ZETRON®

Model 4010 Radio Dispatch Console
Installation and Programming

025-9227S

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

The Ringer Equivalence Number (REN) for this terminal equipment is 0.1. The REN assigned to each terminal equipment provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the RENs of all the devices does not exceed 5.0.

Information on Disposal of Old Electrical and Electronic Equipment and Batteries (applicable for EU countries that have adopted separate waste collection systems)

Products and batteries with the symbol (crossed-out wheeled bin) cannot be disposed as household waste. Old electrical and electronic equipment and batteries should be recycled at a facility capable of handling these items and their waste byproducts.

Contact your local authority for details in locating a recycle facility nearest to you.

Proper recycling and waste disposal will help conserve resources whilst preventing detrimental effects on our health and the environment.

Pb

Notice: The sign “Pb” below the symbol for batteries indicates that this battery contains lead.

Safety Summary

Warning! For your safety and the protection of the equipment, observe these precautions when installing or servicing Zetron equipment:

- Follow all warnings and instructions marked on the equipment or included in documentation.
- Only technically qualified service personnel are permitted to install or service the equipment.
- Be aware of and avoid contact with areas subject to high voltage or amperage. Because some components can store dangerous charges even after power is disconnected, always discharge components before touching.
- Never insert objects of any kind through openings in the equipment. Conductive foreign objects could produce a short circuit that could cause fire, electrical shock, or equipment damage.
- Remove rings, watches, and other metallic objects from your body before opening equipment. These could be electrical shock or burn hazards.
- Ensure that a proper electrostatic discharge device is used, to prevent damage to electronic components.
- Do not attempt internal service of equipment unless another person, capable of rendering aid and resuscitation, is present.
- Do not work near rotating fans unless absolutely necessary. Exercise caution to prevent fans from taking in foreign objects, including hair, clothing, and loose objects.
- Use care when moving equipment, especially rack-mounted modules, which could become unstable. Certain items may be heavy. Use proper care when lifting.

Change List for Rev S, 7 March 2011

- Added caution about silkscreen labels in *Dual Channel Card Jumpers and Switches* on page 27.
- Corrected the channels associated with J2, J3, and J4 in *Model 4010 Main Control Board* on page 104.
- Added to the description of *Instant Call* on page 127.
- Updated JP6-B description in *Configuration* on page 51.
- Removed *Entering IDs in Ericsson/GE MDX Radio*.

Contents

Introduction

The Model 4010 Radio Dispatch Console is a self-contained, multichannel, desktop console. It is a single position console that interfaces directly to the radio transceivers and telephone lines. It is suitable for use in public safety applications, such as police and fire communications, as well as public service applications, such as utility and industrial communications. The Model 4010 may be tailored to fit the size of the system, from 2 to 12 radio channels, by adding dual channel cards as required. The channels can be configured to support a mix of control types: DC remote, tone remote, local control, and E&M control.

Figure 1: Model 4010

The diagram in Figure 2 illustrates a Model 4010 Radio Dispatch Console configured with four radio channels. A console can be configured with up to 12 radio channels.

Figure 2: Typical Model 4010 System Layout

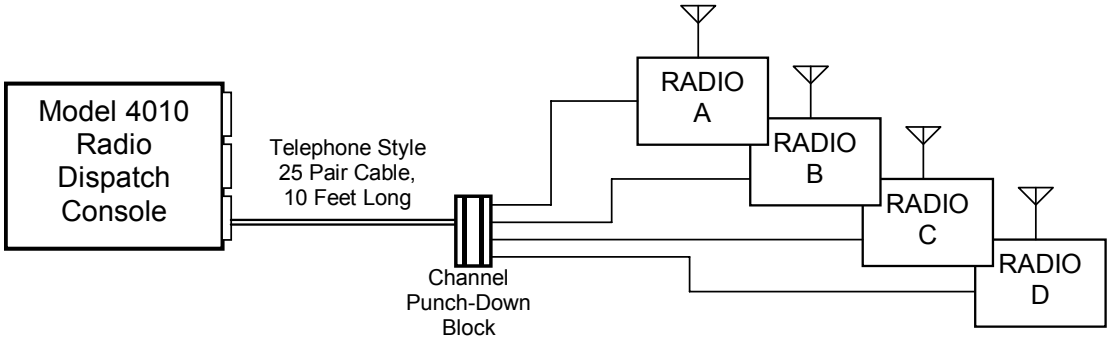
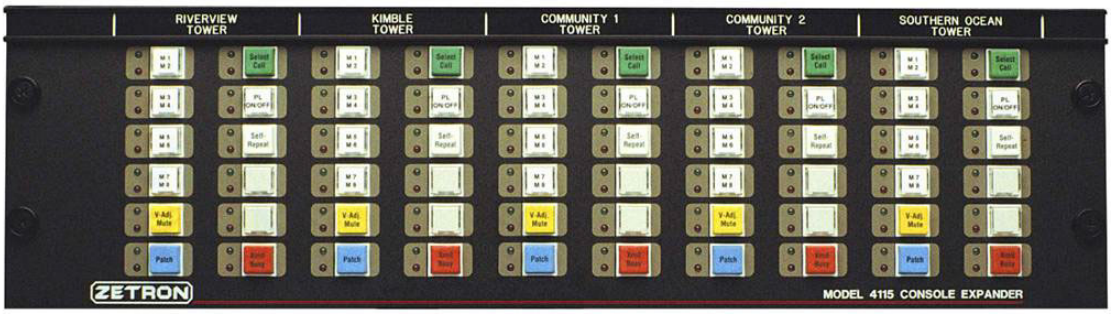


Figure 3: Model 4010R

The Model 4010R Radio Dispatch Console has the same functions and capabilities as the desktop Model 4010. Whereas the Model 4010 is a desktop console, the Model 4010R is a rackmount console designed to be mounted into a rack or furniture with a built-in rack mount compatible system.

In this manual both the Model 4010 and 4010R are referred to as the Model 4010 unless specifically stated otherwise.

Figure 4: Model 4115B



The Model 4115B Console Expander is a rackmount 60-button panel used to expand the number of programmable keys available to the Model 4010 and Model 4010R.

Manuals

Several manuals describe the operation, installation, service, and programming of the Model 4010. This manual describes the installation of the Model 4010. Below is a list of the manuals and a description of their contents.

Manual Title	Part Number	Description
Operator Manual	025-9226	Presents an overview of the console panels, a description of the functions of each button, and a detailed description of the Model 4010.
Installation and Programming Manual	025-9227	Presents a description of how to install, configure, and program the Model 4010 console and accessories.

Specifications

Transmit Electrical Specifications

Audio Output	+10 dBm max. into 600Ω line
Output Impedance	Transmit: 600Ω balanced Idle: 600Ω or 3500Ω
Distortion	<2% at full output Signal-to-Noise > 50 dB Hum, Cross-Talk all -50 dB at full output
Microphone Input	-65 dBm for full output
Headset Input	-20 dBm for full output
Page/Spare Input	-15 dBm, not compressed
Freq. Response	-3 to +1 dB from 250-5000 Hz
Compression	Input level increase of 30 dB above knee of compression causes <3 dB output increase

Receive Electrical Specifications

Input Impedance	600Ω or 10KΩ (4-wire)/3500Ω (2-wire)
Line Balance	66 dB at 1000 Hz
Rx Sensitivity	-30 dBm max at knee of compression; adjustable
Freq. Response	-3 to +1 dB from 250-5000 Hz (except GT notch)
Compression	Input level increase of 30 dB above the knee of compression causes <3 dB output increase
Distortion	< 2%
Call Light	Sensitivity -20 dB below knee of compression
Audio Output	5 watts each speaker
Mute	Adjustable to -28 dB (with Individual Volume Control Option) or full mute. Mute time 1 sec to indefinite

Other Electrical Specifications

Radio Control	Local, E & M, Tone Remote, DC Remote
Radio Channels	2-wire simplex/half-duplex or 4-wire half/full duplex
DC Control	Operable up to 8KΩ loop resistance Current programmable 15 mA max in 2.5 mA increments Accuracy +/-0.25 mA

Tone Control	15 standard tones supported programmable (no trimmer adjustment) 650 to 2050 Hz High Level Guard Tone duration 120/600 mSec Function Tone Duration 40 mSec Guard Tone Frequency 2175 Hz Tone frequency accuracy +/- 0.2%; timing accuracy +/-1.0%
Local Control	PTT normally open relay contact rated 1.0 A at 24 $V_{AC/DC}$
E & M Control	TX control via PTT relay, external 48V required
Busy Channel Detect	Local Cross-Busy detection Guard Tone or DC Control detection (LOTL) optional
Recorder Outputs	1 per channel (TX/RX audio summation), plus 1 output per console (various combinations of select, unselect and microphone audio) 0 dBm level, 600Ω, single-ended outputs
Capacity	12 radio channels plus 1 or 2 phone lines with an optional phone patch card
Operating Temp.	+5° to +50° Celsius

Console Power Requirements

Voltage	+13.5 V_{DC} (+11.5 V_{DC} minimum — +16.0 V_{DC} maximum)
Current	2.5 amperes maximum

Power Supply (802-0092) Specifications

Voltage	+13.5 V_{DC} ± 0.5 volts
Current	7 amperes
AC Input	95 to 250 V_{AC}, 47 to 63 Hz
Approval	CE

Physical Specifications

Model 4010	
Size	height = 9″ x width = 18″ x depth = 14″ inches
Weight	15 pounds
Model 4010R	
Size	height = 10.5″ x width = 19″ x depth = 10.5″ inches
Weight	15 pounds
Model 4115B	
Size	height = 5.25″ x width = 19″ x depth = 2.25″ inches
Weight	4 pounds

Overview

System Description

The Model 4010 Radio Dispatch Console is a single position unit that has many built-in features. The Model 4010 is a desktop unit, and the Model 4010R is a rackmount unit. Both units have identical features and capabilities and are referred to as the Model 4010 in this manual unless specifically stated otherwise. Up to three positions may be paralleled for multioperator applications with fairly simple wiring. If more positions are necessary, contact Zetron Technical Support.

The console has individual channel volume, clock and volume meter, all-mute, simulselect, alerts, site intercom, instant transmit, and individual channel frequency/PL select. The unit can be configured between 2 and 12 channels in increments of two channels. The console is self-contained and interfaces directly to base station or repeater wire lines.

The Model 4010 has a built-in paging encoder which is capable of generating all popular signaling formats, including: Motorola/GE Two-Tone, and DTMF. Rotary Dial (1500 Hz or 2805 Hz), Plectron, Quick-Call 1 (2+2), and 5/6 Tone Sequential are available as an option with Extended Call Paging. With the Instant Call Paging option, these tones can be automatically routed to the proper channel. Without this option, the tones must be manually routed. This Instant Call Paging option also allows individual control buttons to be programmed to send one or an entire sequence of pages.

Each channel can be optioned to support a mix of control types: DC remote, tone remote, local control, and E&M control. The DC remote control requires one optional DC Control Daughter Board per DC channel. This DC Control Daughter Board also has a line-operated transmit light (LOTL) to show if a channel is in use via another source. The tone remote control requires one optional Tone Remote System Adapter Board per system. Each channel that requires tone control can now be configured with the channel option jumpers. If a channel requires LOTL indication, a Tone Remote LOTL Daughter Board is then added for that specific channel.

A Phone Patch Card is an option that allows the console operator to establish a patch between any radio channel and a telephone line. The card can have either one or two telephone interfaces. The console can also function as a hands-free, single-line or dual-line telephone, giving the operator the ability to receive and place telephone calls from the console. Only one card can be added per system. It does not require one of the dual channel slots.

The Expanded Auxiliary I/O Card adds input and output capabilities over the standard 8 inputs and 8 outputs available. This card does require one of the Dual Channel Card slots.

The Model 4115B is a rackmount panel, which allows the system to be configured with an additional 60 programmable switches. The system can accept a maximum of two expansion panels. The Console Programming System (CPSW) is used to define the function of the additional panel(s).

The console can be configured with a variety of communication options. The standard options are desk microphone, gooseneck microphone, or PTT handset with cradle, and/or headset. A PTT footswitch is also available to control transmissions.

Installation Sequence

Prior to installation, you are encouraged to review this manual as well as the Operator's Manual. This will help your understanding of the system and will ease the installation. This manual is laid out section-by-section, in the sequence in which the system should be installed. If you should need help during installation, call Zetron.

Planning

Installation begins with planning the system layout. It is best to consider carefully the placement of the console and its options, the wiring to a punch-down block, and to the radios. The channel I/O connectors are laid out with four channels per the 50 pin Amphenol-type connector and one punch-down block is required per four channels.

Mapping

Card-slot mapping allocates a particular channel and console card slot to your base stations. It also creates a cross-reference between the channel and position names that you are familiar with. After the card-slots have been mapped, the channel and console should be configured using their various jumpers and switches.

Wiring

After the system has been configured, then wiring of the system may begin. The system will require wiring between the Console and any punch-down block, the radio base station, and between the consoles and their various accessory options (microphones, recorders, encoders, etc.).

Testing

When planning, mounting, configuring, and wiring have been completed, the system is ready for its first installed test. The components have been tested at the Zetron factory, but it is necessary for you to perform a preliminary system check in order to verify the proper configuring and wiring.

Level Setting

The last step is to adjust the audio levels in the system. Adjustments *must* be performed for the receive and transmit audio levels at every channel, and audio levels within the console.

Operation

During its initial operation, the system will operate according to the programming done at the Zetron factory. If you wish to alter operation through programming, see *Programming* on page 79. Changes in the programming may be performed by you once the system is installed.

Console Installation

Overview

The Model 4010 Communication Console is a self-contained unit, which makes for an easy installation. Accessories may be added to the console including headset jack box, desk microphone, handset (desktop unit only), gooseneck microphone, footswitch, and telephone/radio headset interface. The handset and gooseneck microphone options are installed at the factory if ordered with the console. They are also an easily added option if ordered later. Instructions for installing options are included in the following chapter, *Option Installation* on page 47.

Major sections in this chapter:

Important Notes

New Units

The Model 4010 Communication Console you have received is fully functional and calibrated to a factory standard of 0 dBm for both RX and TX levels. The line terminations are set at low impedance (600 Ω). You will need to reset RX and TX levels for the radio types and wiring configuration at each site.

It is important to set the impedance of the audio lines to high when connecting the channel card audio lines in parallel with another 4010 system or remote unit. One device remains at low impedance (600 ohm) and the remainder are set to high. See *Configuring Dual Channel Cards* on page 26 for setting the termination jumpers.

Program/Run Switch

The Model 4010 is programmed by sending a configuration file to it from a PC over a temporary serial connection. The configuration data is stored in write-protected memory, so writing must first be enabled by the program/run switch located on the bottom of the unit. Do not move this switch unless programming or checking the options in the 4010. On a desktop Model 4010, this switch is located on the bottom of the unit. The "normal" or "run" switch position is to the right (towards the Unselect speaker). Detailed programming instructions are provided in *Programming* on page 79.

Physical Installation

Console Location

When preparing to place the control panels, consider the amount of tabletop space required not only for the console, but also for a writing surface for the operator. Also, consider where accessory items such as microphones, foot switches, and headset jack-boxes may be placed. Another consideration is how close the placement will be to a power outlet. A solid earth ground must be provided.

Console Access

The channel connectors of the Model 4010 Console and option wiring are accessed from the rear of the unit. Routing of the channel wires to the common connector block must be considered. The rear of the unit also has the channel status lights, which need to be monitored during system verification and troubleshooting. To gain access to insert channel cards or to make channel or console adjustments, the top of the desktop console is opened in a clamshell fashion that requires about 17 inches of vertical space. A service loop on the

wiring may be necessary for ease of access. The rack-mount console requires the removal of two screws that hold the top cover on. Access to the cards is then from the top of the unit and probably requires the unit to be removed from the rack or furniture enclosure.

Power

Primary Power

The Model 4010 requires an external 2.5 Ampere, 13.5 V_{DC} regulated supply. The minimum input voltage of the console is 11.5 V_{DC} and maximum of 15 V_{DC}. Zetron P/N 802-0092 provides 7 Amps, 13.5 V_{DC} ± 0.5 volts, with a DIN connector to mate with the input power connector J5. The module operates with an input of 95 to 250 V_{AC}, 47 to 63 Hz, and is UL, CSA, VDE, and CE approved. The pin connections are as follows:

J5 PIN	SIGNAL
1	PWR-
2	Open
3	PWR+
4	PWR-
5	PWR+
Shell	Chassis GND

The console is equipped with an internal fuse. This is labeled F1 on the Control Board near the input power connect J5. The fuse is accessible by lifting the top cover of the unit. If replacement is required, replace only with 2.5-ampere, slow-blow AGC-type fuse.

Auxiliary Power

A connection for auxiliary power is also provided internal to the unit. Screw terminal connector J16 is used to connect +12 V_{DC} and ground. The specifications for the auxiliary DC voltage is the same as the main supply, however the voltage level must not exceed the main supply by more than 2.5 V_{DC} or drain on the auxiliary supply may occur. The auxiliary supply is automatically connected when the primary voltage drops more than 3.5 V_{DC} below the voltage of the auxiliary supply.

Connection to the auxiliary is made through the wiring access hole in the back of the unit. The three-position screw terminal strip J16 is used for connection and AWG #18 stranded

wire is recommended. Strip the ends of the wire back 0.25 inches and insert into J16 and secure by screwing down the terminal. The pin connections are as follows:

J16 PIN	Location	SIGNAL
1	Nearest to channel card slot	PWR+
2	Center terminal	PWR-
3	Nearest to side of case	PWR-

System Grounding

Warning! Improper system grounding can cause electric shock to personnel, damage to equipment, and system malfunctions.

Proper earth grounding is an important electrical consideration. The earth ground protects the system and personnel from lightning strikes, provides a path for any electrostatic discharge (ESD), and provides a solid reference for the system. Improper grounding of the system could cause susceptibility to ESD, induced noise from input power wiring, and reduced effectiveness of lightning protection devices. Induced noise could cause false signal indications or a variety of system errors.

A “star” grounding system (a single point ground to which satellite grounds are connected) is the best grounding system. The central star point must be firmly attached to a low-impedance earth ground point, such as a ground rod.

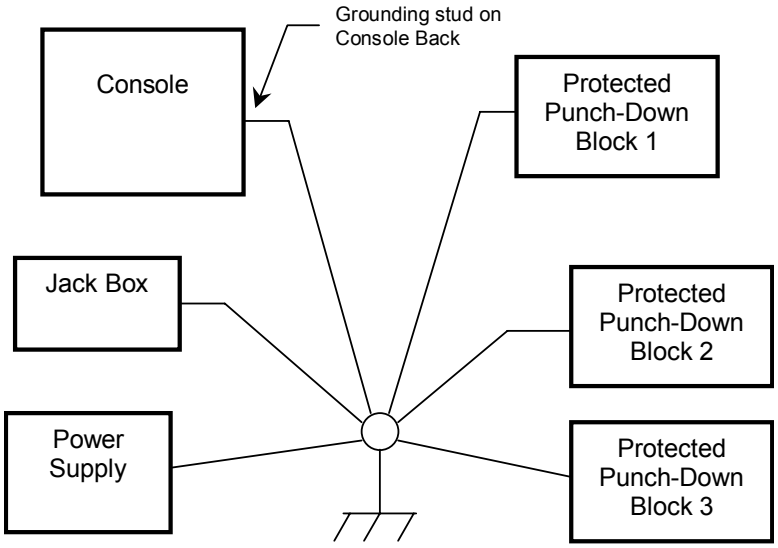
If protective punch-down blocks are used, a large diameter (6-gauge) copper conductor (or equivalent braided strap/ bus bar) must be connected between the ground lug of each block and the earth ground or central star grounding point. With the protected punch-down blocks, it is best to wire directly to the earth ground if possible. Each piece of equipment should have its chassis grounded to the central star point with a separate ground wire. The gauge of the wire depends on the length of the run, 12 gauge is adequate if the length is less than 15 feet. The length of the runs should be minimized. Securely connect a grounding wire to the case of each unit making sure that a metal-to-metal connection is made (no paint or oxidation layer). Most Zetron equipment provides a grounding stud. Figure 5 shows a central star grounding system.

All earth grounds in the system should be isolated from signal lines. It is easy to couple ESD or lightning noise spikes if these lines run parallel for any distance. The AC power

wires (and DC power to a lesser degree) should also be routed separately. AC lines can have large switching current noise spikes that could couple into signal lines.

> **Caution!** Do not connect signal ground to the central star ground. The conditioning and reference of the signal grounds is controlled inside the Zetron equipment. The system will be more susceptible to noise interference.

Figure 5: Typical Star Grounding System



Slot Mapping

Slot mapping gives a reference of the channel number, type of channel, channel nomenclature, and plug designator used throughout this and other manuals. The slot map is necessary in order to complete the configuration and wiring of the system, and necessary to maintain the system. Usually the Zetron factory will prepare a slot map to your specifications, especially if you requested factory programming, since the map is required before the system can be programmed. If prepared at the factory, you will find a copy of your slot map with this manual. Even if the slot map has been provided, you are encouraged to continue to read this section.

The first step in preparing your slot map is to become familiar with the channel cards and option boards contained in the console. Open the desktop console by unscrewing the two

latches on the back of the console and lifting the top open. The rack-mount console has two screws that hold the top cover on located on the back of the unit.

> ⚠ **Caution!** Keep the front of the desktop unit on the tabletop, do not let the front hang over a table edge. The console can be knocked off balance onto the floor in this position.

Figure 6 shows the view of the desktop console with the top opened. You will notice several card slots designated J6-J12. Since the system is tested at the Zetron factory, you will find the channel cards already plugged into the assigned slots. Slots J12-J7 are for channel cards or Auxiliary I/O boards. J6 is for the Phone Patch card. On the back of the unit are three 50-conductor male Amphenol-type plugs used to connect the Console to the punch-down blocks and radios. These are designated J4 (channels 1-4), J3 (channels 5-8), and J2 (channels 9-12).

Figure 6: A Model 4010 with its case open

Table 1: Slot/Card Compatibility Matrix

Slot	Card Compatibility	
J12	Dual Channel Card, channels 1-2	Aux I/O Card
J11	Dual Channel Card, channels 3-4	Aux I/O Card
J10	Dual Channel Card, channels 5-6	Aux I/O Card
J9	Dual Channel Card, channels 7-8	Aux I/O Card
J8	Dual Channel Card, channels 9-10	Aux I/O Card
J7	Dual Channel Card, channels 11-12	Aux I/O Card
J6	Phone Patch Card, line 1-2	

Configuring Dispatch Consoles

The console has several jumper selectable configuration options. Table 2 shows the various options and the normal factory setting. See *Model 4010 Dual Channel Card Layout* on page 103 for the location of these jumpers.

Table 2: Model 4010 Control Board Jumpers and Switches

Jumper	Options	Notes
JP1	**Recorder Output & VU meter**	The audio recorder output and the VU meter include the console microphone transmit audio and its Select receive audio. Place the jumper in position B to add Unselect receive audio as well.
A*	Unselect audio not sent to Recorder/VU	
B	Unselect audio mixed with Select audio to Recorder Output and VU	
JP2	**Auxiliary Audio to Select Audio**	The transmitted audio from the auxiliary audio input may be monitored with the Select speaker. For example, when an external encoder is used, the operator can hear the encoder tones as they are being transmitted.
A*	Auxiliary audio mixed with Select audio on Select speaker	
B	Auxiliary audio disabled	
JP3	**Unselect Speaker / Headset & Handset Audio**	Determines where Unselect audio is heard. You might want to change this if, for example, you want the Unselect speaker to turn off when the software detects a handset lifted from a cradle or a headset plugged into a jack.
A*	Unselect audio always on unselect speaker	
B	Unselect audio switch under software control	
C	Unselect audio always on headset/handset	
JP4	**Headset/Handset Unselect Monitor**	Occasionally, it is desirable to monitor both Select and Unselect audio on the earpiece of the headset or handset. Jumper JP4 may be used to enable the Unselect audio monitoring.
A*	Unselect audio not heard at headset/handset	
B	Unselect audio heard at headset/handset	
JP5	**Auxiliary Audio input impedance**	If an external encoder is used, use JP5 to set the input impedance of the Model 4010 to match the output impedance of the encoder.
A*	Auxiliary Audio 600 Ω impedance	
B	Auxiliary Audio 10 kΩ impedance	
JP6	**Select Speaker / Headset & Handset audio**	Determines where Select audio is heard. You might want to change this. For example if you want the Select speaker to turn off when the software detects a handset lifted from a cradle or a headset plugged into a jack.
A	Select audio always on select speaker	
B*	Select audio switch under software control	
C	Select audio always on headset/handset	
JP7	**Tone generator input filter**	The output of the tone generator has an additional high frequency filter that can be inserted. This filter is not required, in which case the jumper should be left in position A.
A*	No tone filter	
B	Tone filter connected	
JP8	Reserved for use with the TRHI. See *Telephone/Radio Headset Interface* on page 53.	
JP9	Not used.	
JP10	**Operator Paging/Alert/Warning Audio**	Operator audio refers to the paging and alert/ warning tones generated by the M4010. These tones can be irritating when monitored by the dispatcher, depending on where it is heard and how loud it is. The level is adjusted by R104.
A*	Operator Audio to Select Speaker	
B	Operator Audio to Unselect Speaker	

Note In Table 2, the asterisk (*) is used to show the typical position of a jumper. However, the M4010 is configured and programmed at the factory according to various customer preferences, so your default positions from the factory may be different than the typical positions listed here.

Model 4010 Options

The Model 4010 console may be shipped with optional features that deviate from standard operation. There is a method to determine what options are enabled in a particular console. The Model 4010 has a programming switch located on the bottom of the console. Put the programming switch in the program position* for approximately one second and then return it to the normal run position while pressing the # key on the keypad. As long as the # key is held down the option code may be read from the LCD display.

Note * On the Model 4010, the "program" position is toward the Select speaker.

If no options are installed in the unit then the display will show "Opt:-". If there are options enabled in the unit then "Opt:" will be followed by one or more letters indicating the options enabled. Use Table 3 to interpret the letters appearing after the prompt.

Table 3: Model 4010 Console Option Code Definition

Option Code	Description	Default
B	DC I Boost enabled. For DC channels only, this provides an initially boosted current to overcome greater capacitance found in longer wire runs. After the initial boost, current returns to normal levels.	DC I Boost disabled. Normal current levels are used.
D	D-PTT always selects the desk mic. This option is required when using both a desk mic and a gooseneck mic at the same time.	A contact closure on D-PTT selects the dynamic input programmed by CPSW.
C	Coded/Clear TX feature enabled. For tone control only, this allows encrypted control of the base station.	Coded/Clear TX feature disabled.
X	Extended Paging enabled. This adds several paging formats: Rotary Dial/1500 Hz or 2805 Hz, Plectron, Quick-Call I (2+2), and 5/6 Tone Sequential.	Paging formats are limited to Motorola Two-Tone, GE Two-Tone, DTMF, and alert tones.
I	Instant Call Paging enabled. This allows frequently used pages or sequences of pages to be initiated and automatically steered to the correct channel with a single key press.	Instant Call Paging disabled. All pages are entered manually.
If an option code is not displayed, that option is set to the default condition.		

Some options require purchasing. To inquire about changing options to a Model 4010 console already in service, please contact Zetron's Technical Support.

Configuring Dual Channel Cards

Now that the system slot map has been developed, you know the allocation of channels and you can configure each Dual Channel Card (DCC) to meet the requirements of the channel pairs. Card configuration is usually performed at the Zetron factory to comply with the customer's system configuration request, but it *must* be checked when installed at the end user's site. The following will be useful for understanding the options available and for system modifications or additions.

The first step is to label each card with your names for channel A and B. This is helpful so that once configuration and adjustments have been made, the card will not be placed in a wrong slot, which probably has different configuration and adjustment requirements.

Channel Type

Each channel in the Model 4010 can be programmed to be one of three control types: Local, Tone, or DC. This programming is performed using CPSW software. Refer to *Channel Configuration* on page 85 for details.

In addition to programming, there are some jumper and switch settings that must be reviewed.

Local Control

This is the default for all channels and no additional hardware is required. If a Tone Remote Adapter is installed, then the DCC's Guard Tone Enable jumpers (JP4 and JP6) must be set to position A to disable the low-level guard tone.

Tone Control

To have any tone control channels, a Tone Remote Adapter must be installed (only one is required for all channels). In addition to programming, the DCC's Guard Tone Enable jumpers (JP4 and JP6) must be set to position B.

DC Control

For a channel to be DC controlled, the DC remote adapter board must be installed. One adapter is required for each channel that is to be set to DC. Jumpers (JP4 and/or JP6) must be in the A or Local position; however, if a DC module is installed on a channel defined in CPSW as local, a card error will be displayed on the console. Programming allows the DC type to be set as momentary or constant.

The Dual Channel Card has several jumper and switch selectable options. The configuration switches of the Dual Channel Cards are located at the bottom rear edge of the dual channel card and labelled on the back panel. There are eight switches in two halves. The top four are labeled for an odd channel (or channel A on the card) and the bottom four are labeled for an even channel (or channel B on the card). See Table 4.

> **Caution!** The cards in a Model 4010 are not hot swappable in the unit. You must power the unit off before any cards can be safely removed or added to the system.

To make jumper verification easier, the console may be powered down and the Dual Channel Card taken from its card slot by removing the one mounting screw from the back panel and pulling the card up and towards the front of the unit. This will allow the LEDs to clear their rear panel openings. To install the card, insert the front edge of the connector first and push down and towards the rear panel. Verify that the LEDs line up properly while positioning. Reinstall the screw through the back panel to the bracket on the card.

The subsections following Table 4 describe the jumper/switch option settings.

> **Caution!** When comparing the DIP switch's ON/OFF labelling with the Model 4010's ON/OFF labelling, the installer might notice that the direction of ON and OFF disagree.
>
> The ON and OFF directions provided in Table 4 are intended to be used with the Model 4010 silkscreen labelling.

Table 4: Dual Channel Card Jumpers and Switches

Option Name	Channel A	Channel B	Notes
2W Line Termination			See *Line Termination* on page 28.
Low Impedance (600Ω)	JP1-A	JP7-A	
High Impedance (3.5 KΩ)	JP1-B	JP7-B	
4W Line Termination			
Low Impedance (600Ω)	JP2-A	JP3-A	
High Impedance (10 KΩ)	JP2-B	JP3-B	
Guard Tone Enable			Disable for local control or DC channels. Enable for tone control channels.
Guard Tone disabled	JP4-A	JP6-A	
Guard Tone enabled	JP4-B	JP6-B	
Busy Transmit Inhibit (BTI)			See *Busy Transmit Inhibit* on page 28.
BTI enabled	SW1-1-ON	SW1-5-ON	
BTI disabled	SW1-1-OFF	SW1-5-OFF	
Channel Cross Muting (CCM)			See *Channel Cross-Mute* on page 29.
CCM disabled	SW1-2-OFF	SW1-6-OFF	
CCM enabled	SW1-2-ON	SW1-6-ON	

Option Name	Channel A	Channel B	Notes
Option Switch (OPT) - function depends on type of channel			
Tone Control			See *Tone Control, HLGT Duration* on page 29.
Standard HLGT Duration	SW1-3-OFF	SW1-7-OFF	
Custom HLGT Duration	SW1-3-ON	SW1-7-ON	
DC Current Control			See *DC Current Control — Current Selection* on page 29.
Zetron standard levels	SW1-3-OFF	SW1-7-OFF	
Motorola/GE currents	SW1-3-ON	SW1-7-ON	
Full Duplex (FD)			See *Full Duplex* on page 29.
FD disabled	SW1-4-OFF	SW1-8-OFF	
FD enabled	SW1-4-ON	SW1-8-ON	
LOTL			See *LOTL Disable* on page 29.
LOTL enabled	JP1-A *	N/A	
LOTL disabled	JP1-B *	N/A	
* JP1 in this instance refers to jumper JP1 on the daughter board, not the Dual Channel Card.			
Jumpers JP5 and JP8 are fixed in place and should not be changed.			

Line Termination

The transmit audio output and receive audio input may be configured for low-impedance or high-impedance. For systems with only one control point on a channel, the channel should be configured for low-impedance (600 Ω). For systems with multiple control points on a channel, all but one parallel-connected channel should be configured for high-impedance. One control point in a multiple control point system should be configured for low-impedance termination, and this should be the channel card at the far end of the transmission line from the base station.

Low-impedance configurations present a 600Ω impedance on the transmit and receive lines at all times. High-impedance configurations present a 3500Ω (or greater) impedance on the transmit/2-wire receive line while idle, and 600Ω while transmitting. On the 4-wire receive line, high-impedance is 10,000Ω at all times.

Busy Transmit Inhibit

Each channel may be configured to either allow or inhibit transmission on a Busy channel. A channel is Busy whenever its cross-busy input (Busy In) is activated by a locally paralleled control point, or when its line-operated transmit light (LOTL) is activated by a remotely paralleled control point. Usually inhibiting while busy is desired to prevent confused communications and to keep proper line terminations and levels. However, when line conditions cause falsing of the LOTL, it is desirable to be able to transmit even while busy.

Channel Cross-Mute

Each channel may be configured so that the external cross-busy input (Busy In) will also mute the receive audio of the channel to all console positions. This is useful to prevent audio feedback between consoles present in the same room.

If you need to cross mute more than three consoles, call ZETRON Technical Support for guidance.

Tone Control, HLGT Duration

When a channel is programmed for tone remote control, the OPT switch allows selection between the standard HLGT (high-level guard tone) duration (120 milliseconds) or the custom HLGT duration (defined via CPSW). Placing the switch in the OFF position selects the standard duration. Placing the switch in the ON position selects the custom duration.

DC Current Control — Current Selection

To control transmission using DC current, the optional DC Remote Daughter Board must be installed on the Dual Channel card for that specific channel. When the daughter board is installed, the OPT switch controls the current setting level for transmission. In the OFF position, the standard Zetron level, which is appropriate for most applications, is used. In the ON position, the standard Motorola/GE settings are used.

Full Duplex

Each channel may be configured for full duplex or simplex operation. Full duplex operation requires a 4-wire system and allows the dispatcher to transmit and receive simultaneously (like a telephone). Simplex (or half-duplex) operation may either be a 2-wire or 4-wire system, and allows the dispatcher to transmit or receive but not both simultaneously. This switch selectable option prevents dispatchers in full duplex operation from hearing themselves, and thus prevents feedback.

LOTL Disable

The option boards, DC Remote Daughter Board and Tone Remote LOTL Daughter Board, may be configured to ignore LOTL parallel remote transmit signals. Note that when parallel control points are used, the FCC requires that the LOTL function be enabled. If no parallel control points are installed, it may be desirable to disable the LOTL function, because when enabled, the LOTL function operates even when this console is transmitting.

Channel VOX Hang Time

The VOX signal is used to activate the unit CALL LED and to control patch transmission. The hang time of the CALL LED is programmable via CPSW, allowing the CALL indicator to remain on for a number of seconds after the actual voice activity ends. The hang time for patching is controlled by the channel or telephone card VOX circuit. Experience has shown that an optimal patch hang time is about one second, which is the factory default. Contact Technical Support if you need to change this timing.

Wiring to the Channels

The radio channel interface is performed by the Dual Channel Cards. Each Dual Channel Card has terminations for two transmit/receive channels, known as Channels A and B. Each of the possible 12 channels in the system is referred to by a number; Channels 1-12. The channel numbers that a Dual Channel Card is controlling depends only on the card-slot into which the channel card is plugged. The odd number channel would be channel A. The connections between the Dual Channel Card and the radio base stations are made through the three 50-conductor male chassis connectors (J2, J3 and J4) on the back of the Console. Table 5 shows the channel allocations by slot designator and plug label.

Table 5: Radio Channel Connections

Card Slot	Channel Numbers (A / B)	Plug
J12	1 / 2	J4 (A/B)
J11	3 / 4	J4 (C/D)
J10	5 / 6	J3 (A/B)
J9	7 / 8	J3 (C/D)
J8	9 / 10	J2 (A/B)
J7	11/ 12	J2 (C/D)

Since each 50-conductor plug carries signals for four radio channels, the channels on the plug are referred to as channel A, channel B, channel C, and channel D. Each channel has 12 signals brought out on these plugs. These signals are the same regardless of the method of control used by the Dual Channel Card.

The following subsections describe the channel signals.

Push to Talk +/-

The dry contacts across these two signals close whenever the channel is transmitting. This may be used for single-function, local transmitter keying, or E&M signaling. The contacts will handle 1 amp at 48 V. While the PTT contacts are closed, the XMIT indicator on the channel card will be on.

Logging Recorder Output

Each channel provides a logging recorder analog audio output, which is the summation of both the transmit and receive audio for the channel. The outputs are single-ended (not balanced), AC-coupled, and provide about 0 dBm (0.75 V_{rms} into 600 Ω). The output does not notch any guard tone frequencies that may be present; a third party notch filter can be used. Analog ground is provided for the return path.

Auxiliary Output

This open-collector output pulls to ground when the standby-base feature for the channel is activated. This output will sink 500 mA to 0.8 V when active, and will withstand no more than 12 V when inactive. Ground is provided for the return path.

Transmit Audio +/-

This is the balanced source for transmit audio. Normally, the impedance of this output is 600Ω, however, with the replacement of a jumper, this output can be made to go to 3500Ω when not actually sourcing audio. This can be useful for paralleling control stations on the same set of wires. The output is isolated for voltages up to 1500 V_{AC}.

Note The transmit audio level may be adjusted close to +10 dBm using the TX adjustment on the channel card.

The TX Audio signal wires are also used for receiving audio in a 2-wire system. The 2-wire receive sensitivity may be adjusted to -30 dBm using the 2W RX adjustment on the channel card.

Receive Audio +/-

This is the balanced input for receive audio in a 4-wire system. Normally, the impedance of this input is 600Ω, however, with the replacement of a jumper, this input can be made to go to 10,000Ω useful for paralleling multiple control points. The output is isolated for voltages up to 1500 V_{AC}. The 4-wire receive sensitivity may be adjusted to -30 dBm using the 4W RX adjustment on the channel card edge.

Cross-Busy Input/Output

This input/output pair is used for cross-busy handshaking for multiple parallel control point arbitration. The X-Busy Output sinks current to ground when the channel is being transmitted upon. The X-Busy Input inhibits transmission on the channel while the input is grounded (or within 1 volt). The output will sink up to 0.5 amperes at 0.8 V when active, and will tolerate no more than 12 V when inactive. The input represents a 3300Ω load to +12 V_{DC} but will withstand up to 25 V across its signal. While the X-Busy Input is active, the BSY-I indicator on the channel card will be on. If enabled via the BTI and CCM DCC DIP switch segments (and the Bsy-Out connector block terminals are wired to the appropriate Bsy-In terminals), the X-Busy Input will mute the audio of the channel when the input is active.

Tip The transmitting console will not busy itself out, even with its Busy Output connected to its Busy Input. This reduces the complexity of the wiring by allowing the installer to MUX those outputs and inputs together, not having to keep them separate.

Equivalent Circuits

The figures accompanying Table 6 illustrate the interface signals' equivalent circuits and the plug connections on which they may be found. All pin numbers listed in the following table refer to the 50-pin connectors on the rear of the unit and correspond to the terminal numbering on the punch-down blocks.

Table 6: Equivalent Circuits for Console I/O

50-Pin Connector Pin Numbers J2, J3, and J4				
Ch-A	**Ch-B**	**Ch-C**	**Ch-D**	**Signal**
1	7	13	19	PTT +
26	32	38	44	PTT –
2	8	14	20	Record
27	33	39	45	Analog Ground
3	9	15	21	Aux Output
28 gnd	34 v+	40 gnd	46 v+	Ground or V+
4	10	16	22	Tx Audio +
29	35	41	47	Tx Audio –
5	11	17	23	Rx Audio +
30	36	42	48	Rx Audio –
6	12	18	24	Busy Input
31	37	43	49	Busy Output

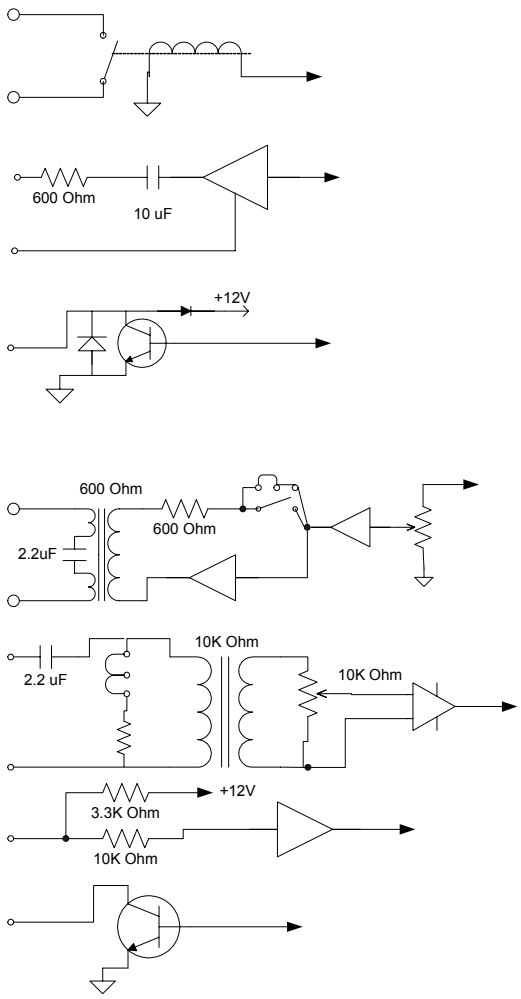


Table 7 summarizes the signals found on each channel plug. The table also contains the wire colors for the 25-pair cables often used to connect to the plugs.

Table 7: Channel Plug Signals (J2, J3, J4) and 25-Pair Cable Colors

Signal	Wire Color	Connector	Wire Color	Signal
Chan A. PTT-	White/Blue	26 ----------1	Blue/White	Chan A. PTT+
Analog Ground	White/Orange	27 ----------2	Orange/White	Chan A. Recorder Out
Digital Ground	White/Green	28 ----------3	Green/White	Chan A. Aux Output
Chan A. TX -	White/Brown	29 ----------4	Brown/White	Chan A. TX +
Chan A. Rx -	White/Slate	30 ----------5	Slate/White	Chan A. Rx +
Chan A. X-Busy Out	Red/Blue	31 ----------6	Blue/Red	Chan A. X-Busy In
Chan B. PTT-	Red/Org	32 ----------7	Org/Red	Chan B. PTT+
Analog Ground	Red/Green	33 ----------8	Green/Red	Chan B. Recorder Out
V+	Red/Brown	34 ----------9	Brown/Red	Chan B. Aux Output
Chan B. TX -	Red/Slate	35 --------- 10	Slate/Red	Chan B. TX +
Chan B. Rx -	Black/Blue	36 --------- 11	Blue/Black	Chan B. Rx +
Chan B. X-Busy Out	Black/Org	37 --------- 12	Org/Black	Chan B. X-Busy In
Chan C. PTT-	Black/Green	38 --------- 13	Green/Black	Chan C. PTT+
Analog Ground	Black/Brown	39 --------- 14	Brown/Black	Chan C. Recorder Out
Digital Ground	Black/Slate	40 --------- 15	Slate/Black	Chan C. Aux Output
Chan C. TX -	Yellow/Blue	41 --------- 16	Blue/Yellow	Chan C. TX +
Chan C. Rx -	Yellow/Orange	42 --------- 17	Orange/Yellow	Chan C. Rx +
Chan C. X-Busy Out	Yellow/Green	43 --------- 18	Green/Yellow	Chan C. X-Busy In
Chan D. PTT-	Yellow/Brown	44 --------- 19	Brown/Yellow	Chan D. PTT+
Analog Ground	Yellow/Slate	45 --------- 20	Slate/Yellow	Chan D. Recorder Out
V+	Violet/Blue	46 --------- 21	Blue/Violet	Chan D. Aux Output
Chan D. TX -	Violet/Orange	47 --------- 22	Orange/Violet	Chan D. TX +
Chan D. Rx -	Violet/Green	48 --------- 23	Green/Violet	Chan D. Rx +
Chan D. X-Busy Out	Violet/Brown	49 --------- 24	Brown/Violet	Chan D. X-Busy In
Chassis Ground	Violet/Slate	50 --------- 25	Slate/Violet	Chassis Ground

Note First color is main color, second color is stripe.

Split 50 66m Type Punch-Down Block

P/N 950-9351

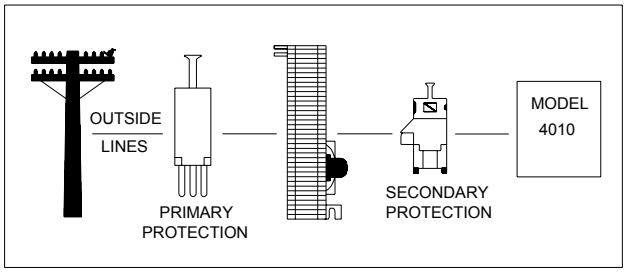
Four Channels	UP	
Chan A. PTT -	26	26
Chan A. PTT +	1	1
Analog GND	27	27
Chan A. Record	2	2
Ground	28	28
Chan A. Aux Output	3	3
Chan A. TX -	29	29
Chan A. TX +	4	4
Chan A. RX -	30	30
Chan A. RX +	5	5
Chan A. X-Busy Out	31	31
Chan A. X-Busy In	6	6
Chan B. PTT -	32	32
Chan B. PTT +	7	7
Analog GND	33	33
Chan B. Record	8	8
V+	34	34
Chan B. Aux Output	9	9
Chan B. TX -	35	35
Chan B. TX +	10	10
Chan B. RX -	36	36
Chan B. RX +	11	11
Chan B. X-Busy Out	37	37
Chan B. X-Busy In	12	12
Chan C. PTT -	38	38
Chan C. PTT +	13	13
Analog GND	39	39
Chan C. Record	14	14
Ground	40	40
Chan C. Aux Output	15	15
Chan C. TX -	41	41
Chan C. TX +	16	16
Chan C. RX -	42	42
Chan C. RX +	17	17
Chan C. X-Busy Out	43	43
Chan C. X-Busy In	18	18
Chan D. PTT -	44	44
Chan D. PTT +	19	19
Analog GND	45	45
Chan D. Record	20	20
V+	46	46
Chan D. Aux Output	21	21
Chan D. TX -	47	47
Chan D. TX +	22	22
Chan D. RX -	48	48
Chan D. RX +	23	23
Chan D. X-Busy Out	49	49
Chan D. X-Busy In	24	24
Chassis	50	50
Chassis	25	25

Signals shown for four channels

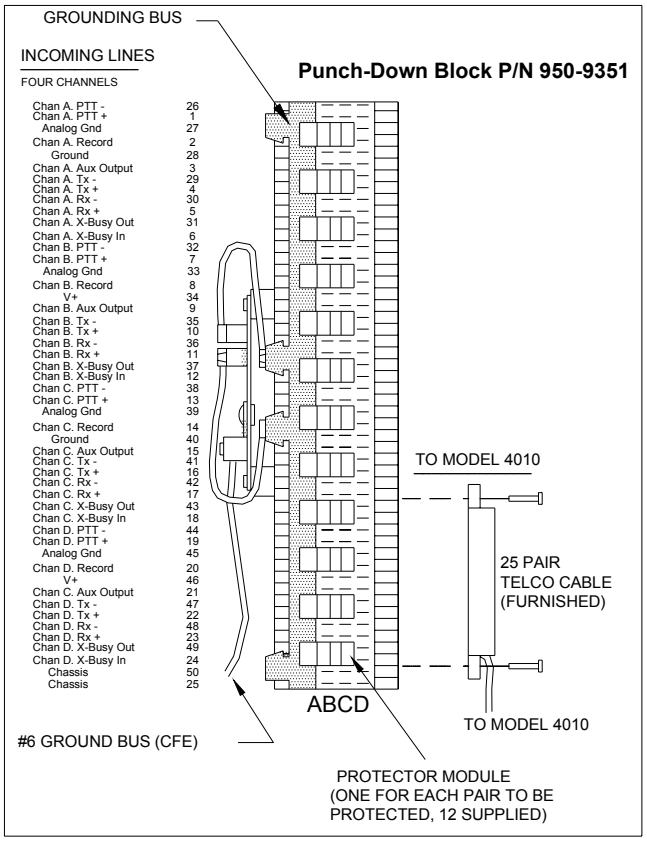
Warning! Do not place a bridge clip across the V+ contacts (34-34 and 46-46).

Protected Punch-Down Block Configuration

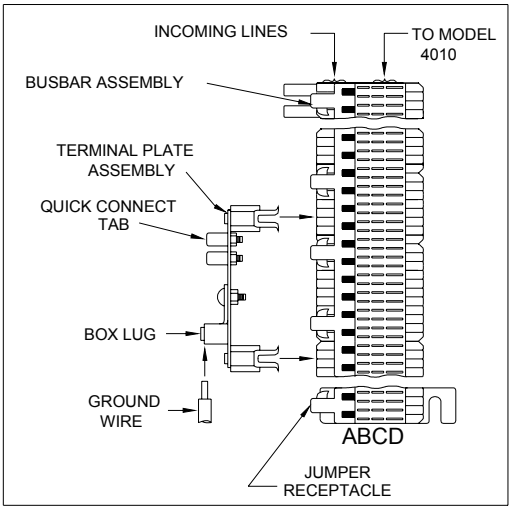
MODEL 4010 INSTALLATION
PROTECTED PUNCH-DOWN BLOCK



OVERALL CONFIGURATION



PROTECTED PUNCH-DOWN BLOCK



TERMINAL PLATE
CONNECTION

024-0109A

Inputs and Outputs

The main board of the Model 4010 is equipped with eight inputs and outputs. These inputs and outputs can be used as auxiliary I/O, or as spare I/O. All inputs on the board must be one or the other (auxiliary or spare). All outputs must be one or the other (auxiliary or spare). By default, the I/O is set to spare inputs and outputs. See *Input/Output Configuration* on page 90 for an explanation of the differences between auxiliary and spare I/O.

Auxiliary I/O can be added by installing Auxiliary I/O Cards (see *Model 4010 Auxiliary I/O Card* on page 56). Each Auxiliary I/O Card adds six auxiliary inputs and six auxiliary outputs. There is no method for adding spare inputs or spare outputs.

Inputs

The Console has eight inputs, which are a standard feature and located on the Control Board (as are the outputs below). Inputs are programmed through CPSW (see *Input/Output Configuration* on page 90). Inputs are TTL compatible (0 to 5 V_{DC} only) and accessible through the wiring access hole in the rear of the unit and wired to P8. The mating connector is provided with the unit. The pinout is shown in Table 8.

Table 8: P8 Inputs

Signal	P8 Pin #
INPUT 1	1
INPUT 2	2
INPUT 3	3
INPUT 4	4
INPUT 5	5
INPUT 6	6
INPUT 7	7
INPUT 8	8
(open)	9
GROUND	10

Outputs

The Console has eight outputs, which can be programmed through CPSW. Outputs 1-4 are open collector drivers that can drive 0 to 25 V_{DC}, 200 mA. Although the open collector outputs can each source 200 mA, only one collector output can be active at a time. If more than one is to be activated, the load should be no more than 100 mA.

Outputs 5-8 are relay outputs which have the common (C) and normally open (NO) contacts brought out to connector P7. These contacts are capable of 1 Amp and 50 V non-inductive load. Wiring access is through the rear of the unit. The mating connector is provided with the unit. The connector pinout is listed in Table 9.

Table 9: P7 Outputs

Signal	P7 Pin #	Signal	P7 Pin #
OUTPUT 1	1	OUTPUT 6 - NO	8
OUTPUT 2	2	OUTPUT 7 - C	9
OUTPUT 3	3	OUTPUT 7 - NO	10
OUTPUT 4	4	OUTPUT 8 - C	11
OUTPUT 5 - C	5	OUTPUT 8 - NO	12
OUTPUT 5 - NO	6	GROUND	13
OUTPUT 6 - C	7	GROUND	14

Output 1 has a special function that can be used to generate an off-hook signal for the TRHI (see *Telephone/Radio Headset Interface* on page 53).

Auxiliary Audio

The console has additional audio signals available on connector P1 at the rear of the unit. Most of these signals are used when installing optional equipment. The mating screw terminal connector is supplied with the console. The connector pinout is listed in Table 10.

Table 10: Auxiliary Audio

Signal	P1 Pin #
BUSY OUT	1
SELECT AUDIO OUT	2
AUX AUDIO IN	3
AUX AUDIO COMMON	4
AUX PTT IN	5
PTT COMMON	6
D. MIC AUD IN+	7
D. MIC AUD IN–	8
D. MIC PTT IN	9
PTT COMMON	10
MONITOR SW IN	11
MON COMMON	12
FOOTSWITCH	13
FS COMMON	14
COMB AUDIO OUT*	15
* Set JP1 to position B to enable unselect audio at pin 15. See Table 2 on page 24.	

Labeling

The push button switches of the control panels usually come from the factory with customer specified labeling installed. If for any reason, the labeling needs to be changed, the labels may be replaced in the field. Spare clear key tops are provided with the unit for future modification. The key tops are accessible by removing the push-button key top from its plastic plunger. Grasp the key top with thumb and forefinger placed on horizontal edges of the key. Gently pull the key top off. Pliers may be used, but care must be taken so not to slip and scratch the cover. Only the outer portion of the key should be grasped when removing to allow the lower locking rib to release. Use a rocking motion to release one side at a time.

Labels may be made of white or colored typing paper, upon which the desired words have been typed or photocopied. Guidelines for cutting the label to the proper size may be made

by lightly drawing a rectangle, .39" x .43" in dimension centered over the label words. Insert the label into the clear key top with the bottom of the label orientated toward the tabs of the key top. The key top is placed on the switch with the tabs down.

Model 4115B Connections

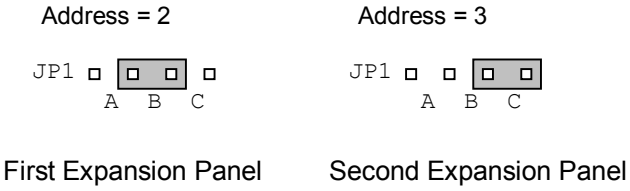
The expansion panel communicates with the dispatch console via a serial data loop. There may be a maximum of three panels per position: one dispatch console, and optionally two expansion panels. Each panel has a Loop In and a Loop Out connector. Every Loop Out must be connected to the Loop In of the next panel with the supplied four-conductor modular telephone-type cable. In this way, the data loops around from panel to panel in a daisy chain.

Power is supplied to the expansion panel via the loop cable from the Model 4010. Each panel is also protected by a fuse labeled F2, which is accessible via the cutout in the rear panel. It should be replaced only with a 2.0 ampere, AGC type fuse.

Loop Address

Because two expansion panels may be included in the data loop of the console, each of these units must have a unique loop address to identify it from another identical unit. Jumper JP1 on the back of the 4115B may be placed in position B or position C to determine the panel loop address. No two units at the same console may have the same loop address; otherwise, improper operation will result. The 60-button panel that is part of the Model 4010 console is given address 1, so this address is not available for the expansion panel. When one panel is added, it must be given address 2 (JP1 in position B). The second expansion panel is given address 3 (JP1 in position C).

Loop Address Jumpers



Preliminary System Check

After the system has been completely wired and configured, it is time to turn on the power to the system. This section of the manual suggests the sequence to follow when initially bringing the system on-line. This sequence will help identify any console operational problems that may have occurred.

Bringing the System On Line

1. Turn on the power to the Console by plugging it in. If the console display remains blank when the power is turned on, check the power supply voltage and polarity. In addition, check the fuse F1 inside the Dispatch Console.
2. Check the console system configuration, which is displayed when the Model 4010 is powered up (or when it is switched out of program mode).

   The display shows the configuration file name in the upper left corner, the detected card status in the lower line, and the operating software version in the lower right corner.

   The detected card status is displayed in the following format:

   TaDbXcPeNi

   Where a = the number of tone/local channels found
   b = the number of DC channels found
   c = the number of Aux. I/O channels found
   e = the number of phone channels found
   i = the number of ANI channels found

   The card status display represents the actual physical cards detected by the firmware and not necessarily the configuration programmed by CPSW (although they should agree for proper console operation).

   If the display shows PROGRAM instead of the console system configuration, then the Dispatch Console has the programming switch located on the bottom of the unit in the wrong position. Place the switch toward the DATA IN connector on the side of the unit. The display should now show the console system configuration.

   If the display shows CPS DATA ERR, the configuration stored in the console does not contain the proper information and must be reloaded. Refer to *Loading a Configuration* on page 83 for the proper procedure.
3. Change the display to show the time, date, and “Model 4010” by pressing the Diagnostic Reset key. If that key is not programmed, press any other key. The clock has been set at the factory for the Pacific Time Zone. The clock set function can be used to change the time if required. Refer to the *Model 4010 Radio Dispatch Console Operator’s Manual* (P/N 025-9226) for this procedure.

4. Check the audible alarm by pressing any non-programmed key. The alarm (two beeps) is heard on the select speaker.
5. If the system is operating correctly up to this point, then make all necessary level adjustments. These adjustments are described in the next section.

Level Adjustments

Note Unless otherwise requested, receive, transmit, and transmit monitor audio levels have been factory adjusted to 0 dBm. Final adjustments should be made on site during normal working conditions.

In order to provide optimum performance, the audio levels at every input and output of the system must be adjusted. The maximum amount of gain in an audio path is usually never required. This adjustment procedure will set the gains to the minimum for the required audio level that will keep the noise level at the lowest possible. Adjustments are necessary for each channel, as well as each microphone and external audio input to the console. Table 11 gives a summary of adjustments to be made and the location of the adjustment. Adjustments should only be made once the configuration, wiring, and preliminary system check have been completed. Also, levels are best adjusted when the system is connected to the intended radio base stations.

Table 11: Level Adjustment Locations

Adjustment	Location
Channel Receive Level	Back of Console
Channel Transmit Level	Back of Console
Console Microphone Level(s)	Inside Console
Minimum speaker levels	Inside Console

Receive Audio Adjustment

The receive audio on the Dual Channel Card should be adjusted first. Each channel has the adjustments labeled on the back of the console. While a 1000 Hz tone with audio level -12dBm (.193 mV AC RMS) is being applied to the channel receive audio input (2W-RX or 4W-RX depending on base-station), the level at the channel RXA (odd channel) or RXB (even channel) test point on the card should be measured. Access to the test points (P1) is gained from inside the unit (top cover open) at the upper portion of the card nearest the front panel. A cable with flying leads and the appropriate connector (709-7330) is

provided with the 4010 when shipped to facilitate test point access. See *Model 4010 Dual Channel Card Layout* on page 103 for the location of P1. The P1 test points are:

P1-1	Analog ground
P1-2	CHB receive (RXB)
P1-3	CHB transmit (TXB)
P1-4	CHA receive (RXA)
P1-5	CHA transmit (TXA)

On a four-wire channel, use the 4W-RX adjustment. On a two-wire channel, use the 2W-RX adjustment. Start with the adjustment fully counterclockwise (25 turns) and then turn the adjustment clockwise while observing the voltage measurement. Adjust for the knee of compression by stopping when the measurement stops increasing, which will be at about 0.24 Vrms (0.7 Vpp or -10 dBm).

In most applications, completely turn off either the 2-wire or 4-wire pot (whichever is not being used to carry audio).

Microphone Adjustments

The microphone audio inputs of the Dispatch Console are run through an automatic-gain-control (AGC) which limits the maximum amount of audio that may pass through it. However, AGC circuits, if not properly adjusted, can cause background noise to be amplified when the operator is not speaking. Proper adjustment and microphone practices will eliminate background noise from the transmitted audio.

The microphone levels are adjusted by speaking into the console microphone (while transmitting) at a normal voice level and distance from the microphone, and turning the adjustment until the background noise level is removed without reducing the amplitude of the voice. This can be verified both by monitoring the transmitted signal, and by observing the bar-graph level meter under the console time display. Optimum performance is achieved when all dispatchers speak at the level and distance for which the console was initially adjusted.

Adjustment	Part	Label
Handset/Headset Microphone	R68	E
Desk-Top Microphone	R70	D
Gooseneck Microphone	R69	GN
PTT Handset with Cradle	R7	E

Tip Gooseneck and desk microphones are designed to have the mouth within a few inches of the microphone element. Otherwise, voice quality is impacted and there is increased pickup of background noise.

All the adjustments are accessible with the top cover in the raised position. See *Model 4010 Main Control Board* on page 104 for the location of the microphone adjustments.

If the PTT handset with cradle option was installed, the ear audio level is adjusted by R7. This would have been set at the factory and probably needs no adjustment.

Auxiliary Audio Input Adjustment

The console auxiliary audio input level adjustment is labeled "R63 AUX". See *Model 4010 Main Control Board* on page 104 for the location of the auxiliary input adjustment. This input is not run through an AGC circuit and is not notch-filtered when transmitted over tone-controlled channels; a third party notch filter can be used. The adjustment is best performed while monitoring the deviation on the channel over which the auxiliary audio is being transmitted. Fully compressed audio from the console will be at 0.75 Vrms (0 dBm, 2.2 V_{PP}).

Speaker Minimum Audio Level

The Select and Unselect Speakers have adjustments to set the minimum audio level that the front panel volume knobs may reduce the level to. These are set at the factory for no audio output (completely counterclockwise) with the volume knobs completely off. The minimum level can be set with the vertical mounted potentiometers next to the associated speakers on the Display Board (Select speaker is R32 and Unselect is R1).

The other adjustments on the Display Board are set at the factory and should not require adjustment. If the Display Board is replaced or repaired, the following adjustment is required.

Warning! Speaker DC bias is very sensitive. If adjusted incorrectly, the speaker amplifiers can be damaged. Contact Zetron Technical Support for assistance.

R21	Display contrast, adjusted for best viewing
R34	Select speaker DC bias, adjusted for minimum DC voltage across select speaker (0 ± 30 mV)
R7	Unselect speaker DC bias, adjusted for minimum DC voltage across unselect speaker (0 ± 30 mV)

Tone Level Adjustments

The tone generating circuit of the console generates the alert, paging, and warning tones. The alert tones are adjusted with the R67 (TONE) potentiometer. The maximum output level is limited by the input audio AGC circuit. The alert and paging tones are also sent to the operator select/unselect speaker and are adjusted with a potentiometer.

The function tone and paging audio level is adjusted with R62 (MUTE). For systems with tone control channels, R62 should be adjusted so the function tone level is 10 dB below the high level guard tone. This is the factory setting when a unit is equipped from the factory with tone remote control capability. For systems without a tone control channel, R62 only adjusts the paging level and may be set as desired. Paging, alert, and warning tones may be monitored on the Unselect or Select Speakers as determined by JP10. The level of the monitor signal may be adjusted with R104.

R67	TONE	Adjust alert signal level
R62	MUTE	Adjust TX paging and function tone levels
R104	PAGE/ALERT/WARNING MONITOR (beep)	Adjust paging, alert, and warning audio level heard over the speakers by the operator

Transmit Audio Adjustment

Adjust the transmit audio on the Dual Channel Card after other audio adjustments have been made. The TXA or TXB test points do not reflect the actual transmitted level and line loses. Measurements must be done at the transmit audio pair of wires or even better yet, while monitoring the transmitted signal level or deviation. Cause the Console to generate a steady 1000 Hz test (alert) tone on the channel. Use the TX adjustment on the back panel to adjust the transmit audio of the appropriate channel to the desired output level.

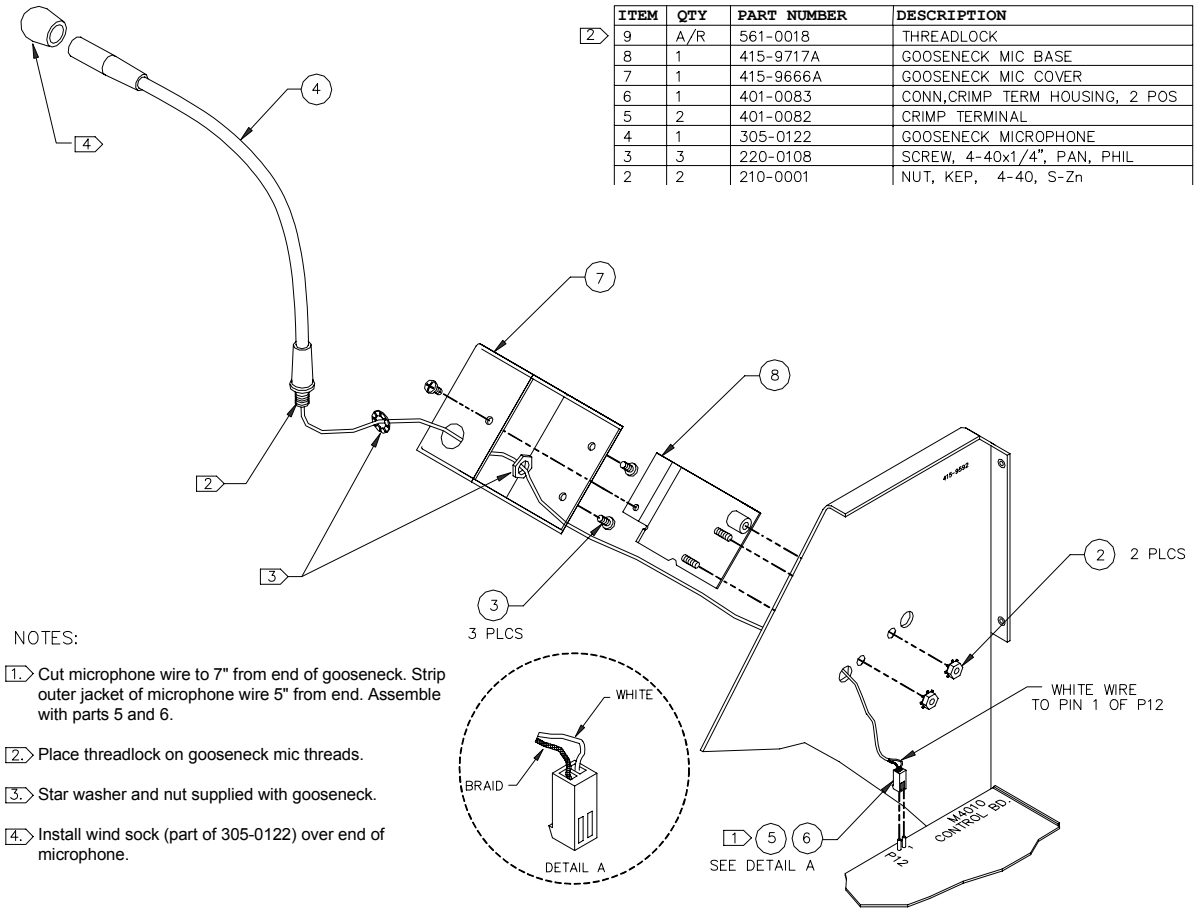
Option Installation

This chapter contains instructions for installing the following Model 4010 Console options:

Gooseneck Microphone

The Gooseneck Microphone (P/N 950-9314) may be used with the Model 4010 Console. When installed in the field, the microphone will come with an adapter box to provide a base for the mounting of the microphone.

Figure 7: Gooseneck Microphone Assembly



Installation requires opening the top cover, inserting the cable through the front hole of the four mounting holes located on the left side of the unit (see Figure 7). The cable is then drawn through the hole while positioning the mounting box studs in the other three mounting holes. The nuts are used to secure the microphone adapter with the two threaded studs.

The cable is connected to P12 on the Control Board near the microphone adapter mounting position. Pin 1 of the cable is the white wire and is connected to the P12, Pin 1, which is nearest the rear of the console.

The system configuration normally uses the gooseneck microphone as the default audio source. If the audio source has been changed (e.g., to a desk microphone), it is necessary to use CPSW to modify the system configuration (see *Miscellaneous* on page 99).

Desk Microphone

Zetron desktop microphones are wired directly to the consoles. Identify which microphone you have in Figure 8 and wire it to the console's **P1 Aux Audio** connector pins as identified in Table 12. **P1 Aux Audio** is located at the rear of the console.

Figure 8: Zetron Desktop Microphones

Rigid Style **Flexible Style**

Table 12: Desktop Microphone Wiring

Signal	Rigid Desktop Microphone	Flexible Desktop Microphone	Aux Audio Connector
Ground/Shield	—	Green	Pin 6
Audio +	Yellow	Blue	Pin 7
Audio –	Bare wire*	White/Blue	Pin 8
PTT +	Red	White/Brown	Pin 9
PTT –	Bare wire*	Brown	Pin 10
Mon +	Black	White/Orange	Pin 11
Mon –	—	Orange	Pin 12
* For the rigid desktop microphone, connect the bare wire to either pin 8 or 10 and use a jumper to connect pin 8 and 10.			

To select the desk microphone as the audio source, use the Miscellaneous menu in CPSW to modify the system configuration (**Edit**, **Position Configuration**, **Miscellaneous**).

Footswitch

The Footswitch (P/N 950-9102) allows foot control of headset or gooseneck microphone transmission, and/or the PL monitor function. More than one footswitch may be attached to a console; for example one may be used for transmit control and the other for monitor control. Table 13 shows the connections to the removable terminal block P1 (AUX AUDIO), on the back of the console.

Table 13: Model 4010 Footswitch Connections

Wire	PTT	Monitor
White Wire	P1-13	P1-11
Black Wire	P1-14	P1-12

Headset Jackbox

The Headset Jackbox (P/N 950-9327) allows 4-wire or 6-wire headsets to be used with the console (6-wire headsets can activate PTT). Use the 4W/6W switch on the side of the Headset Jackbox to configure it. The jack-box 9-pin cable is plugged into the J1 headset connector on the back of the console or in the Expansion port (J1) on the Secondary Headset Jackbox.

For additional instructions, refer to *S4000 Headset Jackbox Installation Instructions* (P/N 011-0540).

Secondary Headset Jack Box

Introduction

The Zetron Series 4000 Secondary Headset Jack Box (SHJB), P/N 950-9208, is designed to allow multiple headsets to be simultaneously connected to the Model 4010 radio control console. The SHJB is low profile and is intended for mounting under the writing surface of an operator's station. It is equipped with a dual-prong jack (accepting either 4-wire or 6-wire plugs), and a volume control to adjust the earpiece volume.

Installation

Installation requires mounting the SHJB, selecting interface operation via jumpers, wiring the SHJB to the radio control console, wiring the jack box to other parallel jack boxes, and optionally wiring the jack box to a footswitch.

Mounting

The SHJB can be mounted anywhere desired, but most frequently, it is installed under the writing surface of the dispatch furniture. The top cover is removable so that it can be secured to the bottom of the writing surface using the supplied screws. It is best to place it at either end of the writing surface and far enough back so that the headset plug body is not at risk due to chair movement.

Configuration

The SHJB circuit board is equipped with four user-configurable jumpers, which allow the operation of the jack box to be tailored to the installation. The following jumper options are available:

Jumper	Operation
*JP1-A	Normal.
JP1-B	PTT Override (Must set JP3=B and JP6=B).
*JP3-A	Normal.
JP3-B	PTT Override (Must set JP1=B and JP6=B).
*JP5-A	For six-wire (w/ PTT) operation).
JP5-B	For four-wire (w/o PTT operation).
*JP6-A	Enables mouthpiece muting via local PTT.
JP6-B	Disables mouthpiece muting (mouthpiece always live). This position should be set when used with a phone card.

* = Factory jumper settings.

Note DO NOT install a four-wire plug into an SHJB configured for six-wire operation. Doing so may cause the console to unexpectedly transmit on the selected channel.

PTT override operation may be used if each secondary headset jack box is provided with its own transmit switch (such as a foot-switch or 6-wire PTT headset). When PTT override is enabled (JP1, JP3 and JP6 set to position B) pressing PTT on the primary jack box mutes the secondary jack box transmit audio and routes the primary jack box audio to the transmitter, allowing the primary jack box user to preempt (override) the secondary jack box user.

If PTT override operation is desired only two jack boxes can be used on each console position, one primary and one secondary.

Mouthpiece Muting

Normally, if a headset is plugged into any of the headset jack boxes, transmissions from the radio control console will use the mouthpiece audio from ALL of the attached headsets. This may not be desirable if headsets are being worn by personnel who do not know that a transmission is taking place.

If each SHJB can be provided with its own transmit switch (such as a footswitch or 6-wire PTT headset), then the jack boxes may be reconfigured to mute the mouthpieces of all head-sets not being used. Jumper JP6 should be placed in the A position to provide such muting.

Wiring to Zetron Console

The Secondary Headset Jack Box is easily plugged into the Model 4010. The 9-pin, D-type connector, J2 (console), at the rear of the jack box provides the signals to the console. The supplied 9-pin cable should be used to interconnect the jack box port J2 to the console at the headset connector J1. For installation of multiple jack boxes, only one Secondary Headset Jack Box connects to the console.

Wiring to Additional Jack Boxes

If more than one jack box is to be installed for a single console, only one Secondary Headset Jack Box connects to the console. All additional jack boxes must connect in daisy-chain fashion to the initial jack box at connector, J1 (expansion), at the rear of the box. If either the standard headset jack box (P/N 950-9327) or the Telephone Radio Headset Interface (P/N 950-9439) are to be among the multiple jack boxes for a single console, it must be the last jack box in the daisy chain. When multiple Secondary Headset Jack Boxes are used, connector J2 of one box should connect to connector J1 of the preceding box.

Wiring to a Footswitch

Connector, TB1 (footswitch), is used to wire to a footswitch associated with the headset jack box. The switch should wire across the terminals labeled GND and PTT.

Console Programming

In order to assure proper routing of headset mouthpiece audio when the console “soft” transmit buttons (such as instant “xmit”, and site “icom”) are used, the console must be suitably programmed via CPSW. To program audio routing, navigate to the following selection in CPSW: **Edit, Position Configuration, Miscellaneous, Audio Source for soft transmit keys, Spare Input #9 steered**.

Telephone/Radio Headset Interface

Overview

The Zetron Series 4000 Telephone-Radio Headset Interface (TRHI) (P/N 950-9439) is designed to allow one common headset to be used for both the Model 4010 radio control console and a telephone instrument. It should not be confused with the Headset Jack Box (P/N 950-9327) which merely provides a jack for the Model 4010 console. (See *Secondary Headset Jack Box* on page 50 for Headset Jack Box installation instructions.)

Connections

To physically install the TRHI for use with the Model 4010, refer to the *TRHI Product Manual* (025-9553).

Console Programming for TRHI

In order to cause proper routing of headset mouthpiece audio when the console "soft" transmit buttons (such as instant "xmit", and site "icom") are used, the console must be properly programmed via the Console Programming System (CPSW). In CPSW, navigate to the following selection: **Edit, Position Configuration, Miscellaneous, Audio Source for soft transmit keys, Spare Input #9 steered**.

Off-Hook Control

Many types of telephone instruments do not provide an OFF HOOK contact. This is especially true of systems controlled by an Automatic Call Distributor (ACD) or systems that use newer electronic telephones. In these cases, check with the phone or headset manufacturer to see if a modification can be made to provide an OFF HOOK signal. If no OFF HOOK signal is available from the telephone instrument, the TRHI can be configured to detect OFF HOOK from one of the following sources:

Microphone current — Most headsets are of the electric type, which means that bias current is required for operation. Most telephone devices supply this current when a telephone line is selected. The TRHI can be configured to detect this current and generate the OFF HOOK signal. To use this method, set jumper **JP2** on the TRHI to position **B**.

Console Off-hook Control — The console can be programmed to generate an OFF HOOK signal when a certain key is pressed. The disadvantage of this method is that it requires the operator to press this key in addition to taking the telephone off hook.

♦ To implement console off-hook control

1. On the TRHI, set jumper **JP2** to position **C**.
2. On the Model 4010, install jumper **JP8**.
3. Pick a physical console key and label it as "Off Hook".

4. Using CPSW, define the previously chosen console key as follows:
   a. In CPSW, click **Edit**, **Position Configuration**.
   b. In the **Key Definitions** section, select the panel representing the physical key you selected earlier.
   c. Select the appropriate key representing the physical key you selected earlier.
   d. Set the **Key's Functional Group** to **Spare Output**
   e. Set the **Spare Output assigned to this key** to **1**
   f. Set the **Key's Type** to **Spare Output Toggle**

Model 4010 Phone Patch Card

The Phone Patch card may be attached to a standard phone line giving both telephone answer and originate capabilities to the console. The single phone line interface has part number 702-9403, and the dual phone line interface has part number 702-9522.

Tip If more than two phone lines are needed, a Series 4000 Phone Coupler can connect additional telephone lines to the Model 4010. Contact Zetron for more information.

Installation

The Phone Patch card is installed in the last slot of the Model 4010 chassis. Open the console by unscrewing the two latches on the back of the console and lifting the top open.

Caution! Keep the front of the unit on the tabletop; do not let the front hang over a table edge. The console can easily be knocked off balance onto the floor when the front hangs off the table.

The card is inserted in the last slot (J6), which has the cutouts in the back panel made to fit. Insert the side away from the back panel in first then rock the card towards the back panel into position. Take care that the LED is properly positioned. Secure the board by inserting the screw through the hole in the back panel into the bracket on the card.

The Phone Patch card is connected to the telephone line via the modular phone jack extending from the back of the console. A Dual Phone Patch card will have two phone jacks on the back. LINE 1 jack is for the phone patch channel 13 and LINE 2 is channel 14. These channel numbers are required when programming the Phone Patch option.

Programming

You may use CPSW to add the extra buttons you will need to control the phone channel(s). (See *Programming* on page 79.) The channel numbers are fixed, channel 13 for LINE 1 and channel 14 for LINE 2 (if the Dual Phone Patch Card is installed). Operation of the phone channel will be much like that of a regular radio channel. The following buttons are typically used for phone channels: Answer Hold (Off-Hook), Release (On-Hook), Switch Hook Flash, Mute, Volume Adjust, and Patch. See the *Model 4010 Operator's Manual* (P/N 025-9226) for details on these buttons and other operating information.

Refer to the *Model 4010 Operator's Manual* (P/N 025-9226) for complete operating instructions.

Level Adjustments

Setting levels for the Phone Patch card will require access to the potentiometers on the back unit and if an AC voltmeter is used, access to the test points on the Phone Patch card. Two adjustments need to be made:

Phone-Line Hybrid Balance - For proper balance adjustment, the Phone Patch card should be attached to its intended phone line. Dial a phone number that can be answered and silenced (no automated messages or loud background noises). Transmit a 1000 Hz tone to the phone channel via the console. The Alert 1 key is normally programmed at the factory for a continuous 1 kHz tone.

While monitoring the level at the receive audio test point, alternately adjust potentiometers RBAL and CBAL at the back panel for a minimum signal. Note that the signal at the receive audio test point will be present for only 2 or 3 seconds; therefore, it is necessary to release the Alert key and press it again every 3 seconds.

	Test Point	P1
LINE 1 (Channel 13)	Transmit Audio Receive Audio	5 4
LINE 2 (Channel 14)	Transmit Audio Receive Audio Ground	3 2 1

Level from Phone Line - Set the level to the Phone Patch card by monitoring an incoming call and setting the VOX potentiometer so the CALL indicator will trigger on the minimum audio level expected. This level should not be set to trigger on noise. If the level is set to trigger on noise, incorrect PATCH operation will result. The volume level of this channel going to the speakers can now be set for normal listening levels.

The incoming ringer level as heard in the speaker/headset can be changed using jumpers JP2 and JP3 as noted in the table below.

Jumper	Function
JP2	+*= Line 2 Normal - = Lower Line 2 Ringer level by 9dB
JP3	+*= Line 1 Normal - = Lower Line 1 Ringer level by 9dB

* = Factory jumper settings

Model 4010 Auxiliary I/O Card

The Auxiliary I/O Board, 702-9448, may be installed in any dual channel slot in the Model 4010 to add additional input and output capability. Each card adds six double ended outputs and six single ended inputs.

A maximum of five Auxiliary I/O Cards can be installed.

Installation

Open the console by unscrewing the two latches on the back and lifting the top.

> ⚠ **Caution!** Keep the front of the unit on the tabletop; do not let the front hang over a table edge. The console can easily be knocked off balance onto the floor when the front hangs off the table.

Insert the card into the selected slot by placing the end of the connector away from the back panel in first, and then rock the card towards the back panel into position. Secure the board by inserting the screw through the hole in the back panel into the bracket on the I/O board.

Auxiliary Outputs

The outputs are the common and normally open contacts of a relay whose contacts are rated at 1 A, 50 V_{DC}. Each output has two jumpers associated with it. One jumper will change the normally open output to normally closed. The second jumper will place ground on the common lead to the relay making the output a single ended relay contact to ground.

Table 14: Auxiliary Output Configuration Jumpers

Output #	Jumpers
Output 1	JP1 and JP7
Output 2	JP4 and JP10
Output 3	JP6 and JP12
Output 4	JP2 and JP8
Output 5	JP3 and JP9
Output 6	JP5 and JP11

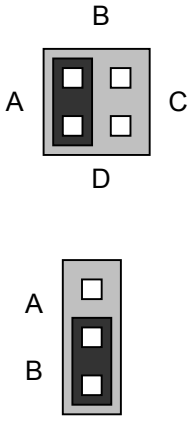
Auxiliary Inputs

The inputs are single ended logic level inputs. Only a contact closure to ground is required to activate the interface. The inputs are protected against voltage levels higher than the 5 V interface level.

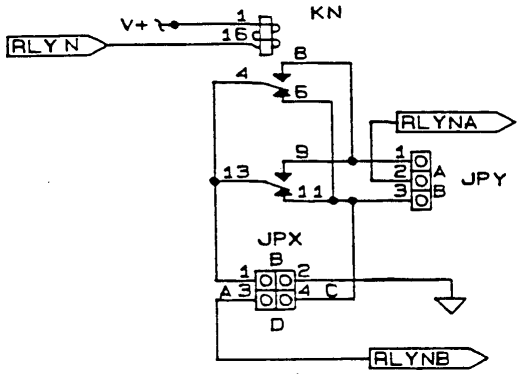
Auxiliary Output Jumper Settings

Each relay output has two sets of jumpers, as shown in Figure 9.

Figure 9: Auxiliary Output Relay Jumpers



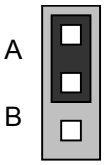
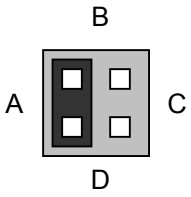
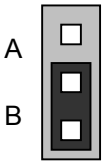
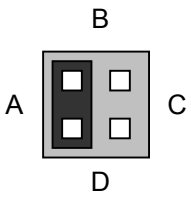
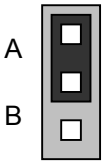
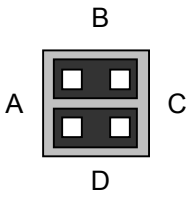
Jumper Pairs As Viewed On Board Near Relays



Typical Relay Diagram

By arranging these jumpers, each relay output can be used as described in Table 15.

Table 15: Auxiliary Output Jumpers Explained

Relay Contact Configuration	Jumper Pair JPY	Jumper Pair JPX
Relay off, A & B signals open Relay on, A & B signals connected		
Relay off, A & B signals connected Relay on, A & B signals open		
Relay off, A signal open, B signal grounded Relay on, A signal grounded, B signal open		

Programming

The Auxiliary I/O Board functions are programmed with CPSW. See *Programming* on page 79. Refer to *Input/Output Configuration* on page 90 for more detail about using inputs and outputs.

The inputs and outputs will be assigned numerical values depending on the sequence of the installed boards. The board in the lowest channel slot will be assigned the lowest numerical value in groups of six. The I/O on the Control Board are assigned values 1-8, so the first Auxiliary I/O Board will be assigned values 9-14. The second Auxiliary I/O Board will be assigned values 15-20 and any additional boards will follow in groups of six. For example, Input 1 on the first Auxiliary I/O Board will be Input 9 to CPSW and Input 2 will become Input 10 to CPSW. This sequence is followed for output signal numbering also.

Table 16: I/O Numbers vs. CPSW Numerical Assignment

I/O Number	CPSW Numerical Assignment
Control Board 1-8	Input or Output 1-8
First I/O Board 1-6	Input or Output 9-14
Second I/O Board 1-6	Input or Output 15-20

The sequence will continue for as many I/O boards as are installed.

Note The locations of the Auxiliary I/O Boards are sensed during power up and are assigned the proper sequence. If an Auxiliary I/O Board is added to a channel slot before an existing board, the I/O assignment of the existing board will have to be changed via CPSW to match the new I/O numbers assigned to it by the Model 4010 software.

Connector Pinout

The location of the auxiliary signals depends on which channel slot the Auxiliary I/O Board is installed in. The location will vary between output connectors as well as which half of the connector is used as shown in the following tables. First select the channel slot the Auxiliary I/O board will be installed in and that will show which connector and which half is used for the signals. The upper half or lower half then shows the appropriate pinout.

Table 17: Channel Assignment vs. Connector Pinout

Channel	Connector	Half
1&2 (J12)	J4	upper
3&4 (J11)	J4	lower
5&6 (J10)	J3	upper
7&8 (J9)	J3	lower
9&10 (J8)	J2	upper
11&12 (J7)	J2	lower

Table 18: Signal vs. Pin Assignment — Upper Half

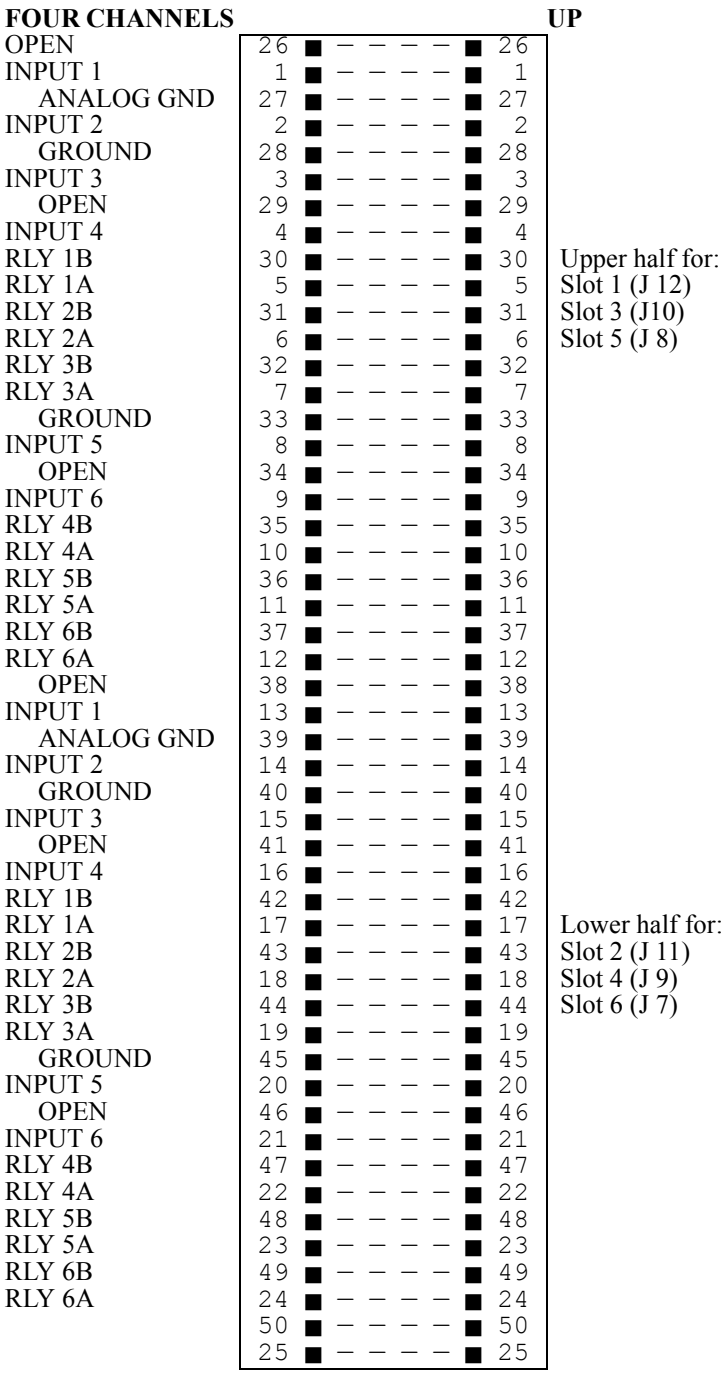
Signal	Pin	Pin	Signal
open	26	1	Input 1
Analog GND	27	2	Input 2
Ground	28	3	Input 3
open	29	4	Input 4
RLY1B	30	5	RLY1A
RLY2B	31	6	RLY2A
RLY3B	32	7	RLY3A
Ground	33	8	Input 5
open	34	9	Input 6
RLY4B	35	10	RLY4A
RLY5B	36	11	RLY5A
RLY6B	37	12	RLY6A

Table 19: Signal vs. Pin Assignment — Lower Half

Signal	Pin	Pin	Signal
open	38	13	Input 1
Analog GND	39	14	Input 2
Ground	40	15	Input 3
open	41	16	Input 4
RLY1B	42	17	RLY1A
RLY2B	43	18	RLY2A
RLY3B	44	19	RLY3A
Ground	45	20	Input 5
open	46	21	Input 6
RLY4B	47	22	RLY4A
RLY5B	48	23	RLY5A
RLY6B	49	24	RLY6A

Split 50 66M Type Punch-Down Block

P/N 950-9351



Model 4010 Tone Remote System Adapter

One of the Tone Remote System Adapters (P/N 950-0255, or 950-9922) is required for the Model 4010 to transmit to a tone controlled radio. The adapter has a 2175-Hz oscillator to generate the required guard tone and has 2175-Hz filters to remove the low-level guard tone from the received audio. Only one card is required per system, which allows all channels the option of being a tone channel. The 950-0255 is a functionally equivalent replacement of the 950-9717. The 950-9922 has additional audio delay features.

Installation

The cover of the Model 4010 must be raised by unscrewing the two thumbscrews on the back of the unit and lifting the top.

> **Caution!** Do not install this board with the power applied. Damage to the board can occur. Keep the front of the unit on the tabletop; do not let the front hang over the table edge. The console can be knocked off balance onto the floor in this position.

The Tone Remote System Adapter is installed on the Control Board connector P4, which is near the external AUX AUDIO connector. Remove any jumpers that may be on connector P4. When installing the board, verify that the Tone Remote board pins are aligned with the Main board connector and the right angle bracket on the adapter board lines up with the mounting hole in the back panel. Secure the board by inserting the screw through the back panel hole into the bracket.

Adjustments

The Tone Remote System Adapter comes from the factory adjusted for the nominal level required by most transmitters. The guard tone level is set by the potentiometer that is labeled GT. To maintain the proper signal level between the guard tone and audio signals, the pot is set for a reading of 0.7 V_{P-P} (-10 dB) at test point TP2, pin-6 (pin-1 is ground). The guard tone is summed with the audio at the channel card. The transmit adjustment (TX) for each channel controls the summed audio level. The difference between the high-level guard tone and the low-level guard tone is fixed at 30 dB by the channel card. The guard tone may also be monitored at the test points on the channel card, P1, but this level is dependent on the TX potentiometer setting of each channel.

> **Note** Test point TP2 and the notch filter jumpers are not available on 950-9717.

High Level Guard Tone Timing

The high level guard tone (HLGT) duration has a standard setting of 120 milliseconds when the channel OPT switch is in the OFF position. The HLGT duration may be selected in the system configuration when the OPT switch is in the ON position.

Notch Filters

There are four guard tone notch filters on the adapter to filter out the 2175 Hz tone from the select and unselect speaker audio, the transmitted microphone audio and the patching audio. The microphone and patching filters have jumpers to disable the filter. The default settings for the jumpers on the Tone Remote Board are to be in the IN position. Table 20 shows the jumper positions for the MIC and Patch notch filters.

Table 20: Notch Filter Jumpers on the Tone Remote Board

Jumper	Position	Status
JP6 (MIC)	IN OUT	Enable notch filter Disable notch filter
JP7 (Patch)	IN OUT	Enable notch filter Disable notch filter

The notch filtering only applies to incoming audio. Although the output does not notch any guard tone frequencies that may be present, a third party notch filter can be used.

Audio Delay

The Tone Remote with Audio Delay Board (950-9922) has an additional feature, which allows for audio delay in both the Patch Bus and the MIC Bus for up to a maximum of 1.0 second.

The audio signals between the console channels that are connected together in a patching mode (Patch Bus) may be time delayed to compensate for the channel key-up time. The audio from the dispatcher (MIC Bus) may also be delayed. The two delays can be independently selected (via jumpers) and the audio delay time can be set to 0.25, 0.50, 0.75 or 1.0 second. (See Table 21). The default setting for the delay period is 0.75 seconds.

Table 21: Delay Related Jumpers on the Tone Remote Board

Jumper	Position	Status
JP1 (Delay)	.25	0.25 second delay period
	.50	0.50 second delay period
	.75	0.75 second delay period
	1.0	1.0 second delay period
JP2 (MIC)	IN	Enable MIC delay
	OUT	Disable MIC delay
JP3 (Patch)	IN	Enable Patch delay
	OUT	Disable Patch delay

When using the delay on the MIC Bus, the delayed audio will be clipped off when the transmit key is released unless a delay is programmed into the Model 4010 console configuration. The Model 4010 Console Programming System (CPSW) will have to be used to download a modified configuration. To extend the transmit time, the MIC Delay Eliminator option (Position Configuration and Audio Control menu) must be enabled (set to YES). Refer to *Audio Controls* on page 96 for the programming.

When the operator selects the optional Phone Patch Card, 950-9719 or 950-9720, the MIC Bus delay is automatically disabled so the sidetone back to the operator and the Select Speaker audio will not cause feedback or confusion. Firmware version 1.60 or higher is required to enable this feature.

Model 4010 DC Remote Daughter Board

The DC Remote Daughter Board (P/N 702-9380) is an option board that is installed on the Dual Channel Board. This option will allow the channel card to generate the DC current required to control DC remote controlled transmitters. Normally this option is installed at the factory, but it can also be installed in the field with the following instructions.

Installation

The cover of the Model 4010 must be raised by unscrewing the two thumbscrews on the back of the unit and lifting the top.

> ⚠ **Caution!** Keep the front of the unit on the tabletop; do not let the front hang over a table edge. The console can easily be knocked off balance onto the floor when the front hangs off the table.

Remove the Dual Channel Card that has the channel that requires the DC current option. If the channel number is an odd number, the DC Remote Daughter Board is installed in

connector P2 (upper strip connector). If the channel number is even, use connector P3. The Daughter board comes with two standoffs and mounting screws. First, remove the screws, and then install the Daughter board into the strip connector. Using the screws and standoffs, secure the board to the Dual Channel Card. Insert the Dual Channel Card into the channel slot by placing the side away from the back panel in first, then rock the card towards the back panel into position. Take care that the LEDs are properly positioned. Secure the board by inserting the screw through the hole in the back panel into the bracket on the card.

DC Current Calibration

The DC Remote Daughter Board has a potentiometer to adjust the DC current level. The pot is adjusted at the factory and should not require adjustment. The pot (R15) is accessible from the top of the unit (with Model 4010 cover open) and, with a current meter in series with the transmission line, can be adjusted to the desired level. The factory adjustment is for 0.5-milliampere programmable steps.

Note DC current levels are programmable in 0.5-milliampere steps and R15 is used only for fine adjustment.

Programming

The Console Programming System (CPSW) is used to set the current levels for the various transmission requirements. The DC board can be programmed in 0.5-milliampere increments up to a maximum of 15 milliamperes. Refer to *Channel Configuration* on page 85 for details.

LOTL Option

The LOTL (line operated transmit lamp) indication is provided with the DC Remote Daughter Board. This signal is used to indicate when a transmission is occurring and to prevent the Model 4010 from transmitting while the line is busy. This signal is not useful if there is no parallel device (console or station remote) and should be disabled with the jumper on the DC board.

LOTL	Enabled	Disable
Jumper JP1	A	B

Model 4010 Tone LOTL Daughter Board

The Tone LOTL Daughter Board (P/N 702-9450) is an option board that is installed on the Dual Channel Board. This option will allow the channel card to monitor the transmitter line for the guard tone frequency and prevent transmission if the transmitter is busy. This option is only useful if the transmitter has a parallel device (console or station remote) controlling it.

Installation

The cover of the Model 4010 must be raised by unscrewing the two thumbscrews on the back of the unit and lifting the top.

> ⚠ **Caution!** Keep the front of the unit on the tabletop; do not let the front hang over a table edge. The console can easily be knocked off balance onto the floor when the front hangs off the table.

Remove the Dual Channel Card that has the channel that requires the tone LOTL indication. If the channel number is an odd number, the Tone LOTL Daughter Board is installed in connector P2 (upper strip connector). If the channel number is even, use connector P3. The Daughter board comes with two standoffs and mounting screws. First, remove the screws, and then install the Daughter board into the strip connector. Using the screws and standoffs, secure the board to the Dual Channel Card. Insert the Dual Channel Card into the channel slot by placing the side away from the back panel in first, then rock the card towards the back panel into position. Take care that the LEDs are properly positioned. Secure the board by inserting the screw through the hole in the back panel into the bracket on the card.

The LOTL (line operated transmit lamp) signal is used to indicate when a transmission is occurring and to prevent the Model 4010 from transmitting while the line is busy. This signal is not useful if there is no parallel device (console or station remote) and should be disabled with the jumper on the board.

LOTL	Enabled	Disable
Jumper JP1	A	B

Model 4010 Channel ANI Decoder

The ANI channel decoder board is a single board used to detect and display ANI information being sent to a channel.

The console that requires ANI information to be monitored must have the individual channel ANI decoder boards installed. The part number of the channel ANI decoder board depends on the type of ANI signaling used.

DTMF Decoder	702-9535	(Option 950-9722)
5/6 Tone Decoders	702-0147	(Options 950-9707, 950-9708)
FSK Tone Decoder	702-9583	(Option 950-9709)

The decoder board monitors the channel it is installed on and sends any valid ANI signal to the front panel display.

Installation

The cover of the Model 4010 must be raised by unscrewing the two thumbscrews on the back of the unit and lifting the top.

> ⚠ **Caution!** Keep the front of the unit on the tabletop; do not let the front hang over the table edge. The console can be knocked off balance onto the floor in this position.

Remove the Dual Channel Card that has the channel that requires the ANI decoder. If the channel number is an odd number, the ANI board is installed in connector P2 (upper strip connector). If the channel number is even, use connector P3. The Daughter board comes with two standoffs and mounting screws. First, remove the screws, and then install the Daughter board into the strip connector. Using the screws and standoffs, secure the board to the Dual Channel Card. Insert the Dual Channel Card into the channel slot by placing the side away from the back panel in first, then rock the card towards the back panel into position. Take care that the LEDs are properly positioned. Secure the board by inserting the screw through the hole in the back panel into the bracket on the card.

Checkout

After the console powers up but before pressing any keys, observe the firmware version number shown in the front panel display of the console. If it does not indicate “v0.21” or higher, the ANI feature will not work. Call Zetron to upgrade your console to the correct firmware version level.

Next, observe the first two non-blank characters immediately to the left of the firmware version number. They should be “nx”, where x is the number of ANI decoders installed. If x is the correct number of decoders, your Model 4010 is ready to detect ANI on the

appropriate channels. If the characters are “N0”, your Model 4010 did not recognize any ANI board and will not communicate with it. Make sure the ANI board is properly installed, reset the Model 4010 by cycling power, and try again. If the display still indicates “N0” or the wrong number of ANI decoders, contact Zetron.

Configuration

For ANIs to be buffered and displayed by the Model 4010, the ANI REVIEW function must be assigned to a console key (usually on the system key panel) using CPSW. Other useful functions to program are ANI SOURCE and ANI SELECT. Refer to *ANI Decode/ Display* on page 97 for complete details.

Note The Model 4010 is able to decode only the unit identification in a PTT-ID. ANIs that are configured with fleet or group designation separated by a dash from the unit ID cannot be displayed on the 4010 LCD. Therefore, end users who have multiple fleet/group IDs need to insure that the Unit IDs assigned in one fleet/group are not duplicated in another or there may be confusion as to the source of the call.

Jumper and Switch Settings

5/6 Tone Decoder Jumpers

The jumpers JP1 and JP2 are used for 5/6 tone decoding only. The standard setting is both jumpers in position B.

JP1	JP2	ZVEI Formats (950-9707)
B	B	ZVEI where repeat digit = 2600 Hz
B	A	DZVEI where repeat digit = 2400 Hz
A	B	ZVEI-2 where repeat digit = 970 Hz
A	A	Ignore ANIs

JP1	JP2	CCIR Formats (950-9708)
B	B	CCIR/EEA
B	A	Ignore ANIs
A	B	Ignore ANIs
A	A	Ignore ANIs

FSK Tone Decoder Jumper and Switch

JP3 shorts out the incoming audio stream, disabling the ANI decode. This would normally be left open.

The **SW1** 4-position bitswitch is not used.

Model 4010 Parallel Status Option

When two Model 4010 consoles control the same radio transmitter, the Parallel Status Option communicates the frequency information between the consoles. The Busy Out and Busy In signals of the two associated channels also need to be connected together so the consoles reflect the transmit status of the channel.

The Parallel Status Option has the following features and limitations:

- Two consoles can be connected together for parallel status
- This option cannot be used on a console with an expansion panel installed
- Only frequency switching information is shared

Cable Installation

A split 50 terminal 66M punch-down block can be used for the installation. It allows the channel signals from the two consoles to be brought to adjacent pins. Jumpers or bridge clips can then be used to connect PTT-, PTT+, Tx-, Tx+, Rx-, and Rx+ (if 4-wire) of the two channels. The Busy Out signal must be connected to the Busy In of the associated channel of the second console and the Busy In to the associated Busy Out. See Figure 10 for the split 50-block configuration.

The parallel status cable (P/N 709-7313) is installed between the two consoles' Data Comb connectors (6 pin RJ-11). This cable transfers the frequency information between consoles.

Channel Card Termination

When connecting two consoles to the same transmitter, only one console can be terminated with 600 ohms impedance. The second should be in the high impedance configuration. The console that is the longest distance from the transmitter should have the 600 impedance. See Table 22 for the Model 4010 channel card jumper positions for the impedance settings.

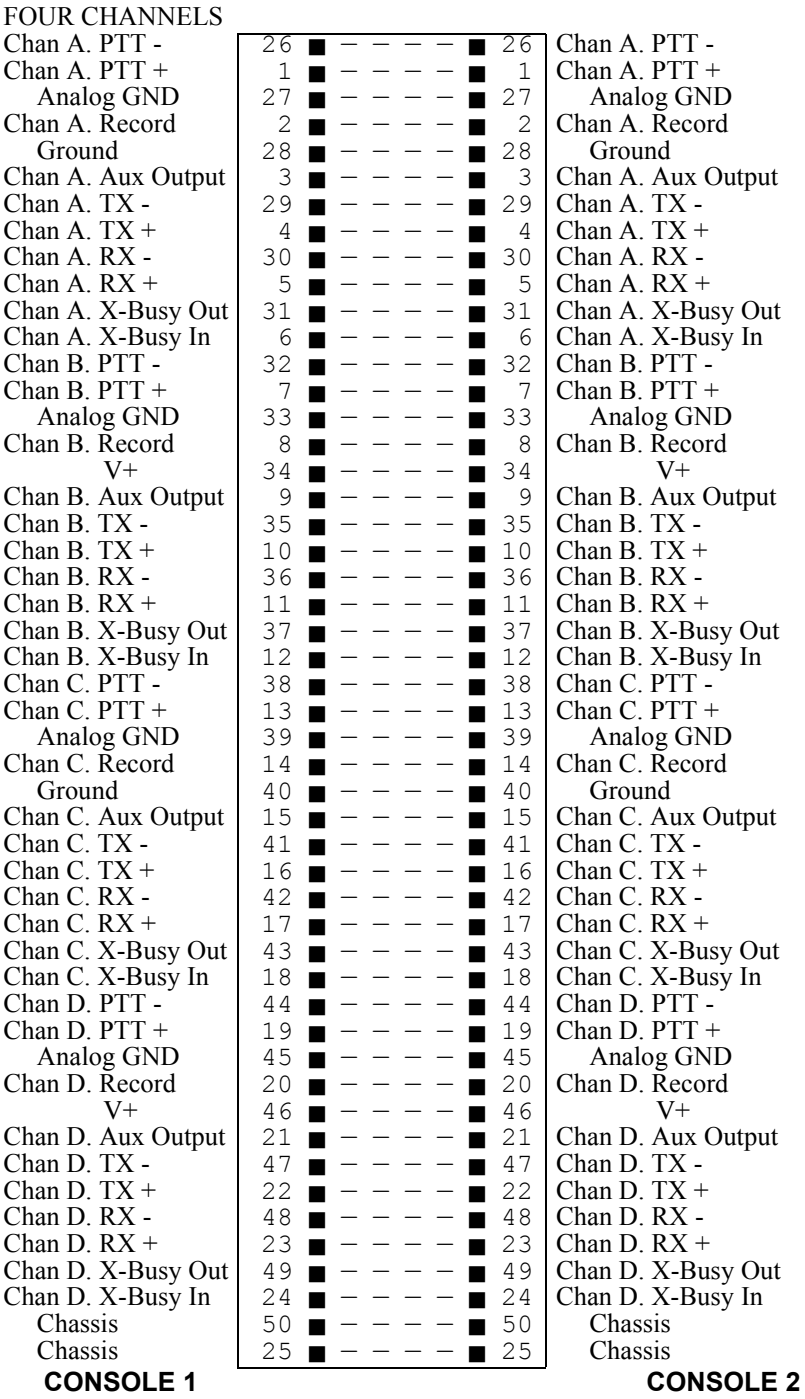
Table 22: Channel Card Impedance Jumper Settings

Option	Channel A	Channel B
2-Wire Line Termination		
Low Impedance (600 Ω)	JP1-A	JP7-A
High Impedance (3.5 kΩ)	JP1-B	JP7-B
4-Wire Line Termination		
Low Impedance (600 Ω)	JP2-A	JP3-A
High Impedance (10 kΩ)	JP2-B	JP3-B

Console Programming

The console must be programmed using the Console Programming System (CPSW) to enable the Parallel Status option. If the console is ordered with the Parallel Status option, it is programmed at Zetron. Refer to *Miscellaneous* on page 99 for programming information.

Figure 10: Split 50 66M Punch-Down Block (P/N 950-9351) for the Parallel Status Option



GE-Star Decoder

The ZETRON Model 4010 GE-STAR Decoder is designed to add on to any existing ZETRON Model 4010 Dual Channel Card. The GE-STAR Decoder can be configured to interpret one of a number of different GE-STAR formats. The DIP switches 1-4 on the GE-STAR Decoder board determine the format that will be decoded. Each format uses the GE-STAR T1, T2, and S1 bits in a different manner and some formats expand the basic 11-bit GE-STAR ID.

GE-STAR Overview

The signaling method used in GE-STAR is phase-shift-keying (PSK). This method uses 400 bps data with a 1600 Hz sub-carrier, resulting in 90 degree phase shifts that indicate a change in bit status (either 0 to 1 or 1 to 0).

The format of the data is shown below:

```
            ------------------------------------------------
Word 1:     |  |  |  |  |  |11|10| 9| 8| 7| 6| 5| 4| 3| 2| 1|
            ------------------------------------------------
                    ^                    ^
                    Sync Bits            ID Bits

            ------------------------------------------------
Word 2:     |T1|T2|S1|S2|S3|S4|M1|M2|M3|M4|  |  |  |  |  |  |
            ------------------------------------------------
               ^     ^             ^             ^
               Tag   Status        Message       Error
               Bits  Bits          Bits          Detection Bits
```

Typically, the GE-STAR information is transmitted in a short burst of three repeated messages of the above format, preceded by a 16-bit preamble of alternating l's and 0's. The repetitions and error detection on each message provide immunity to falsing and high decoding reliability.

GE-STAR Decoder Setup

DIP switches 1-4 on the Model 4010 GE-STAR Decoder board determine the format that will be decoded. The valid settings are summarized below:

Table 23: Multi-System Formats (T1,T2=System Number)

Switches 4321	Description
0000	System 0 Only Decode
0001	System 1 Only Decode
0010	System 2 Only Decode
0011	System 3 Only Decode
0=On (direction of arrow on switch) 1=Off (opposite direction of arrow on switch)	

Table 24: Mobile/Portable Formats (T2=O=Mobile, T2=1=Portable)

Switches 4321	Description	Extra ID Bits
0110	12-bit Mobile/Portable	T1=12th bit
0111	13-bit Mobile/Portable	S1=12th bit, T1=13th bit
0=On (direction of arrow on switch) 1=Off (opposite direction of arrow on switch)		

Table 25: Extended ID Formats

Switches 4321	Description	Extra ID Bits
1101	GE-STAR #4	T1=13th, T2=12th, S1=14th
1110	GE-STAR #3	T1=13th, T2=14th, S1=12th
1111	Expanded- ID STAR #1	T1=14th, T2=13th, S1=12th
0=On (direction of arrow on switch) 1=Off (opposite direction of arrow on switch)		

Switch settings other than those listed above will default to 11-bit ID decoding, ignoring the T1, T2, and S1 bits of the GE-STAR receive information.

Error Indications

If the GE-STAR Decoder receives and decodes an ANI that is out of the 0000-9999 range, it will display "#####" on the console to indicate the error. Any emergency or man-down indications will be passed to the console also, despite the out of range ID.

Output Format

The M4010 ZETRON GE-STAR Decoder output will display on the console as a sequence of characters and numbers that represent the decoded GE-STAR ID. The displayed ID starts with either a number sign (#) for non-emergency ID's or a star (*) for emergency IDs, followed by the four digit ID number (0000-9999), followed by a status or message character if present in the transmission. The possible outputs are shown below:

Table 26: 11-Bit and Extended ID Decoding

Output	Description
#xxxxS	Status Message (where S=0-7)
#xxxxB	Request to Talk ID
#xxxxC	Stuck Mic ID
#xxxx	PTI ID
*xxxx	Emergency ID
*xxxxD	Man Down ID
where xxxx = decoded GE-STAR ID: 0000-2047 w/11-bit decoding 0000-4095 w/12-bit decoding 0000-8191 w/13-bit decoding 0000-9999 w/14-bit decoding	

Table 27: Mobile /Portable Decoding

Output	Description
#xxxx*(S)	Mobile Decode (S=Status, if any)
#xxxx#(S)	Portable Decode (S=Status, if any)

Table 28: Multi-System Decoding

Output	Description
#xxxx(S)	Decoded for system 0, 1, 2, or 3 only (S=Status, if any)

Model 4010 T2-2R Base Station Installation

There are two methods of installing a T2-2R base station to a Model 4010 Console.

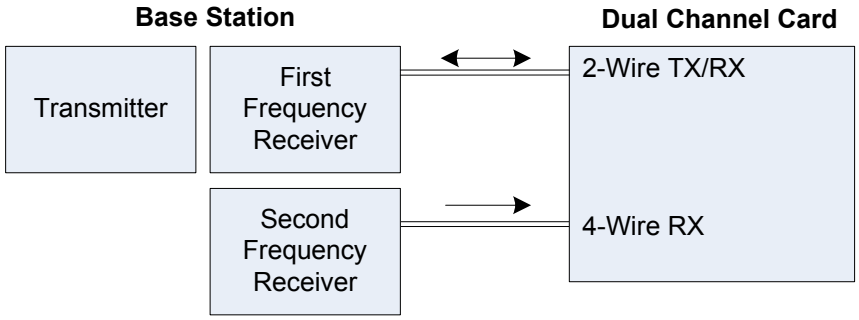
Method 1

This method allocates one system channel to the T2-2R base station.

Advantage: Uses only one system channel instead of two. The installation is simple.

Disadvantage: Both receivers are summed together giving only one mute button, one channel volume control, and one call indicator.

Figure 11: T2-2R installation method 1



Programming: Program the channel as a T2-2R channel. In addition to a channel select button, include a F1/F2 button (sent at Xmit) for transmit frequency selection, and optionally an R2 On/Off button for second receiver muting at the base station. If Instant Select is desired, use an F1-select and an F2-select button instead of the conventional select button.

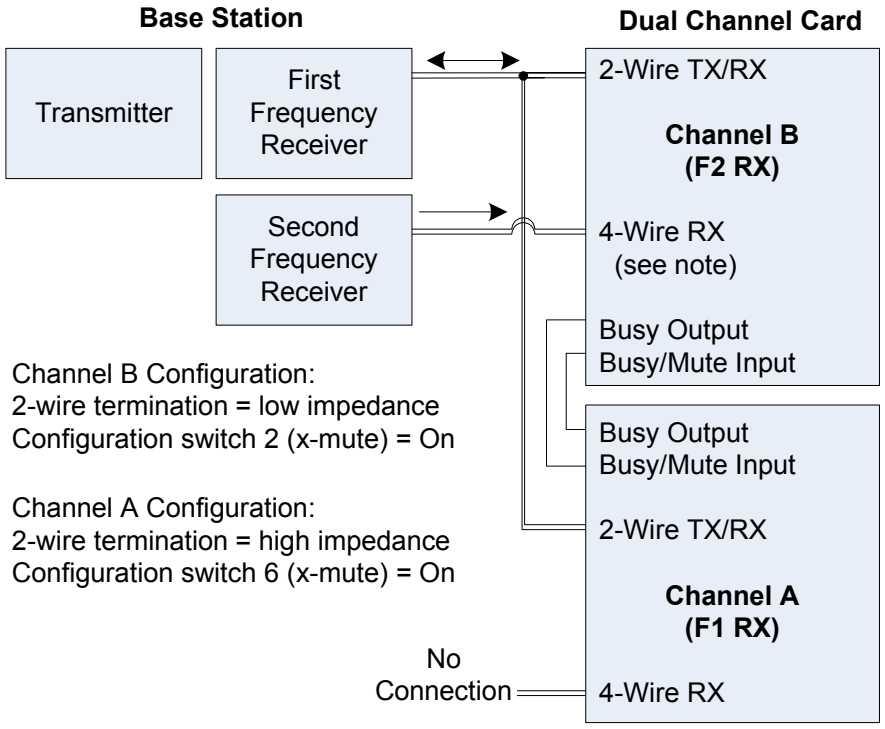
Method 2

This method allocates two system channels to the T2-2R base station.

Advantage: Each receiver is given its own channel and thus individual mutes, channel volumes and call indicators.

Disadvantage: Requires two system channels and more complex installation.

Figure 12: T2-2R installation method 2



Programming: Program both channels A and B as Custom channels. When asked for the custom tone or current, specify the value that is desired. Generally, channel A will have an F1 tone (1950 Hz) or current (+5 mA), and Channel B will have an F2 tone (1850 Hz) or current (+12.5 mA) upon transmit only.

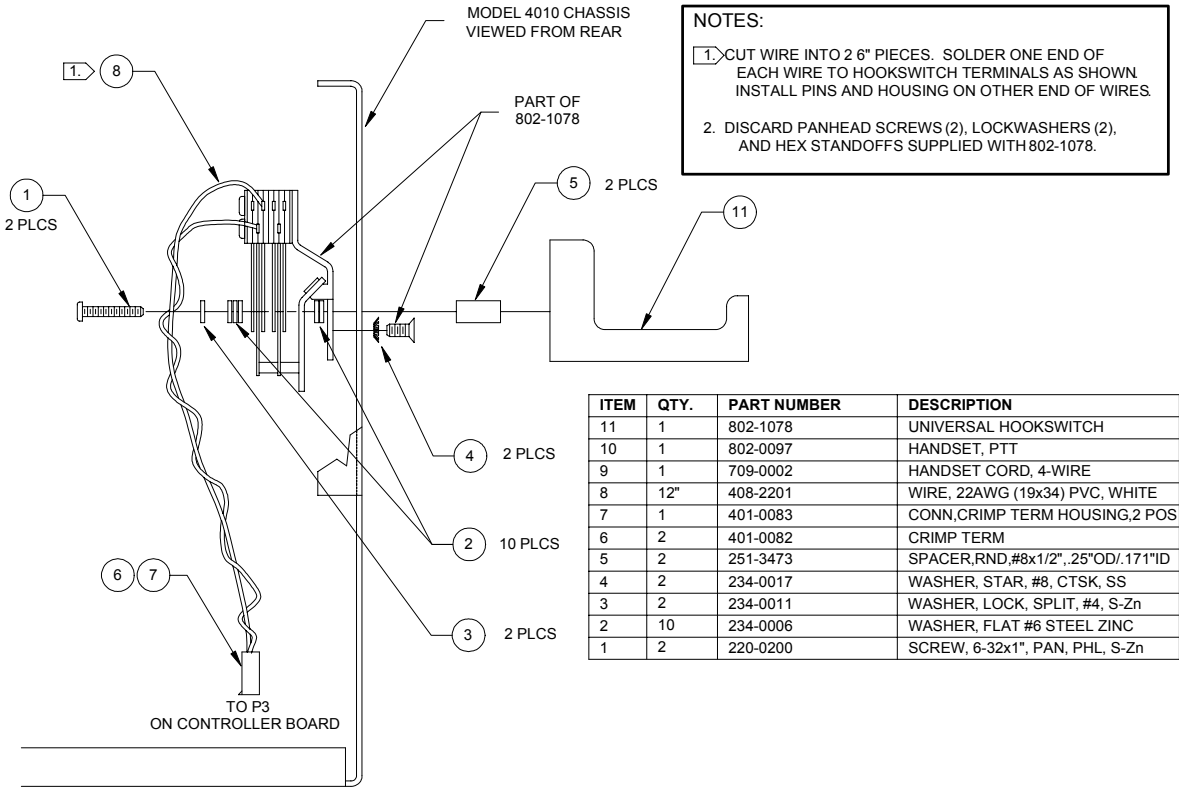
Note In the configuration shown in Figure 12, the 2-wire Rx in Channel B should be turned down (CCW) so that F1 RX 2-wire audio is not processed on Channel B.

PTT Handset with Cradle

The PTT Handset (P/N 950-9315) may be used with the Model 4010 Console. When installed in the field, the handset cradle must be mounted to the side of the console using the four mounting holes provided. See Figure 13 for details.

The connector with wires from the switch hook is installed on P3, which is on the Control Board under the handset cradle mounting location. The four-wire modular cord from the handset is installed in the modular connector on the exterior side of the console near the handset cradle.

Figure 13: Handset Cradle Assembly



ITEM	QTY.	PART NUMBER	DESCRIPTION
11	1	802-1078	UNIVERSAL HOOKSWITCH
10	1	802-0097	HANDSET, PTT
9	1	709-0002	HANDSET CORD, 4-WIRE
8	12"	408-2201	WIRE, 22AWG (19x34) PVC, WHITE
7	1	401-0083	CONN,CRIMP TERM HOUSING,2 POS
6	2	401-0082	CRIMP TERM
5	2	251-3473	SPACER,RND,#8x1/2",.25"OD/.171"ID
4	2	234-0017	WASHER, STAR, #8, CTSK, SS
3	2	234-0011	WASHER, LOCK, SPLIT, #4, S-Zn
2	10	234-0006	WASHER, FLAT #6 STEEL ZINC
1	2	220-0200	SCREW, 6-32x1", PAN, PHL, S-Zn

Programming

Introduction

This chapter describes how to use the Console Programming System for Windows (CPSW). CPSW provides technicians with the ability to field program any of the keys on a Model 4010, Model 4116B, Model 4018, or Model 4118. The keys may be defined to accommodate a new channel, a new layout, or a new remote function. The advanced menu-driven window interface makes the program intuitive and easy to use.

The CPSW executable can be run to support the Model 4010, or the Model 4116B and 4018/4118. This chapter provides instruction for CPSW for the Model 4010 only. The following table can help you identify the correct documentation for your model.

Model	Manual
M4010	Model 4010 Radio Dispatch Console Installation (this manual) P/N 025-9227
M4116B M4018 M4118	Series 4000 Installation and Configuration Manual P/N 025-9533 (rev F or newer)

Tip For online help, press F1 at any time in the CPSW application.

Versions and Compatibility

DOS and Windows

CPSW replaces CPS, an older program with similar functionality but created for use in MS-DOS. The older CPS application may be used within a command line window on a

Windows 95, 98, ME, or XP Professional PC as long as the serial port settings are set to: 9600, N, 8, 1, no flow control.

Tip This chapter is for CPSW only. CPS DOS users can obtain the CPS manual (025-9229 *Model 4010 Programming*) by contacting Zetron or by directly downloading from the Zetron reseller website. See http://www.zetron.com.

Firmware Compatibility

Each version of CPS and CPSW is designed to work with a specific firmware version or range of firmware versions. It is best to use the version of CPSW that was delivered with your system or your last firmware upgrade. If you need a replacement copy of CPSW, contact Zetron technical support. They can assist you with acquiring the correct programming software for your specific firmware.

- CPS is supported for firmware versions up to 1.80 only.
- CPSW is supported for firmware versions 1.80 and newer.

Installation

Installation

To install CPSW, follow the instructions provided with it (*CPSW Installation Notes*, P/N 011-0795).

Uninstallation

♦ **To uninstall CPSW**

CPSW uses the standard Windows procedure for uninstallation.

1. From the Windows Control Panel, double-click **Add/Remove Programs**.
2. In the alphabetical list of installed programs, find and click **Zetron CPSW** to select it.
3. With **Zetron CPSW** selected, click **Remove** (located on the same highlighted line).
4. Proceed through the uninstallation wizard.

Note The Microsoft .NET Framework can also be uninstalled using the same method, but this is not recommended because other applications may rely on .NET.

CPSW Menu Structure

The following two figures provide a map for all menu items in CPSW. Figure 14 shows all menus items except key definitions. Figure 15 shows menu items related to key definitions.

Note When using CPSW, several menu items may be unavailable if they are incompatible or not relevant based on other configured settings. For example, keys cannot be defined for custom channel functions if there are no custom channels in the current system configuration.

Figure 14: CPSW Menu Structure

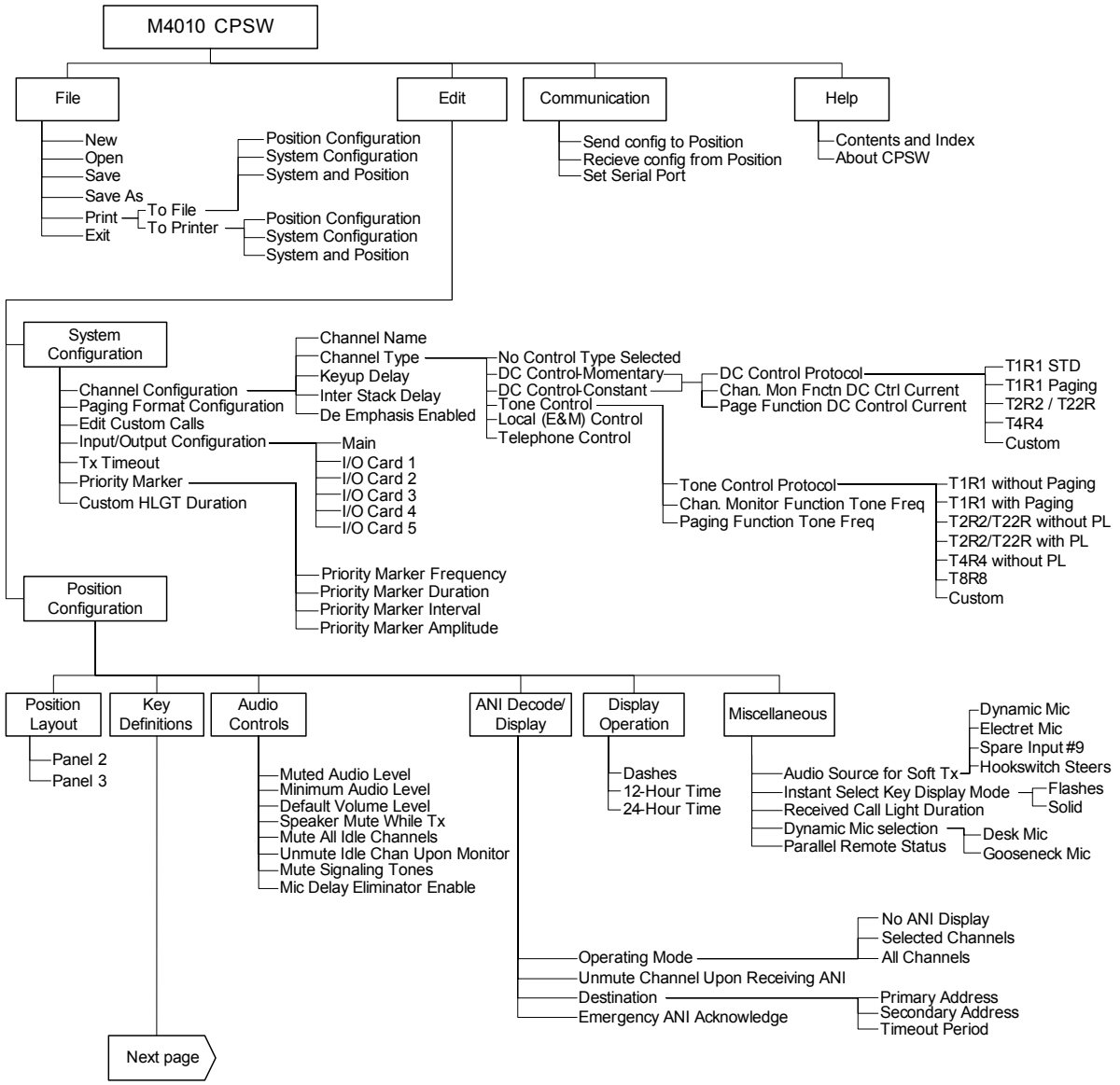
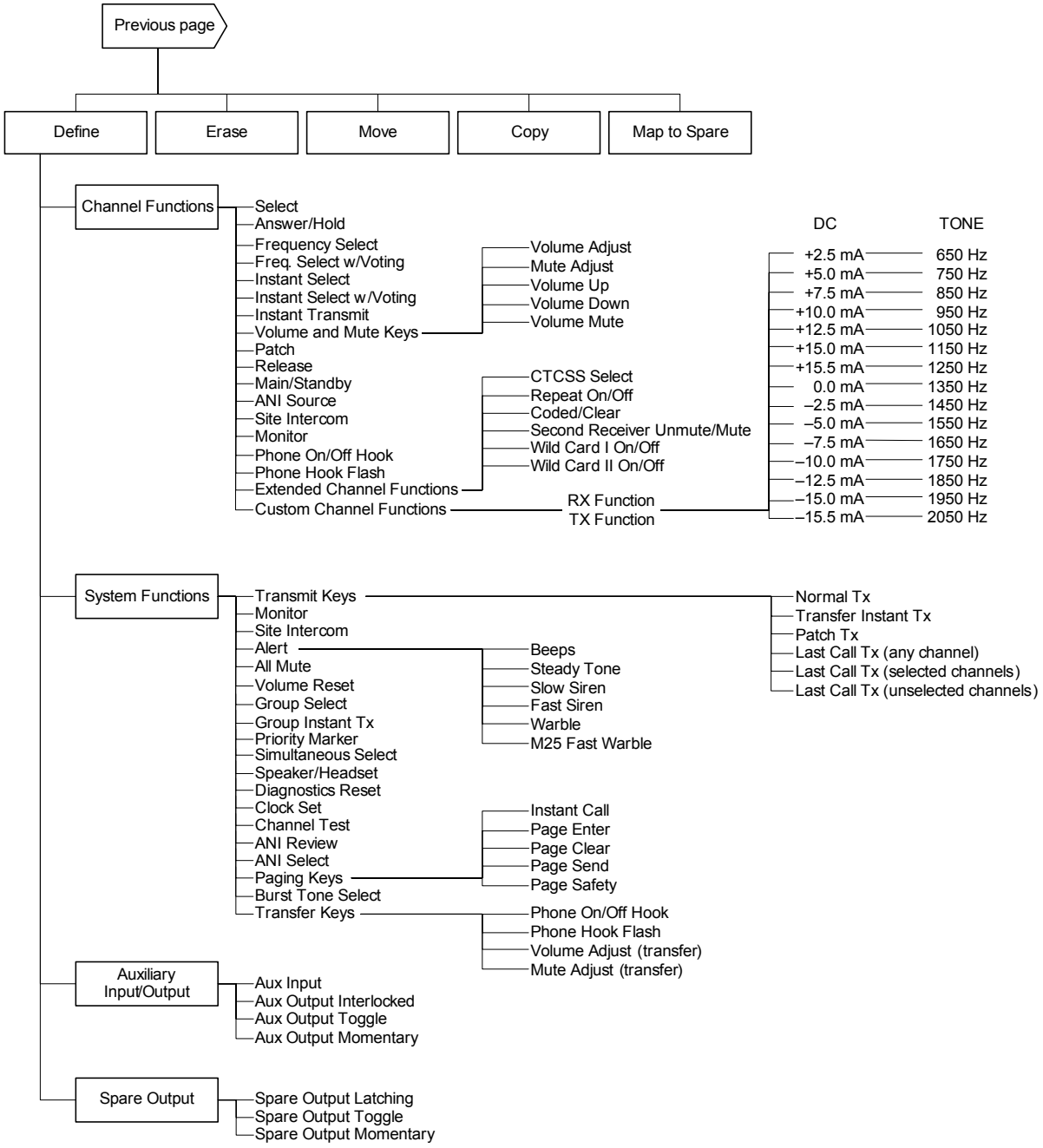


Figure 15: CPSW Menu Structure (continued)



Using CPSW

This chapter describes how to configure Model 4010 dispatch consoles. This is accomplished through three primary tasks:

1. Use one of the following methods to get configuration settings:
   a. Download an existing configuration from a console
   (see *To receive the configuration from a console* on page 84)
   b. Open an existing configuration file from a disk
   (see *To load a configuration from a file* on page 84)
   c. Start with a new, blank configuration
   (see *To configure a position's panel layout* on page 94)
2. Edit the configuration settings as needed
   (see *Editing a Configuration* on page 85)
3. Save the configuration file and send the configuration to one or more consoles
   (see *Sending a Configuration to a Console* on page 101)

This section, Using CPSW, provides step-by-step procedures to cover everything you need to do in order to configure your consoles.

Starting CPSW

Start CPSW by double-clicking on its shortcut. Alternatively, the program itself is located in C:\Program Files\Zetron\CPSW\ and titled "CPSW_Application.exe" (assuming the default location was used during installation). If you don't use the shortcut, CPSW will prompt you for the system type, which is **M4010**.

Configuring CPSW

The serial port setting is the only setting needed to configure the CPSW application. By default, CPSW is set to COM1.

♦ To configure the serial port

1. Determine which serial port will be used to connect to consoles (typically COM1 or COM2).
2. Go to **Communication**, **Set Serial Port**.
3. CPSW provides a list of available COM ports. Select the serial port to use.
4. Click **Save Port Selection**.

Loading a Configuration

Zetron uses CPSW to preconfigure Model 4010 consoles for customers. The resulting configuration file is supplied by email or floppy disk to customers.

♦ To receive the configuration from a console

1. Use the supplied programming cable to connect your PC with the console:
   - If you have a cable with one RJ connector (P/N 709-7266 or 709-7400), use it to connect the serial port of your computer to the COMB jack (combined data) on the console.
   - If you have a cable with two RJ connectors (P/N 709-7084 or 709-7417), use it to connect the serial port of your computer to the DATA IN and DATA OUT jacks on the console (these jacks might also be named LOOP IN and LOOP OUT). The cable ends are labeled for specific ports (IN vs OUT) and must be connected correctly.

   If there are existing cables already connected to any of these ports, you must temporarily remove them while programming. Before removing these existing cables, ensure they are labeled so they can be returned to the proper ports.

> **Note** The USB-to-serial port adapter provided by Zetron (P/N 802-0516) is tested and the recommended adapter for this application. Many third party USB-to-serial port adapters are inconsistent with their serial port implementation and do not reliably communicate with Zetron equipment.

2. There is an unlabeled switch on the bottom of the Model 4010 used to switch the console between RUN and PROGRAM modes. Move the switch to the program position, which is towards the gooseneck MIC and away from the DATA IN, DATA OUT, and COMB jacks.

   The console display shows “PROGRAM”.
3. In CPSW, click **Communication, Receive config from Position**.
4. Click **OK** to begin receiving the configuration.

   The console display shows “UpLoading CPS” while it is sending data and shows “DONE” when all data is transferred.

   If you receive the error message “Console did not send any data”, check the following items and try again:
   - Check your cable for loose or incorrect connections
   - Ensure the RUN/PROGRAM switch is set to PROGRAM
   - Check your serial port settings (see *To configure the serial port* on page 83)

♦ To load a configuration from a file

1. Click **File, Open**.

2. Navigate to the location containing your configuration files. Configuration files have a file name extension of ".cf1". The default location is **C:\CPSW Config Files**.

> **Note** CPSW configuration files ending in ".cf1" are used for M4010 and M4010R consoles.
>
> CPSW files ending in ".cfg" are used for M4x18 (Series 4000) consoles.

> **Tip** If custom configuration files were provided by Zetron, they are located on the supplied 3.5" floppy disk.

3. Double-click the appropriate .cf1 file.

   Once loaded, the system name of this configuration appears in the window's title bar adjacent to "CPSW" and the CPSW version number. When ZETRON prepares the configuration file, the system name is also the first seven letters of the filename.

Editing a Configuration

> **Warning!** Prior to configuring the system, it is imperative that the programmer has a complete understanding of the radio system that is to be controlled by the Model 4010 console.

There are two types of configuration settings: *position* and *system*. *Position* configuration refers to the settings specific to a single console position, such as the button layout and preferences for that position. *System* configuration refers to overall system settings such as channel types, paging formats, and I/O.

> **Tip** It is best to configure system settings before position settings. Some position settings, such as specific key definitions, are not available until the system settings are configured correctly.

System Settings

Channel Configuration

♦ **To configure channels**

1. Click **Edit, System Configuration, Channel Configuration**.
2. Select the channel number to configure using the up and down arrows next to **Channel Number**.
3. Enter a **Channel Name**. **Channel Name** is used for reference only, and can be left blank if desired.

4. Select the **Channel Type**.

Channel Type	Description
DC Control Momentary	Use this DC control option if the radio requires only a momentary DC current to perform the desired function.
DC Control Constant	Some radios require that the control current be maintained constant in order to perform the desired function. Use this option if your radio requires a constant current.
Tone Control	Radio is controlled by way of various tone frequencies.
Local (E&M) Control	A local control radio has only PTT and audio connections; it does not have control functions.
Telephone Control	Due to slot/card compatibility, channels 13 and 14 can only be Telephone Control. No other channels can be Telephone Control.

Note Different channel types have different settings to be configured. Depending on the channel type you have configured, some of the following settings may not be relevant and available for configuration.

Note Channels 13 and 14 are only supported by the Phone Patch Interface Card. Therefore, the only compatible channel type for those channels is **Telephone Control**.

5. If applicable, select the **Control Protocol**. Some channel types have control protocols and some do not. Also, the list of available control protocols will vary depending on channel type.

Control Protocol	Description
T1R1 Without Paging	Single frequency standard tone controlled radio without paging option. This is the option to use if the channel is to be used without an external paging terminal such as a Model 25.
T1R1 With Paging	Single frequency standard tone controlled radio with external paging option. If your radio supports the paging option, use this type. The Auxiliary PTT input will cause a control tone different from the normal PTT to be generated.
T2R2/T22R Without PL	Two-frequency tone controlled remote radio without PL. Refer to *DC and Tone Remote Function Definitions* on page 110 for a list of the frequencies generated.
T2R2/T22R With PL	Two-frequency standard tone controlled radio with Private Line (PL)-Tone Squelch option. If your radio supports the PL option, use this type. The Auxiliary PTT input will cause a control tone different from the normal PTT to be generated.

Control Protocol	Description
T4R4 Without PL	Four-frequency tone controlled remote radio without PL. Refer to *DC and Tone Remote Function Definitions* on page 110 for a list of the frequencies generated.
T8R8	This is an eight-frequency tone controlled remote radio. Refer to *DC and Tone Remote Function Definitions* on page 110 for a list of the tones required to control this type of radio.

6. If applicable, select the **DC Control Current** or **Tone Frequency** used for channel monitor. See *DC and Tone Remote Function Definitions* on page 110 for a description of the control currents and tone frequencies.

   The options for channel monitor depend upon the channel type and some channel types may not support a monitor function at all.

7. If applicable, enter a value from 0.0 to 10.0 seconds for **Keyup Delay** to set the time delay between when the channel has finished keying up the transmitter and the start of the first page in a stack.
8. If applicable, enter a value from 0.0 to 10.0 seconds for **Inter-Stack Delay** to set the time delay between pages in a stack. This delay will only occur for manually entered page stacks (i.e., for two or more pages entered via Paging/DTMF keypad). Because each page can be sent out over different channels, Instant-Call (single button) paging stacks always use the Keyup Delay between pages even if the next page uses the same channel as the previous page.
9. If applicable, select the **DC Control Current** or **Tone Frequency** used for paging function. See *Appendix B: CPSW Reference Material* on page 109 for a description of the control currents and tone frequencies.

   The options for channel monitor depend upon the channel type and some channel types may not support a monitor function at all.

10. If applicable, enable or disable **De Emphasis** by marking or clearing its checkbox. De Emphasis may need to be enabled if the radios transmitting via the console are using Pre Emphasis. If you are uncertain, leave De Emphasis disabled.
11. If you have additional channels to configure, click **Next** or **Previous** and repeat this procedure.
12. If you are finished configuring channels for now, click **Done**.

♦ To delete or clear a channel's configuration

1. There are two ways to delete a channel's configuration:
   a. If you want to delete a channel's configuration but retain the channel name, change the **Channel Type** to **No Control Type Selected**.
   b. If you want to delete a channel's configuration including the channel name, click **Delete** or change the **Channel Type** to **Undefined**.

Paging Format Configuration

Each paging format to be used in Model 4010 consoles must have certain parameters unique to that format defined and must have a leading digit assigned to it. There are 14 leading digits available to be assigned among the nine different paging formats the console is capable of generating (some of which are optional). This allows the console user to select which type of page to transmit by preceding each page with its assigned leading digit.

If only one paging format is programmed (only one leading digit has been assigned), the page is keyed in directly and no leading digit is necessary (or allowed). The console already knows what type of page it will be.

Multiple variations of the same paging format can be programmed into the console by assigning each one its own unique leading digit. For example, leading digits 3, 4, and 5 might each be assigned to the DTMF paging format but with different on/off timing defined for each of the three formats.

Note When programming Instant Call Key paging stack(s), a leading digit is always required.

♦ To assign and configure a paging format for a leading digit

1. Click **Edit, System Configuration, Paging Format Configuration**.
2. To select a leading digit to configure, click on the leading digit or click **Prev. Digit** / **Next Digit** until it is selected.
3. Select the **Paging Format**.

   A number of configurable settings are displayed based upon the paging format that was selected.
4. Configure the paging format settings. In general, you need to match your particular or desired radio setup.

   Notes for certain paging formats:

   a. Most paging formats have a setting for Talk Time that may need to be configured. Talk Time is the default amount of time after a page is finished that the microphone and transmitter are keyed up. After that time expires, the next page in the stack is transmitted.

      Operators can use the Transmit key or a PTT button to override the default Talk Time by extending or cancelling the transmission. Once the Transmit key or a PTT button is pressed, the default Talk Time is cancelled and the transmitter is keyed up until the key or button is released.

   b. If you are using the paging format “1000 Call Two Tone” or “100 Call Two Tone”, the details for the code plans are listed in *Appendix B: CPSW Reference Material* on page 109.

   c. If you are using the paging format “Custom (Plectron)” be sure to later configure custom calls (see *To configure Custom Calls* on page 90).

d. The paging format "Alerts" is used to add various alert tones to your pages. The following list shows the page character used by the operator to generate each Alert function:

(0) Beep alert

(D) Delay function

(1) Slow siren alert

(2) Fast siren alert

(3) Hi/Lo warble alert

(4) Fast warble alert

For example, assuming the "Alerts" paging format has been assigned to leading digit "A", keying **A4** on the Model 4010 paging/DTMF keypad enters the Fast Warble alert on the paging stack.

Beep Alert (0) and Delay (D) function are configurable:

- Tone Frequency configures the tone for the Beep Alert. (When programming a delay, you must use a frequency even though no tone is being processed.)
- ON Duration sets the length of each beep tone.
- OFF Duration sets the delay between each beep tone.
- Count / Delay Time sets the number of beeps for the Beep Alert or the delay in seconds for the Delay function.

The tones for Alert (1) through (4) are predefined in the console; only their duration is configurable (by setting **Alert Duration**).

5. If you have additional Leading Digits to assign, repeat this procedure. If you are finished, click **Done**.

Warning! When you have configured a Leading Digit and you select another Leading Digit, the configuration changes you made are automatically applied. Clicking **Cancel** only cancels configuration changes for the currently selected Leading Digit. Likewise, clicking **Revert** only reverts configuration changes for the currently selected Leading Digit.

Edit Custom Calls

Note The "Edit Custom Calls" menu item is only enabled when there is a leading digit in the "Paging Format Configuration" dialog that has been defined as "Custom (Plectron)". Otherwise, this menu item is disabled and cannot be accessed to configure any data in the area.

Custom Calls defines your own custom two-tone pages for the paging format "Custom (Plectron)". If you have assigned a leading digit to a custom paging format (see *To assign and configure a paging format for a leading digit* on page 88), then you must configure custom calls here.

♦ To configure Custom Calls

1. Click **Edit, System Configuration, Edit Custom Calls**.

   If the **Edit Custom Calls** menu item is disabled, you must first assign a leading digit to a custom paging format (see *To assign and configure a paging format for a leading digit* on page 88).

2. Type in a custom **Call Number** between 1 and 255 and press **Enter**. Alternatively, you can select a call number by using the **Up** and **Down** arrow controls or the **Next** and **Prev** buttons.

   Choose a Call Number based on the number to key in. For example, if the "Custom Call" paging format has been assigned to leading digit "C" and you configure Call Number "11", then keying "C11" on the Model 4010 paging/DTMF keypad would add the custom call to the paging stack.

Tip The **defined** buttons jump to the next or previous defined call numbers only, thus skipping undefined call numbers.

3. If you are configuring a call number that wasn't previously defined, click **Define** to make the Tone Settings editable. (If the call number was previously defined, the Tone Settings are already editable.)
4. Enter the **Frequency** and **Duration** parameters for each tone, the **Tone Gap Duration** (duration between tones 1 and 2), and the **Talk Time**. For an explanation of Talk Time, see Step 4 on 88.
5. If you have additional Call Numbers to configure, repeat this procedure. If you are finished, click **OK**.

Tip The **Revert** button will restore the settings of the current call number only. The settings for other call numbers are not affected.

♦ To delete custom calls

1. To delete all custom calls, click **Delete All Custom Calls**.
2. To delete a specific custom call:
   a. Select the **Call Number** to be deleted.
   b. Click **Delete**.

Input/Output Configuration

The main board of the Model 4010 is equipped with eight inputs and outputs. These inputs and outputs can be used as auxiliary inputs and outputs, or as spare inputs and outputs. All inputs on the board must be one or the other (auxiliary or spare). All outputs must be one

or the other (auxiliary or spare). Different types of inputs and outputs serve different purposes.

Tip You will have to make choices about whether you need spare or auxiliary inputs and outputs before you configure them. Therefore, you should read about and understand the differences provided in the following list before you start configuration procedures.

- **Auxiliary inputs** are limited to controlling the console LED indicators. These are typically used to monitor alarms or show voter status.
- **Spare inputs** can control console LED indicators and can also be associated with function keys. For example, spare inputs can perform configurable functions, such as selecting a channel or transmitting.
- **Auxiliary outputs** can be interlocked with other auxiliary outputs and associated with auxiliary inputs. Auxiliary outputs have more choices than spare outputs when configuring the LED behavior. There are up to 38 auxiliary outputs available, so they can be labeled in CPSW for reference purposes.
- **Spare outputs** cannot be interlocked, associated with inputs, or labeled. Spare outputs have less choices for LED configuration. Spare outputs 7 and 8 can be used for a special purpose related to ANI. See *Outputs 7 and 8 in Reverse Selective Calling Mode* on page 129.
- The eight inputs on the main board can be configured to be all spares or all auxiliary. Likewise, the eight outputs on the main board can be configured to be all spares or all auxiliary.
- The number of auxiliary inputs and outputs can be increased by adding Aux I/O Cards (see *Model 4010 Auxiliary I/O Card* on page 56). Each Aux I/O Card has six inputs and six outputs, and you can add up to five Aux I/O Cards. For more information about auxiliary inputs and outputs, see *Auxiliary Input/Output* on page 128.
- There is no method for adding more spare inputs and outputs.

♦ To configure the main board I/O as spare or auxiliary

1. Click **Edit, System Configuration, Input/Output Configuration**.
2. To configure the inputs as auxiliary, mark the **Use Control Board Spare Inputs as Aux Inputs** checkbox.
3. To configure the inputs as spare, clear the **Use Control Board Spare Inputs as Aux Inputs** checkbox.
4. To configure the outputs as auxiliary, mark the **Use Control Board Spare Outputs as Aux Outputs** checkbox.
5. To configure the outputs as spare, clear the **Use Control Board Spare Outputs as Aux Outputs** checkbox.

6. Proceed with the following procedure to label auxiliary I/O, or click **Done** if you are finished.

> **Note** To define spare inputs and outputs, see *To define a key* on page 95. To configure a spare input to activate a defined key, see *To map a key to a spare input* on page 96.

♦ **To enable and name the auxiliary inputs and outputs**

The names of the auxiliary inputs and outputs is used for reference within CPSW only. Although this is not required, providing identifiable names will ease configuration later when defining keys.

1. Click **Edit, System Configuration, Input/Output Configuration**.
2. Use **Next** and **Previous** to select the main board I/O or the appropriate I/O card to configure.
3. Enter the names for inputs and outputs that need to be configured.
4. Mark or clear the **Enable** checkbox to enable or disable inputs and outputs.
5. To configure inputs and outputs on other cards in the system, click **Previous** or **Next** and repeat this procedure. If you are finished, click **Done**.

> **Tip** The **Revert** button will restore the settings of all inputs and outputs for the currently selected card only.

> **Note** To define auxiliary inputs and outputs, see *To define a key* on page 95.

Transmit Timeout (TX Timeout)

The transmit timeout is the maximum amount of time (in minutes) that a channel can be keyed before the channel is automatically released. The transmit timeout prevents an accidental keyup from tying up a channel for longer than the timeout duration.

♦ **To configure TX Timeout**

1. Click **Edit, System Configuration, TX Timeout**.
2. Use the slider or manually type in the number of minutes for the timeout.
3. Click **OK**.

Priority Marker

The priority marker is typically a short-duration beep that sounds every few seconds or so, in order to alert mobile radio users to stay off of a channel being used for emergency or other special conditions.

♦ **To configure the priority marker**

1. Click **Edit, System Configuration, Priority Marker**.
2. Set the **Priority Marker Frequency** (600 to 2000 Hz). This sets the tone frequency of the beep.
3. Set the **Priority Marker Duration** (50 to 2000 ms). This sets the duration of the beep.
4. Set the **Priority Marker Interval** (1 to 300 sec). This sets how often the beep will sound.
5. Set the **Priority Marker Amplitude** (1 to 100 percent). This sets the volume of the beep.
6. Click **OK**.

Custom HLGT Duration

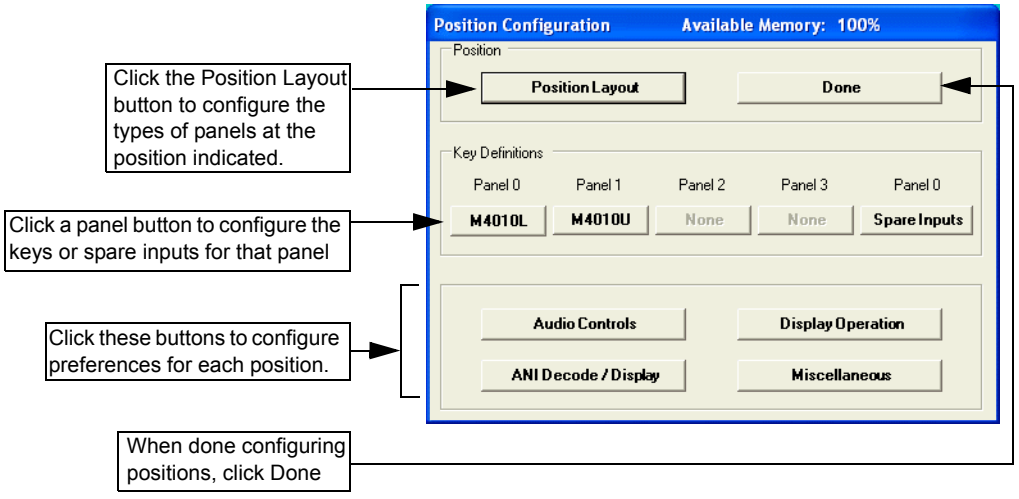
This setting allows you to configure the High Level Guard Tone duration to be used by enabled tone channels in the system. This custom duration can be enabled on a per-tone-channel basis by the option bit switch on the back of the card, as described in *Tone Control, HLGT Duration* on page 29.

♦ **To configure the custom HLGT duration**

1. Click **Edit, System Configuration, Custom HLGT Duration**.
2. Move the slider to the desired duration (in milliseconds) or click inside the number box and type in the precise value. This parameter is adjustable from 10 to 630 ms in increments of 10ms, with a default setting of 120 ms.
3. Click **OK**.

Position Settings

To configure position settings, click **Edit, Position Configuration**. A dialog box will appear, as shown in the following figure.



> **Tip** It is best to configure system settings before position settings. Some position settings, such as specific key definitions, are not available until the system settings are configured correctly. See *System Settings* on page 85.

Position Layout

The layout of button panels can vary from position to position.

♦ To configure a position's panel layout

1. Click **Edit, Position Configuration**.
2. Click **Position Layout**.

   The Position Panel Layout dialog box opens.
3. Configure the panels according to the actual hardware in use at this position.

> **Tip** Choosing a panel affects the panel choices that follow, so configure panels in numerical order (Panel 0 through Panel 3).

4. When finished, click **Done**.

Key Definitions

Each panel that is configured in the position layout has a button that appears in the Key Definitions area. Panel 0 also has a button for configuring spare inputs.

♦ To choose a panel for configuring keys

1. Click **Edit, Position Configuration**.
2. Select a panel by clicking on its button.

   After selecting the appropriate panel, you will see a "key map" of the particular panel that you are configuring. The layout of the key map matches the physical layout of the keys on the actual panel.

> **Note** **Panel 0 Spare Inputs** is used to define the functions that spare inputs activate. This virtual panel is configured just like the actual panels, so the following procedures apply.

3. Use the following procedures to define keys.

♦ To erase key definitions

1. Click on **Erase**.
2. Select all keys to erase by clicking on them. Deselect keys by clicking on them again. Selected keys are outlined in blue. Undefined keys cannot be selected for erasure because there is nothing to erase.

3. Click **Apply**.
4. Click **Yes** to confirm.

♦ To move or swap a key definition

1. Click **Move**.
2. Click a key to select its definition for moving. This is the "source" key. (If you are swapping key definitions, it does not matter which key you select first.) Once selected, the key is outlined in blue.
3. Click a key to select it for receiving the definition. This is the "destination" key. Once selected, this key is outlined in red.

   If the destination key is undefined, CPSW will ask for confirmation to move the definition. Once confirmed, the destination key takes the source key's definition and the source key becomes undefined.

   If the destination key already has a definition, CPSW will ask if you want to exchange the keys or not. If you click Yes, the key definitions are swapped. If you click No, the destination's key is redefined with the source key's definition and the source key becomes undefined.

♦ To copy a key definition

1. Click **Copy**.
2. Select keys for copying by clicking on them (these will be the source keys). Deselect keys by clicking on them again. Selected keys are outlined in blue. Undefined keys cannot be selected for copying because there is nothing to copy.

   Although several keys can be selected and copied at the same time, the layout of the source keys must match the layout of the destination keys. In other words, if you select a 3x4 group of keys to copy, the keys you copy them to must also be a 3x4 group of keys.
3. When done selecting keys, click **Next**.
4. Click the destination key (if several source keys are selected, click the destination key that is the upperleft-most key) and click **Next**.

   The destination key or keys will appear with a red outline so you can confirm that these keys will receive the copied definitions. If the destination keys do not appear red and you've selected more than one key to copy, then the destination area is not large enough to copy all of the source keys.
5. If the source keys are related to channels, CPSW prompts you to select a channel for the destination keys. If so, select a channel from the drop-down list in the lower right-hand corner of the window. All destination keys will be assigned to the chosen channel even if the source keys have multiple channels.
6. Click **Apply**.

♦ To define a key

1. Click on **Define**.
2. Click a key to define. A key definition dialog box opens.

3. There are approximately 130 functions that can be configured in this dialog box. All settings are grouped by the key's functional group.
   a. To assign a channel function to this key, select **Channel Functions** from **The Key's Functional Group**. The channel functions group includes all functions specifically related to a channel. For example: selecting a channel, monitoring a channel, and adjusting the volume for a channel.
   b. To assign a system function to this key, select **System Functions** from **The Key's Functional Group**. The system functions group includes all functions specifically related to the system (as opposed to a channel). For example: reviewing ANI, setting the clock, taking over a console, and the site intercom.
   c. To assign an auxiliary I/O function to this key, select **Auxiliary Input/Output** from **The Key's Functional Group**.
   d. To assign a spare output function to this key, select **Spare Output** from **The Key's Functional Group**.
4. Depending upon the functional group and key choice, some parameters may appear.

Tip A description of each key and its parameters are explained in *Description of Key Functions and Parameters* on page 119.

Tip If you are having trouble finding the correct setting to configure, refer to Figure 15 *on 82* for a map of all possible settings for key definitions.

♦ To map a key to a spare input

A spare input can be defined to perform the same function as a defined console key by mapping it to that key.

1. Click **Map to Spare**.
2. Click a defined key to map. Once selected, the key will have a blue outline. If the key is undefined, you will have to define it first (see *To define a key* on page 95).
3. Select a spare input from the drop-down list in the lower right-hand corner of the window.
4. Click **Yes** to confirm the mapping or **No** to cancel the mapping.

Audio Controls

This function sets volume and speaker muting for each position.

♦ To configure Audio Controls

1. Click **Edit, Position Configuration**.
2. Click **Audio Controls**.

   The Audio Controls dialog window opens.

3. Configure the audio control settings as needed. The following table explains each setting:

Muted Audio Level *	This number (0 to 99) represents the percentage of total volume to be used as a muted audio level for all channels of the position.
Minimum Audio Level *	This number (0 to 99) represents the percentage of total volume to be used as a minimum adjustable audio level for all channels of the position.
Default Volume Level *	This number (0 to 99) represents the percentage of total volume to be used as a power-up default volume level for all channels of the position.
Speaker Mute while Transmitting	When enabled, both select and unselect speakers will mute when you are transmitting. Disable if you want speakers to remain unmuted.
Mute all Idle Channels	When enabled, audio from channels that do not have "call" activity are muted. This is useful for a position that has many channels, since quiescent line noise will accumulate on the unselected speaker audio.
Unmute Idle Chan Upon Monitor	When enabled, channels unmute when the CTCSS monitor function is active.
Muting Signaling Tones	When enabled, tone remote signaling tones from the auxiliary audio input are muted at this position. Disable to hear the signaling tones.
Mic Delay Eliminator	The Mic Delay Eliminator puts a delay in the microphone voice signal so that the operator's voice reaches the transmitting radio at the same time that the carrier is activated. Enable this to prevent the lost first syllables that can occur when transmitting over transmitter links or tone-remote control. This function is typically disabled by default. Enable this for use with the Tone Remote System Adapter with Audio Delay, as described in the adapter's technical sheet (P/N 011-0347).
* The percentage entered will be rounded to the nearest multiple of three.	

4. Click **Done** when you are finished.

ANI Decode/Display

ANI (automatic number identification) is normally used for identification of mobile radios. ANI uses remote signaling tones that are either automatically or manually sent when the radio is keyed. One use for ANI is as a single-button-press on the radio to call for help.

On systems equipped with the ANI option, the ANI Decode / Display function will allow the ANI mode and the ANI address to be set.

Note ANI decode is only possible from channels that have ANI enabled.

♦ To configure ANI Decode / Display

1. Click **Edit, Position Configuration**.
2. Click **ANI Decode / Display**.

   The ANI Configuration dialog window opens.

3. Configure the ANI decode settings as needed. The following table explains each setting:

Operating Mode	Select the desired operating mode: • No ANI Display - ANI is not displayed on this position. • Selected Channels - ANI is displayed at this position for select channels only. • All Channels - ANI is displayed at this position for all channels.
Unmute Channel Upon Receiving ANI	Select **Yes** to enable channels to be automatically unmuted when an ANI is received. If channels are already unmuted, this has no effect.
Primary Address Secondary Address	Each console supports two Reverse Selective Calling ANI addresses. There is no functional difference between the Primary Address and Secondary Address; they both perform the same function. You can configure a Primary Address only, or a Secondary Address only, or both. Configuring an address automatically puts the console in Reverse Selective Calling (RSC) Mode. • The primary and secondary addresses both act as filters to the ANI displayed. • If an incoming PTT ID does not have one of the configured addresses, it is not displayed. • Only the digits following the Primary/Secondary Address are displayed. (Digits prior to the address and the address digits are not displayed.) • The Primary Address has priority over the Secondary Address. If an incoming ANI happens to match both addresses, the Primary Address is used for filtering the ANI. Enter the primary address by entering up to six digits in the **Primary Address** field. Enter the secondary address in the same manner. The following characters are valid digits “0123456789ABCD#*”. See *Example Results for Primary and Secondary Addresses* on page 99.
Timeout Period	The timeout period is the time window between the detection of a valid address and the last ANI digit accepted. During operation, new ANIs will only be recognized after the time period has elapsed after the previous ANI. If the calling unit has automatic ANI calling, one or two seconds should be sufficient. If the calling unit uses a manual keypad to enter the ANI address, five seconds is the normal timeout. Enter a timeout period from 1 to 10 seconds.
Emergency ANI Acknowledge	This function makes the console automatically acknowledge the receipt of an ANI on any selected channel that has this function enabled. Mark the check boxes to select channels for emergency ANI acknowledgement.

4. Click **Done** when you are finished.

Table 29: Example Results for Primary and Secondary Addresses

Configured Addresses	Incoming PTT ID	ANI Displayed at Console
111 and 123	11155	55
	123777	777
	12311	11
	4411155	55
	10166	Nothing
	22299	Nothing

Note The Model 4010 is able to decode only the unit identification in a PTT-ID. ANIs that are configured with fleet or group designation separated by a dash from the unit ID cannot be displayed on the 4010 LCD. Therefore, end users who have multiple fleet/group IDs need to insure that the Unit IDs assigned in one fleet/group are not duplicated in another or there may be confusion as to the source of the call.

Display Operation

The display of each position is configurable to show time of day in 12-hour or 24-hour format. Alternatively, the display can show "- - - - -" (dashes) to prevent confusion with a master site clock.

♦ To configure Display Operation

1. Click **Edit, Position Configuration**.
2. Click **Display Operation**.
   The Display Operation dialog window opens.
3. Choose a display option.
4. Click **Done** when you are finished.

Miscellaneous

The **Miscellaneous** button opens a dialog window containing miscellaneous configuration settings.

♦ To configure miscellaneous settings

1. Click **Edit, Position Configuration**.
2. Click **Miscellaneous**.
   The Miscellaneous dialog window opens.

3. Configure the miscellaneous settings as needed. The following table explains each setting:

Audio Source for 'Soft' Transmit Keys	This option allows you to specify the transmit audio source (microphone) when a "soft" transmit key is activated. A "soft" transmit key is a programmable key which has been defined as a transmit key. Choose one of the following audio sources to assign it to 'Soft' transmit keys: • Dynamic Mic - Use a deskmic connected to the D-Mic input on the console Aux Audio Connector **P1**, or a Gooseneck Mic connected to the 4010 Main Control Board at **P12**. • Electret Mic - Use a handset or headset. • Spare Input #9 steered - Use whichever audio source that Spare Input #9 is switched to. Spare Input #9 is the mic switch input on the headset box connector on the console back panel (J4-pin 9 on the Model 4118 and J1-pin 9 on the Model 4018). • Hookswitch steers... - Use whichever audio source that the hookswitch is switched to. Hookswitch is the ear switch input on the headset box connector on the console back panel (J4-pin 8 on the Model 4118 and J1-pin 8 on the Model 4018).
Instant Select Key Display Mode	This option allows you to set the green LED for the selected Channel/Frequency to either flash on/off or stay constantly lit. This option changes the display behavior only; there is no operational difference.
Received 'CALL' light duration	Enter the number of seconds (1-60) that the console "call" light indicator remains on after the channel received audio has stopped. Since the channel call light is typically on for three seconds (set by VOX hold time) after the end of a call, the time entered here is in addition to the three seconds. For example, if you enter 12 here, the console call light indicator would remain on for 15 seconds after the end of the incoming call.
Dynamic Mic selection	This setting is used to select either a Desk Mic or Gooseneck mic when TX keys are pressed. This selection must be made if a gooseneck mic is not installed on the console. Both microphones may be used together if the console firmware is ordered with the "D-bit option" enabled. In this case the panel TX keys will source audio from the GN. The PTT switch on the Desk Mic or a Footswitch activation will source audio from the Desk Mic.
Parallel Remote Status	Enable this option to allow each console to display or follow the status of other console positions (for certain functions). For example, with Parallel Remote Status enabled, if console 1 has F1 selected for a particular channel and console 2 sets that channel to F2 for transmission, the indicator on console 1 will show F2 and the console 1 operator must re-select F1 in order to transmit on it. This option is typically enabled. By disabling Parallel Remote Status, each console will retain its own frequency selection.

4. Click **Done** when you are finished.

Saving a Configuration

Saving the configuration to disk is accomplished in the usual Windows manner (**File, Save** or **File, Save As**). The saved file contains all of the settings that have been configured, including system configuration and position configuration for all positions.

Sending a Configuration to a Console

For installations with parallel consoles, all consoles should be configured identically. If you are changing the configuration of one console, you should update all consoles.

♦ To send configuration information to a console

1. Use the supplied programming cable to connect your PC with the console:
   - If you have a cable with one RJ connector (P/N 709-7266 or 709-7400), use it to connect the serial port of your computer to the COMB jack (combined data) on the console.
   - If you have a cable with two RJ connectors (P/N 709-7084 or 709-7417), use it to connect the serial port of your computer to the DATA IN and DATA OUT jacks on the console (these jacks might also be named LOOP IN and LOOP OUT). The cable ends are labeled for specific ports (IN vs OUT) and must be connected correctly.

   If there are existing cables already connected to any of these ports, you must temporarily remove them while programming. Before removing these existing cables, ensure they are labeled so they can be returned to the proper ports.

   Note The USB-to-serial port adapter provided by Zetron (P/N 802-0516) is tested and the recommended adapter for this application. Many third party USB-to-serial port adapters are inconsistent with their serial port implementation and do not reliably communicate with Zetron equipment.

2. There is an unlabeled switch on the bottom of the Model 4010 used to switch the console between RUN and PROGRAM modes. Move the switch to the program position, which is towards the gooseneck MIC and away from the DATA IN, DATA OUT, and COMB jacks.

   The console display shows “PROGRAM”.
3. Click **Send config to position**.
4. If previous edits to the configuration file have not been saved, you will be asked if you want to save them now. To proceed, click whichever action you prefer.
5. Click **OK** to begin sending the configuration settings.

   The mouse cursor switches to an hourglass while CPSW is sending data.
6. The download is successfully completed if the console displays “** DONE **”. If the console does not display “** DONE **”, then some troubleshooting is required:
   a. If the console display shows “PROGRAM” after CPSW is done sending, then there was a communication break between the PC and console, such as a serial cable not connected, a mismatched baud rate, or a wrong COM port configured in CPSW.
   b. If the console continues to display “DnLoading CPS” long after CPSW is done sending, then the serial transfer was interrupted after it started. The cable may

have been disconnected or the baud rate changed in the middle of the download (Windows XP will occasionally change the baud rate by itself). There is no timeout function on the console, so it will continue to display "DnLoading CPS" until reset or switched back to 'Run' mode.

c. If the console displays “THX 084”, a checksum error occurred, and the console ignored the rest of the download. This can be caused by a baud rate change or data corruption.

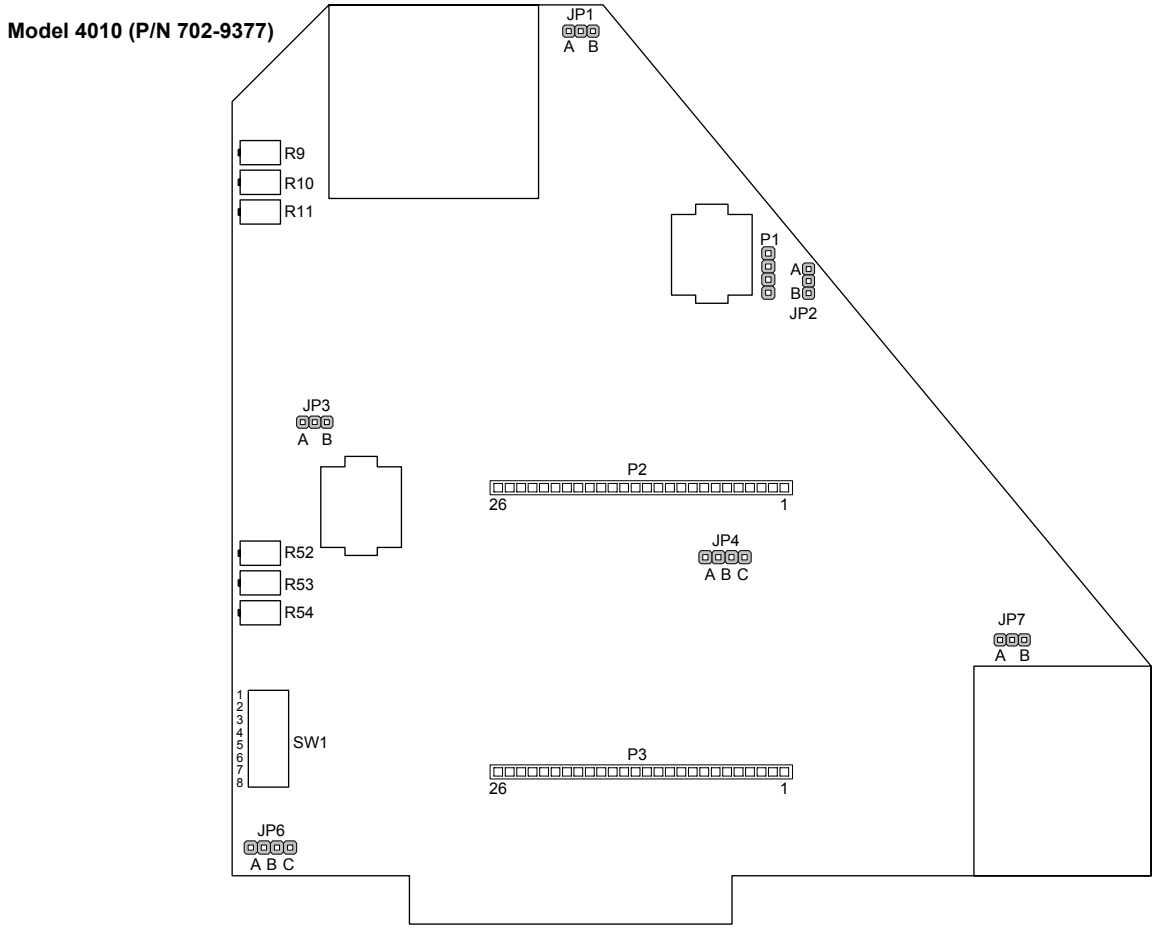
Warning! If the console displays “DnLoading CPS” or “THX 084” after the PC has stopped sending data, the console's key-definition database has been corrupted and the console will not work until a good CPSW database is successfully downloaded. Until the console is fixed, it will always display "CPSdataErr" when switched back to 'Run' mode and it may ignore all buttons.

Tip You can attempt to download again by toggling the console's mode switch to 'Run' and then back to 'Program'. The display will then show "PROGRAM" again and a new download from CPSW can start.

7. Move the switch to the run position. The top line of the LCD should show the name of the configuration file. If the name of the file has fewer than eight characters, the LCD may display extra characters.
8. If you need to send the same configuration settings to more than one 4010 console, repeat this procedure as needed.

Appendix A: Model 4010 Components

Model 4010 Dual Channel Card Layout

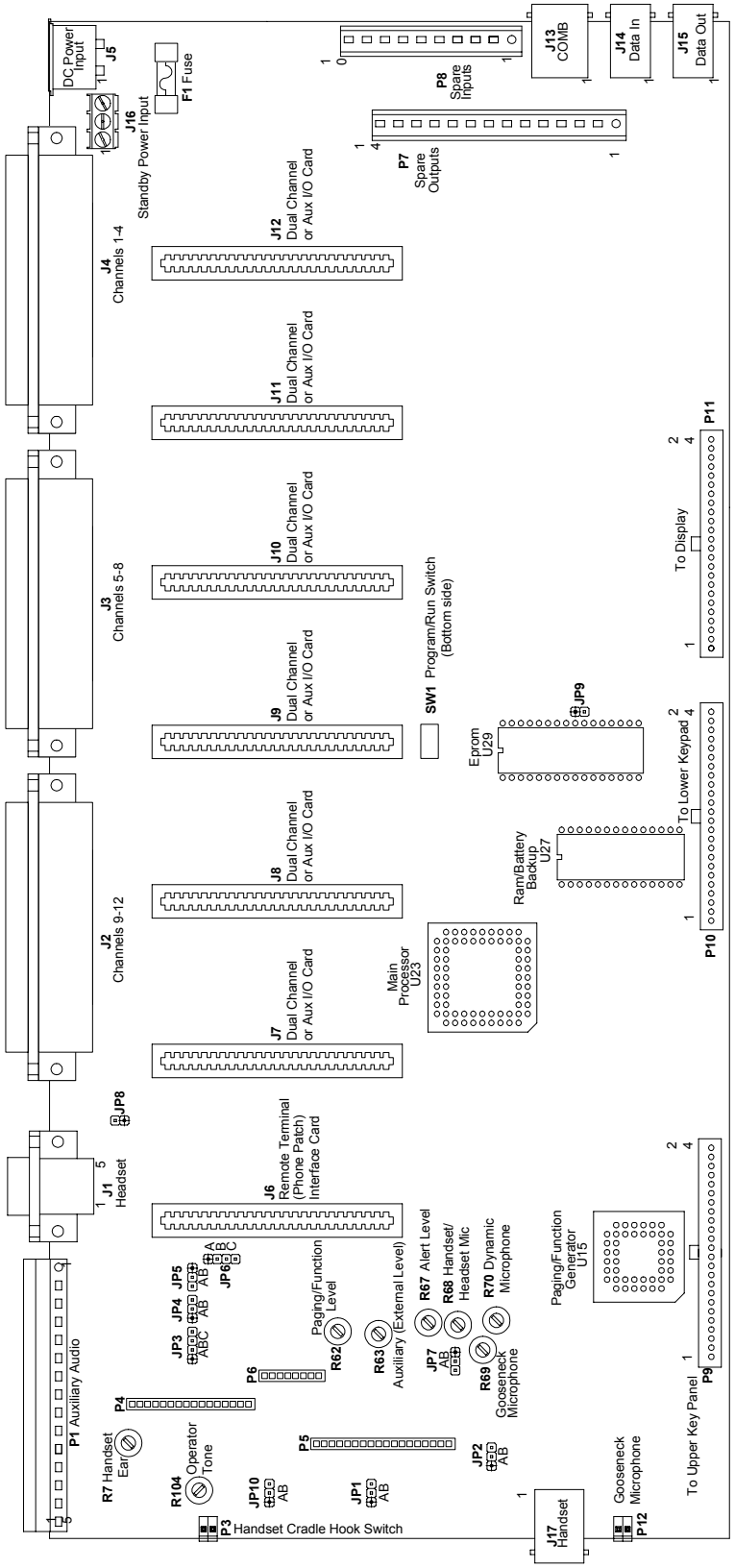


On older boards, P1 and JP6 may be located in different positions than shown here. P2 and P3 are used to mount daughterboard such as the LOTL or Channel ANI Decoders.

For a list of jumpers and switches, see *Table 4 on page 27*. For a list of potentiometers, test points, and audio adjustment information, see *Receive Audio Adjustment* on page 42 and *Transmit Audio Adjustment* on page 45.

Model 4010 Main Control Board

Model 4010 (P/N 702-9376)
Model 4010R (P/N 702-9569)



Model 4010 Control Board Connectors and Fuse

For a list of jumpers and switches, see *Model 4010 Control Board Jumpers and Switches* on page 24. For a list of pots, see *Level Adjustments* on page 42. For a list of connectors, see the following table.

Number	Name	Notes
F1	Fuse	See *Primary Power* on page 19
J1	Headset Jackbox	See *Telephone/Radio Headset Interface* on page 53.
J2	Channels 1-4	See *Wiring to the Channels* on page 31.
J3	Channels 5-8	
J4	Channels 9-12	
J5	Power	See *Primary Power* on page 19.
J6	Phone Patch Card	See *Model 4010 Phone Patch Card* on page 54.
J7 - J12	Slots for Dual Channel Cards and/or Aux I/O Cards	See *Table 1 on page 23* for compatibility matrix. See *Configuring Dual Channel Cards* on page 26. See *Inputs and Outputs* on page 37.
J13	COMB	See *Program/Run Switch* on page 18. See *Cable Installation* on page 69.
J14	Data In / Loop In	
J15	Data Out / Loop Out	
J16	3-pin auxiliary DC power connector	See *Auxiliary Power* on page 19.
J17	Handset jack	This connector is not present on the Model 4010R. See *PTT Handset with Cradle* on page 77.
P1	Auxiliary Audio	See *Auxiliary Audio* on page 39.
P3	Telephone hook switch	See *PTT Handset with Cradle* on page 77.
P4	Tone Remote connector	If there is no Tone Remote Card installed, four jumpers must be installed across this connector at the following pins: 1-2, 3-4, 5-6, 7-8. Either the card or the jumpers have to be installed in order to pass Unselect, Select, Mic, and Patch audio.
P5	System Wide ANI connector	If there is no System Wide ANI Card installed, a jumper must be installed across this connector at pins 1-2. Either the card or the jumper has to be installed in order to pass Select audio. (No longer available).
P6	Audio Delay connector	If there is no Audio Delay Card installed, a jumper must be installed across this connector at pins 1-2. Either the card or the jumper has to be installed in order to pass Select audio. (No longer available).
P7	Spare Outputs	Spare I/O may be configured in CPSW to act as Auxiliary I/O. See *Inputs and Outputs* on page 37.
P8	Spare Inputs	
P9	Upper button panel connector	Connects to J1 on the button panel circuit board on the front of the console.
P10	16-Digit Keypad connector	Connects to J1 on the keypad board on the front of the console.
P11	Display board connector	Connects to J1 on the display board on the front of the console.
P12	Gooseneck mic connector	See *Gooseneck Microphone* on page 48.
SW1	Program/Run switch	See *Program/Run Switch* on page 18.

Model 4010 Display Board

(P/N 702-9378)

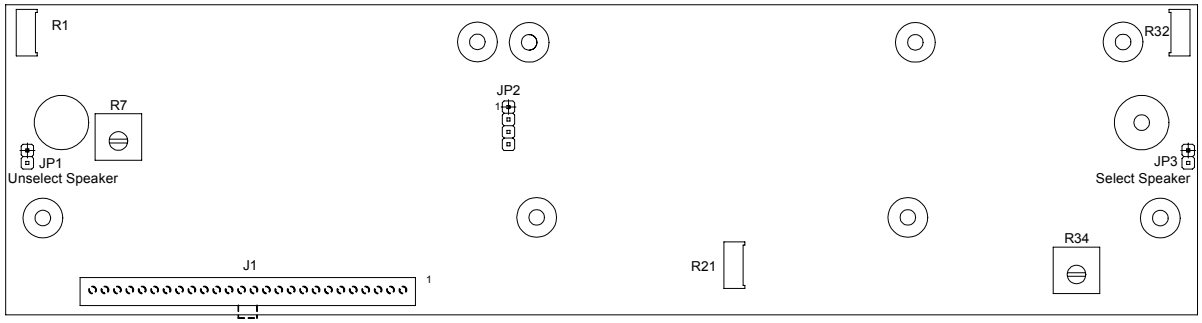
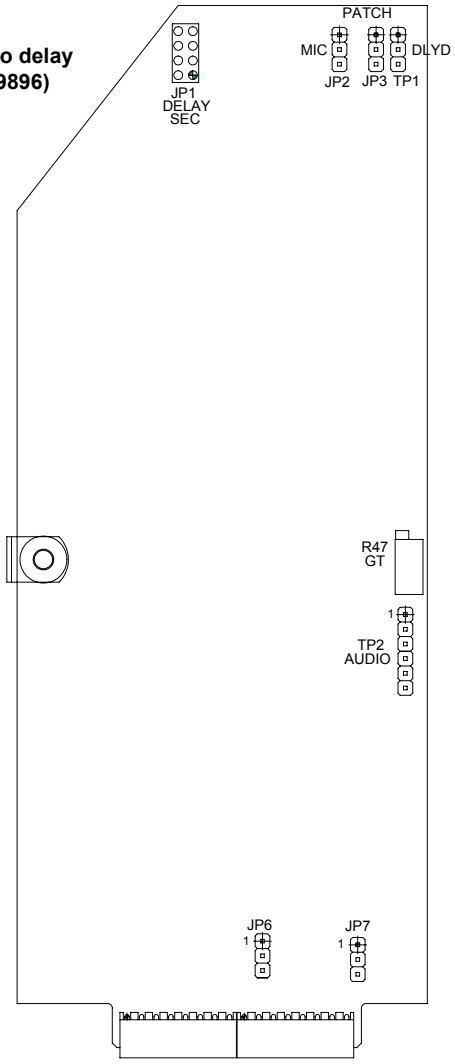


Table 30: Model 4010 Display Board jumpers and pots

JP2	Adjusts the backlight brightness to low (L), medium (M), or high (H). The default setting is H.
R1	Adjusts the minimum volume of the unselect speaker. Older units may have a different pot number, but the pot is located in the same location.
R7	Adjusts the unselect speaker bias. This is adjusted at the factory. **Adjusting this incorrectly can lead to a damaged op-amp**. See *Display Board Adjustment* on page 132.
R21	Adjusts the display contrast. This is adjusted at the factory and typically does not need adjustment.
R32	Adjusts the minimum volume of the select speaker. Older units may have a different pot number, but the pot is located in the same location.
R34	Adjusts the select speaker bias. This is adjusted at the factory. **Adjusting this incorrectly can lead to a damaged op-amp**. See *Display Board Adjustment* on page 132.

Model 4010 Tone Remote Adapter

With audio delay (P/N 702-9896)



Without audio delay (P/N 702-9433)

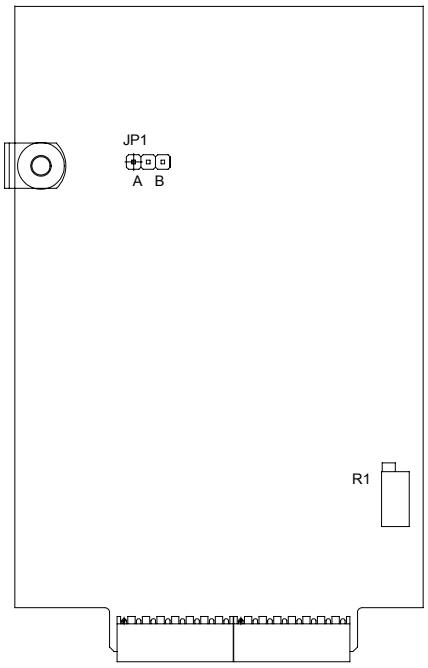


Table 31: Tone Remote Adapter (with audio delay) jumpers

	Jumper	Position	Status
Delay Jumpers	JP1 (DELAY)	.25	.25 sec delay
	JP1	.50	.50 sec delay
	JP1	.75	.75 sec delay
	JP1	1.0	1.0 sec delay
	JP2 (MIC)	IN	Enable delay
	JP2	OUT	Disable delay
	JP3 (PATCH)	IN	Enable delay
	JP3	OUT	Disable delay
Notch Filter Jumpers	JP7 (PATCH)	IN	Enable notch filter
	JP7	OUT	Disable notch filter
	JP6 (MIC)	IN	Enable notch filter
	JP6	OUT	Disable notch filter
The default conditions for the jumpers are in the IN position and .75 seconds for the delay setting.			

For additional information, see *Model 4010 Tone Remote System Adapter* on page 62.

Appendix B: CPSW Reference Material

This appendix contains reference material used for programming with CPSW (Console Programming System for Windows). See *Programming* on page 79.

Main topics in this appendix:

DC and Tone Remote Function Definitions

Table 32: DC Remote Function Definition

Current	T1R1 STD	T1R1 PAGING	T2R2	T4R4
0.0 mA	RX	RX	RX	RX
+2.5 mA	—	—	—	—
+5.0 mA	F1	—	F1	F1
+7.5 mA	—	—	—	—
+10.0 mA	—	—	—	—
+12.5 mA	RPTR ON	F1 W PL	F2	F2
+15.0 mA	—	—	—	—
+15.5 mA	—	—	—	—
-2.5 mA	PL MON	PL MON	PL MON	PL MON
-5.0 mA	RPTR OFF	—	R2 OFF	F3
-7.5 mA	—	—	—	—
-10.0 mA	—	—	—	—
-12.5 mA	—	F1 W/O PL	—	F4
-15.0 mA	—	—	—	—
-15.5 mA	—	—	—	—

Table 33: Tone Remote Function Definition

Tone Freq	T1R1	T2R2	T4R4	T8R8
650Hz	—	—	—	—
750Hz	—	—	—	—
850Hz	—	—	—	F8
950Hz	—	—	—	F7
1050Hz	PL4/WC 2 OFF	PL4/WC 2 OFF	WC 2 OFF	F6
1150Hz	PL3/WC 2 ON	PL3/WC 2 ON	WC 2 ON	F5
1250Hz	PL2/WC 1 OFF	PL2/WC 1 OFF	F4	F4
1350Hz	PL1/WC 1 ON	PL1/WC 1 ON	F3	F3
1450Hz	RPTR ON	RPTR ON	RPTR ON	RPTR ON
1550Hz	RPTR OFF	RPTR OFF	RPTR OFF	RPTR OFF
1650Hz	R2 ON	R2 ON	R2 ON	R2 ON
1750Hz	R2 OFF	R2 OFF	R2 OFF	R2 OFF
1850Hz	F1 W/O PL	F2	F2	F2
1950Hz	F1	F1	F1	F1
2050Hz	PL MON	PL MON	PL MON	PL MON

Achieving Motorola/GE DC Control Currents

Normally, the available positive and negative currents which are based on 2.5 mA increments will achieve proper control of DC Remote Controlled base stations. However, a feature on the late DC Dual Channel Cards allow the exact Motorola and GE currents to be achieved. This is done using the Console Programming System for Windows (CPSW) custom DC programming in the System Configuration menu, and switches on the back of the DCC (requires the DC Remote Daughter Board to be installed on the applicable channel).

If the “A” channel of a Dual Channel Card needs Motorola/GE standard currents, close option switch 6 of the card's configuration switch. If the “B” channel of the Dual Channel Card needs Motorola/GE standard currents, close option switch 2 of the card's configuration switch.

Then using CPSW, locate the **System Configuration** menu and program all channels that require the standard Motorola/GE currents with a Channel Type of **DC Control...** and a DC Control Protocol of **Custom** (see *Channel Configuration* on page 85). Then using the conversion table below, locate the desired current and find the CPSW current to use for **DC Control Current**.

Desired Current	CPSW Current
0.0 mA	+0.0mA
+2.5 mA	+2.5 mA
+5.5 mA	+5.0 mA
+6.0 mA	+7.5 mA
+11.0 mA	+10.0 mA
+12.5 mA	+12.5 mA
+15.0 mA	+15.0 mA
+15.5 mA	+15.5 mA
-2.5 mA	-2.5 mA
-5.5 mA	-5.0 mA
-6.0 mA	-7.5 mA
-11.0 mA	-10.0 mA
-12.5 mA	-12.5 mA
-15.0 mA	-15.0 mA
-15.5 mA	-15.5 mA

Paging Format Specifications

Table 34: Motorola and GE Tone Group Frequencies

Tone	Tone Groups						
Number	Mot 1	Mot 2	Mot 3	Mot 4	Mot 5	Mot 6	Mot A
0	330.5	569.1	1092.4	321.7	553.9	1122.5	358.9
1	349.0	600.9	288.5	339.6	584.8	1153.4	398.1
2	368.5	634.5	296.5	358.6	617.4	1185.2	441.6
3	389.0	669.9	304.7	378.6	651.9	1217.8	489.8
4	410.8	707.3	313.0	399.8	688.3	1251.4	543.3
5	433.7	746.8	953.7	422.1	726.8	1285.8	602.6
6	457.9	788.5	979.9	445.7	767.4	1321.2	668.3
7	483.5	832.5	1006.9	470.5	810.2	1357.6	741.3
8	510.5	879.0	1034.7	496.8	855.5	1395.0	822.2
9	539.0	928.1	1063.2	524.6	903.2	1433.4	912.0
A	none	none	none	none	none	none	1011.6
B	none	none	none	none	none	none	1122.1
Diagonal Tone	569.1	979.9	569.1	569.1	979.9	979.9	979.9

Tone	Tone Groups						
Number	Mot B	Mot Z	GE A'	GE B'	GE C'	Mot 10	Mot 11
0	371.5	346.0	682.5	652.5	667.5	1472.9	1930.2
1	412.1	384.6	592.5	607.5	712.5	1513.5	1989.0
2	457.1	426.6	757.5	787.5	772.5	1555.2	2043.8
3	507.0	473.2	802.5	832.5	817.5	1598.0	2094.5
4	562.3	524.8	847.5	877.5	862.5	1642.0	2155.6
5	623.7	582.1	892.5	922.5	907.5	1687.2	2212.2
6	691.8	645.7	937.5	967.5	952.5	1733.7	2271.7
7	767.4	716.1	547.5	517.5	532.5	1781.5	2334.6
8	851.1	794.3	727.5	562.5	577.5	1830.5	2401.0
9	944.1	881.0	637.5	697.5	622.5	1881.0	2468.2
A	1047.1	977.2	none	none	none	none	none
B	1161.4	1084.0	none	none	none	none	none
Diagonal Tone	979.9	979.9	742.5	742.5	742.5	none	none

Table 35: Motorola and GE Code Plans

Pager	Code Plans								
Cap-code	Mot B Groups	Mot C Groups	Mot D Groups	Mot E Groups	Mot F Groups	Mot G Groups	Mot H Groups	Mot J Groups	Mot K Groups
0xx	2+4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1xx	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1	1+1
2xx	2+2	2+2	2+2	2+2	1+3	1+3	1+3	1+4	1+4
3xx	3+3	1+2	1+2	1+2	3+3	3+3	3+3	4+1	4+1
4xx	1+2	4+4	1+5	2+1	4+4	3+1	3+1	4+4	4+4
5xx	1+3	1+4	5+5	1+6	3+1	5+5	1+6	5+5	1+6
6xx	2+1	2+1	2+1	6+6	1+4	1+5	6+6	1+5	6+6
7xx	3+1	4+1	5+1	6+1	4+1	5+1	6+1	4+5	6+1
8xx	2+3	2+4	2+5	2+6	3+4	3+5	3+6	5+4	4+6
9xx	3+2	4+2	5+2	6+2	4+3	5+3	6+3	5+1	6+4
Groups	1-2-3-4	1-2-4	1-2-5	1-2-6	1-3-4	1-3-5	1-3-6	1-4-5	1-4-6
	Mot L Groups	**Mot M Groups**	**Mot N Groups**	**Mot P Groups**	**Mot Q Groups**	**Mot R Groups**	**Mot S Groups**	**Mot T Groups**	**Mot U Groups**
0xx	N/A	4+2	4+2	4+2	4+2	4+2	4+2	4+2	4+2
1xx	1+1	2+3	2+3	2+3	2+4	2+4	2+5	3+4	3+4
2xx	1+5	2+2	2+2	2+2	2+2	2+2	2+2	4+3	4+3
3xx	5+1	3+3	3+3	3+3	4+2	4+2	5+2	3+3	3+3
4xx	1+6	4+4	3+2	3+2	4+4	4+4	2+6	4+4	4+4
5xx	5+5	3+2	5+5	2+6	5+5	2+6	5+5	5+5	3+6
6xx	6+6	2+4	2+5	6+6	2+5	6+6	6+6	3+5	6+6
7xx	6+1	4+2	5+2	6+2	4+5	6+2	6+2	4+5	6+3
8xx	5+6	3+4	3+5	3+6	5+4	4+6	5+6	5+4	4+6
9xx	6+5	4+3	5+3	6+3	5+2	6+4	6+5	5+3	6+4
Groups	1-5-6	2-3-4	2-3-4-5	2-3-4-6	2-4-5	2-4-6	2-5-6	2-3-4-5	2-3-4-6
	Mot V Groups	**Mot W Groups**	**Mot Y Groups**	**Mot MT Groups**	**GE X Groups**	**GE Y Groups**	**GE Z[1] Groups**	**SPL EXT Groups**	
0xx	4+2	4+2	N/A	4+2	A'+A'	B'+B'	A'+A'	10+10	
1xx	3+5	4+6	A+A	1+1	B'+A'	C'+B'	C'+A'	11+11	
2xx	5+3	6+4	B+B	2+2	B'+B'	C'+C'	C'+C'	10+11	
3xx	3+3	5+6	Z+Z	1+2	A'+B'	B'+C'	A'+C'	11+10	
4xx	3+6	4+4	A+B	4+4	C'+C'	N/A	N/A	3+10	
5xx	5+5	5+5	A+Z	5+5	C'+A'	N/A	N/A	6+10	
6xx	6+6	6+6	B+A	2+1	C'+B'	N/A	N/A	3+11	
7xx	6+3	4+5	Z+A	4+5	A'+C'	N/A	N/A	6+11	
8xx	5+6	5+4	B+Z	5+4	B'+C'	N/A	N/A	10+6	
9xx	6+5	6+5	Z+B	2+4	N/A	N/A	N/A	11+6	
Groups	2-3-4-5-6	2-4-5-6	A-B-Z	1-2-4-5	A'-B'-C'	B'-C'	A'-C'	3-6-10-11	

1. GE 100-call plan Z is tone groups C'+C'; use (100-Call format). For capcodes ending in double-digits using tone group twice, (example: 122 in code plan C), use diagonal as one of the tones.

Table 36: General Encoding Plans

Pager	General Plan		Modified Gen. Plan		General Alternate Plan	
Cap-code	Tone Groups	Diagonal Tone	Tone Groups	Diagonal Tone	Pager Capcode[1]	Tone Groups
0xx	4+2	N/A	N/A	N/A	0xx	N/A
1xx	1+1	569.1	1+1	569.1	1xx	953.7 + Mot 1
2xx	2+2	979.9	2+2	979.9	2xx	953.7 + Mot 2
3xx	1+2	N/A	3+3	569.1	3xx	979.9 + Mot 2
4xx	4+4	569.1	4+4	569.1	4xx	953.7 + Mot 4
5xx	5+5	979.9	5+5	979.9	5xx	953.7 + Mot 5
6xx	2+1	N/A	6+6	979.9	6xx	979.9 + Mot 1
7xx	4+5	N/A	N/A	N/A	7xx	979.9 + Mot 5
8xx	5+4	N/A	N/A	N/A	8xx	979.9 + Mot 4
9xx	2+4	N/A	N/A	N/A		
Axx[2]	3+3	569.1	N/A	N/A		

1. For General Alternate Code Plan, the last two digits of the capcode are the same.
2. The General Plan has an eleventh pager block (with Capcodes Axx), which is not coded on the console.

Tone Groups	
General Plan	1, 2, 3, 4, 5
Modified Gen. Plan	1, 2, 3, 4, 5, 6

Note On General and Modified General plans, there are different diagonal tones for different pager blocks.

Table 37: Reach Encoding Plan

Tone Number	Frequency (Hz)	Tone Number	Frequency (Hz)	Tone Number	Frequency (Hz)	Tone Number	Frequency (Hz)
0	3960.0	16	2274.0	32	1306.0	48	750.0
1	3824.0	17	2196.0	33	1261.0	49	725.0
2	3694.0	18	2121.0	34	1219.0	50	700.0
3	3568.0	19	2049.0	35	1177.0	51	676.0
4	3446.0	20	1980.0	36	1137.0	52	653.0
5	3329.0	21	1912.0	37	1098.0	53	631.0
6	3215.0	22	1847.0	38	1061.0	54	609.0
7	3106.0	23	1784.0	39	1025.0	55	588.0
8	3000.0	24	1723.0	40	990.0	56	568.0
9	2898.0	25	1664.0	41	956.0	57	549.0
10	2799.0	26	1608.0	42	923.0	58	530.0
11	2704.0	27	1553.0	43	892.0	59	512.0
12	2612.0	28	1500.0	44	862.0	60	495.0
13	2523.0	29	1449.0	45	832.0		
14	2437.0	30	1400.0	46	804.0		
15	2354.0	31	1352.0	47	776.0		

Table 38: Zetron Tone Groups for Reach Encoding

Tone	Tone Groups				
Number	Z1	Z2	Z3	Z4	Z5
0	1980.0	1177.0	1400.0	832.0	588.0
1	2704.0	1608.0	1912.0	1137.0	804.0
2	2612.0	1553.0	1847.0	1098.0	776.0
3	2523.0	1500.0	1784.0	1061.0	750.0
4	2437.0	1449.0	1723.0	1025.0	725.0
5	2354.0	1400.0	1664.0	990.0	700.0
6	2274.0	1352.0	1608.0	956.0	676.0
7	2196.0	1306.0	1553.0	923.0	653.0
8	2121.0	1261.0	1500.0	892.0	631.0
9	2049.0	1219.0	1449.0	862.0	609.0

Table 39: Reach Code Plan

Pager Capcode	Individual Call Tone Groups (x+y)
0yx	Z5+Z3
1xy	Z1+Z2
2yx	Z2+Z1
3xy	Z3+Z4
4yx	Z4+Z3
5xy	Z1+Z4
6yx	Z4+Z1
7xy	Z1+Z5
8yx	Z5+Z1
9xy	Z3+Z5

Note The ones/tens digit encoding, shown by "x" and "y," reverses position for each 100 pager block. In Motorola/GE plans, the first tone is always the tens digit and the second tone is the ones digit.

For REACH group call, 0xx group is not present. Instead, ten group calls are accessible using pager numbers 000, 011, 022...099. These pager numbers generate the ten group call tones from tone group Z1. The group calls activate the first tone Z1 pagers (capcodes 1xx, 5xx, and 7xx).

Table 40: Zetron Standard Tone Sets

Tone Set[1]	CCIR	EEA	EIA	ZVEI	DDZVEI	DZVEI	PZVEI
Tone No. 0	1981	1981	600	2400	2400	2200	2400
Tone No. 1	1124	1124	741	1060	1060	970	1060
Tone No. 2	1197	1197	882	1160	1160	1060	1160
Tone No. 3	1275	1275	1023	1270	1270	1160	1270
Tone No. 4	1358	1358	1164	1400	1400	1200	1400
Tone No. 5	1446	1446	1305	1530	1530	1400	1530
Tone No. 6	1540	1540	1446	1670	1670	1530	1670
Tone No. 7	1640	1640	1587	1830	1830	1670	1830
Tone No. 8	1747	1747	1728	2000	2000	1830	2000
Tone No. 9	1860	1860	1869	2200	2200	2000	2200
A Group	2400	1055	2151	2800	885	825	970
C X-Tone	2247	2400	2010	970	740	2800	2800
E Repeat	2110	2110	459	2600	970	2400	2600
Timing[2]	**CCIR**	**EEA**	**EIA**	**ZVEI**	**DDZVEI**	**DZVEI**	**PZVEI**
Preamble	673	673	673	673	673	673	673
Gap	65	65	65	65	65	65	65
Tone	100	40	33	70	70	70	70
X-Tone	100	40	65	70	70	70	70

1. Frequencies are shown in hertz.
2. Timing is shown in milliseconds

Table 41: DTMF Tone Pair Frequencies and Timing

	Column 1	Column 2	Column 3	Column 4
First Row[1]	**1** 697 1209	**2** 697 1336	**3** 697 1477	**A** 697 1633
Second Row	**4** 770 1209	**5** 770 1336	**6** 770 1477	**B** 770 1633
Third Row	**7** 852 1209	**8** 852 1336	**9** 852 1477	**C** 852 1633
Fourth Row	***** 941 1209	**0** 941 1336	**#** 941 1477	**D** 941 1633

1. Frequencies are shown in hertz.

Key from 16-button keypad.
Timing: Variable. Typical is 150ms of tone, 50ms of silence.
Digits: 1 through 14, including A, B, C, D, *, and #.

Table 42: Quick Call One (Two-Plus-Two) Frequencies and Timing

Tone	A Series		B Series		Z Series	
No.	Freq.[1]	Code	Freq.	Code	Freq.	Code
0	358.9	CA	371.5	CB	346.7	CZ
1	398.1	DA	412.1	DB	384.6	DZ
2	441.6	EA	457.1	EB	426.6	EZ
3	489.8	FA	507.0	FB	473.2	FZ
4	543.3	GA	562.3	GB	524.8	GZ
5	602.6	HA	623.7	HB	582.1	HZ
6	668.3	JA	691.8	JB	645.7	JZ
7	741.3	KA	767.4	KB	716.1	KZ
8	822.2	LA	851.1	LB	794.3	LZ
9	912.0	MA	944.1	MB	881.0	MZ
A	1011.6	NA	1047.1	NB	977.2	NZ
B	1122.1	PA	1161.4	PB	1084.0	PZ

1. Frequencies are shown in hertz.

Timing: Variable.

Typical Timing:

First tone pair: 1250ms
Gap: 0ms
Second tone pair: 1000ms
Group call: 5000ms (if 1st and 2nd tone pairs are same)

Description of Key Functions and Parameters

This section describes key functions and their definable parameters. Use this section as a reference when defining key functions (see *To define a key* on page 95).

Channel Functions

To define a channel function, you must first select the channel number. The channel must have been previously defined in System Configuration.

Select

This function will "Select" the appropriate channel for transmission when a transmit key is pressed. The received audio from the selected channel will be heard on the "Select" speaker. All other received audio will be routed to the "Unselect" speaker. All channels must have one and only one "Select" key assigned.

Answer/Hold

This key requires telephone control and thus is only available for channels 13 and 14. The key is used to answer a telephone call. Once a call is answered (telephone is off-hook), this key toggles the hold function.

Frequency Select

This key is only applicable with a tone or DC controlled radio with multiple frequency capability. By selecting this key, the desired frequency command will be sent. The current or tone will be sent to the radio in order to select the desired frequency.

Please note that "no current" is different from 0.0 ma. Selecting "0.0 ma" will cause zero milliamperes of DC control current to be sent when this command is executed. Selecting "No current" will cause the previous control current for that function to be maintained with no current change.

After selecting the receive current/tone, you must also specify a current or tone to activate the transmitter for the desired frequency.

Frequency Select with Voting

This key is identical to the frequency select function with the added feature of selecting an auxiliary input. This allows the output of a voter to indicate which frequency was voted. The red LED will be illuminated for the frequency that voted.

The input must have been previously defined before using this key.

Instant Select

Instant Select differs from the normal Select function in that after the Select is performed, a DC or Tone control function is sent. This is normally used on a multi-frequency base station to select a channel at a desired frequency. Several Instant Select keys may be assigned to a single channel even though only one can be active at a time.

Instant Select with Voting

If you chose instant select with voting, you must also pick the Auxiliary input that will receive the voter result. This input indicator will be illuminated whenever the voter picks this particular input. The input must have been previously defined using the System Configuration menu.

Note This is an indication of the voter result only. The channel is NOT selected by the voter input.

Instant Transmit

The Instant Transmit function will cause the transmitter on the assigned channel to activate even though the channel is not selected. The selected channel will not be affected.

Note If the key being defined is associated with a spare input and the channel is multi-frequency tone or DC control, you will be asked to select a function tone to be used when this key is activated.

Volume and Mute Keys

Volume Adjust (Knob)

The volume adjust key allows the volume of a specific channel to be set or changed at the console. Pressing the key will cause the current volume level (in percentage) to be displayed. Turning the “channel volume” knob while holding the key down will cause the volume level to be changed with the new value displayed on the console display.

Mute Adjust

This is a dual function key and is more correctly called the “Volume Adjust/Mute” (abbreviated “V-Adj. Mute”). Pressing and releasing the key causes the channel's received audio to be muted. The red light by the key will remain on while the channel is muted. Pressing again will unmute the channel. Pressing and holding this key will allow the channel volume to be set as described in the preceding paragraph, “Volume Adjust”.

Volume Up (Key)

This key is assigned to a specific channel to allow “one hand” volume adjusting. Pressing this key will cause the current volume setting to be displayed. Holding the key will cause

the volume to be adjusted upwards. Releasing the key will cause the volume to be set to the displayed level. The red key indicator will illuminate while the key is pressed.

Volume Down (Key)

This key is assigned to a specific channel to allow “one hand” volume adjusting. Pressing this key will cause the current volume setting to be displayed. Releasing the key will cause the volume to be set to the displayed level. Holding the key will cause the volume to be adjusted downwards. The red key indicator will illuminate while the key is pressed.

Volume Mute

The Volume Mute key will cause the specific channel's volume to be “muted” to the mute pre-set value. The red LED associated with the key will illuminate showing that the channel is muted. If the channel volume option is not present, the mute level will be set to zero.

Patch

The patch key, when activated, connects a channel with other patched channels. When audio is received on one of the patched channels, the other transmitter(s) are activated as long as the audio is active. The patch keys on at least two channels must be activated in order to have any effect.

Release

This key requires telephone control and thus is only available for channels 13 and 14. The key is used to end a telephone call and thus release the line.

Main/Standby

This key activates the channel's Auxiliary output line. It is normally used to select a standby transmitter but can be used for other functions if desired. Each channel has one auxiliary output line.

ANI Source

This function is assigned to the key’s lights only. The ANI option must be installed for this function to have meaning. Whenever a valid ANI is displayed, the ANI source light for the channel that received the ANI will illuminate. This light will be illuminated (flashing) until the ANI review key is activated.

Site Intercom

The site intercom key allows the console operator to communicate with the radio site by using the audio lines as an intercom path. When this key is pressed, only the audio is sent to the selected channel; the transmitter is not keyed.

Monitor

This key will send the correct command (current or tone) to disable the private line or channel guard feature of the radio allowing the received audio to be heard at the console. The indicator LED will remain on until the channel's transmitter is keyed.

Phone On/Off Hook

This key will activate the auxiliary output line of the designated channel. It is intended to be used as an “off hook” signal to answer an incoming phone line when the optional telephone coupler is installed. Each channel has one auxiliary output line.

Phone Hook Flash

The phone Hook Flash key will cause the On/Off Hook line to be deactivated for 500 ms thereby putting the phone on “hold”. Hit the key again to enable the phone conversation.

Extended Channel Functions

These are additional channel functions that can be assigned to Standard Tone and/or DC controlled channels.

CTCSS Select

This command activates CTCSS (constant tone coded squelch signal) over-ride. This key will cause the PL (private line) feature to be disabled thereby allowing all radio channel activity to be monitored by the console operator. Refer to *DC and Tone Remote Function Definitions* on page 110 for the actual tone or DC current transmitted.

Repeat On/Off

This key will toggle the radio repeater on/off function on the appropriate channel. Refer to *DC and Tone Remote Function Definitions* on page 110 for the actual tone or DC current transmitted.

Coded/Clear

This key will toggle the coded/clear function on the appropriate channel. Refer to *DC and Tone Remote Function Definitions* on page 110 for the actual tone or DC current transmitted.

Second Receiver Unmute/Mute

This key will toggle the radio Mute on/off function on the appropriate Tone controlled channel. Refer to *DC and Tone Remote Function Definitions* on page 110 for the actual tone transmitted.

Wild Card I On/Off

Toggle the Wild Card I function on the appropriate tone controlled radio channel. Refer to *DC and Tone Remote Function Definitions* on page 110 for the function actually transmitted.

Wild Card II On/Off

Toggle the Wild Card II function on the appropriate tone controlled radio channel. Refer to *DC and Tone Remote Function Definitions* on page 110 for the function actually transmitted.

Custom Channel Functions

The Custom Channel Functions are used to customize the channel card to the radio. Each key must have the desired transmit and receive tones or DC currents assigned.

DC

If the channel is defined as a DC controlled channel, choose the desired current for receive and transmit.

Tone

If the channel has been defined as a tone controlled channel, you will be asked to select the desired transmit and receive tone. The receive tone selected will be sent whenever the key is pressed. The transmit function will be sent on transmit.

System Functions

System functions are assigned to individual keys, but may affect more than a single channel.

Transmit Keys

The following transmit functions may be assigned to a specific key.

Normal Tx

This key will cause the selected channel(s) to transmit. This is functionally the same as the optional foot-operated PTT switch. Normally only one TX key is assigned per position.

Transfer Instant Transmit

This key, when pressed, will cause the next channel “Select” key pressed to become an “instant transmit” key for the channel. The selected channel will not change. This key is used to eliminate the need for individual Instant transmit keys on each channel.

Last Call Transmit Any Channel

This key will cause the last channel that received audio ("Call" activity) to transmit. The channel will not be selected.

Last Call Transmit Selected Channels

This key will cause the last "Selected" channel that received audio ("Call" activity) to transmit. The channel will not be selected.

Last Call Transmit Unselected Channels

This key will cause the last "Unselected" channel that received audio ("Call" activity) to transmit. The channel will not be selected.

Monitor

This key causes the programmed PL monitor current or tone to be sent to the "Selected" channel, thereby disabling the "private line" feature on the radio.

Site Intercom

The site intercom key allows the console operator to communicate with the "Selected" radio site by using the audio lines as an intercom path. When this key is pressed, only the audio is sent to the channel; the transmitter is not keyed.

Alert

Select a key to generate the desired alert tone to be transmitted to the "Selected" channel. The desired alert will be sent as long as the key is held down.

All Mute

This "All Mute" function key will cause the audio from all "Unselected" channels to be muted. The "selected" channel will be unaffected. If a muted channel is "selected", it will be unmuted as long as it is selected. If it becomes "unselected", it may become muted again if the "all mute" function has not been toggled.

Volume Reset

This key will cause the received audio level of the selected channel to be set to its default level, usually 51%.

Group Select

The group select key allows a set of preselected radio channels to be selected with a single key. Mark check boxes to add or delete a channel from this group key. Several group keys may be defined on a single position. A channel may be a member of several different

groups. If a channel card is not installed in the system, its channels will not show in the table.

If the channel chosen is tone or DC and is defined as a multi-frequency channel, you will be asked to select the desired function (tone or current) to be used when this key is activated.

Group Instant Tx

The group instant transmit key will cause all members of the group to be keyed with a single key. Mark check boxes to select channels for this key. A channel may be a member of several different groups. If a channel card is not installed in the system, its channels will not show in the table.

If the channel chosen is tone or DC and is defined as a multi-frequency channel, you will be asked to select the desired function (tone or current) to be used when this key is activated.

Priority Marker

To cause the priority marker to be sent when this key is pressed, click the channel number for a specific channel or click “Select” or “Transfer”. Clicking “Select” will cause the marker to be sent on the “Selected” channel. Clicking “T” will cause the marker to be sent to the channel of the next “select” key pressed.

Simultaneous Select

Holding this key and pressing channel “Select” keys will cause multiple channels to be “Selected”. All the channels thus selected will transmit when the transmit key is pressed and all their received audio will be routed to the “Select” speaker.

Speaker/Headset

When this key is programmed on the upper panel, it will cause the speaker audio to be toggled between the speakers and headset. The Green LED will indicate that the audio is routed to the speaker; the red LED will indicate the headset is receiving the audio.

When this key is programmed on the lower panel, the red LED will come on to indicate the headset is receiving audio. Pushing the key will source audio to the speakers and the LED will extinguish.

Note Jumpers are available on the console controller board to allow “Selected” or “Unselected” audio to be “locked” to the speakers or headset thus negating the function of this key.

Diagnostics Reset

By programming this key, any diagnostic messages displayed on the console will be held until the key is pressed. If this key is not assigned, the diagnostic will be removed after approximately three seconds or when the next key is pressed.

Clock Set

By programming this key, clock setting can be initiated by pressing the “CLOCK SET” key on the key panel.

The first time the “CLOCK SET” key is pressed, the seconds-unit on the time display will be highlighted with an underscore. The seconds-unit may be adjusted up or down using the “CHANNEL VOLUME” knob. When the desired number of seconds have been set, press the “CLOCK SET” key again.

In a similar manner, each time you press the “CLOCK SET” key, another time unit will be highlighted in the display, until the entire time and date have been set. The units are adjusted starting with seconds, then minutes, hours, month, day, and finally year. The display will automatically show the date once the three units of the time of day have been set. You may distinguish a time display from a date display by the colon (:) units separator used for time versus the slash (/) units separator used for date.

Channel Test

This key is for diagnostic use only. Pressing this key will cause all indicator LEDs to light for any channel which is currently inoperable.

ANI Review

Because ANIs are received from various radios, they will be decoded and stored in a “stack” in memory. The ANIs are reviewed and removed from the stack by repeatedly pressing this key. The LED associated with this key will blink as long as an ANI remains in the stack.

Note ANI Select only functions if the optional ANI hardware is installed in the console on a DCC Channel A or B.

ANI Select

Pressing the ANI Select key will cause the channel that received the ANI showing in the display to be “Selected”.

Note ANI Review only functions if the optional ANI hardware is installed in the console on a DCC Channel A or B.

Paging Keys

> **Note** The "Instant Call" and "Page Safety" functions represent optional features. They can always be programmed, but will generate an error message in the console if the Instant Call Paging option has not been installed.

Instant Call

An Instant Call key can have single or multiple pages (called a page stack) assigned to it. Each page in the stack can be a different format (e.g., DTMF, Two-Tone, Alert) and be steered to different channel(s).

Begin by entering a previously defined leading digit representing the desired paging format and then the page code into the **Pager Code** field. The maximum number of page code digits (after the leading digit) allowed is 15. This limit only affects variable length paging formats such as DTMF, Rotary, and Knox. To enter the "*" and "#" digits for these formats, use "E" and "F", respectively.

Page Enter

This paging function is used during manual page entry (via the console DTMF/paging keypad) to terminate the entry and add the page to the stack. The use of this key is only required for variable-length paging formats (i.e., DTMF). Fixed-length paging formats (i.e., Two-Tone and Alerts) are self-terminating.

Page Clear

If manual page entry (via the console DTMF/paging keypad) is in progress, this function will abort the current key entry sequence and clear the paging display without altering the existing page stack. If a page entry is not in progress, pressing this key will delete all console page stacks. If a page transmission is in progress, it will also immediately abort the page transmission. This function should always be programmed if the console is to be used for paging.

Page Send

This paging function will terminate any manual page entry in progress (as if a PAGE ENTER key had been pressed), and begin transmitting the manual page stack on the currently selected channel(s) in the order the pages were stacked (entered). The page stack is retained and can be transmitted again (on different channel(s), for example) by pressing this key again.

Page Safety

If this function is programmed, instant-call pages will not be transmitted until this key is pressed, allowing the operator to review the selected instant-call pages before sending

them. If this key has not been programmed, pressing an instant-call page key will begin the page transmission immediately.

Burst Tone Select

A 1-second tone burst can be enabled by selecting a frequency from the list. This tone burst is generated for each transmit function after the transmitter is keyed-up and before the console audio is switched on. Several keys can be programmed with different frequencies. The tone burst can be disabled by selecting a key programmed with the "No Tone" choice. This feature is always disabled if no Burst Tone Select keys have been programmed.

Transfer Keys

The number of keys on a console is limited, especially for consoles with many channels. In order to reduce the number of keys used for common functions such as Volume Adjust, there are "transfer keys". Transfer keys are used to transfer the desired function temporarily to another channel in order to save key space. By programming these keys, you can have (for example) a single Volume Adjust key usable for all channels instead of several Volume Adjust keys, one for each channel.

Phone On/Off Hook (Transfer)

This key will activate the auxiliary output line of the next channel "Selected". It is intended for use as an "off hook" signal to answer an incoming phone line when the optional telephone is installed. Each channel has one auxiliary output line.

Phone Hook Flash (Transfer)

The phone Hook Flash key will cause the On/Off Hook line of the next channel selected to be deactivated for 500 ms thereby putting the phone on "hold". Hit the key again to enable the phone conversation.

Volume Adjust (Transfer)

Pressing this key will cause the next "select" key pressed to become a "Volume adjust" key. This eliminates the need for a separate Volume adjusts key for each channel.

Mute Adjust (Transfer)

Pressing this key will cause the next "select" key pressed to become a "Mute/Volume adjust" key. This eliminates the need for a separate Mute Adjust key for each channel.

Auxiliary Input/Output

Auxiliary Input / Output ports have a variety of uses. Input ports can monitor alarms or show voter status. Output ports can control gates, gas pumps, video monitors, room lights and doors, even control the lawn sprinkler system.

Auxiliary Input Port numbers 9-38 are assigned to the optional Expanded Aux. I/O Card(s) (P/N 702-9448) as follows: 9-14 to the first Aux. I/O Card, 15-20 to the second Aux. I/O Card, etc. This allows the Model 4010 to support up to five Aux. I/O Cards for a total of 30 ports. Auxiliary Output Port numbers 9-38 are assigned to the optional Expanded Aux. I/O Card(s) in the same manner as the input ports as described above.

Auxiliary Input Port numbers 1-8 are assigned to the Model 4010 main PC board Spare/Aux. inputs (on connector P8) if these inputs have been configured as auxiliary inputs. If the inputs have been defined as spare inputs instead (the default), Auxiliary Input Port numbers 1-8 are unavailable. Auxiliary Output Port numbers 1-8 are assigned to the Model 4010 main PC board Spare/Aux. outputs (on connector P7) if these outputs have been configured as auxiliary outputs. If the outputs have been defined as spare outputs instead (the default), Auxiliary Output Port numbers 1-8 are unavailable. In this case, however, spare outputs can be assigned to a key (see *Key Definitions* on page 94).

Note Auxiliary Output Ports 1 through 4 are logic level outputs. Auxiliary Output Ports 5 through 8 are relay closures.

Note For more information about spare and auxiliary inputs and outputs, see *Input/Output Configuration* on page 90.

Selecting Auxiliary Input / Output Functions will display the AUXILIARY INPUT / OUTPUT menu. From the menu you may assign an auxiliary input, one of three different types of auxiliary outputs, or spare outputs.

Outputs 7 and 8 in Reverse Selective Calling Mode

If either a primary or secondary ANI address is programmed (see *ANI Decode/Display* on page 97), the console operates in Reverse Selective Calling (RSC) mode. Radios must support one of the following signaling modes in order to support RSC: DTMF, 5/6 Tone, or SS1A.

If a primary or secondary ANI address is programmed, and your radios support RSC, and Spare Outputs 7 and 8 are not programmed, then Spare Outputs 7 and 8 will function as follows:

- Spare Output 7: ON when ANI is displayed on the console display, OFF otherwise
- Spare Output 8: Produces a 500 ms pulse when an ANI is decoded by the console

Auxiliary Input

By assigning an input to this key, the associated LEDs will reflect the state of the input. Pick the desired inputs by entering the input numbers. The input must have been previously enabled using the **System Configuration** menu (see *To enable and name the auxiliary inputs and outputs* on page 92). Then select the desired LED behavior.

Auxiliary Output Interlocked

Several outputs may be “interlocked” such that only one output can be active at any given moment. That is, when one output goes active, all others will be inactive. Up to 32 interlock groups may be defined with any number of outputs per group.

Enter the desired output number up to 38. The output number will be accepted if it has been previously defined using the System Configuration menu.

Type an interlock group number 1 - 32. If the interlock group has been already used, this input will be added to it. If not, a new interlock group will be created.

Auxiliary Output Toggle

The chosen output will toggle with this key. That is, press the key once and the output will be activated; press again and the output will deactivate.

Auxiliary Output Momentary

As long as this key is pressed, the output will be active; when released, the output will be inactive.

Spare Output

Spare Output Latching

The eight spare outputs are located on pin block P7. When an output is ON, its voltage is greater than +3.5 volts DC relative to ground. When the output is OFF, its state is less than +0.5 volts.

If Spare outputs 7 and 8 are not reprogrammed, Spare Output 7 will be ON whenever an ANI is displayed on the console and Spare Output 8 will produce a 500 ms pulse every time an ANI is decoded by the console.

The assigned spare output will toggle on and off with each press of the spare output latching key. The red LED will toggle to show the state of the output.

Spare Output Toggle

The assigned spare output will toggle on and off with each press of this key. The red and green LEDs will toggle to show the state of the output.

Spare Output Momentary

The assigned spare output will be activated only as long as the key is depressed. The green LED will blink as long as the key is held down.

For each spare output assigned, select the desired output number (1-8).

Appendix C: Maintenance

Warning! Cards in the Model 4010 are not hotswappable. Before replacing any cards, remove power from the unit and wait five seconds.

Battery Check/Replacement

The Model 4010 relies on battery backup to keep the configuration stored in memory. This battery, contained within a socket, has a life expectancy of 4-7 years. Zetron recommends replacing the battery at a minimum of every 5 years. You can check the battery voltage using the following procedure, which requires a voltmeter.

♦ To check the battery

1. Power down the Model 4010 and wait at least 5 seconds.
2. Locate socket U27 (see *Model 4010 Dual Channel Card Layout* on page 103).
3. Check the voltage across pins 14 (ground) and 28 (power).
4. The voltage should be 3.0vdc or greater. If the voltage is lower than 3.0vdc:
   - The battery should be replaced soon.
   - Removing power may cause the configuration to be lost or corrupted.
   - You should have a backup configuration file to reprogram the console.

If the battery needs replacing, contact Zetron to order a replacement. See *Model 4010 Battery Replacement Instructions* (P/N 011-0789).

Firmware Upgrade

A firmware upgrade requires new parts from Zetron. The upgrade kit comes with instructions. Refer to *M4010 Dispatch Console Software Upgrade Instructions* (P/N 011-0422). Changing the settings or features listed in Table 3 on page 25 also require a change to the firmware.

Display Board Adjustment

The Display Board is properly adjusted at the factory and does not require further adjustment. If you replace the Display Board, use the following procedure to properly adjust the board.

Warning! An incorrect adjustment can lead to a damaged op-amp.

♦ To adjust the display board

See *Model 4010 Display Board* on page 106 for a board diagram.

1. Turn on the Model 4010 and check the LCD display for contrast quality. Adjust R21 on the Display Board for the best contrast.
2. Disconnect the Select Speaker from JP3.
3. Connect a digital volt meter (DVM) across JP3 and adjust R34 until the DVM reads 0.0 +/- 0.02 VDC.
4. Remove the DVM and reconnect the Select Speaker to JP3.
5. Disconnect the Unselect Speaker from JP1.
6. Connect a digital volt meter (DVM) across JP1 and adjust R7 until the DVM reads 0.0 +/- 0.02 VDC.
7. Remove the DVM and reconnect the Unselect Speaker to JP1.

Appendix D: Troubleshooting

Console LCD displays the word "PROGRAM"

The Program/Run switch is in the programming position. For normal operation it should be in the run position. Flip the switch to the other position. The switch is located on the bottom of the unit and the positions are unlabeled.

Console LCD displays "CPS Data Error"

This error message can be caused by any of the following problems:

- The configuration file that you just sent to the console was not successfully transferred, because of a serial port parameter mismatch. If you are using CPSW on Windows XP, close the application and try again. If you are using CPS, check that your serial port settings are correct (9600, N, 8, 1, no flow control).
- The battery is too weak or has died. Check the battery voltage and replace if necessary. See *Battery Check/Replacement* on page 131.
- The configuration is invalid. Use CPSW to send a known, valid configuration to the console. See *Programming* on page 79.

Scratchy or no audio on older consoles

Older consoles may suffer from oxidation on the P4 connector pins (see *Model 4010 Dual Channel Card Layout* on page 103). A short-term fix is to remove the Tone Remote System Adapter, clean the P4 pins, and reseat the adapter. A long-term fix is available in the form of a gold-pin upgrade. Contact Zetron for more information.

Erratic behavior on 4-year or older consoles

Check the battery. See *Battery Check/Replacement* on page 131.

Certain types of audio no longer occur when some options are removed

See **P4**, **P5**, and **P6** in *Model 4010 Control Board Connectors and Fuse* on page 105.

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