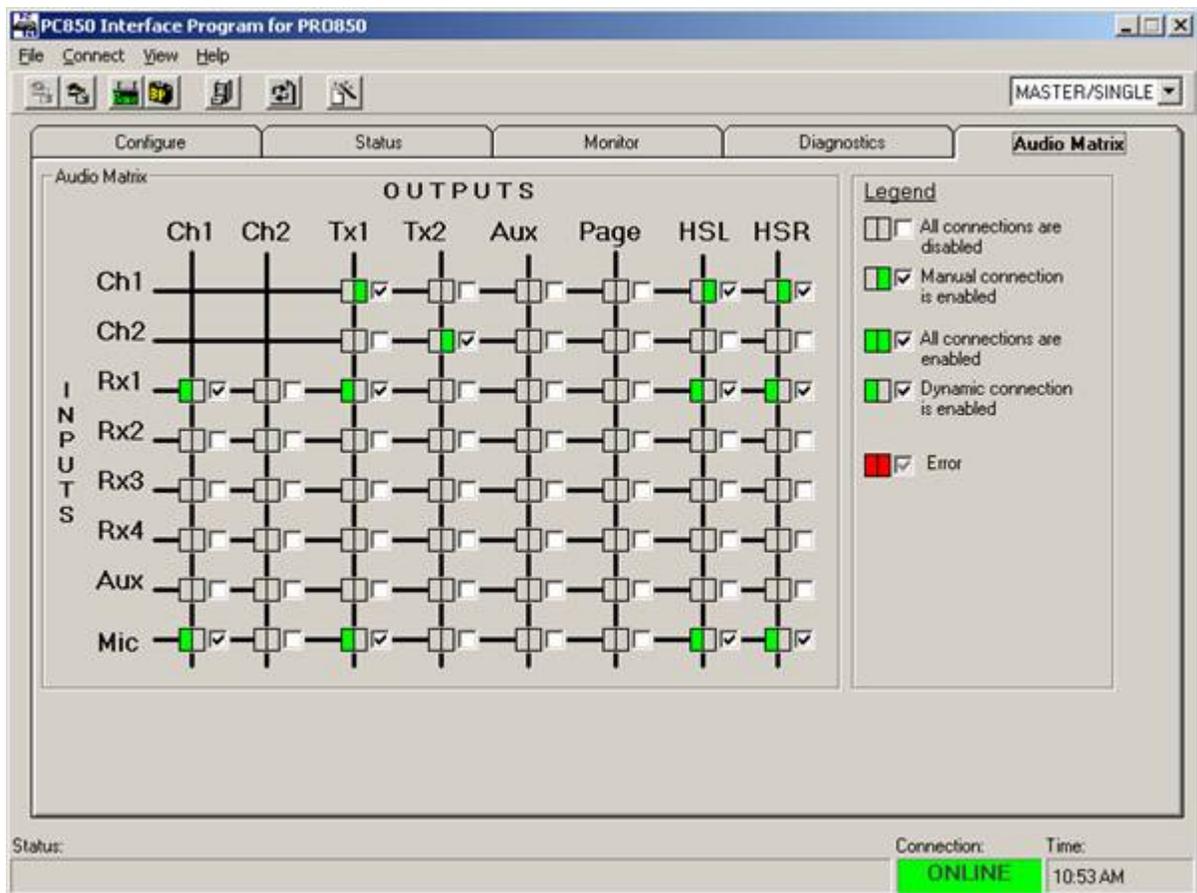
NOTE: The Audio Connection Matrix window can only be opened while PC850 is "online".

SECTION 13.   PC850 WIZARD

The PC850 provides a wizard to simplify the configuring of your PRO850 system.
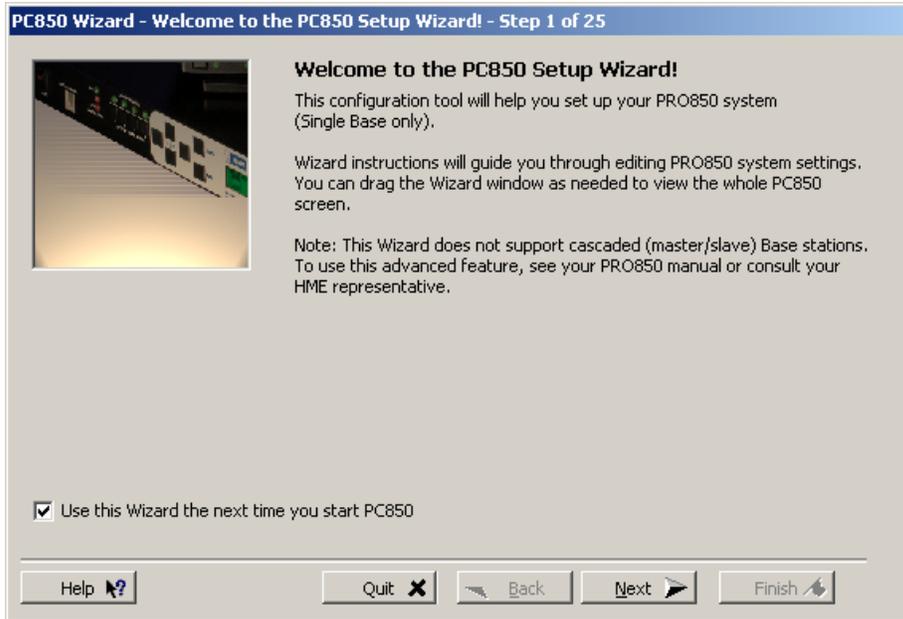
This wizard is integrated with the PC850 to take you through a series of steps to set up both your base station and Beltpacs. The wizard helps to configure a Single-Base system with non-shared Rx frequencies. Each screen within the wizard has a "Help" button, which will open PC850 help at the specific section pertaining to that screen.

SECTION 14.   PRO850 EQUIPMENT DATA

Determining your Base Station's Band ID:

PRO850 systems always use a pair of frequency bands - one for transmit and one for receive. The Band ID of a base indicates which pair of frequency bands that base uses. To determine the Band ID find on the side or rear of your Base Station a label with the Product K-number as follows:

K25850 - ABCD, where the letter "B" is replaced by a single letter or number.

- B = 1 for Band 1-9 (Base Tx: 488MHz - 506MHz   Beltpac Tx: 632MHz - 650MHz)
- B = 2 for Band 2-A (Base Tx: 506MHz - 524MHz   Beltpac Tx: 650MHz - 668MHz)
- B = 4 for Band 4-C (Base Tx: 542MHz - 560MHz   Beltpac Tx: 686MHz - 697.825MHz)

Base Station Front Panel Features:
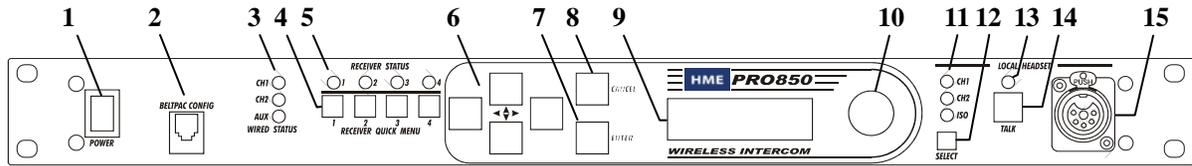
1. POWER switch
2. BELTPAC CONFIGuration connector (RJ10 telephone handset cable connector)
3. WIRED STATUS lights
    CH1 = Channel 1 intercom status
    CH2 = Channel 2 intercom status
    AUX = ISO+ mode
4. RECEIVER QUICK MENU buttons
5. RECEIVER STATUS lights
6. Arrow buttons (move curser around on menu)
7. ENTER button (selects function or setting)
8. CANCEL button (backs out of menus or cancels operation)
9. Display screen
10. Multi-function knob (headset volume control; adjustment for specific menu selections)
11. Local headset function lights
12. Local headset function select switch
13. Local headset TALK indicator light
14. Local headset TALK switch
15. Local headset connector

Base Station Rear Panel Features:
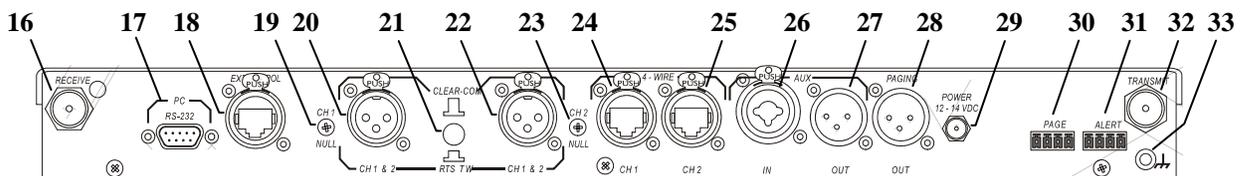
16. Receiver antenna connector
17. 9-pin RS-232 computer connector
18. RS-422 interface (for connecting two or more bases together)
19. Channel 1 null adjustment
20. Channel 1 2-wire intercom interface connector
21. Clear-Com/RTS select button
22. Channel 2 2-wire intercom interface connector
23. Channel 2 null adjustment
24. Channel 1 RJ45 4-wire intercom interface connector
25. Channel 2 RJ45 4-wire intercom interface connector
26. Auxiliary input connector (accepts XLR plug or standard phone plug)
27. Auxiliary output connector
28. Paging output connector
29. 12-14VDC power jack
30. Page relay connector
31. Alert relay connector
32. Transmitter antenna connector
33. Grounding screw

Beltpac Top Panel Features:
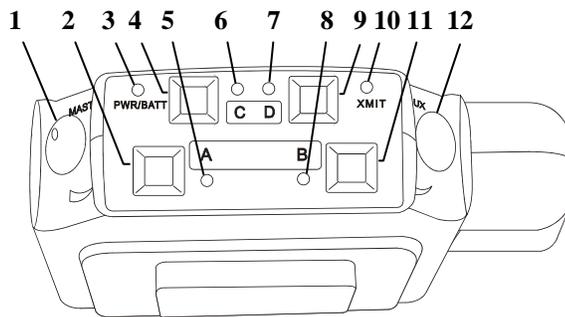
1. Master power/volume control
2. "A" button
3. Power and battery condition indicator
4. "C" button
5. "A" light – indicates Channel 1 active
6. "C" function light
7. "D" function light
8. "B" light – indicates Channel 2 active
9. "D" button
10. Transmit light – indicates transmitter on
11. "B" button
12. Auxiliary volume control

Beltpac Bottom Panel Features:
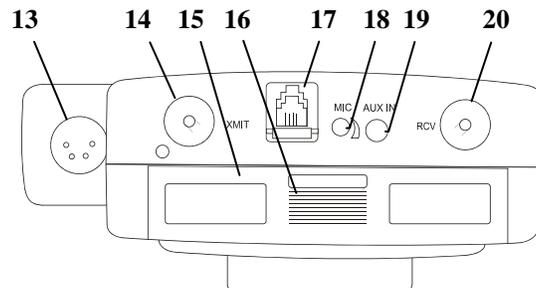
13. Headset connector
14. Transmitter antenna connector
15. Remote configuration connector
16. Battery compartment cover
17. Battery cover thumb grip
18. Microphone gain adjustment
19. Auxiliary input connector
20. Receiver antenna connector

Block Diagrams:

Base Station
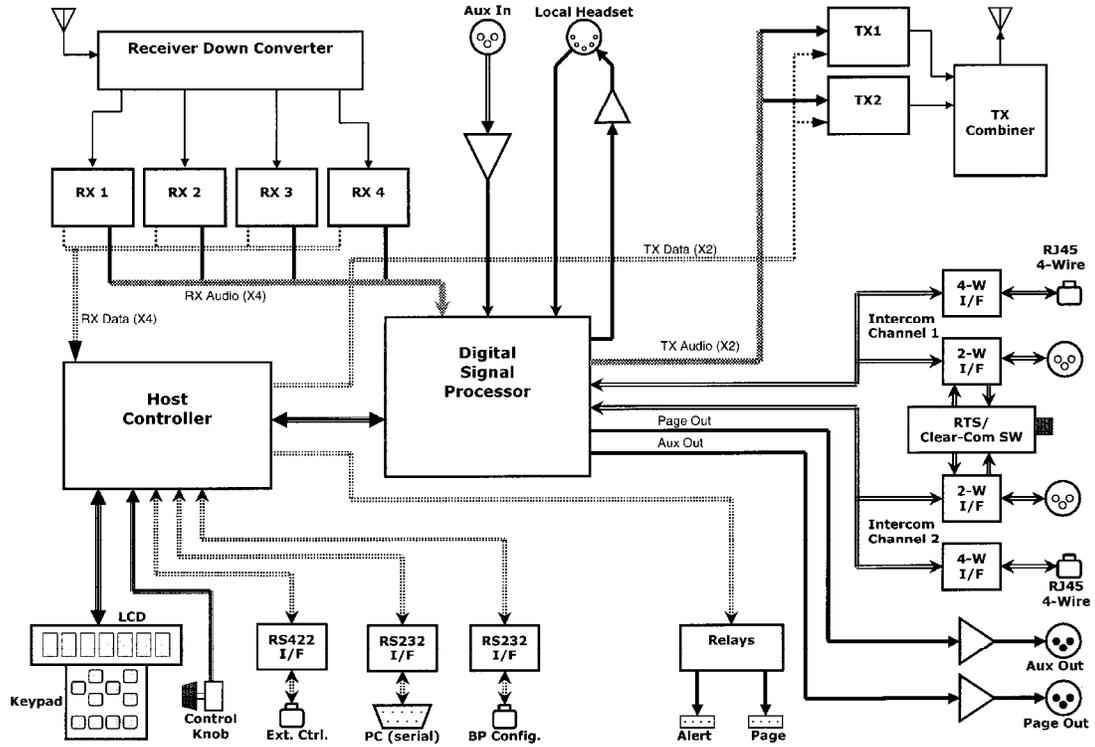
Beltpac
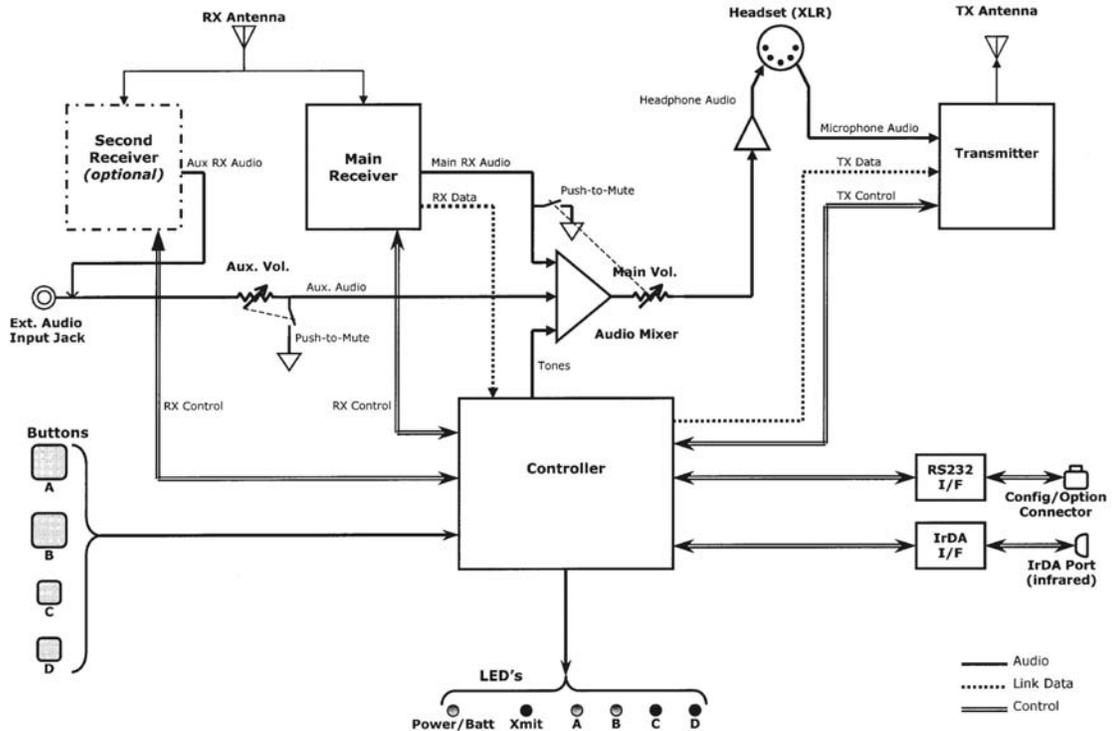
Equipment Specifications:

Base Station

General —

Frequency Range:	470-608 MHz, 614-697.825 MHz in 18 MHz Tx and Rx bands (12 MHz in Band C)
Frequency Response:	50 Hz to 10 kHz
Power Requirements:	100-240VAC, 50-60Hz or 12-14VDC
Temperature Range:	32-122°F (0-50°C)
Size:	19" x 1.72" x 11.5" (1-RU) (48.26 x 4.37 x 29.21 cm)
Weight:	<11 lbs. (4.99 kg maximum)
# of Receivers:	1 to 4, configurable
# of Transmitters:	0 to 2, configurable
4-Wire I/O:	RJ45, 6̃0Ω balanced, level adjustable, simultaneous operation with 2-wire
2-Wire I/O:	XLR-3F, externally-switchable RTS® or Clear-Com® mode, 2̃0Ω, level adjustable, null adjustable
Auxiliary Input:	XLR-3F/¼" (6.35 mm) combo jack, 6̃0Ω balanced, level adjustable
Auxiliary Output:	XLR-3M, 6̃0Ω balanced, level adjustable
Paging Output:	XLR-3M, 6̃0Ω balanced, level adjustable
Page & Alert Relay:	2 four-pin Molex, 60W switching capacity (2A @ 30VDC)
Beltpac Interface:	RJ10, RS-232
PC Interface:	DB9, RS-232, 38400 baud
External Control Interface:	RJ45, RS-422

Headset Connector:	XLR-4M	Optional field-installable XLR-5F
	pin 1 = mic-lo	pin 1 = mic-lo
	pin 2 = mic-hi	pin 2 = mic-hi
	pin 3 = ear-lo	pin 3 = common
	pin 4 = ear-hi	pin 4 = ear-left
		pin 5 = ear-right

Mic Input:	Auto-detect, low impedance dynamic or electret microphone
Headset Output:	Stereo – 160mW per side
	Mono – >200mW into 50Ω
Front Panel Controls:	Power Switch
	Up, Down, Left, Right, Enter & Cancel Menu Buttons
	Receiver Quick-Menu Buttons
	Rotary knob for adjustments
	Headset channel select & PTT
Front Panel Indicators:	Graphic LCD, 4 Receiver Status LEDs, 3 Intercom Status LEDs, 3 Headset channel select LEDs, Headset PTT LED
Rear Panel Controls:	2-wire channel line null
	RTS®/Clear-Com® mode switch

Transmitter —

Type:	720 synthesized, 25 kHz channel steps
Transmit Power:	240, 100, 10 or 1 mW
Modulation Type:	FM
Deviation:	50 kHz
Occupied Bandwidth:	190 kHz maximum
Frequency Stability:	10 ppm
Harmonics/Spurious:	Exceeds FCC specifications
Antenna Type:	¼-wave whip (supplied) or external (BNC connector)

Receiver —

Type:	720 synthesized, 25 kHz channel steps (480 steps in Band C)
RF Sensitivity:	<1µV for 20dB SINAD
Squelch:	Adjustable
Image Rejection:	60dB
Squelch:	Data channel coded plus carrier signal level
Squelch Quieting:	90dB
Frequency Stability:	10 ppm
Distortion:	<1% at maximum deviation
Antenna Type:	¼-wave whip (supplied) or external (BNC connector)

Beltpac

General —

Frequency Range:	470-608 MHz, 614-697.825 MHz in 18 MHz Tx and Rx bands (12 MHz in Band C)
Antenna Type:	Flexible ¼-wave, field-replaceable
Frequency Response:	50 Hz to 10 kHz
Battery Requirements:	6 "AA" Alkaline Cells (optional NiMH)
Battery Life:	PTE − Up to 9 hours (alkaline), PTT − Up to 15 hours (alkaline)
Temperature Range:	32-122°F (0-50°C)
Weight:	16 oz (.454 kg) with batteries
Base Interface:	RJ10, RS-232
PDA Interface:	IrDA
Auxiliary Input:	Connector: 1/8" (3.18 mm) miniature phone jack
	Impedance: 10kΩ
	Receive Level: 100mV minimum
	Overrides optional 2nd receiver if installed
Headset Connector:	XLR-4M, optional field-installable XLR-5F
Mic Input:	Auto-detect, low impedance dynamic or electret microphone
Headset Output:	200mW @ 1% THD into 50Ω, capable of driving 8-400Ω
Controls:	Main Volume Control with power switch and push-to-mute, 2nd RCVR/Ext. Volume Control with push-to-mute, 4 mode/function switches Microphone gain adjustment
Indicators:	Power/low battery LED, Transmit LED, 2 channel LEDs, 2 function LEDs

Transmitter —

Type:	Synthesized, 720 25 kHz channel steps (480 steps in Band C)
Transmit Power:	100, 50, 10 or 1 mW configurable for fixed output or automatic power control
Transmission Modes:	Push-to-talk (PTT), push-to-talk-shared (PTS), or push-to-enable (PTE) May be configured for momentary or latch mode
Modulation Type:	FM
Deviation:	50 kHz
Occupied Bandwidth:	190 kHz maximum
Frequency Stability:	10 ppm
Harmonics/Spurious:	Exceeds FCC specifications

Receiver —

Type:	Synthesized, 720 25 kHz channel steps
RF Sensitivity:	<1µV for 20dB SINAD
Image Rejection:	60dB
Squelch:	Adjustable carrier signal level
Squelch Quieting:	80dB
Frequency Stability:	10 ppm
Distortion:	<1% at maximum deviation

Factory Defined Frequencies:

Band 9 Beltpac Tx Base Rx		Band 1 Base Tx Beltpac Rx		Band A Beltpac Tx Base Rx		Band 2 Base Tx Beltpac Rx		Band C Beltpac Tx Base Rx		Band 4 Base Tx Beltpac Rx	
Group/Channel	Freq. (MHz)	Group/Channel	Freq. (MHz)	Group/Channel	Freq. (MHz)	Group/Channel	Freq. (MHz)	Group/Channel	Freq. (MHz)	Group/Channel	Freq. (MHz)
S1	633.250	P1	490.250	S1	651.250	P1	508.250	S1	687.250	P1	544.250
P1	633.375	S1	490.500	P1	651.375	S1	508.500	P1	687.375	S1	544.500
T1	633.500	T1	491.250	T1	651.500	T1	509.250	T1	687.500	T1	545.250
S2	633.875	P2	491.750	S2	651.875	P2	509.750	S2	687.875	P2	545.750
P2	634.000	S2	496.250	P2	652.000	S2	514.250	P2	688.000	S2	550.250
T2	634.125	T2	496.500	T2	652.125	T2	514.500	T2	688.125	T2	550.500
S3	635.000	P3	497.250	S3	653.000	P3	515.250	S3	689.000	P3	551.250
P3	635.125	S3	497.750	P3	653.125	S3	515.750	P3	689.125	S3	551.750
T3	635.250	T3	502.250	T3	653.250	T3	520.250	T3	689.250	T3	556.250
S4	636.875	P4	502.500	S4	654.875	P4	520.500	S4	690.875	P4	556.500
P4	637.000	S4	503.250	P4	655.000	S4	521.250	P4	691.000	S4	557.250
T4	637.125	T4	503.750	T4	655.125	T4	521.750	T4	691.125	T4	557.750
S5	637.250			S5	655.250			S5	691.250		
P5	637.375			P5	655.375			P5	691.375		
T5	637.500			T5	655.500			T5	691.500		
S6	638.250			S6	656.250			S6	692.250		
P6	638.375			P6	656.375			P6	692.375		
T6	638.500			T6	656.500			T6	692.500		
S7	641.000			S7	659.000			S7	695.000		
P7	641.125			P7	659.125			P7	695.125		
T7	641.250			T7	659.250			T7	695.250		
S8	643.000			S8	661.000			S8	697.000		
P8	643.125			P8	661.125			P8	697.125		
T8	643.250			T8	661.250			T8	697.250		
S9	645.625			S9	663.625						
P9	645.750			P9	663.750						
T9	645.875			T9	663.875						
S10	646.125			S10	664.125						
P10	646.250			P10	664.250						
T10	646.375			T10	664.375						
S11	646.875			S11	664.875						
P11	647.000			P11	665.000						
T11	647.125			T11	665.125						
S12	648.500			S12	666.500						
P12	648.625			P12	666.625						
T12	648.750			T12	666.750						

SECTION 15.   PRO850 OPERATION

Uses of Base Station Front-Panel Controls, Indicators and Connectors
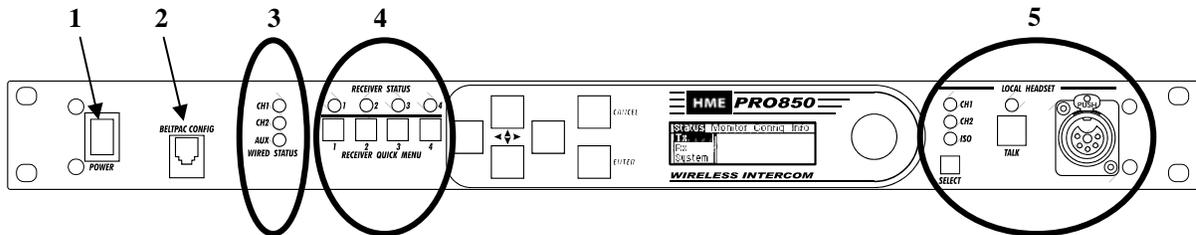
1. Power Switch

Press the upper part of the switch to turn the power on. A red light on the switch will be lit when the base station power is on. Press the lower part of the switch to turn the power off. The red light will go off.

2. Beltpac Configuration Connector

After Beltpac configuration settings have been made in the base station, plug one end of the enclosed RJ10 interconnect cable into this connector, and plug the other end into the RMT receptacle on the bottom of a Beltpac to upload the settings into the Beltpac. Repeat this to upload settings for each Beltpac to be used. ***CAUTION:*** *Be sure not to turn the Beltpac power off and on again while it is connected to the base station. If this does happen, unplug the cable and cycle the Beltpac power again.*

3. Wired Status Indicator Lights

CH1 and **CH2** lights:

> If a 4-wire intercom channel is enabled, the respective CH1/CH2 light will blink when the PRO850 is sending audio on that intercom line.
> If a 2-wire interface channel is enabled, the respective CH1/CH2 light will be on steady when the user is not talking. When the user is talking, the light will be on steady and blinking off.

Aux light:

> The Auxiliary light indicates use of the ISO+ mode. When ISO+ is on, the AUX light will be on steady. When someone is talking on the ISO channel, the light will be on steady, blinking off.

4. Receiver Status Indicators and Buttons

RECEIVER STATUS lights 1 – 4:

> **Steady red** if the respective receiver squelch is turned down, or if it is receiving a signal (squelch is open).
> **Blinking amber** when the respective receiver is receiving status update from a Beltpac.
> **Steady green** when the Beltpac user is talking through the receiver.
> **Blinking red or green** if the Beltpac being received has a low battery condition.

RECEIVER QUICK MENU buttons 1 – 4:

> When pressed, squelch and audio controls for the respective receiver are provided immediately on the display screen.

5. Local Headset Connector and Controls

Plug your local headset connector into the receptacle at the right end of the PRO850 front panel. Use the SELECT button to choose communication channels CH1, CH2, CH1 and CH2 together, or ISO. The respective indicator light above the button will remain lit for the selection you make. Press and release the TALK button quickly to "latch on" for open communication. Press and release the button again quickly to "latch off."
Press and hold the TALK button for more than one second for momentary communication. In this mode, the selected channel will remain open only as long as you are pressing the TALK button.