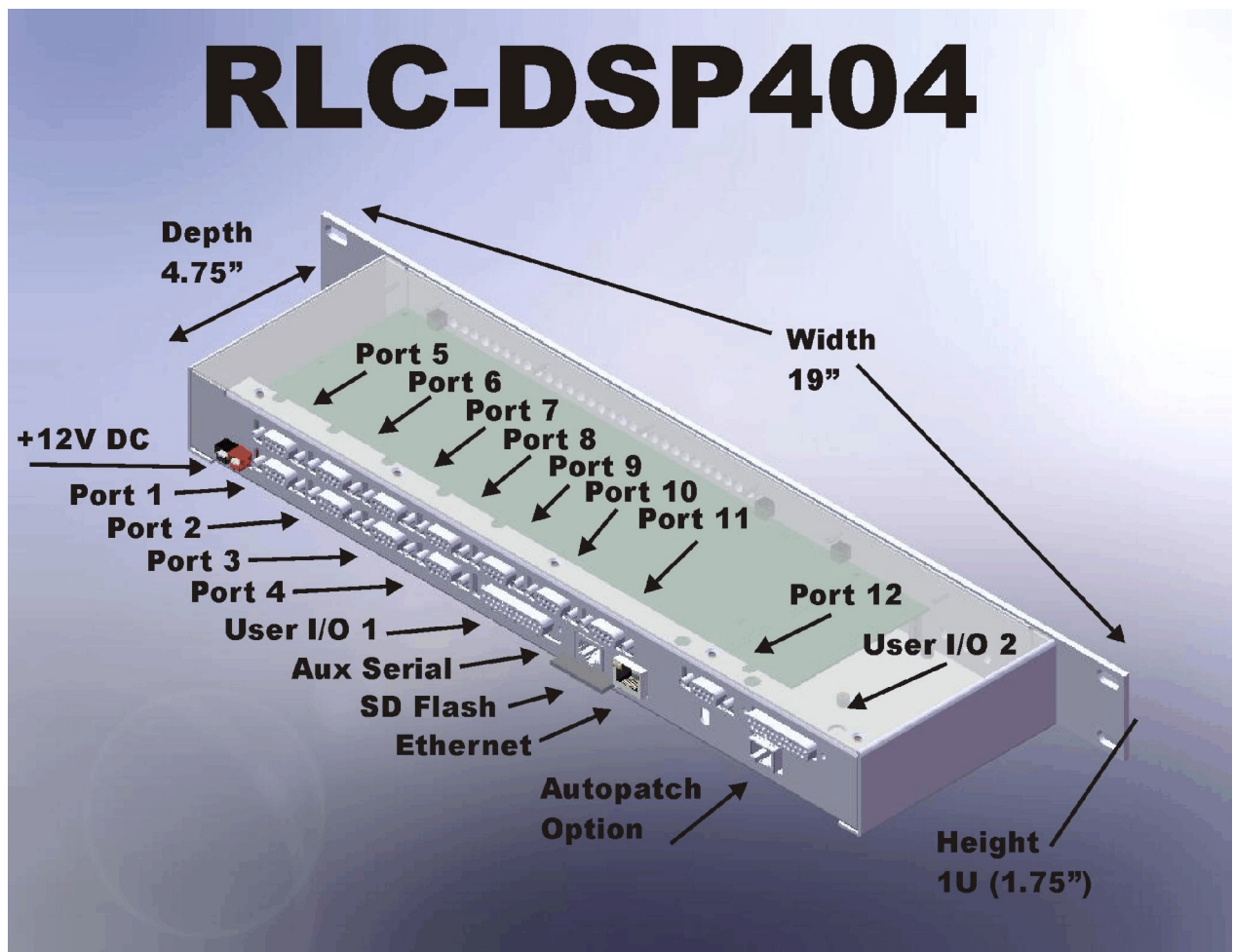


# Chapter 1: Getting Started

Welcome to the powerful RLC-DSP404 advanced DSP based communications controller. The DSP404 supports up to 12 full-duplex radio ports, 16 Inputs, 16 Analogs and 16 output channels in a small 1U (1.750") enclosure.

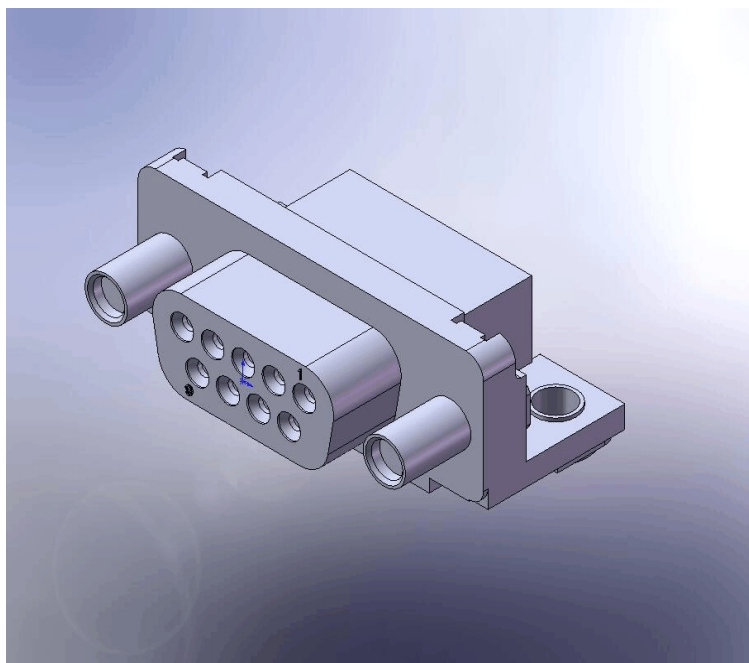
This section will cover the basic mechanical and port locations, radio port DB-9 connector pinouts and the DB-25 I/O connector pinouts. Initial port configuration switches will be explained and detailed. Following the hardware mechanical descriptions a complete discussion on the programming and operation of the included Windows<sub>(TM)</sub> Remote Control Interface (RCI) software. Once section 1 has been read, the DSP-404 can be setup and operated. In most cases, the rest of the manual is used for reference only and not necessary for day to day operations of the system.



**RLC-DSP404 Port Locations**

## RLC-DSP404 Radio Port

The DB-9 used on the DSP404 will accept any Link Communications controller based cable, but for extended operations you may need to make a few changes. The DSP404's input and output characteristics are different (in a good way), expanding the flexibility of the types of signals the controller can accept without external changes.



**Front View of the DB-9 on the DSP-404**

Pin	Default Function	Alternate Function	Default Switch Setting
1	Ground	RS-232 Transmit Data	6 position Switch 1 - Off, Switch 2 - On
2	CTCSS Detect	CTCSS/DCS Output	10 position Switch 8 - Off, Switch 9 - On
3	PTT Out	.....	.....
4	Audio Out	.....	.....
5	Audio In	.....	.....
6	Ground	RS-232 Receive Data	6 position Switch 3 - Off, Switch 4 - On
7	COR Detect	.....	.....
8	Ground	+5 Volt Output	6 position Switch 5 - Off, Switch 6 - On
9	Ground	.....	.....

You will notice that several pins have different functions depending on the switch settings. This enables a 9 pin connector to be used in varying applications without requiring a larger connector. In most instances you will leave the switch settings in their default position. A complete list of switch setting variables is provided below. It is a good idea to decide ahead of time what setting positions you need because you will need to open the case to access them. When the 12 port expansion card is installed you will need to remove that piece to access the lower boards switch settings.

There are two switches per port. The six position switch is for RS-232 serial and power selection. The ten position switch configures receiver and transmit setup functions

Switch	Default	Function
1	Off	DB-9 Pin 1 Function: RS-232 Transmit Data Output
2	On	DB-9 Pin 1 Function: Ground
3	Off	DB-9 Pin 6 Function: RS-232 Receive Data Input
4	On	DB-9 Pin 6 Function: Ground
5	Off	DB-9 Pin 8 Function: +5V Power Available (For smart cables)
6	On	DB-9 Pin 8 Function: Ground

Six Position Switch Functions

Switch	Default	Function
1	On	COR Input Pull-Up (47.5K ohm) to +3.3V
2	Off	COR Pull-Down (47.5K ohm) to Ground
3	On	CTCSS Input Pull-Up (47.5K ohm) to +3.3V
4	Off	CTCSS Pull-Down (47.5K ohm) to Ground
5	Off	Receiver Audio Input De-Emphasis filter, -6dB/octave
6	On	Transmit Audio Output Pre-Emphasis filter bypass, +6dB/octave
7	Off	Transmit Audio Output Gain Range (x3.33) <i>Higher gain when Off</i>
8	Off	DB-9 Pin 2 is a Tone Output from DAC 2
9	On	DB-9 Pin 2 is the CTCSS detect input
10	On	Receive Input Range Select ( $\div 2.333$ ) <i>Higher gain when Off</i>

Ten Position Switch Functions

## RLC-DSP404 I/O Port Pinout

The DB-25 used on the DSP404 will accept any Link Communications RLC-3 based cable. The I/O portion of the DSP-404 will now accept without any switch changes, analog inputs from 0 to 15 volts. Any input voltages above +15V must be externally resistively divided to keep from over voltage on the analog system. The digital inputs can handle a maximum of 60V inputs. The output lines can handle a maximum of 100mA sinking current.

When attaching an externally powered temperature sensor, like the National Semiconductor LM335Z, a switch is provided that powers the sensor. This switch is an 8 position where each switch number corresponds to an analog input line.



**Front View of the DB-25 on the DSP-404**

The connector is divided into three distinct areas; Analog, Inputs and Outputs. There are 25 pins and 24 signals with one ground reference. The ground reference is at the same potential as the DSP404's (-) power terminal.

When attaching an analog input that is greater than +15V an external series resistor is necessary to act as a voltage divider. The input resistance of the analog input is 120K ohms. A series 100K resistor is part of the input circuit and a 20K resistor provides the necessary voltage divider to bring 15V maximum down to +2.5V which is the rail of the 12 bit Analog to Digital Converter (ADC).

**$V_o = V_i (R_g / (R_i + R_g))$** :  $V_o = 2.5V$ ,  $R_g = 100K$ ,  $R_i = 20K$  and  $V_i = 15V$  so...select  $R_i$  based on your  $V_i$  to keep from exceeding +2.5V at  $V_o$ . So  $25V_i$ ,  $R_i$  would be 180K (100K already there), so add a series 80K to handle a 25V input.

To test the 80K plug it back into the above formula.

$V_o = 25V(20K/180K+20K) \dots V_o = 2.5V$  which works.

If an 80K resistor is not available, choose the next larger value and then refer to Chapter 12 concerning your calibration and offset options that can be programmed to each analog input to address the analog input differences.

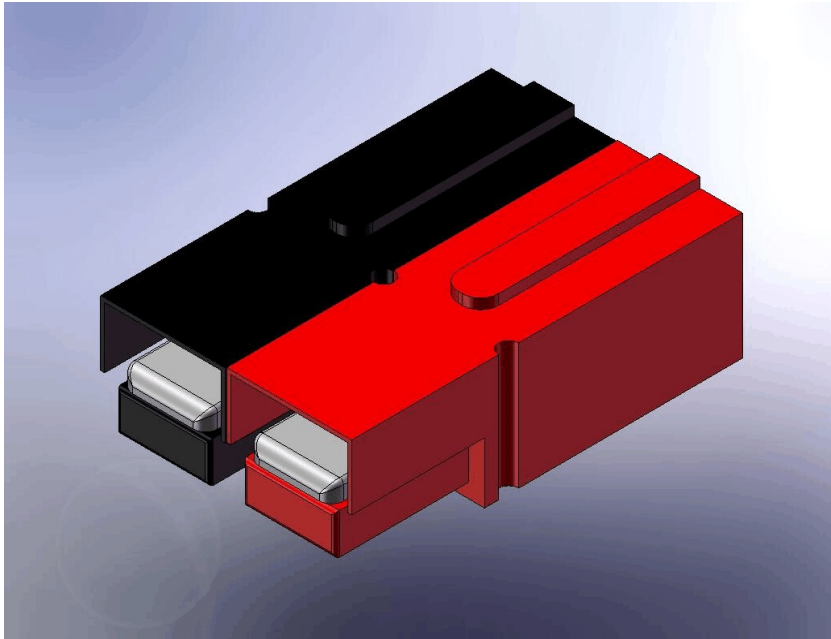
Pin	Functions		Pin	Functions
1	Ground Reference		14	Ground on I/O Board #1 : Analog 8 on I/ Board #2
2	Analog 7		15	Analog 6
3	Analog 5		16	Analog 4
4	Analog 3		17	Analog 2
5	Analog 1		18	Input 8
6	Input 7		19	Input 6
7	Input 5		20	Input 4
8	Input 3		21	Input 2
9	Input 1		22	Output 8
10	Output 7		23	Output 6
11	Output 5		24	Output 4
12	Output 3		25	Output 2
13	Output 1			

Switch	Function	Switch	Function
1	Analog #1 Power	5	Analog #5 Power
2	Analog #2 Power	6	Analog #6 Power
3	Analog #3 Power	7	Analog #7 Power
4	Analog #4 Power	8	Analog #8 Power (No function on I/O Board #1)

DB-25 pinout and Analog Power Switches

## RLC-DSP404 Power Input

The RLC-DSP404 utilizes an Anderson Power Pole<sub>(TM)</sub> power connector as the primary power system. All other Link controllers utilize a 2.5mm power connector but the style was changed to a latching power connector to address concerns with unplugging that could occur with the 2.5mm connector. There is, however, a 2.5mm power connector pattern on the PC board. A connector can be purchased to fill this pattern if desired.

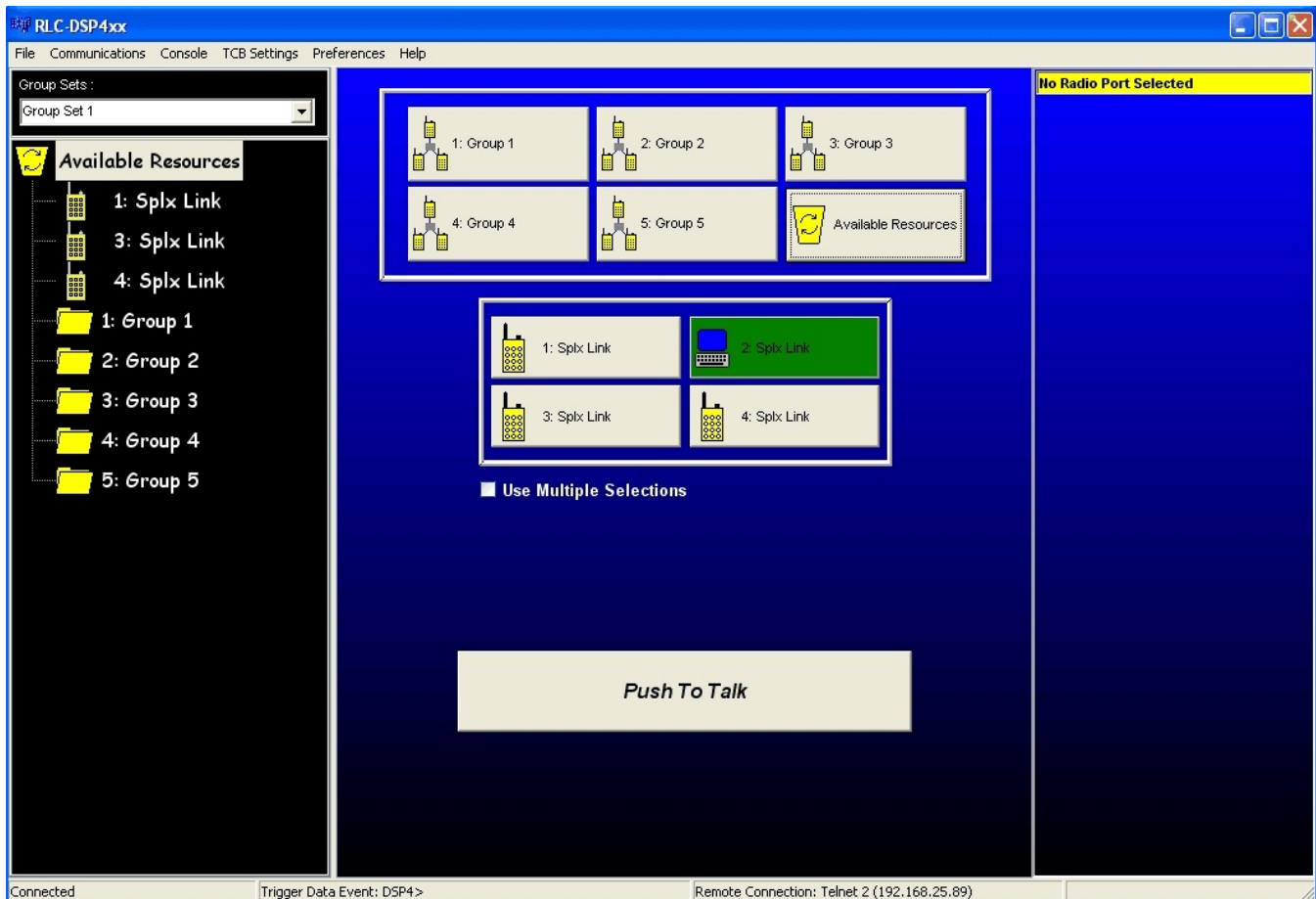


Power Pole Polarities: Red is (+)...

# Windows(TM) Remote Control Interface (RCI)

The RLC-DSP404 comes with a very flexible GUI interface that enables most aspects of the DSP404 to be setup either using an RS-232 serial port or utilizing an Ethernet port. Only the Ethernet port enables the Voice Over Internet Protocol (VoIP) features, but either method works well for programming and operation. Ethernet programming has the added feature which enables up to four computers accessing at the same time, all with VoIP.

RCI can not operate at this time without a controller hooked up to or connected to. All variables are stored on the controller and none on the computer. This feature keeps computer issues from effecting the controllers settings if a computer crashes or is not available. If this occurs then download a new version of RCI on any computer and connect to the controller and all of your settings are still there.



## Windows(TM) Remote Control Interface (RCI)

The operational console for RCI. If you get to this screen your computer is communicating with the controller unit, and will indicate a good connection by the Remote Connection message. In this case, Telnet 2 (out of four possible connections). If you were connected using the RS-232 serial port, the connection dialog on the bottom of the screen would identify Serial as the connection type.



# Port Setup from RCI

The easiest way to get to know your DSP404 is with the RCI GUI interface software. For the setup discussion I will exclusively be using RCI and not the DTMF commands. The DTMF commands are covered later in the manual and can be referenced is need-be.



Accessing setup is accomplished by clicking your Right mouse button when the pointer is over the Port or Group you wish to configure.

Right Click over the requested Port

**Advanced Radio Properties**

Audio Levels	ID Messages	Courtesy Beep	Timers
Personalities	Radio Name	Radio Type	Rx Activity

**Predefined Radio Personalities**

Load Personality

Factory Defined Radio Personalities :

3. Splx Link

User Defined Radio Personalities :

Warning: Custom settings will be lost

Save Settings to a User Defined Personality Slot

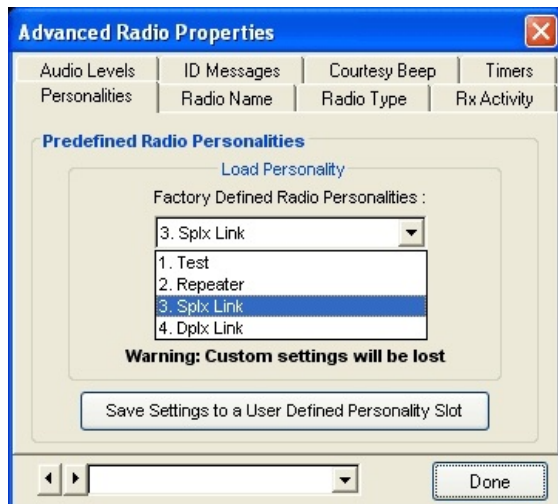
Port 1 Done

Port Setup Screen

After right clicking the mouse over a port the Port Setup Screen will appear. This screen enables access to features and variable for the selected port. In an effort to minimize the amount of clicking required, a port selection box is located to the left of the “Done” button. This enables an easy method of selecting different ports without the need to exit setup and select a different port.



The initial setup screen enables the user to select a **Radio Personality**. Personalities contain only stuff that is specific to the make and model of the radio, not how it is used. A ports ID's and Courtesy Beeps are not stored because they are not radio specific.

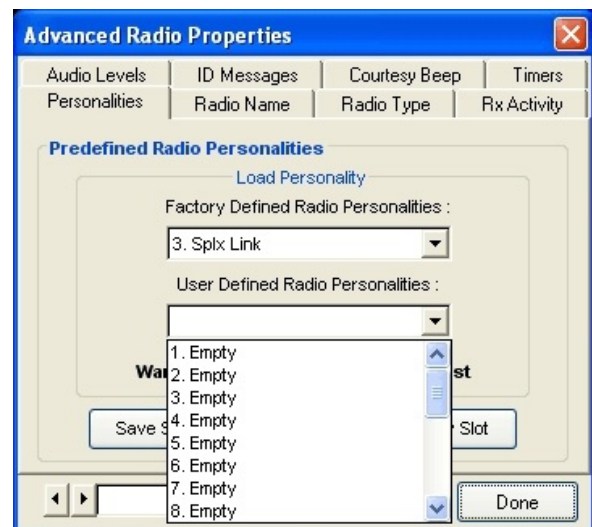


Some default radio personalities are included for a Repeater, Simplex Link and Duplex Link. To select a personality, select the required personality and press Done. Now all the settings stored in the personality will be recalled.

If a personality does not contain all the exact settings you wish, you can recall a setting and make you own changes to the personality and save it under a User Defined Personality Slot.

A user defined personality is nothing more than a predefined personality with changes that is stored on the units Flash for use later.

Because every radio is unique, unique settings are necessary to have the radio setup correctly. A user slot is handy because it is a good place to start when connecting a radio to the system.



The next setup tab allows the ports displayed **Radio Name** to be shown on the Port button. The name is limited to 9 characters and shows up on the selected port button.

The Radio Description section is used for a description only and is not displayed. It is currently limited to 100 characters and could be used as a basic log for a ports additions, changes and maintenance.

The next tab is the **Radio Type** tab that controls the radio type connected to a port.

**Link / Remote Base:** This identifies that the radio attached to the port is not functioning as a repeater but as either a half-duplex (simplex) radio or a full-duplex base radio.

**Repeater:** This identifies that the radio connected to the port is operating as a repeater with its COR looped to the PTT on the same port.

**Half Duplex Timer:** This timer is only active when a radio is in Half Duplex mode, and is triggered when the PTT for the port goes from active to inactive.

Some radios COR will bounce when coming out of PTT, and will cause an unnecessary courtesy beep or other PTT's on connected ports. If your radio has this problem, set the Half Duplex timer to a value that will suppress the COR hick-up.

**Audio Delay:** This timer provides delayed receiver audio from 0 seconds up to 5 seconds per port. The timer defaults to 0 seconds and is programmable in 1 millisecond steps.

**Link Type:** This defines if the connected radio is either a Half Duplex (single antenna port with combined receiver and transmitter inside one package) or Full Duplex (two antenna ports with separate receiver and separate transmitters in one or two packages).

**Radio Channel Control:** This setting identifies the function of the connected radio. A Not Controllable radio is a typical radio without the controllers ability to frequency steer the radio. If steerable radios are connected, such as the Tait 8115, 9115 series radios, then select the Tait radio in the options box. When a steerable radio is selected for a port, the right hand 1/3 of the main screen changes to indicate a controllable radio is available. Otherwise this selection keeps that part of the screen unavailable. The default setting is Not Controllable.

The screenshot shows the 'Advanced Radio Properties' dialog box with the 'Radio Type' tab selected. The dialog has a title bar with a close button. Below the title bar is a tabbed interface with the following tabs: 'Audio Levels', 'ID Messages', 'Courtesy Beep', 'Timers', 'Personalities', 'Radio Name', 'Radio Type' (selected), and 'Rx Activity'. The 'Radio Type' tab contains the following settings:

- Type:** Two radio buttons: 'Link / Remote Base' (selected) and 'Repeater'.
- Device Settings:**
  - Half Duplex Timer (sec):** A numeric input field with a value of '0.25' and up/down arrows.
  - Audio Delay (sec):** A numeric input field with a value of '0' and up/down arrows.
  - Link Type:** Two radio buttons: 'Half-Duplex' (selected) and 'Duplex'.
  - Radio Channel Control:** A dropdown menu with 'Not Controllable' selected.
- Port Selection:** A dropdown menu at the bottom left showing 'Port 1'.
- Done Button:** A button at the bottom right.

The next tab to examine is the **RX Activity** Tab. This tab control the receiver access conditions for the port.

**COR:** Carrier Operated Receiver (Relay for the old timers...) Indicates that activity on DB-9 pin 7 must go either high or low to identify an active receiver. The default condition is active low.

**CTCSS:** Continuous Tone Coded Squelch System access is connected to pin 2 of the DB-9 connector. It receives activity from an external analog or digital tone decoder, or other source, as an alternate access method other than COR.

**VOX:** Voice Operated Transmitter is a method of accessing the controller with only the presence of voice. If a connected radio does not have a COR or CTCSS output and you wish to use it (sell it and get a radio with a COR or CTCSS line...), VOX must be used. In a repeater environment, it is best to use a radio with a hardware line and not VOX, but otherwise select VOX. When the voice is detected the controller will indicate an active receiver condition. Because VOX operated on voice, you will need to select a response time (typically Medium) to delay going from active to inactive between someone's words. If the average person using your system talks...really...slow... then you will need to set the VOX response to slow. The response is a voice activated hang timer, therefore when the person stops speaking, the controller will wait a period of time to make sure they are really no longer speaking.

**VOX Threshold:** This setting is the VOX trigger point where the controller treats incoming audio as either active or inactive. The lower the number the quieter the input audio to be detected. A setting of 50 works well with most audio sources.

When a line is set to be **Low** going indicates that the receiver must pull the line to ground for it to be recognized. Depending on the switch settings, the line can be released to an open (if the pull-up switch is on), be at a voltage and release the line when active (if the pull-down switch is on), or provide a voltage to the line and a ground when active (if both pull-up and pull-down switches are off).

When a line is set to be **High** going, it operates opposite from the Low going line. So a receiver provides a voltage when active. Every receiver is different so between the switch settings and the Low/High selections, most receivers can be interfaced without issue. The COR and CTCSS lines are connected to an insulated gate FET which provides an extremely high input impedance to the connected receiver when the switches are both off. The switches provide either a pull-up or pull-down with a load of 47.5K ohms each. Refer to the switch settings at the beginning of this chapter for proper settings for pull-ups and downs on the COR or CTCSS lines.



The next tab controls the Audio Levels for the receiver, transmitter and tone system.

**Transmit Level** has 255 discrete adjustment steps (in 3/8dB/step) and is displayed as a 0 to 255 steps. Future software releases will add a fine level adjustment to span digitally the 1 step, steps. Mic and Line level selections are only available for the Tactical Communication Bridge (TCB) units.

**TX Tone Level** adjustment sets the level of the transmitted tones and is mixed with all other receivers audio. The tone level is a 0 to 100% adjustment.

**Receiver Level** adjustment adjusts the level of the incoming receiver audio that is presented to the 24 bit CODEC.

**Enable Automatic Gain Control** sets tells the controller to automatically adjust the units receiver audio level to a point where the controller's CODEC performs the best. This feature is useful when a variety of people use a system, with different levels of spoken audio. AGC is currently available on the TCB line of units and is planned for the DSP-404.

The 'Advanced Radio Properties' dialog box is shown with the 'Audio Levels' tab selected. It features a 'Transmitter Settings' section with 'Transmit Level' set to 50 and 'TX Tone Level' set to 20. Below these are radio button options for 'Mic Level' and 'Line Level', with 'Line Level' selected. The 'Receiver Settings' section shows 'Receive Level' set to 50 and an unchecked checkbox for 'Enable Automatic Gain Control'. At the bottom, there is a dropdown menu for 'Port 1' and a 'Done' button.

The 'Advanced Radio Properties' dialog box is shown with the 'ID Messages' tab selected. It features a section titled 'IDs' with a checked checkbox for 'Enable IDs'. Below this are two text input fields: 'Call Sign' containing 'KF7FW' and 'Voice ID' containing 'Welcome to the KF7FW Repeater'. An 'Advanced' button is located at the bottom right of the 'IDs' section. At the very bottom of the dialog, there is a dropdown menu for 'Port 1' and a 'Done' button.

The next tab allows programming of a ports **Identification Requirements** like the CW Call Sign and the Voice ID used. All ID slots are programmed with the Voice ID entered from this form.

When a user sets up the ID's, currently only two ID's are setup directly with the GUI, the CW and a Voice ID for the selected port.

Access to other ports ID slots is accomplished by pressing the Advanced button. A list of the other ports available ID's will be listed and using the Macro Editor can easily add or modify the ID's.

This block contains two overlapping dialog boxes. The 'Macro Editor' dialog box is in the foreground, showing a 'Command' field with '066' and a 'Data' field with 'KF7FW'. It has 'Add Line' and 'Delete Line' buttons, and a 'Macro Number' set to 380. The 'Advanced Radio Properties' dialog box is visible in the background, showing the 'ID Messages' tab with 'Call Sign' as 'KF7FW' and 'Voice ID' as 'Welcome to the KF7FW Repeater'. A 'Push 1' button is visible at the bottom right of the image.



The next tab enables the recalling and programming of a ports Courtesy Beep information. The user can recall default beeps (that are used on the RLC-Club and RLC-3 controllers), or program a Custom beep sequence when the Custom selection is made.

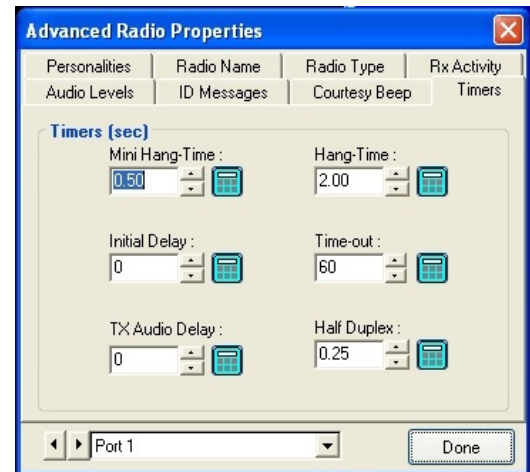
When a preset beep is requested, custom changes can be made to the recalled beeps by pressing the Advanced button which pulls up the macro editor with the contents of the Courtesy Beep macro.

If a preset beep is not desired, and the user wishes to have a Custom Beep, select Custom. Up to three custom tone combinations can be programmed here to provide unique beep sounds. If you need more than three tone sequences, use the Preset option and press the Advanced button. This will allow more than three tones to be programmed into the Courtesy Beep macro.

The last tab under a ports setup is are the Port Specific Timers. There are only six timers that can be set under this screen, and these timer are only the timers that directly affect the ports operation.

The format to change and set timers is either with a point and click up or down selection or to directly enter the time with by clicking on the calculator icon.

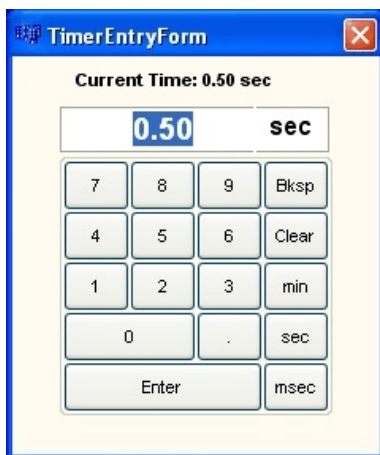
Up and down clicking increment in 10mS steps, and are displayed in seconds format.



The 'Advanced Radio Properties' dialog box, 'Timers' tab, shows settings for various timers. The 'Timers (sec)' section includes:

- Mini Hang-Time: 0.50 (with up/down arrows and a calculator icon)
- Hang-Time: 2.00 (with up/down arrows and a calculator icon)
- Initial Delay: 0 (with up/down arrows and a calculator icon)
- Time-out: 60 (with up/down arrows and a calculator icon)
- TX Audio Delay: 0 (with up/down arrows and a calculator icon)
- Half Duplex: 0.25 (with up/down arrows and a calculator icon)

At the bottom, there is a dropdown menu set to 'Port 1' and a 'Done' button.



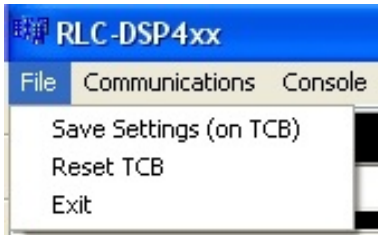
The 'TimerEntryForm' dialog box displays the 'Current Time: 0.50 sec'. It features a numeric keypad with buttons for digits 0-9, a decimal point, and unit buttons for 'sec', 'msec', 'min', and 'Bksp'. There are also 'Clear' and 'Enter' buttons.

When using the calculator pad, different timer values are available when entering a time. Msec, Sec and Min are available.

Once the timer amount has been calculated press the Enter Bar to accept and continue.

# System Features

Once a port has been setup access to some system features might be necessary in order for the GUI and unit to perform as desired.



Starting with the File drop-down menu there are three available options.

**Save Settings** (on TCB or RLC) will take the user changes and store them into non-volatile Flash memory. Until the settings are saved, they can be lost with a controller power-down event.

**Reset the TCB (or RLC)** will cause a power-on reset command to be issued to the controller. This is the same as pressing the Reset button or removing and reapplying power to the unit

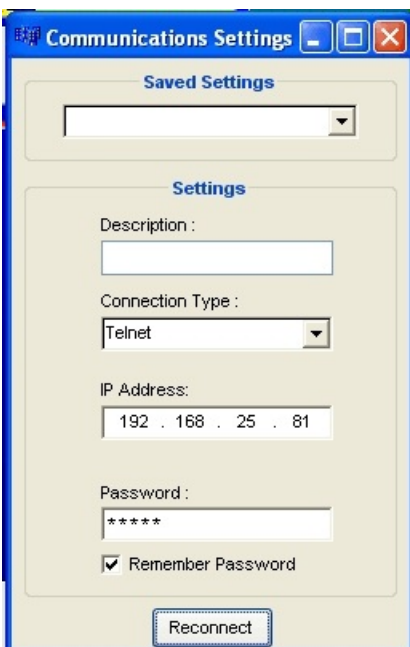
**Exit** will exit RCI

The Communications drop-down allows communications parameters to be accessed and changed.



There are three options that are available for the communications system. Controlling how the unit communicates with RCI, using serial or Telnet, watching the control signals status and accessing a terminal to make custom changes to the unit are supported.

## Communications Settings:

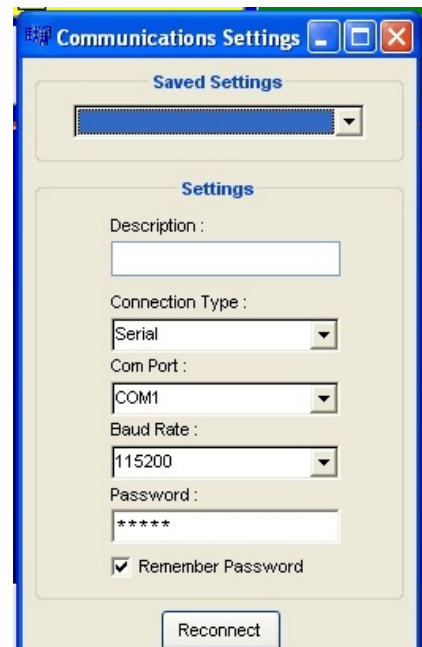


There are two options to connect to the unit. If using Telnet then an IP address and password is required. If using Serial, then a COM port, Baud Rate (115,200 Baud by default and password is necessary.

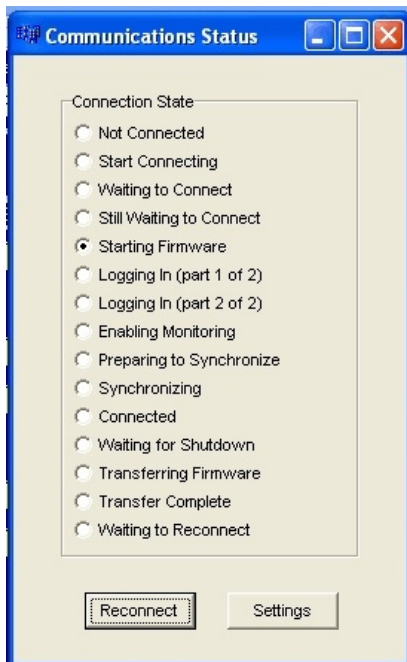
### Note:

On the RS-232 serial port, there is no password out of initializations. One must be entered if desired.

On the Network port a password **MUST** be entered before the network port will function.



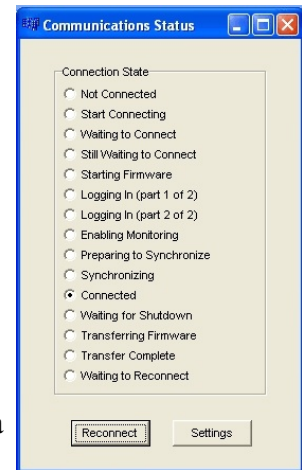




When RCI first starts, the **Communications Status** screen will display. This screen shows 15 discrete steps that effect the connection, updating and saving on the controller. If the controller is connected, the Connected line will be highlighted.

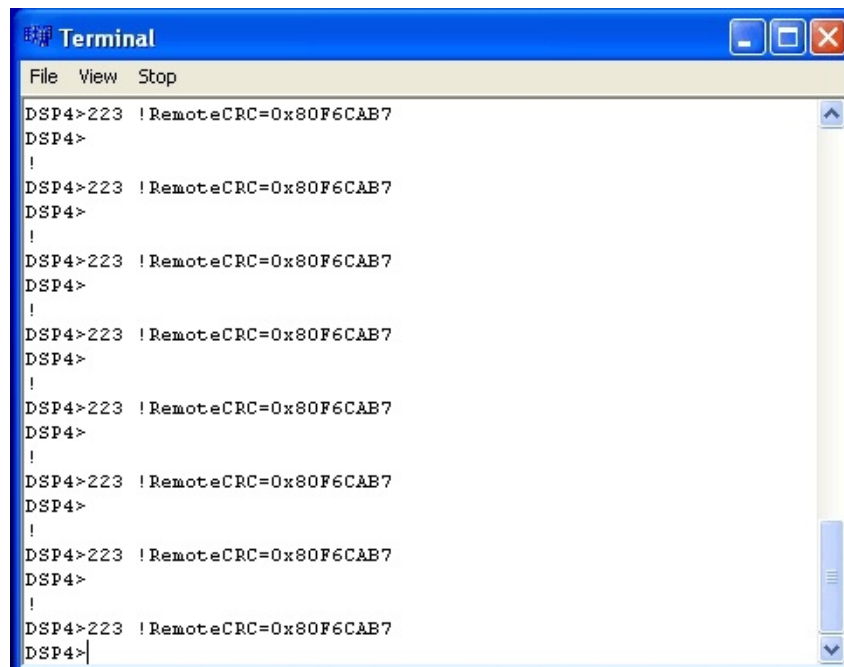
The communications settings will keep the system from connecting and when this occurs, the communications status screen will display. If your system is having connection problems, check the Communications Setup screen of press the Settings button.

Make a change then press the Reconnect button. If all else fails when working with a network, try the serial port.



*If contacting technical support, note the point from the Status screen where the communications failed.*

The **Terminal Screen** enables the user to watch and enter commands



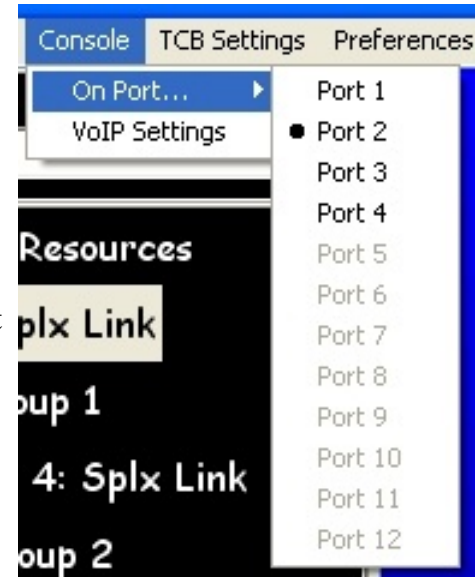
To use the Terminal as a standard terminal ensure the “Verbose” selection is not checked under the view menu.

To watch RCI’s communications to from RCI to the controller check the “Verbose” selection. This will unhide the background communications that is happening. All other features are self explanatory and can be played with without effecting the controllers operation.

**Console** drop-down menu accesses settings that affect RCI's console screen. The Console screen is the displayed screen on computers running RCI. The VoIP from the controller must go somewhere for the operator of RCI to access.

This screen requires a radio port to utilize and operate from. The port can be assigned from the Console drop-down menu but the port defaults to Port2.

To reassign the console port click the 'On Port' selection and assign a port. Only installed ports can be assigned as an RCI port therefore selection is limited to the non-greyed out ports.



### VoIP Settings Form

**VoIPForm**

☐ Enable VoIP Streami

**VoIP Settings**

**Network Settings**

☒ Connect via LAN (IP address determined automatically)  
Use this option if the TCB is on the same LAN (local area network) as your computer.

☐ Connect through a firewall  
Use this option if the TCB is not on the same local area network as your computer, such as if you are connecting to it over the Internet. In this case, the TCB will need to know the address of the firewall between your computer and the Internet to be able to send VoIP audio to you. You may be able to find your firewall's IP address by clicking the "Get Public IP Address" button.

Enter Firewall Address: 0 0 0 0 Get Public IP Address

**Latency Adjustments**

VoIP Out Latency: 7

VoIP In Latency: 7

**Connection Statistics**

**Counters**

Underflow 0	Lock 0
Over Flow 0	Fragment 0
Encroach 0	Address 0

Clear

**Cursors**

Current 0
Last 0
Fill 0

Update

Done

Streaming Stopped.

VoIP Settings can also be accessed under the Console menu. VoIP is only available on computers that are operating over a network port but supports up to four connections at one time. The four connections share the same console port and get audio from the controller but are limited to one incoming audio stream at a time. The incoming stream is controlled by the Push To Talk (PTT) button on the screen (or spacebar). When in console controlled PTT, audio from the computer's microphone is routed to the port assigned as Console on the controller. This port can be individually assigned to any of the unit's ports or part of a talk group to communicate with multiple ports.

When VoIP is enabled the user must select the method the data is accessed. Two methods are available; connection over a LAN or Connection through a Firewall. When connecting locally without exiting your LAN, no special configurations are necessary. The VoIP traverses using Port 23000 which will need to be opened if a firewall is used.

When going through a firewall, RCI can tell you the address it sees by pressing the "Get Public Address" button. RCI will show you the address that needs to be entered into the firewall address. You will still need to open port 23000 for the VoIP data to find the controller, but once connected the systems should talk.

**Diagnosing VoIP's Operation:** Because of the complex nature of VoIP, a method of easily diagnosing the operation of the system is necessary. There are several indications that diagnose the operation of the digital audio.

The screenshot displays a diagnostic interface with two main sections: "Latency Adjustments" and "Connection Statistics".

**Latency Adjustments:** This section contains two input fields with up/down arrows. The first is labeled "VoIP Out Latency" and has the value "7". The second is labeled "VoIP In Latency" and also has the value "7".

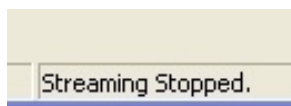
**Connection Statistics:** This section is divided into three parts:

- Counters:** A table showing various error counters, all with a value of 0.

Underflow	0	Lock	0
Over Flow	0	Fragment	0
Encroach	0	Address	0
- Buttons:** Below the counters table are two buttons: "Clear" and "Update".
- Cursors:** A table showing cursor values, all with a value of 0.

Current	0
Last	0
Fill	0

The initial method of seeing if a problem exists with the VoIP is with the streaming message. If the message "Streaming Stopped" is on the screen (bottom of the VoIP Screen), data is broken between



RCI and the unit. None of the Connection Statistics will fix this problem.

This usually occurs when the IP addresses are incorrect or a firewall is blocking the VoIP from arriving at RCI. There are no tools built into RCI that can help in verifying the stream is working. A freeware program is

available called wireShark that is a valuable tool when troubleshooting network connection problems. The software is available at [www.wireshark.org/download.html](http://www.wireshark.org/download.html).

Once the stream is working the connection statistics can help determine if your network bandwidth is good enough for VoIP operation. The controller's RCI socket operates at 128kbps stream (16 bit PCM at 8KHz) = 128 kbps rate. The broadband nature of the connection is to minimize any audio issues that can occur on the VoIP console channel. A lower bandwidth stream is in the development that drops the bandwidth down to 64kbps G.711 uLaw. Other CODEC's are in the development to drop the bandwidth even more and will be available in the future.

Once operational, the VoIP audio will follow the clicking on Ports or Groups from RCI. PTT routes the computer audio from the microphone to the receiver on the assigned port for VoIP on the controller and received audio will be routed to the speakers on the computer. The VoIP stream is a full-duplex link port.

Remember, if you have problems check your network connections.

Up to this point all settings have been RCI based, and not on the controller. The next drop-down is the TCB Settings menu.

The screenshot shows the 'TCB Network Settings' dialog box. It has a 'Network Setup' section with two checked options: 'Enable Network' and 'Use DHCP'. Below these are three input fields: 'IP Address' (0 . 0 . 0 . 0), 'IP Netmask' (0 . 0 . 0 . 0), and 'IP Gateway' (0 . 0 . 0 . 0). To the right of these fields is a text block explaining that these settings control the network settings of the TCB itself, not the computer's network settings, and that changing them requires resetting the TCB via the 'File' menu. A 'Done' button is at the bottom right.

The setting of the controllers IP information is accessed from the Network Settings tab. The controller supports both Static IP addresses and DHCP assigned. If you want to use the network check the Enable Network box and select the addressing mode you desire. (A Telnet Password will be assigned here in order to enable the network. No yet documented...)

If not utilizing the DHCP server you will need to enter the Address, Netmask and Gateway information. Once completed, press the "Done" button to accept the changes. The controller will need to reboot for the changes to take place, and all settings will be saved. Once the controller has rebooted the network will be available.

The screenshot shows the 'Access Level Settings' dialog box. It has a 'Permissions' section with a list of permissions on the left, including 'Anybody', 'Reconnect', 'Change Group Set', 'Drag and Drop', 'Change Channel', 'Reset TCB', 'Edit Password Settings', 'Edit Main Preferences', 'Edit Group Set Name', 'Edit Port/Group Settings', 'Edit Macros', 'Edit Destination Settings', 'Edit VOIP Settings', 'Edit TCB IP Settings', 'Change Console Port', 'View Communications', and 'Update Firmware'. There are two columns of permissions, 'Users' and 'Administrator', each with a list of permissions and arrows to move items between them. At the bottom are 'Change Passwords' and 'Done' buttons.

The next settings tab controls the access level from RCI to the controller. User and Administrator permissions are assigned for most of the features that RCI can perform. The Administrator permissions can execute the User permissions, but the User permissions can not execute the Administrator permissions.

The screenshot shows the 'Manage Passwords' dialog box. It has two sections: 'User Level' and 'Admin Level'. Each section has 'Old Password', 'New Password', and 'Retype New Password' fields, with a 'Change' button below each. At the bottom is a 'Done' button. A note at the bottom left states: '\*Note: Must click Change for changes to take affect.'


To change the passwords click on the Change Passwords button.

No passwords are assigned out of initialization, so it is good to assign them here. The RCI assigned password system ONLY effects the computer these are assigned. The password system was designed for dispatch operation where controlled access to the RCI system was necessary. The DSP404 still maintains a 1000 user password system as well as the Telnet/SSH password support. In a future release of software will move these passwords to the controller.

The next controller based menu is the Macro Editor. This feature enables the user to access the macros on the controller and to create, edit and delete them.

The example to the right has two commands, 032 and 030. Command 032 sends a serial message out the serial port when executed and Command 030 sends out a voice ID message. The contents are stored in macros 320. To add a command simply click the “Add Line” button and to delete a line in the macro click the “Delete Line” button. You can cycle to other macros without clicking the Done button.

When finished editing, click the “Done” button to exit.



The Macro Editor window has a blue title bar with the text "Macro Editor" and a close button. The main area is divided into two columns: "Command" and "Data". The "Command" column contains two entries: "032" and "030". The "Data" column contains two entries: "Set ID for TX 1" and "40181340293301". Below the table are two buttons: "Add Line" (with a green plus icon) and "Delete Line" (with a red minus icon). At the bottom, there is a "Macro Number" field with a value of "320" and a "Done" button.



The Command Editor window has a blue title bar with the text "Command Editor" and a close button. The main area is titled "Command Options" and contains three fields: "Name" with a value of "000", "Allow execution from Receiver(s)" with a value of "1-12", and "Security Level" with a value of "4" and a dropdown arrow. At the bottom, there is a "Command Number" field with a value of "0" and a "Done" button.

The next drop-down menu is the Command Editor. This feature allows Command Names to be changed, execution permissions to be assigned and security levels to be assigned. The command names can be addressed by DTMF Name or Number.

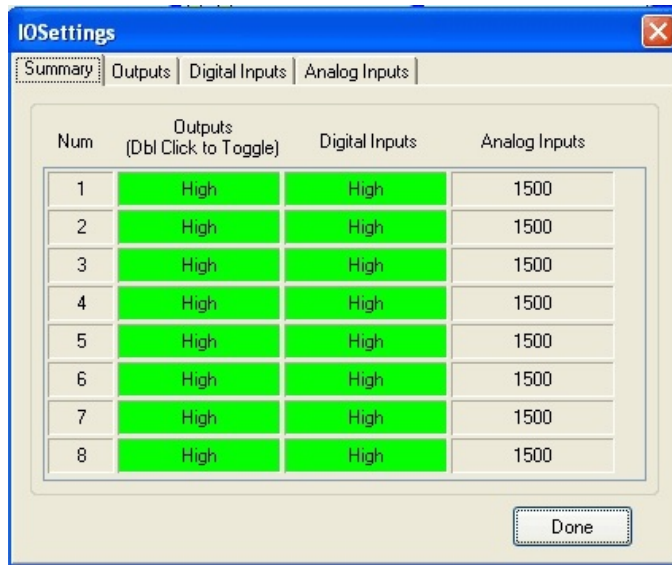
You can cycle to names without clicking the Done button.

When finished editing, click the “Done” button to exit.



# Input and Output line control

The DSP404 has support for 16 input lines, 16 output lines and 15 analog 12 bit channels. Access to the telemetry signals is located under the TCB Settings drop-down menu and located under the IO settings tab.



The summary screen shows all lines and the analog lines converted results. Currently the results are text based but a graphical faceplate template is being developed.

Only the output lines can be user functioned (because it is the only output feature) and is changed by double clicking the desired line.

The total system supports 16 of each of the signals, but only 8 of each are installed currently, therefore only 8 of each show.

After double clicking on output lines 2,3,5 and 7 they change state to Low from High (or open).



Calibrating and assigning unique settings to the input lines and analog signals will be documented at a later date (in the near future).

## Other misc Menus and operations



To manually check for an update for RCI and/or the DSP404 the user simply clicks the Help and the About sub-menu.

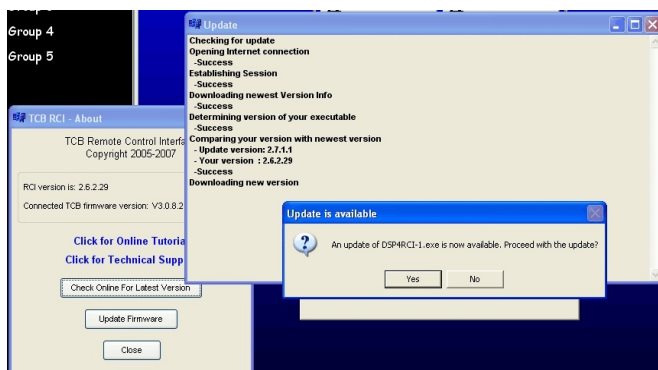
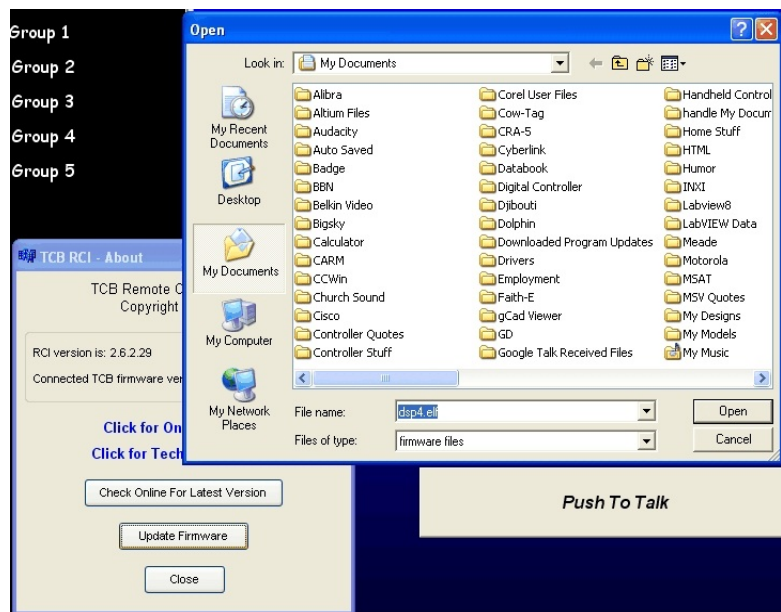
The following screen appears which accesses the Link Communications web site where the updates are located.

Once an update available and downloaded, the user can either update immediately (automatically done), or save the update for a later installation time.

When manually updating the firmware the user clicks the Update Firmware button which opens My Documents to load the file.

All RLC and TCB updates end in the “.elf” designation. This designation is the Linux and RTMS file that handles the executable.

Make sure you load the latest version of firmware as all firmware versions have the same name. It is recommended to make a copy of the downloaded firmware before transferring it to the controller. Rename the firmware to a unique name so you always have a copy and know what the latest version is.



Clicking “Yes” will download the new update and ready the system for the new version.

Clicking “No” will cancel updating the new version.



**The End**