

I·TECH Application Guide



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Introduction

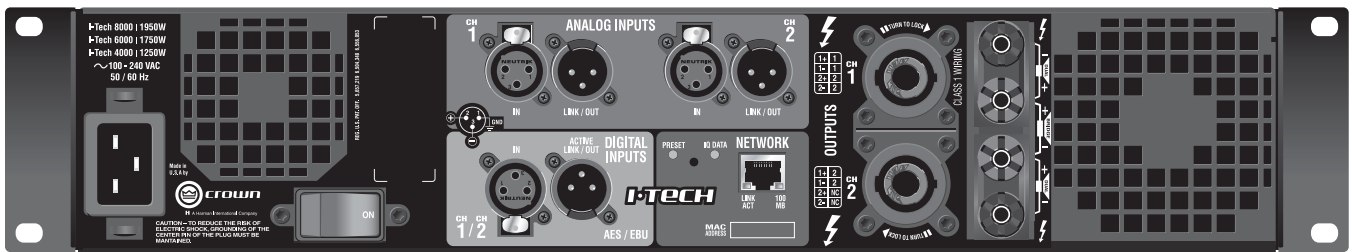
This application guide provides useful information designed to help you best use your new Crown® I-Tech Series amplifier. It is designed to complement your amplifier's Operation Manual, which describes the specific features and specifications of your amplifier.

This guide also provides suggestions for matching I-Tech Series amplifiers to JBL VERTEC® Line Array loudspeaker systems, along with wiring pin assignments for several I-Tech / VerTec combinations. A list of suggested publications and webpages is provided for your convenience in the Appendix section.

Please be sure to read all instructions, warnings and cautions contained both in this guide and your amplifier's Operation Manual.

Table of Contents

Introduction	2
1 Power and Thermal Information	5
1.1 Output Power	5
1.2 AC Power Draw and Thermal Dissipation.....	5
1.3 AC Power Distribution.....	6
2 Wiring Recommendations	6
2.1 Input Wiring	6
2.1.1 Analog and AES/EBU Wiring	6
2.2 Output Wiring	6
2.3 Network Wiring	8
3 I-Tech Settings	9
3.1 Setting Sensitivity	9
3.2 Setting Limiters.....	9
3.3 Communicating with I-Tech	10
3.3.1 IQwic Software.....	10
3.3.2 Network Wizard.....	10
3.3.3 Engage a Dataframe	11
3.4 Presets	12
3.4.1 Save Settings as a Preset	12
3.4.2 Recall a Preset	12
3.5 Loading Firmware	13
3.5.1 TCP/IQ Utility.....	13
3.5.2 Front Panel Firmware	14
3.5.3 DSP Firmware	14
4 I-Tech and JBL VERTEC	15
Appendix	33
I-Tech Sensitivity Charts	25
Frequently Asked Questions (FAQs)	28
Website Links.....	32



1 Power and Thermal Information

1.1 Output Power

Figure 1.1
I-Tech Output Power

	Power Output				
	Stereo			Mono	
	8 Ohm	4 Ohm	2 Ohm	8 Ohm	4 Ohm
I-T8000	2100W	4000W	3500W	8000W	7000W
I-T6000	1500W	3000W	2500W	6000W	5000W
I-T4000	1250W	2000W	1800W	4000W	3600W

Guaranteed minimum power output per channel, 20 Hz to 20 kHz, <0.35% true THD, both channels driven. Rated power is not part-tolerance dependent. 120-240VAC 50 to 60 Hz.

1.2 AC Power Draw and Thermal Dissipation

Pink noise 12dB crest factor, bandwidth limited 22Hz to 22kHz. Typical line impedance used. Data based on both channels driven.

Figure 1.2
I-Tech AC Power Draw and Thermal Dissipation

I-T4000										
	Load	120VAC		208VAC		230VAC		Watts Dissipated	Thermal Dissipation	
		Line Current 120VAC	Watts Out Per 1A Amp Line Current	Line Current 208VAC	Watts Out Per 1A Amp Line Current	Line Current 230VAC	Watts Out Per 1A Amp Line Current		Btu/hr	kcal/hr
Idle (sleep mode)		0.8		0.95		0.9		53	182	157
Idle (awake)		1.6		1.4		1.3		172	587	505
1/8th Power Pink Noise Typical of program material just at clip.	8 Ohms/Ch. 16 Ohms Bridge	5.3	59.6	3.4	94.6	3.1	102.6	305	1040	262
	4 Ohms/Ch. 8 Ohms Bridge	7.8	64.9	4.7	106.9	4.4	116.3	414	1413	356
	2 Ohms/Ch. 4 Ohms Bridge	8.0	58.1	4.8	96.1	4.4	106.0	476	1625	410
1/3rd Power Pink Noise Typical of program material with severe clipping.	8 Ohms/Ch. 16 Ohms Bridge	10.9	77.1	6.6	126.2	6.0	139.9	437	1491	376
	4 Ohms/Ch. 8 Ohms Bridge	17.8	77.0	10.5	129.1	9.5	142.1	711	2426	612
	2 Ohms/Ch. 4 Ohms Bridge	17.7	70.3	10.7	115.3	9.4	128.7	824	2814	709

I-T6000										
	Load	120VAC		208VAC		230VAC		Watts Dissipated	Thermal Dissipation	
		Line Current 120VAC	Watts Out Per 1A Amp Line Current	Line Current 208VAC	Watts Out Per 1A Amp Line Current	Line Current 230VAC	Watts Out Per 1A Amp Line Current		Btu/hr	kcal/hr
Idle (sleep mode)		1.0		1.0		0.95		60	205	177
Idle (awake)		2.1		1.7		1.6		225	767	660
1/8th Power Pink Noise Typical of program material just at clip.	8 Ohms/Ch. 16 Ohms Bridge	6.6	57.6	4.2	91.2	3.8	99.8	392	1338	337
	4 Ohms/Ch. 8 Ohms Bridge	11.6	65.7	7.0	108.8	6.3	120.4	593	2024	510
	2 Ohms/Ch. 4 Ohms Bridge	11.5	55.9	6.8	96.5	6.2	105.3	695	2373	598
1/3rd Power Pink Noise Typical of program material with severe clipping.	8 Ohms/Ch. 16 Ohms Bridge	13.6	74.4	8.1	125.3	7.4	137.2	579	1977	498
	4 Ohms/Ch. 8 Ohms Bridge	27.6	73.9	16.0	127.2	14.3	141.0	1149	3921	988
	2 Ohms/Ch. 4 Ohms Bridge	25.0	67.0	14.9	113.5	13.6	124.3	1223	4173	1052

I-T8000										
	Load	120VAC		208VAC		230VAC		Watts Dissipated	Thermal Dissipation	
		Line Current 120VAC	Watts Out Per 1A Amp Line Current	Line Current 208VAC	Watts Out Per 1A Amp Line Current	Line Current 230VAC	Watts Out Per 1A Amp Line Current		Btu/hr	kcal/hr
Idle (sleep mode)		0.9		1.1		1.0		62	212	183
Idle (awake)		2.0		1.8		1.6		213	726	625
1/8th Power Pink Noise Typical of program material just at clip.	8 Ohms/Ch. 16 Ohms Bridge	8.3	63.6	5.1	103.3	4.7	111.8	441	1504	379
	4 Ohms/Ch. 8 Ohms Bridge	14.6	68.8	8.7	115.2	8.0	124.5	701	2394	603
	2 Ohms/Ch. 4 Ohms Bridge	14.2	62.9	8.2	106.1	7.7	113.6	764	2607	657
1/3rd Power Pink Noise Typical of program material with severe clipping.	8 Ohms/Ch. 16 Ohms Bridge	18.1	77.4	11.0	128.3	9.9	142.0	715	2439	615
	4 Ohms/Ch. 8 Ohms Bridge	35.1	76.3	20.8	128.6	18.7	144.2	1370	4677	1179
	2 Ohms/Ch. 4 Ohms Bridge	33.9	69.2	19.9	118.0	17.9	131.1	1589	5425	1368

1.3 AC Power Distribution

All I-Tech amplifiers are rated using a 20amp power cord per UL/CSA/EC safety standards. I-Tech's innovative PFC technology allows I-Tech to draw current from the mains in a more controlled and efficient way providing greater power on a single 20 amp breaker. A single I-tech amplifier can be run on a dedicated 20-amp circuit. A professional power distribution system is ideal when using a rack or multiple racks of I-Tech amplifiers. A larger system may use a 200 Amp, 120VAC three-phase, 12-circuit-distribution rack, which provides dedicated 20-amp circuits for each of the amplifiers in the system.

Note: Most power distribution systems use heavy duty thermal /magnetic circuit breakers.

2 Wiring Recommendations

2.1 Input Wiring

Your I-Tech amplifier will come with either analog and AES/EBU input signal connections or with integrated IQ Network and CobraNet™ connections.

2.1.1 Analog and AES/EBU Wiring

Figure 2.1 shows connector pin assignments for balanced analog wiring or AES/EBU digital wiring.

IMPORTANT: The use of standard analog cable with AES/EBU will result in diminished performance. For best results, 110 ohm shielded twisted-pair cable for AES/EBU signals is highly recommended. Cable lengths of up to 100 meters are easily supported with 110 ohm shielded twisted-pair cable. Longer line distances are possible with the use active repeaters, and/or transmission and receiver equalization. Refer to the AES Standard for AES/EBU signal wiring for more information (link in the Appendix section of this guide).

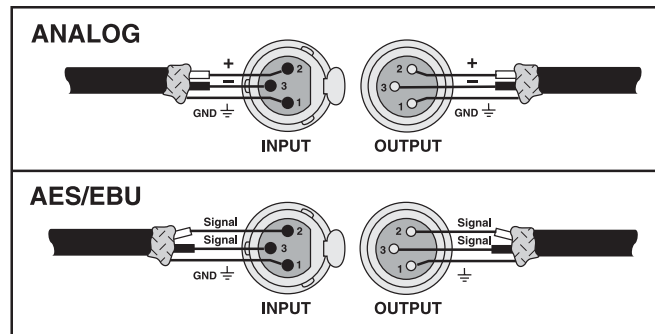


Figure 2.1
Balanced Analog and
AES/EBU Wiring

2.2 Output Wiring

Your I-Tech amplifier includes both industrial-grade (50A) binding post and Neutrik® Speakon® NL4MP output connectors. In order to maximise power transfer to the loudspeaker and minimize line loss, we recommend using 10 AWG or larger professional-grade speaker cable. The chart in Figure 2.2 shows line losses per 20 feet of cable. Note that amplifier output impedance has effect on line loss, and output impedance for I-Tech is factored into these figures.

dB Loss Per 20 Feet, 2-Cond. Cable			
AWG	2 Ohm	4 Ohm	8 Ohm
8	-0.1	-0.1	0.0
10	-0.2	-0.1	0.0
12	-0.3	-0.1	-0.1
14	-0.4	-0.2	-0.1
16	-0.7	-0.3	-0.2
18	-1.0	-0.5	-0.3

Figure 2.2
I-Tech Line-Loss

Figures 2.3 through 2.6 show pin assignments for both binding post and Speakon connection.

Figure 2.3
Output Wiring with 5-Way Binding Post Connectors

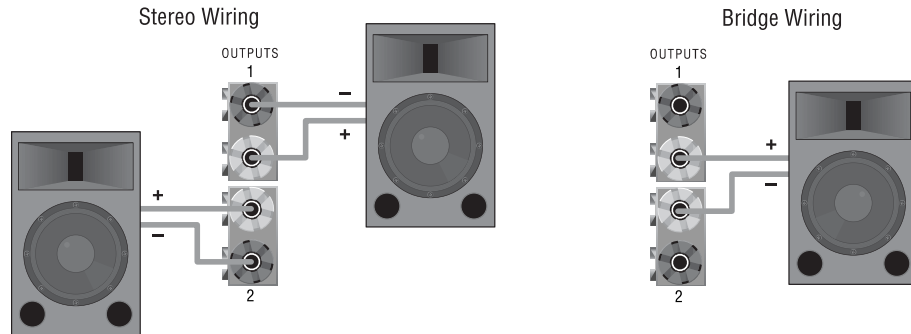


Figure 2.4
Stereo Output Wiring with Both Speakon Connectors

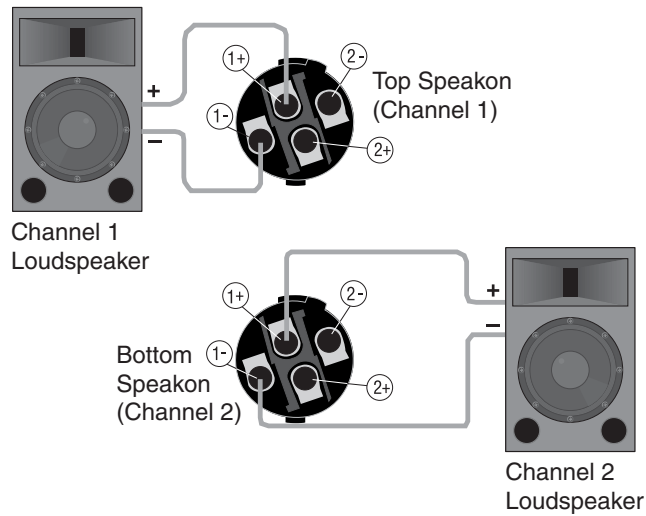


Figure 2.5
Stereo Output Wiring with a Single Speakon Connector

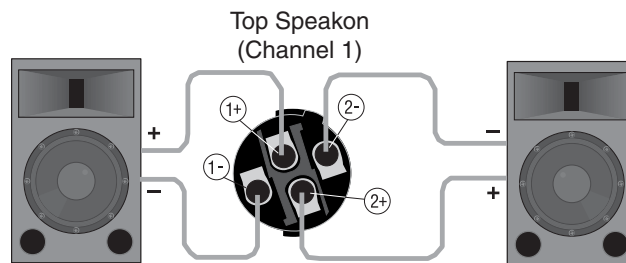
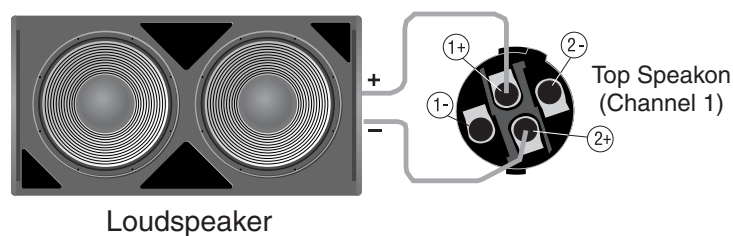


Figure 2.6
Bridge Output Wiring with a Single Speakon Connector



2.3 Network Wiring

To take advantage of the many features available in your I-Tech amplifier via the IQ Network, you can establish a simple network connection between a PC and your I-Tech amplifier. Standard 100Mb Ethernet hardware and network protocol apply. Figure 2.7 shows a connection between a PC and a single I-Tech amplifier using a crossover network cable. Figure 2.8 shows a simple IQ Network between a single PC and three I-Tech amplifiers.

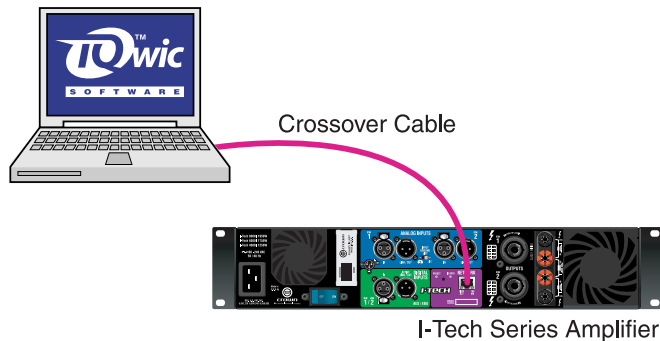


Figure 2.7
Connecting to a single I-Tech Amplifier

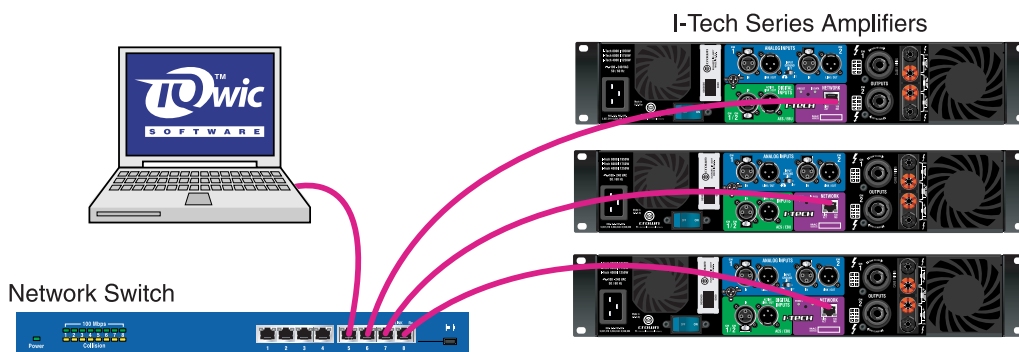


Figure 2.8
Three I-Tech Amplifiers in a Simple IQ Network

Fast Ethernet networks including IQ Networks require Cat. 5 grade or higher network cabling. For best results, the use of preassembled Cat. 5 cables is recommended. When assembling your own network cables, it is good practice to follow the EIA/TIA 568B protocol for RJ-45 cable. This protocol assigns wire colors as follows:

EIA/TIA 568B Color Code			
Pin 1	white-orange	Pin 5	white-blue
Pin 2	orange-white	Pin 6	green-white
Pin 3	white-green	Pin 7	white-brown
Pin 4	blue-white	Pin 8	brown-white

Figure 2.9
EIA/TIA 568B
Color Code

Extra care must be taken when attaching RJ-45 connectors to cable. Make sure you use the appropriate crimping tool and verify that the connector is properly seated into the tool, or damage will result.

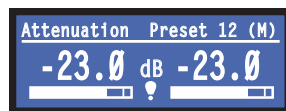
3 I-Tech Settings

I-TechSeries amplifiers allow unprecedented control over amplifier and system settings within the amplifier. While a full discussion of all available settings is beyond the scope of this guide, a few key settings are described, along with instructions on storing and recalling presets, and loading settings into the amplifier from the IQ Network.

3.1 Setting Sensitivity / Gain

Optimized system gain structure maximizes signal to noise within the system. Adjusting your amplifier to fit within an optimized system gain structure is accomplished by properly setting both the sensitivity and attenuation controls within the amplifier. I-Tech amplifiers offer 149 sensitivity and gain settings allowing very fine adjustment of the amplifier’s gain and voltage sensitivity. The Appendix section of this guide provides charts with sensitivity in volts and gain in dB for each sensitivity/gain setting.

Figure 3.1
Sensitivity / Gain Setting



With other amplifiers, it is often necessary to apply attenuation in order to achieve the desired sound pressure level. Large amounts of attenuation are not necessary with I-Tech amplifiers and can, in fact, degrade performance. The attenuation adjustment should only be used for small (3 dB) or temporary adjustments in amplifier gain. Instead, set the sensitivity/gain of your I-Tech amplifier so that you can achieve the desired output output with the attenuators at or near 0 dB.

Example: Suppose that you are using an I-T8000 with the sensitivity/gain set at 1.4V / 37.1 dB. After optimizing the gain structure of the rest of your system you find that attenuating the amplifier by 10 dB produces the desired loudness. The same output level, with improved signal to noise and headroom performance, can be achieved by using 0 dB of attenuation and by setting the amplifier sensitivity/gain to 5.81V/27.0 dB (37 dB – 10 dB = 27 dB).

Note: as indicated in the appendix the list of possible sensitivity settings is different for each position of the max input setting. If while adjusting sensitivity/gain in your amplifier you do not find the setting you need, try changing the status of the max input setting and search again.

3.2 Setting Limiters

I-Tech amplifiers are capable of providing higher voltage at the output than any other amplifier in their class, thus loudspeaker protection is more important than ever before. I-Tech amplifiers provide three different types of output limiters, each a separate and useful way to protect your system without compromising the sound quality. The Clip Eliminator monitors the clip events at the output of the amplifier and attenuates the signal to prevent the amplifier from clipping. The Peak Voltage Limiter allows you to set a peak voltage threshold for the output of the amplifier enabling you to protect your speaker system. The Average Power Limiter allows you to regulate the long term output of the amplifier by setting an average power limit that corresponds with the speaker’s long-term power rating. All three limiters can be accessed from the front panel display as shown in Figure 3.2, and from IQwic software.

Figure 3.2
Output Limiters



3.3 Communicating with I-Tech

One of the most convenient features within I-Tech amplifiers is the ability to load amplifier settings, including DSP settings, into your amplifier, and to save settings as presets via IQwic IQ Network software. This section provides a quick overview of the IQwic software and the procedures for loading and saving settings with IQwic. Note: the front panel work surface only allows you to recall a stored preset. You must use IQwic software to create, modify, and store presets.

3.3.1 IQwic Software

IQwic is the name of the software program that runs on the computer that facilitates the setup, control and monitoring of components in an IQ Network, including I-Tech amplifiers. When IQwic is run on the computer, a “Main Window,” a “Workplace Window,” and “Component Control Panels” may be open on your screen. These are shown below in Figure 3.3.

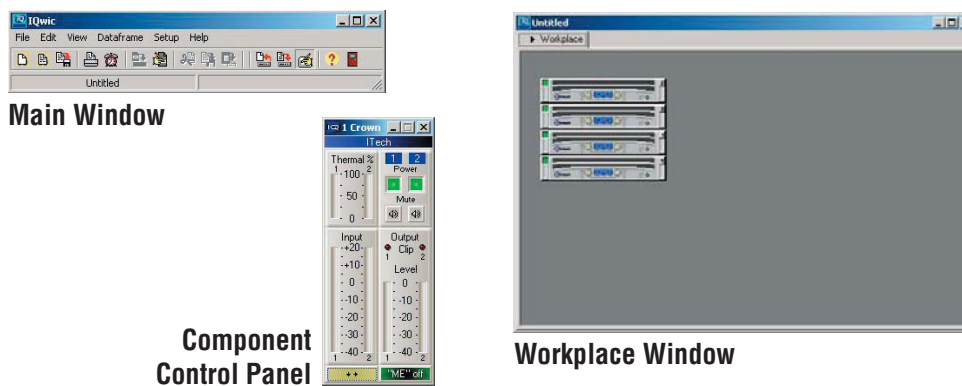


Figure 3.3
Windows in IQwic
Software

Main Window : The Main Window consists of the Main Menu, toolbar and status bar, and is the central point of control over IQ Network functions. The Main Menu contains menu selections that let you start any activity in IQwic. The Main Menu appears in the Main Window. It consists of six Main Menu options, including File, Edit, View, Dataframe, Setup and Help.

Dataframes: A Dataframe is a snapshot of the system at any given point. Dataframes contain information about system elements (what components are in the system) and screen elements (window sizes and positions). Dataframes can be saved to disk at anytime. A Dataframe includes:

- A reference to and description of every IQ component in an IQ Network.
- The control settings of every one of these IQ components.
- The Workplace Window and its contents, Component Images and labels.
- Any scenes created within the Dataframe.
- The size and positions of any auxiliary windows including Control Panels.

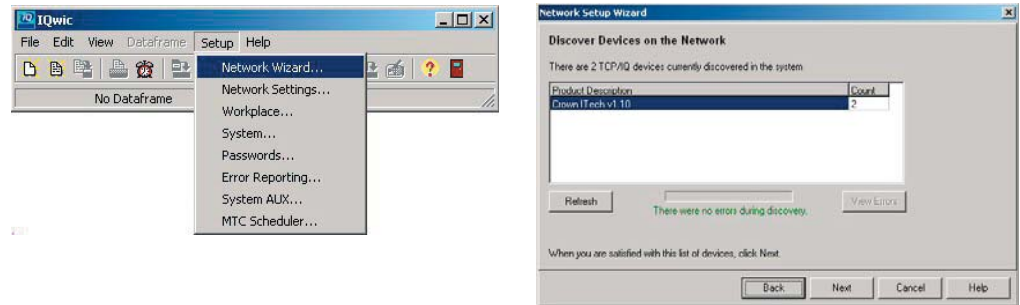
When you create a new Dataframe, you create in computer memory a model for the control of an actual IQ Network. Saving the Dataframe records this model as a file that you can recall later within IQwic.

3.3.2 Network Wizard

The Network Wizard provides a quick way to establish communications with your TCP/ IQ networked components. Using the Network Wizard, you can address your components and be informed of addressing and other errors in the system. Start the Network Wizard by selecting Setup > Network Wizard from the IQwic Main Window.

A series of screens will step you through choosing a network card, discovering and addressing components on the network, and troubleshooting networking errors. For further help with setting up your TCP/IQ network, refer to the help files in IQwic software.

Figure 3.4
Network Wizard



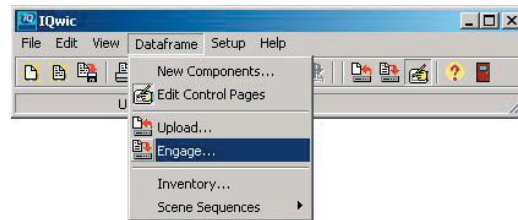
3.3.3 Engage a Dataframe

Note: This procedure assumes you have already established TCP/IQ network communications between your PC and your I-Tech amplifier(s).

To engage a Dataframe is to copy the software control settings of one or more components included in the Dataframe to the actual components of an IQ Network. Make sure that you have addressed the components.

Engage a Dataframe by selecting Dataframe >Engage from the IQwic Main Window.

Figure 3.5
Engage Dataframe

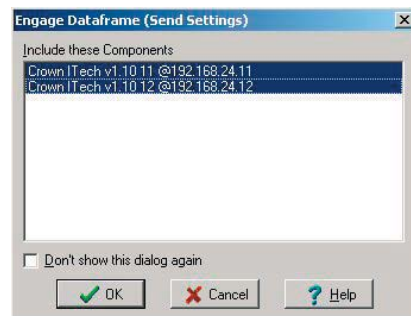


You can control exactly which components are engaged through the Include in Engage and Upload dialog, which appears the first time that the Engage (or Upload*) command is invoked.

*Upload refers to the opposite action of Engage. With Upload, the current settings within one or more components are copied to the software.

Choose the amplifiers you wish to Engage with the Dataframe by highlighting them in this dialog, then click "OK."

Figure 3.6
Choose Components to Engage



Once you have completed the Engage Dataframe step, the amplifier settings from the IQwic Dataframe are now also contained in your I-Tech amplifier.

3.4 Presets

3.4.1 Save Settings as a Preset

If you wish, you can store the settings inside your I-Tech amplifier for easy recall by saving them as a preset.

To store a preset:

- Open the Component Control Panel of the amplifier in IQwic.
- Expand the Control Panel to gain access to the Presets tab, as shown in Figure 3.7.
- Make sure that the current state of the component is one that you wish to save.
- Type any desired text into the Description, Channel 1, or Channel 2 fields. The preset name and channel names will appear on the LCD screen when the speaker preset menu is displayed*
- Click on the “Store” button at the top of the page. This readies the situation so that the next button pressed will be the one through which this particular set of control settings will be recalled.
- Click on any of the buttons, 1 - 10 to store the preset. Clicking on a button that already contains preset data will immediately overwrite the existing preset.

* See the Help files in IQwic software for more about storing and recalling presets.

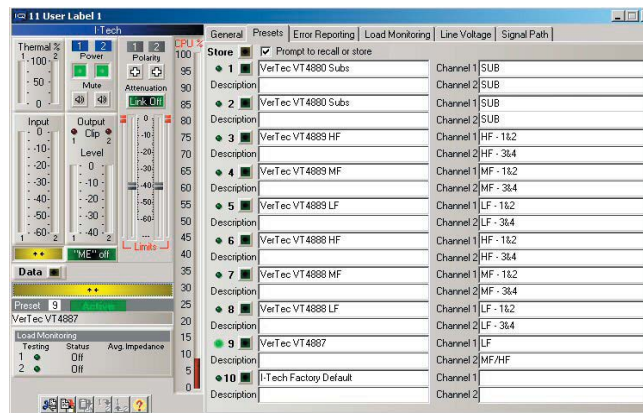


Figure 3.7

Preset Tab of the I-Tech Control Panel in IQwic Software

3.4.2 Recall a Preset

Presets can be recalled from the front panel worksurface of the amplifier as well as from IQwic software.

To recall a preset via the front panel worksurface:

Refer to Figure 3.8 for locations of front panel controls.

- Press the Menu/Exit button
- Press either the Prev. or Next button to scroll forward or backward through the basic menu options until finding the Speaker Preset option.
- Rotate either Encoder knob to choose any of ten available presets. As you scroll through the presets note that the preset number for each of the nine “non-active” presets will flash to indicate that they have not been selected. Figure 3.6 shows an example preset.
- Push in the Encoder knob to select the preset. You will be prompted to press again to confirm your selection. Once active, the preset will stop flashing.
- Press the Menu/Exit button to exit the menu and return the display to the default Attenuation screen.

Figure 3.8
Front Panel
Worksurface Controls

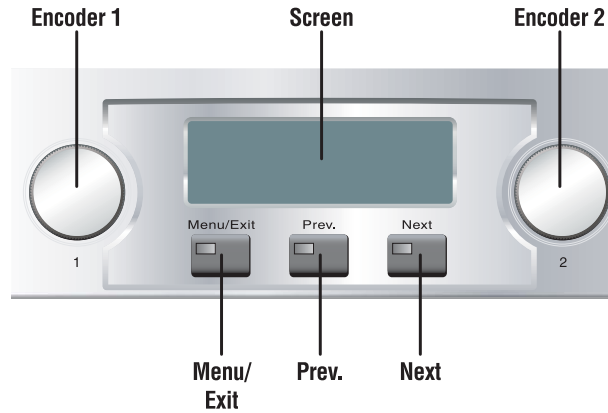


Figure 3.9
Example Preset Menu
Screen



Note: If the status of any setting such as attenuation is changed from what is stored in the preset the text “Changed” will appear in the upper left corner of the speaker preset display. The text will be removed once the setting is returned to its original setting, or the preset is “resaved” or recalled.

Note: Exercise caution when recalling presets. Gain and filtering may vary significantly between presets. Test at a very low level before turning the system up.

To recall a preset from IQwic software:

- Open the Component Control Panel of the amplifier in IQwic.
- Expand the Control Panel to gain access to the Presets tab, as shown in Figure 3.7.
- Click on any of the buttons for the preset. A prompt will appear allowing you to either recall a preset or store a preset to that preset number, as shown in Figure 3.9. Choose “Recall this preset”

See the Help files in IQwic for more about storing and recalling presets.

Figure 3.10
Verify Recall or Store
Preset Prompt



3.5 Loading Firmware

Your I-Tech amplifier can be easily updated with the latest firmware as new versions are released by Crown. Use the TCP/IQ Utility program to load firmware into your amplifier.

3.5.1 TCP/IQ Utility

TCP/IQ Utility allows you to update the firmware of your TCP/IQ component as they are made available. The program also serves as a setup and troubleshooting tool for TCP/IQ IQ Networks. Open the TCP/IQ Utility program by choosing it under

Start > Programs > IQ Systems > IQwic > TCP/IQ Utility.

Note: The following procedures assume you have already established TCP/IQ network communications between your PC and your I-Tech amplifier(s). Refer to the help files in IQwic software for help in setting up your IQ Network.

Before you begin, save a copy of provided firmware files to a local disk. There are different files for front panel and DSP. You may have one or two files, depending on whether you are updating front panel, DSP, or both.

3.5.2 Front Panel Firmware

- Open TCPIQ Utility.
- Select the amplifier that you wish to program. You can select multiple amps if desired.
- Click on “Send Code” (Figure 3.11).
- Navigate to local folder where you saved the firmware file(s).
- Select “ITDAPP_x,” where x represents the version number. This is the front panel firmware file. Click “Open.”
- A window will appear to indicate the progress of the firmware download.
- Observe the LCD on the front of the amplifier. The LCD will indicate that programming is in process. When the text “verify ok” appears on the screen proceed to the next step.
- Cycle amplifier’s power and wait for it to come back online.

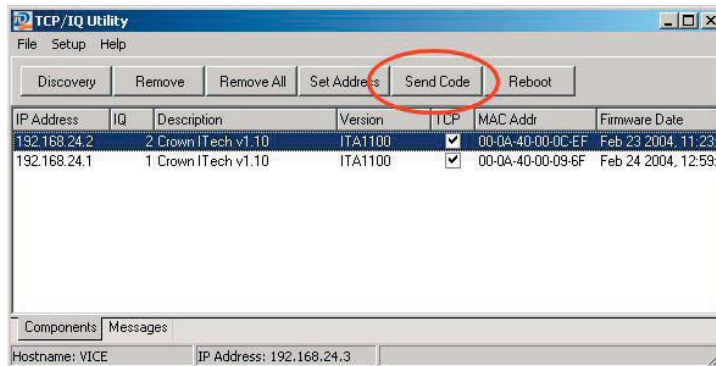


Figure 3.11
“Send Code” Function
in TCP/IQ Utility

3.5.3 DSP Firmware

Note: Downloading new DSP firmware will disrupt audio AND restore factory defaults. All filters and other DSP settings will be turned off and set to factory defaults.

- Open TCPIQ Utility.
- Select the amplifier that you wish to program. You can select multiple amps if desired.
- Click on “Send Code” (Figure 3.11).
- Navigate to local folder where you saved the firmware file(s).
- Select “ITA_x,” where x represents the version number. This is the DSP firmware file. Click “Open.”
- A window will appear to indicate the progress of the firmware download. When the progress indicator shows 100% and the text in the firmware download window disappears, cycle the amplifier’s power and wait for it to come back online.

4 I-Tech and JBL VERTEC

Crown I-Tech amplifiers and JBL VERTEC Line Array loudspeaker systems make a powerful combination. With them, you can deliver a sound that is very loud, clear, and natural, with uniform controlled coverage. This section provides recommendations for matching I-Tech amplifiers to VERTEC loudspeakers, and how to properly wire them.

The examples shown are basic building blocks of a complement of VERTEC elements, along with the appropriate I-Tech amplifiers to drive them. You can design your system with these suggestions used in multiples to build the size of line array you need for your application. With I-Tech's studio-grade, on-board DSP and factory furnished speaker-modeling presets designed for VERTEC, setting up your system has never been easier.

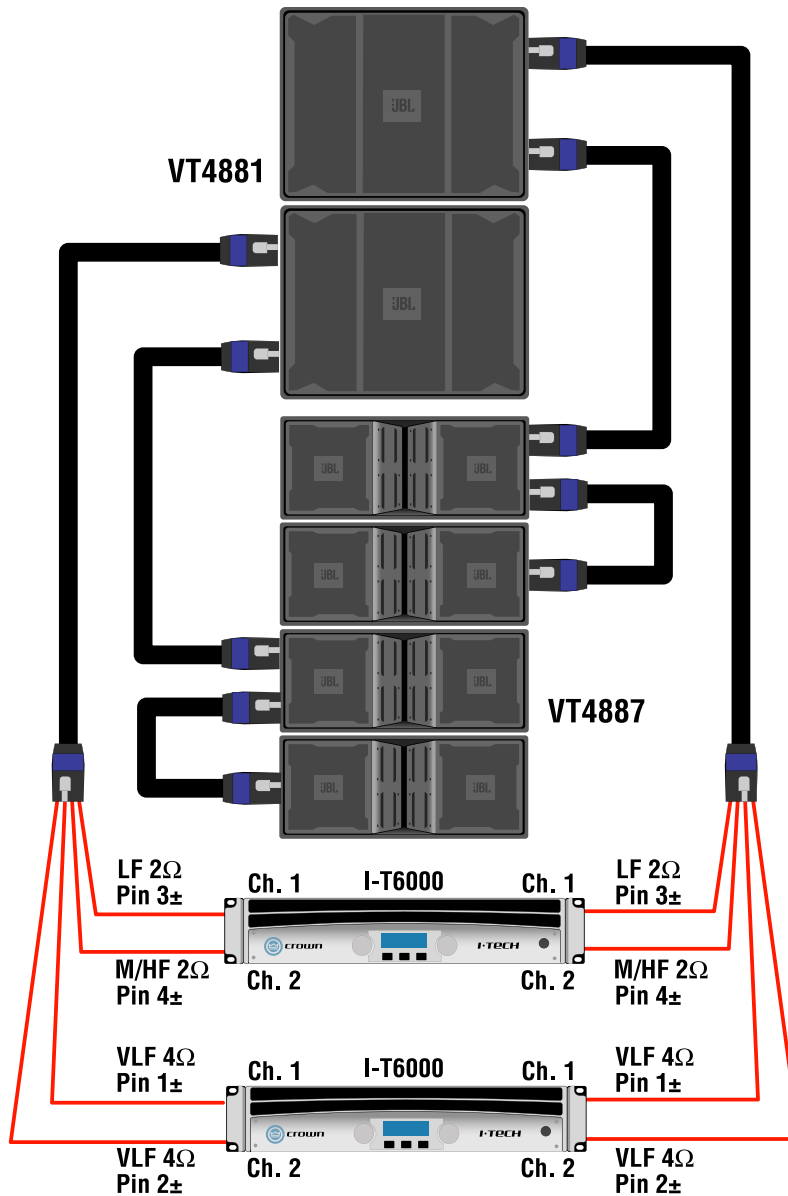
When choosing your power amplifier configuration, you may want to use identical amplifiers for all frequency bands in the system. This is perfectly permissible if you use the available signal processing to limit each amp's channel to a safe output level for its bandpass. This may make it easier to reconfigure your amplifier inventory as needed.

The limiter settings provided for the example systems are based on Average Power and Continuous Maximum Power specifications as suggested by JBL for VERTEC Line Array systems. The band-pass peak voltage is 6 dB above the voltage used at continuous maximum power. The recommended limiter threshold settings will provide 3 dB of headroom before the band-pass peak voltage is reached. The limiter would engage 3 dB above continuous average power, or 3 dB below the peak voltage for the component or Bandpass. Users should adjust these values to their particular needs.

To take full advantage of the Line Array Summation Effect, and to maintain good array coverage and directionality, we suggest using a minimum of four VERTEC array elements. Subwoofers are optional and may not be required in many situations. Refer to the JBL VERTEC Application Guide for further information.

Figure 4.1

**4-Element VT4887 and
2-Element VT4881 with
2 I-Tech**



Four VT4887 & Two VT4881 / Two I-T6000								
Amplifier	Amplifier Channel	Speakon NL8 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T6000	Ch 1	Pins 4+/-	8 x 2407H & 16 x 2104H	2ohms	2500W	625W	54V	-3
	Ch 2	Pins 3+/-	8 x 2168J	2 ohms	2500W	625W	134V	2
I-T6000	Ch 1	Pins 2+/-	2 x 2256G	4ohms	3000W	1500W	86V	0*
	Ch 2	Pins 1+/-	2 x 2256G	4ohms	3000W	1500W	86V	0*

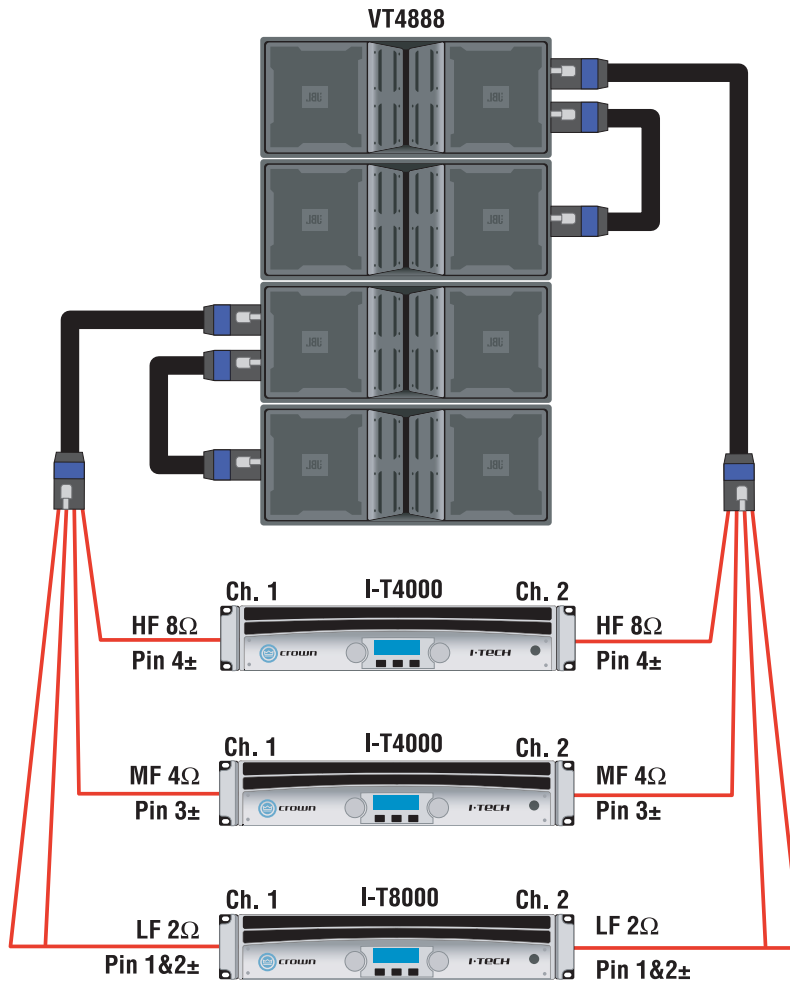
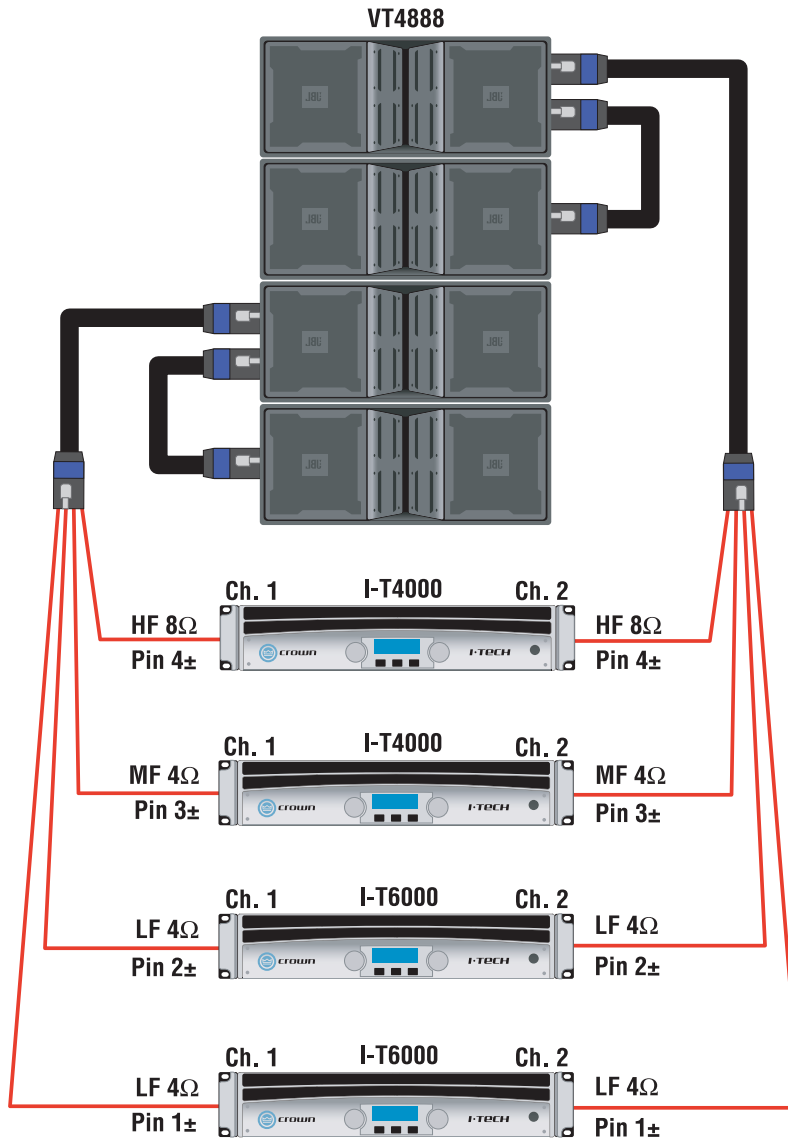


Figure 4.2
4-Element VT4888 with
3 I-Tech

Four VT4888 / Two I-T4000s, One I-T8000								
Amplifier	Amplifier Channel	Speakon NL8 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T4000	Ch 1	Pins 4+/-	4 x 2431H	8 ohms	1250W	312W	56V	-3
	Ch 2	Pins 4+/-	4 x 2431H	8 ohms	1250W	312W	56V	-3
I-T4000	Ch 1	Pins 3+/-	8 x 2106H	4 ohms	2000W	250W	112V	3
	Ch 2	Pins 3+/-	8 x 2106H	4 ohms	2000W	250W	112V	3
IT-8000	Ch 1	Pins 1+/- & 2+/-	4 x 2262H	2 ohms	3300W	875W	130V	2.5
	Ch 2	Pins 1+/- & 2+/-	4 x 2262H	2 ohms	3300W	875W	130V	2.5

Figure 4.3
4-Element VT4888 with
4 I-Tech



Four VT4888 / Two I-T4000, Two I-T6000								
Amplifier	Amplifier Channel	Speakon NL8 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T4000	Ch 1	Pins 4+/-	4 x 2431H	8 ohms	1250W	312W	56V	-3
	Ch 2	Pins 4+/-	4 x 2431H	8 ohms	1250W	312W	56V	-3
I-T4000	Ch 1	Pins 3+/-	8 x 2106H	4 ohms	2000W	250W	112V	3
	Ch 2	Pins 3+/-	8 x 2106H	4 ohms	2000W	250W	112V	3
IT-6000	Ch 1	Pins 2+/-	2 x 2262H	4 ohms	3000W	1500W	130V	3.5
	Ch 2	Pins 2+/-	2 x 2262H	4 ohms	3000W	1500W	130V	3.5
IT-6000	Ch 1	Pins 1+/-	2 x 2262H	4 ohms	3000W	1500W	130V	3.5
	Ch 2	Pins 1+/-	2 x 2262H	4 ohms	3000W	1500W	130V	3.5

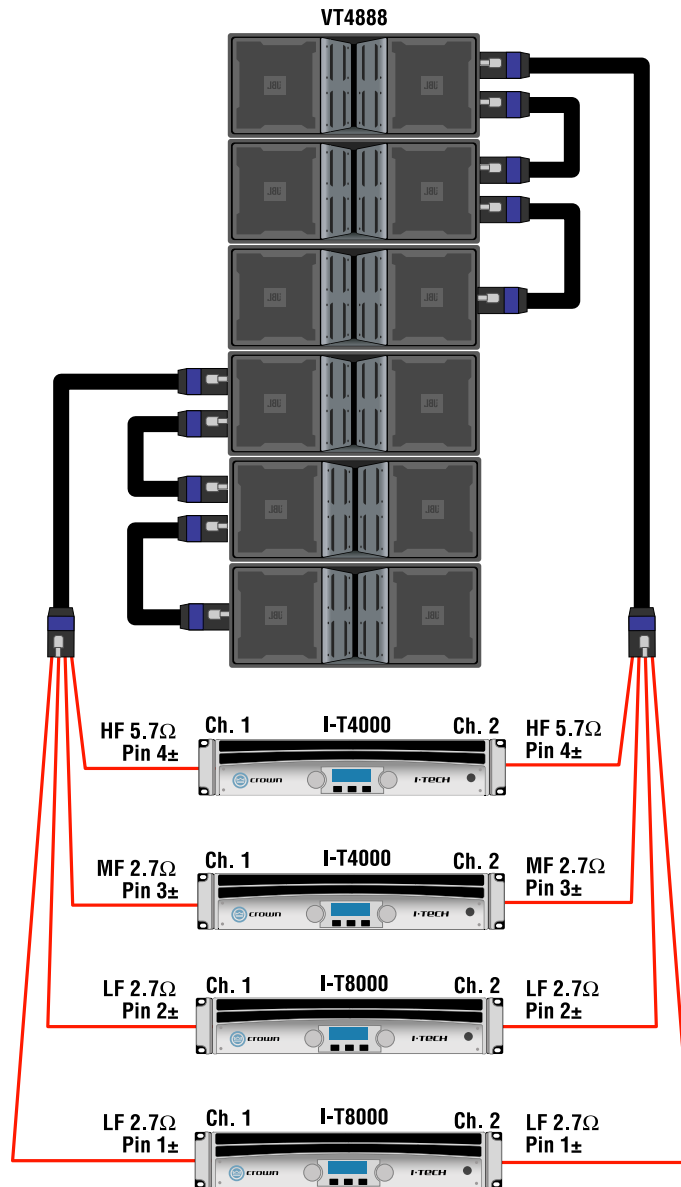
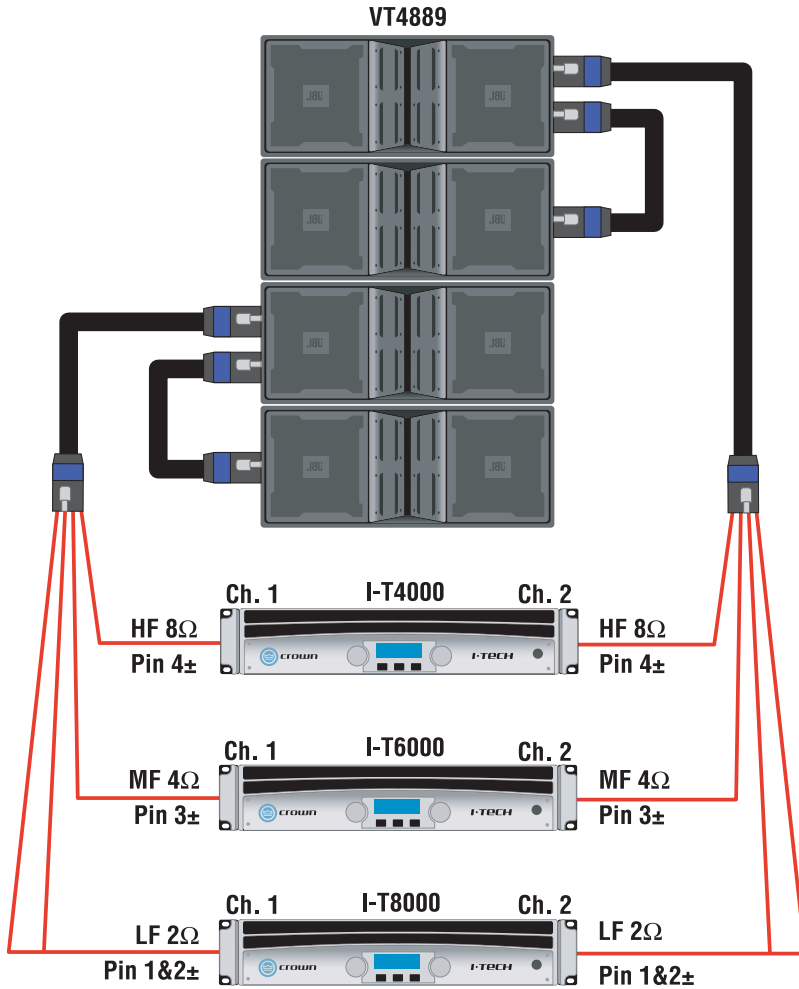


Figure 4.4
6-Element VT4888 with
4 I-Tech

Six VT4888 / Two I-T4000, Two I-T8000								
Amplifier	Amplifier Channel	Speakon NL8 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T4000	Ch 1	Pins 4+/-	6 x 2431H	5.3 ohms	1700W	283W	56V	-3
	Ch 2	Pins 4+/-	6 x 2431H	5.3 ohms	1700W	283W	56V	-3
I-T4000	Ch 1	Pins 3+/-	12 x 2106H	2.7 ohms	1900W	158W	112V	3
	Ch 2	Pins 3+/-	12 x 2106H	2.7 ohms	1900W	158W	112V	3
I-T8000	Ch 1	Pins 2+/-	3 x 2262H	2.7 ohms	3750W	1250W	130V	2.5
	Ch 2	Pins 2+/-	3 x 2262H	2.7 ohms	3750W	1250W	130V	2.5
I-T8000	Ch 1	Pins 1+/-	3 x 2262H	2.7 ohms	3750W	1250W	130V	2.5
	Ch 2	Pins 1+/-	3 x 2262H	2.7 ohms	3750W	1250W	130V	2.5

Figure 4.5
4-Element VT489
with 3 I-Tech



Four VT4899 / One I-T4000, One I-T6000, One I-T8000								
Amplifier	Amplifier Channel	Speakon NL8 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T4000	Ch 1	Pins 4+/-	6 x 2435H	8 ohms	1250W	208W	100V	2.5
	Ch 2	Pins 4+/-	6 x 2435H	8 ohms	1250W	208W	100V	2.5
I-T6000	Ch 1	Pins 3+/-	8 x 2250H	4 ohms	3000W	375W	150V	4.5
	Ch 2	Pins 3+/-	8 x 2250H	4 ohms	3000W	375W	150V	4.5
I-T8000	Ch 1	Pins 1+/- & 2+/-	4 x 2255H	2 ohms	3500W	875W	120V	2
	Ch 2	Pins 1+/- & 2+/-	4 x 2255H	2 ohms	3500W	875W	120V	2

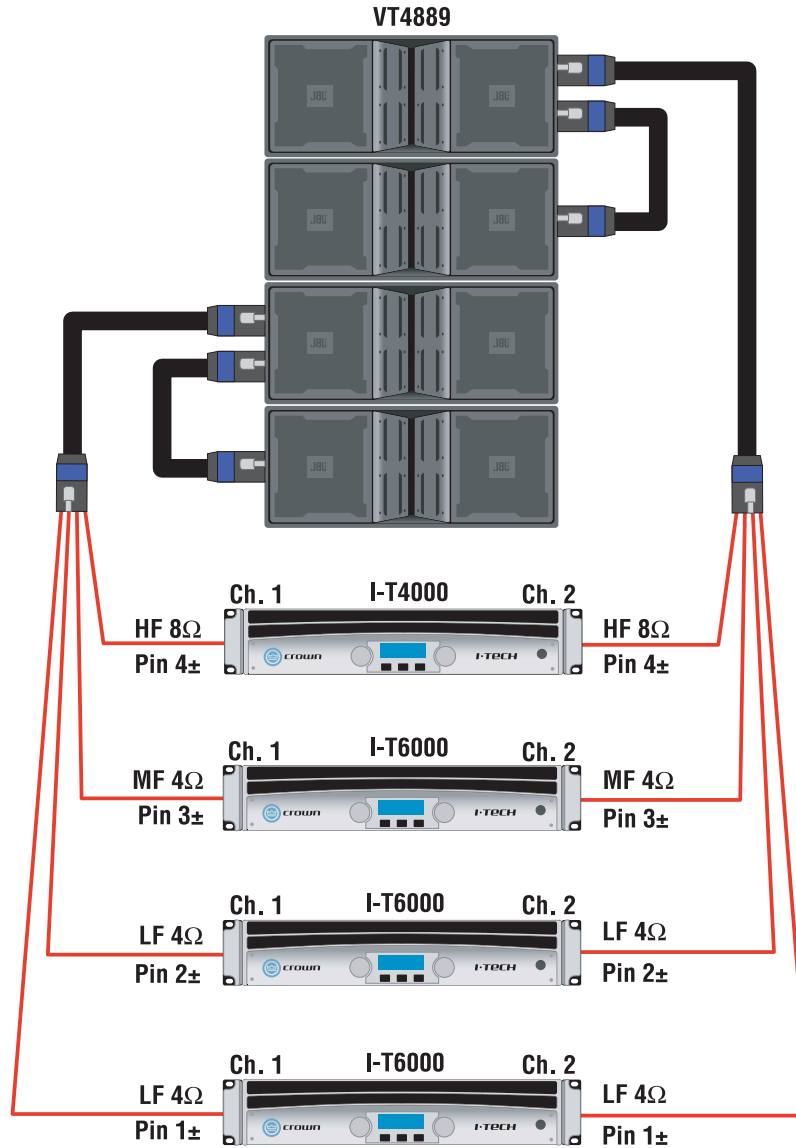
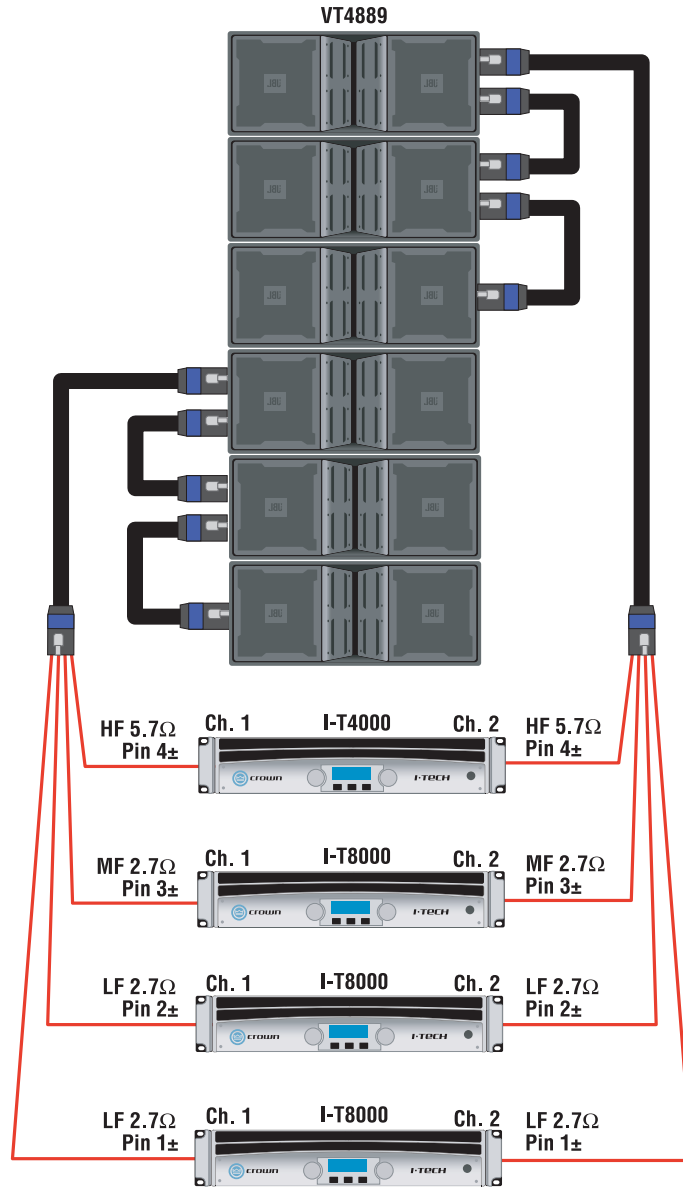


Figure 4.6
4-Element VT4889 with
4 I-Tech

Four VT4889 / One I-T4000, Three I-T6000								
Amplifier	Amplifier Channel	Speakon NL8 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T4000	Ch 1	Pins 4+/-	6 x 2435H	8 ohms	1250W	208W	100V	2.5
	Ch 2	Pins 4+/-	6 x 2435H	8 ohms	1250W	208W	100V	2.5
I-T6000	Ch 1	Pins 3+/-	8 x 2250H	4 ohms	3000W	375W	150V	4.5
	Ch 2	Pins 3+/-	8 x 2250H	4 ohms	3000W	375W	150V	4.5
I-T6000	Ch 1	Pins 2+/-	2 x 2255H	4 ohms	3000W	1500W	120V	3.5
	Ch 2	Pins 2+/-	2 x 2255H	4 ohms	3000W	1500W	120V	3.5
I-T6000	Ch 1	Pins 1+/-	2 x 2255H	4 ohms	3000W	1500W	120V	3.5
	Ch 2	Pins 1+/-	2 x 2255H	4 ohms	3000W	1500W	120V	3.5

Figure 4.7
6-Element VT4889 with
4 I-Tech



Six VT4889 / One I-T4000, Three I-T8000								
Amplifier	Amplifier Channel	Speakon NL8 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T4000	Ch 1	Pins 4+/-	9 x 2435H	5.7 ohms	1700W	200W	100V	2
	Ch 2	Pins 4+/-	9 x 2435H	5.7 ohms	1700W	200W	100V	2
I-T8000	Ch 1	Pins 3+/-	12 x 2250H	2.7 ohms	3750W	312W	150V	3.5
	Ch 2	Pins 3+/-	12 x 2250H	2.7 ohms	3750W	312W	150V	3.5
I-T8000	Ch 1	Pins 2+/-	3 x 2255H	2.7 ohms	3750W	1250W	120V	2
	Ch 2	Pins 2+/-	3 x 2255H	2.7 ohms	3750W	1250W	120V	2
I-T8000	Ch 1	Pins 1+/-	3 x 2255H	2.7 ohms	3750W	1250W	120V	2
	Ch 2	Pins 1+/-	3 x 2255H	2.7 ohms	3750W	1250W	120V	2

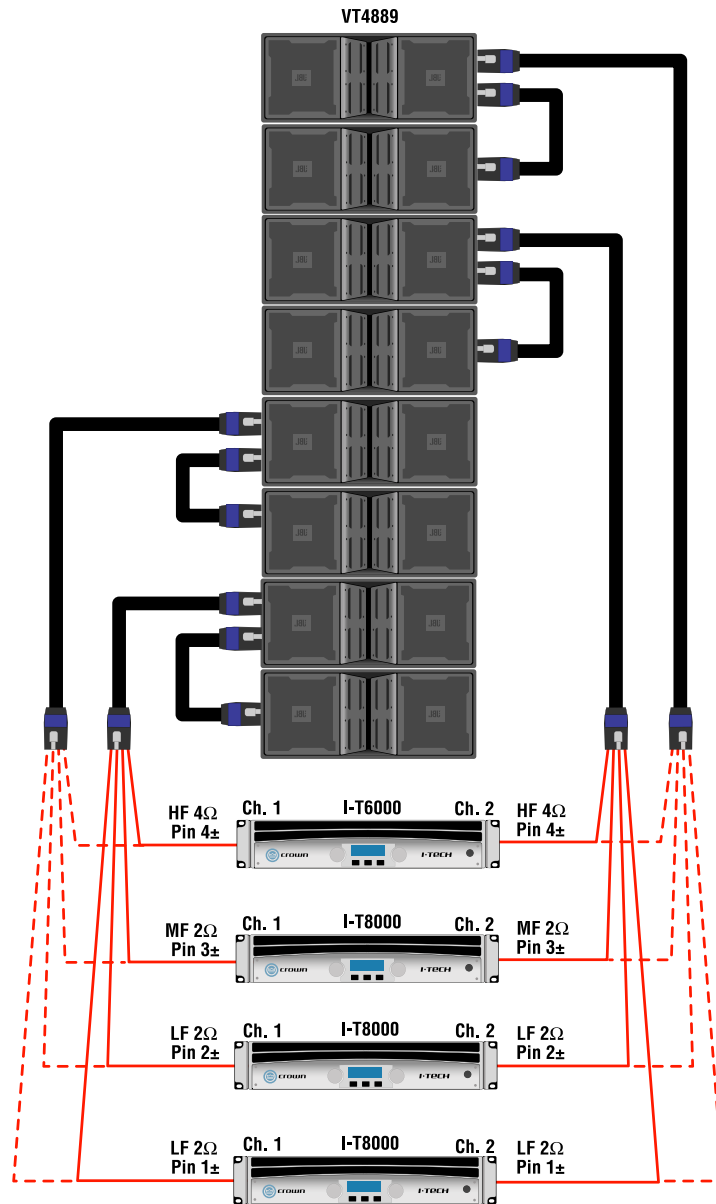
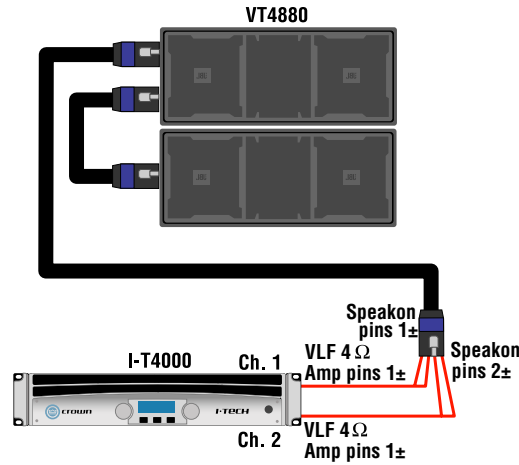


Figure 4.8
8-Element VT4889 with
4 I-Tech

Eight VT4889 / One I-T6000, Three I-T8000								
Amplifier	Amplifier Channel	Speakon NL8 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T6000	Ch 1	Pins 4+/-	12 x 2435H	4 ohms	3000W	250W	100V	2
	Ch 2	Pins 4+/-	12 x 2435H	4 ohms	3000W	250W	100V	2
I-T8000	Ch 1	Pins 3+/-	16 x 2250H	2 ohms	3500W	218W	150V	2
	Ch 2	Pins 3+/-	16 x 2250H	2 ohms	3500W	218W	150V	2
I-T8000	Ch 1	Pins 2+/-	4 x 2255H	2 ohms	3500W	875W	120V	2
	Ch 2	Pins 2+/-	4 x 2255H	2 ohms	3500W	875W	120V	2
I-T8000	Ch 1	Pins 1+/-	4 x 2255H	2 ohms	3500W	875W	120V	2
	Ch 2	Pins 1+/-	4 x 2255H	2 ohms	3500W	875W	120V	2

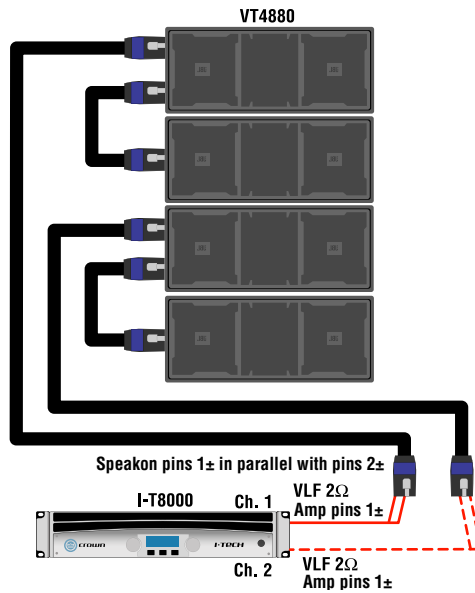
Figure 4.9
2-Element VT4880 with
1 I-Tech



Two VT4880 / One I-T4000								
Amplifier	Amplifier Channel	Speakon NL4 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T4000	Ch 1	Pins 1+/-	2 x 2258H	4 ohms	2000W	1000W	120V	4
	Ch 2	Pins 1+/-	2 x 2258H	4 ohms	2000W	1000W	120V	4

Connect amplifier Ch. 1 pins 1± to loudspeaker Speakon pins 1±.
Connect amplifier Ch. 2 pins 1± to loudspeaker Speakon pins 2±.

Figure 4.10
4-Element VT4880 with
1 I-Tech



Four VT4880 / One I-T8000								
Amplifier	Amplifier Channel	Speakon NL4 Terminals	Driving	Nominal Impedance at Pins	Amplifier Power Rating at Nominal Impedance	Power Available to Each Bandpass	Bandpass Peak Voltage VAC	Limiter Threshold dBu
I-T8000	Ch 1	Pins 1+/-	4 x 2258H	2 ohms	3500W	875W	120V	3
	Ch 2	Pins 1+/-	4 x 2258H	2 ohms	3500W	875W	120V	3

Connect amplifier Ch.1 pins 1± to one loudspeaker's Speakon pins 1± and pins 2± in parallel.
Connect amplifier Ch.2 pins 1± to another loudspeaker's Speakon pins 1± and pins 2± in parallel.
Connect two VT8880 boxes in parallel (two boxes per amplifier channel).

Appendix

I-Tech Sensitivity Charts

	I-T8000			I-T6000			I-T4000		
	Sensitivity	Gain	Input	Sensitivity	Gain	Input	Sensitivity	Gain	Input
	Vrms	dB	Switch	Vrms	dB	Switch	Vrms	dB	Switch
1	1.40	39.3	15dBu	1.40	37.9	15dBu	1.40	37.1	15dBu
2	1.41	39.3	15dBu	1.41	37.8	15dBu	1.41	37.0	15dBu
3	1.43	39.1	15dBu	1.43	37.7	15dBu	1.43	36.9	15dBu
4	1.44	39.1	15dBu	1.44	37.6	15dBu	1.44	36.8	15dBu
5	1.46	39.0	15dBu	1.46	37.5	15dBu	1.46	36.7	15dBu
6	1.48	38.8	15dBu	1.48	37.4	15dBu	1.48	36.6	15dBu
7	1.49	38.8	15dBu	1.49	37.3	15dBu	1.49	36.5	15dBu
8	1.51	38.7	15dBu	1.51	37.2	15dBu	1.51	36.4	15dBu
9	1.53	38.6	15dBu	1.53	37.1	15dBu	1.53	36.3	15dBu
10	1.55	38.4	15dBu	1.55	37.0	15dBu	1.55	36.2	15dBu
11	1.56	38.4	15dBu	1.56	36.9	15dBu	1.56	36.1	15dBu
12	1.58	38.3	15dBu	1.58	36.8	15dBu	1.58	36.0	15dBu
13	1.60	38.2	15dBu	1.60	36.7	15dBu	1.60	35.9	15dBu
14	1.62	38.1	15dBu	1.62	36.6	15dBu	1.62	35.8	15dBu
15	1.64	38.0	15dBu	1.64	36.5	15dBu	1.64	35.7	15dBu
16	1.66	37.9	15dBu	1.66	36.4	15dBu	1.66	35.6	15dBu
17	1.68	37.7	15dBu	1.68	36.3	15dBu	1.68	35.5	15dBu
18	1.70	37.6	15dBu	1.70	36.2	15dBu	1.70	35.4	15dBu
19	1.72	37.5	15dBu	1.72	36.1	15dBu	1.72	35.3	15dBu
20	1.74	37.4	15dBu	1.74	36.0	15dBu	1.74	35.2	15dBu
21	1.76	37.3	15dBu	1.76	35.9	15dBu	1.76	35.1	15dBu
22	1.78	37.2	15dBu	1.78	35.8	15dBu	1.78	35.0	15dBu
23	1.80	37.1	15dBu	1.80	35.7	15dBu	1.80	34.9	15dBu
24	1.82	37.1	15dBu	1.82	35.6	15dBu	1.82	34.8	15dBu
25	1.84	37.0	15dBu	1.84	35.5	15dBu	1.84	34.7	15dBu
26	1.86	36.9	15dBu	1.86	35.4	15dBu	1.86	34.6	15dBu
27	1.88	36.8	15dBu	1.88	35.3	15dBu	1.88	34.5	15dBu
28	1.90	36.7	15dBu	1.90	35.2	15dBu	1.90	34.4	15dBu
29	1.93	36.5	15dBu	1.93	35.1	15dBu	1.93	34.3	15dBu
30	1.95	36.5	15dBu	1.95	35.0	15dBu	1.95	34.2	15dBu
31	1.97	36.4	15dBu	1.97	34.9	15dBu	1.97	34.1	15dBu
32	1.99	36.3	15dBu	1.99	34.8	15dBu	1.99	34.0	15dBu
33	2.02	36.1	15dBu	2.02	34.7	15dBu	2.02	33.9	15dBu
34	2.04	36.1	15dBu	2.04	34.6	15dBu	2.04	33.8	15dBu
35	2.06	36.0	15dBu	2.06	34.5	15dBu	2.06	33.7	15dBu
36	2.09	35.9	15dBu	2.09	34.4	15dBu	2.09	33.6	15dBu
37	2.11	35.8	15dBu	2.11	34.3	15dBu	2.11	33.5	15dBu
38	2.14	35.6	15dBu	2.14	34.2	15dBu	2.14	33.4	15dBu
39	2.16	35.6	15dBu	2.16	34.1	15dBu	2.16	33.3	15dBu
40	2.19	35.4	15dBu	2.19	34.0	15dBu	2.19	33.2	15dBu
41	2.21	35.4	15dBu	2.21	33.9	15dBu	2.21	33.1	15dBu
42	2.24	35.2	15dBu	2.24	33.8	15dBu	2.24	33.0	15dBu
43	2.26	35.2	15dBu	2.26	33.7	15dBu	2.26	32.9	15dBu
44	2.29	35.1	15dBu	2.29	33.6	15dBu	2.29	32.8	15dBu
45	2.31	35.0	15dBu	2.31	33.5	15dBu	2.31	32.7	15dBu
46	2.34	34.9	15dBu	2.34	33.4	15dBu	2.34	32.6	15dBu
47	2.37	34.8	15dBu	2.37	33.3	15dBu	2.37	32.5	15dBu
48	2.40	34.6	15dBu	2.40	33.2	15dBu	2.40	32.4	15dBu
49	2.42	34.6	15dBu	2.42	33.1	15dBu	2.42	32.3	15dBu
50	2.45	34.5	15dBu	2.45	33.0	15dBu	2.45	32.2	15dBu

Note: position of the max input switch affects possible sensitivity and gain settings.

	I-T8000			I-T6000			I-T4000		
	Sensitivity	Gain	Input	Sensitivity	Gain	Input	Sensitivity	Gain	Input
	Vrms	dB	Switch	Vrms	dB	Switch	Vrms	dB	Switch
51	2.48	34.4	15dBu	2.48	32.9	15dBu	2.48	32.1	15dBu
52	2.51	34.3	15dBu	2.51	32.8	15dBu	2.51	32.0	15dBu
53	2.54	34.2	15dBu	2.54	32.7	15dBu	2.54	31.9	15dBu
54	2.57	34.1	15dBu	2.57	32.6	15dBu	2.57	31.8	15dBu
55	2.60	34.0	15dBu	2.60	32.5	15dBu	2.60	31.7	15dBu
56	2.63	33.9	15dBu	2.63	32.4	15dBu	2.63	31.6	15dBu
57	2.66	33.8	15dBu	2.66	32.3	15dBu	2.66	31.5	15dBu
58	2.69	33.7	15dBu	2.69	32.2	15dBu	2.69	31.4	15dBu
59	2.72	33.6	15dBu	2.72	32.1	15dBu	2.72	31.3	15dBu
60	2.75	33.5	15dBu	2.75	32.0	15dBu	2.75	31.2	15dBu
61	2.78	33.4	Both	2.78	31.9	Both	2.78	31.1	Both
62	2.82	33.2	Both	2.82	31.8	Both	2.82	31.0	Both
63	2.85	33.2	Both	2.85	31.7	Both	2.85	30.9	Both
64	2.88	33.1	Both	2.88	31.6	Both	2.88	30.8	Both
65	2.91	33.0	Both	2.91	31.5	Both	2.91	30.7	Both
66	2.95	32.9	Both	2.95	31.4	Both	2.95	30.6	Both
67	2.98	32.8	Both	2.98	31.3	Both	2.98	30.5	Both
68	3.02	32.7	Both	3.02	31.2	Both	3.02	30.4	Both
69	3.05	32.6	Both	3.05	31.1	Both	3.05	30.3	Both
70	3.09	32.5	Both	3.09	31.0	Both	3.09	30.2	Both
71	3.12	32.4	Both	3.12	30.9	Both	3.12	30.1	Both
72	3.16	32.3	Both	3.16	30.8	Both	3.16	30.0	Both
73	3.20	32.2	Both	3.20	30.7	Both	3.20	29.9	Both
74	3.23	32.1	Both	3.23	30.6	Both	3.23	29.8	Both
75	3.27	32.0	Both	3.27	30.5	Both	3.27	29.7	Both
76	3.31	31.9	Both	3.31	30.4	Both	3.31	29.6	Both
77	3.35	31.8	Both	3.35	30.3	Both	3.35	29.5	Both
78	3.38	31.7	Both	3.38	30.2	Both	3.38	29.4	Both
79	3.42	31.6	Both	3.42	30.1	Both	3.42	29.3	Both
80	3.46	31.5	Both	3.46	30.0	Both	3.46	29.2	Both
81	3.50	31.4	Both	3.50	29.9	Both	3.50	29.1	Both
82	3.54	31.3	Both	3.54	29.8	Both	3.54	29.0	Both
83	3.59	31.2	Both	3.59	29.7	Both	3.59	28.9	Both
84	3.63	31.1	Both	3.63	29.6	Both	3.63	28.8	Both
85	3.67	31.0	Both	3.67	29.5	Both	3.67	28.7	Both
86	3.71	30.9	Both	3.71	29.4	Both	3.71	28.6	Both
87	3.75	30.8	Both	3.75	29.3	Both	3.75	28.5	Both
88	3.80	30.7	Both	3.80	29.2	Both	3.80	28.4	Both
89	3.84	30.6	Both	3.84	29.1	Both	3.84	28.3	Both
90	3.89	30.5	Both	3.89	29.0	Both	3.89	28.2	Both
91	3.93	30.4	21dBu	3.93	28.9	21dBu	3.93	28.1	21dBu
92	3.98	30.3	21dBu	3.98	28.8	21dBu	3.98	28.0	21dBu
93	4.02	30.2	21dBu	4.02	28.7	21dBu	4.02	27.9	21dBu
94	4.07	30.1	21dBu	4.07	28.6	21dBu	4.07	27.8	21dBu
95	4.12	30.0	21dBu	4.12	28.5	21dBu	4.12	27.7	21dBu
96	4.16	29.9	21dBu	4.16	28.4	21dBu	4.16	27.6	21dBu
97	4.26	29.7	21dBu	4.26	28.2	21dBu	4.26	27.4	21dBu
98	4.31	29.6	21dBu	4.31	28.1	21dBu	4.31	27.3	21dBu
99	4.36	29.5	21dBu	4.36	28.0	21dBu	4.36	27.2	21dBu
100	4.41	29.4	21dBu	4.41	27.9	21dBu	4.41	27.1	21dBu

Note: position of the max input switch affects possible sensitivity and gain settings.

	I-T8000			I-T6000			I-T4000		
	Sensitivity	Gain	Input	Sensitivity	Gain	Input	Sensitivity	Gain	Input
	Vrms	dB	Switch	Vrms	dB	Switch	Vrms	dB	Switch
101	4.46	29.3	21dBu	4.46	27.8	21dBu	4.46	27.0	21dBu
102	4.51	29.2	21dBu	4.51	27.7	21dBu	4.51	26.9	21dBu
103	4.57	29.1	21dBu	4.57	27.6	21dBu	4.57	26.8	21dBu
104	4.62	29.0	21dBu	4.62	27.5	21dBu	4.62	26.7	21dBu
105	4.67	28.9	21dBu	4.67	27.4	21dBu	4.67	26.6	21dBu
106	4.73	28.8	21dBu	4.73	27.3	21dBu	4.73	26.5	21dBu
107	4.78	28.7	21dBu	4.78	27.2	21dBu	4.78	26.4	21dBu
108	4.84	28.6	21dBu	4.84	27.1	21dBu	4.84	26.3	21dBu
109	4.89	28.5	21dBu	4.89	27.0	21dBu	4.89	26.2	21dBu
110	4.95	28.4	21dBu	4.95	26.9	21dBu	4.95	26.1	21dBu
111	5.01	28.3	21dBu	5.01	26.8	21dBu	5.01	26.0	21dBu
112	5.06	28.2	21dBu	5.06	26.7	21dBu	5.06	25.9	21dBu
113	5.12	28.1	21dBu	5.12	26.6	21dBu	5.12	25.8	21dBu
114	5.18	28.0	21dBu	5.18	26.5	21dBu	5.18	25.7	21dBu
115	5.24	27.9	21dBu	5.24	26.4	21dBu	5.24	25.6	21dBu
116	5.30	27.8	21dBu	5.30	26.3	21dBu	5.30	25.5	21dBu
117	5.36	27.7	21dBu	5.36	26.2	21dBu	5.36	25.4	21dBu
118	5.43	27.6	21dBu	5.43	26.1	21dBu	5.43	25.3	21dBu
119	5.49	27.5	21dBu	5.49	26.0	21dBu	5.49	25.2	21dBu
120	5.55	27.4	21dBu	5.55	25.9	21dBu	5.55	25.1	21dBu
121	5.62	27.3	21dBu	5.62	25.8	21dBu	5.62	25.0	21dBu
122	5.68	27.2	21dBu	5.68	25.7	21dBu	5.68	24.9	21dBu
123	5.75	27.1	21dBu	5.75	25.6	21dBu	5.75	24.8	21dBu
124	5.81	27.0	21dBu	5.81	25.5	21dBu	5.81	24.7	21dBu
125	5.88	26.9	21dBu	5.88	25.4	21dBu	5.88	24.6	21dBu
126	5.95	26.8	21dBu	5.95	25.3	21dBu	5.95	24.5	21dBu
127	6.02	26.7	21dBu	6.02	25.2	21dBu	6.02	24.4	21dBu
128	6.09	26.6	21dBu	6.09	25.1	21dBu	6.09	24.3	21dBu
129	6.16	26.5	21dBu	6.16	25.0	21dBu	6.16	24.2	21dBu
130	6.23	26.4	21dBu	6.23	24.9	21dBu	6.23	24.1	21dBu
131	6.30	26.3	21dBu	6.30	24.8	21dBu	6.30	24.0	21dBu
132	6.38	26.2	21dBu	6.38	24.7	21dBu	6.38	23.9	21dBu
133	6.45	26.1	21dBu	6.45	24.6	21dBu	6.45	23.8	21dBu
134	6.52	26.0	21dBu	6.52	24.5	21dBu	6.52	23.7	21dBu
135	6.60	25.9	21dBu	6.60	24.4	21dBu	6.60	23.6	21dBu
136	6.68	25.8	21dBu	6.68	24.3	21dBu	6.68	23.5	21dBu
137	6.75	25.7	21dBu	6.75	24.2	21dBu	6.75	23.4	21dBu
138	6.83	25.6	21dBu	6.83	24.1	21dBu	6.83	23.3	21dBu
139	6.91	25.5	21dBu	6.91	24.0	21dBu	6.91	23.2	21dBu
140	6.99	25.4	21dBu	6.99	23.9	21dBu	6.99	23.1	21dBu
141	7.07	25.3	21dBu	7.07	23.8	21dBu	7.07	23.0	21dBu
142	7.15	25.2	21dBu	7.15	23.7	21dBu	7.15	22.9	21dBu
143	7.24	25.1	21dBu	7.24	23.6	21dBu	7.24	22.8	21dBu
144	7.32	25.0	21dBu	7.32	23.5	21dBu	7.32	22.7	21dBu
145	7.40	24.9	21dBu	7.40	23.4	21dBu	7.40	22.6	21dBu
146	7.49	24.8	21dBu	7.49	23.3	21dBu	7.49	22.5	21dBu
147	7.58	24.7	21dBu	7.58	23.2	21dBu	7.58	22.4	21dBu
148	7.67	24.6	21dBu	7.67	23.1	21dBu	7.67	22.3	21dBu
149	7.75	24.5	21dBu	7.75	23.0	21dBu	7.75	22.2	21dBu

Frequently Asked Questions (FAQs)

Q. How can I-Tech produce so much power with only a 20A plug?

A. The combination of Class-I technology and an innovative PFC power supply enables I-Tech to very efficiently draw power from the A/C mains and deliver it to the speakers. This high efficiency, coupled with a significant amount of energy storage, allows I-Tech to deliver high power much more effectively than conventional designs, and thus reduces the demands on the power cord.

For more information, read this short “Tech Made Simple” article:
<http://www.crownaudio.com/pdf/amps/137331.pdf>

Q. Isn't Class-I just like other amplifier classes?

A. No, Class -I amplifiers are a fundamentally different design from all other amplifier classes on the market. Crown has patented the technology behind Class-I amplifiers and is the only manufacturer in the world building this design.

For more information about Class-I, read this technical paper: <http://www.crownaudio.com/itech/pdf/137234.pdf>

Q. How does I-Tech recycle energy from the load?

A. Class-I is unique in that it always provides an electrical path between the amplifier's output and power supply bulk capacitors. This means that when a loudspeaker sends energy back to an I-Tech amplifier it stores it in the power supply for later use. This keeps the output devices from dissipating the energy from the loudspeaker as heat and keeps the power supply from having to work as hard.

Q. Why is the 2 ohm power number smaller than the 4 ohm power number?

A. The question may be better stated, “Why is the 4 ohm number so large?” The 4 Ohm number is so large because Class-I is not fundamentally voltage limited, unlike ALL other amplifier designs available on the market. Competitive amplifier designs require complicated multi-level (Class-H) supplies, which limit the voltage available to the output under low impedance loads. This multiple step supply topology lends itself to the typical power matrix.

The down side of Class-H is that if the program material asks for a peak higher than the rail voltage limit the amplifier will distort. In other words, headroom is limited. Class-I does not exhibit this limitation. 200V is always available to all loads. As a result the amplifier is capable of producing very high music output peaks without distorting.

Some view I-Tech's unconventional power matrix to indicate that I-Tech is not “good” or is “unstable” when driving low impedance loads. Nothing could be further from the truth. A fundamental advantage of Class-I is that it cares little about the load impedance. Pile on the speakers. I-Tech isn't afraid.

Q. How does Crown measure power?

A. I-Tech output power is measured using the “Maximum Average Power” method. The Maximum Average Power test is designed to be an easy way to more closely approximate output power with real world musical sources. The test is simple: the amplifier is set up with the level controls turned to the maximum setting, and then a connected sine wave source is increased until the specified total harmonic distortion is reached.

Q. What are your 20Hz to 20kHz specs?

A. All output power specs for I-Tech are provided at 20Hz to 20kHz.

Q. I heard that PFC could cause the mains to sag and shut the amplifier down. Will I-Tech's PFC do that?

A. No. I-Tech monitors the mains voltage and gently corrects for this rare phenomenon.

Q. Are you going to produce a lower-cost version of I-Tech?

A. When compared to retail pricing of competitive amplifiers with similar specifications you will find that I-Tech is priced VERY competitively, and none of those competitive amplifiers have DSP, 200V rails, or global power supply with PFC.

Q. I don't want to use your DSP. Can I buy I-Tech without DSP?

A. No. The DSP is an integral part of the I-Tech, not just bolt-on signal processing. By integrating the DSP into I-Tech, Crown engineers have been able to dramatically improve signal-to-noise, and use this integration to allow intelligent control of amplifier operation.

Benefits of integrated DSP:

- Greatly improved signal-to-noise, even when compared to amplifiers without dsp.
- Gain staging is optimized and no longer a potential for operator error
- DSP has real-time knowledge of the amplifier's operation, which allows I-Tech to offer:
 - Output voltage limiting
 - Load monitoring
 - Average output power limiting

Q. What kind of filters are available in I-Tech's DSP?

A. There are 64 filters total within the I-Tech DSP and they can be placed anywhere within the system. In addition to filtering, each possesses up to +/-24dB of gain.

The following filters are available:

- Lowpass::Bessel 2-4, Butterworth 1-4, and Linkwitz-Riley 4
- Highpass: Bessel 2-4, Butterworth 1-4, and Linkwitz-Riley 4
- Lowshelf: Low-frequency shelving EQ
- Highshelf: High-frequency shelving EQ
- Lowpass EQ: Variable Q from 0.1 to 35
- Highpass EQ: Variable Q from 0.1 to 35
- Parametric EQ: Variable Q from 0.1 to 35
- All Pass: 1st and 2nd order

All Pass filters provide no gain change to the output, but provide a phase change at the selected frequency. This corrects the phase relationship of the output without a gain reduction, such as is found in other filters.

Q. How many filters are available in I-Tech's DSP?

A. There are 64 filters available in I-Tech's DSP.

Q. How much delay is available in I-Tech's DSP?

A. I-Tech has over 2 full seconds of delay available on each channel, adjustable in 20 microsecond increments.

Q. What are the adjustment increments for I-Tech's delay setting?

A. One 48,000th of a second, or 0.02083 millisecond, or approximately 1/4" or about 1 centimeter.

Q. Will other signal processors work with I-Tech? I don't want to use the on board DSP.

A. Yes, any outboard signal processing can be used with I-Tech. You must remember that all DSP has its own inherent latency and this must be considered when configuring delays.

Note: As in all cases with any amplifier, make sure you re-check the EQ for the room every time the system is setup in a different location.

Q. Is post-processed audio available on the analog audio XLR outputs/loop through?

A. No. Since all I-Tech amplifiers have DSP as standard, post-processed outputs are not necessary.

Q. What is an attenuator limiter?

A. An attenuator limiter is a control set via the front panel display or through IQwic software that places a limit or lock on the attenuator at a user defined level keeping curious hands from turning the input attenuator beyond your desired level.

Q. If I use I-Tech and Macro-Tech® to power a stack, do I have to worry about any delay or time alignment?

A. There is a ~1 ms difference between I-Tech and Macro-Tech amplifiers, as well as any other Crown amplifier using the Grounded Bridge™ output design. See the next FAQ for more about I-Tech latency.

Q. What is latency, and does I-Tech have a fixed latency?

A. The latency of a device is the amount of time it takes a signal to travel from the device's input to its output.

When using the analog inputs, latency has been measured at 1.13ms. The latency of the input/DSP section is fixed, and does not change whether using no processing or maximum- available processing.

Latency with an AES/EBU input varies due to buffering of the signal that occurs before it is sent to the input/DSP stage, and is dependent upon the input AES/EBU data rate as shown below:

AES/EBU SAMPLE RATE	SRC DELAY
32 KHz	2.744 ms
44.1 KHz	2.358 ms
48 KHz	2.275 ms
96 KHz	1.807 ms

In addition to these sources of delay through the amplifier, there is the possibility of some minimal delay due to the wiring of the AES/EBU signal. The AES/EBU standard 110 cable has a delay of 6ns/meter. In addition, the I-Tech amplifier has a delay of ~85ns in its active digital loop-thru. To put this in perspective, a system with 50 meters of cable and sixteen amplifiers all looped through each other would have a delay at the last amplifier of 1.575us. This is equivalent to a delay of less than one-quarter inch. This additional source of delay will be inconsequential in almost all systems and can be ignored.

Q. I cannot find 26dB gain in the sensitivity menu. Is it available in I-Tech?

A. Yes, many different sensitivities and gains are available depending on the setting of the max input level switch. Refer to the complete list of all 149 sensitivity / gain settings in the Appendix section of this guide.

To set the I-Tech amp for 26dB gain, change the max input level switch to 20dBu using IQwic or the front panel display. Upon returning to the sensitivity menu you can set the gain to 26dB.

Q. How do I set the power limiters?

A. Via either the front panel LCD or IQwic software.

Q. Why did you put an LCD on the front?

A.

- To provide real-time diagnostics: thermal headroom, load monitoring, etc.
- To provide much of the IQ Network capabilities without the need to set up a network.
- To make monitoring all this information easy.

Q. Do I have to use the LCD?

A. No. The amplifier was designed for simple plug-and-play operation, and can be quickly setup as though it were a traditional amplifier.

Q. How can I keep unauthorized people from tampering with my settings?

A. Controls can be fully locked out through front panel LCD or through higher levels of security using IQwic software.

Q. I don't know anything about networking. Can I get I-Tech's networking up and running quickly without reading a book or taking a class?

A. In IQWic version 7, a network wizard is included under the Setup Menu to assist in the process of setting up your network. The software looks at your computer and configures the address of the amplifier to be on the same network. In many cases, this is all that is required to set up your IQ Network.

Q. What happens if the network breaks or goes down?

A. Network communication will stop, but the amplifier will continue to operate as last programmed.

Q. Why didn't you use the Ethercon connector for the network connection?

A. The EtherCon connector does not provide noise filtering as the one used in I-Tech does. Also, the connector used will generally not be changed often as the use of rack mounted network switches will minimize cable changing.

Q. What happens if the amp loses digital signal?

A. The analog connections can be configured as backup and the amplifier will switch to those connections automatically.

Q. Are there filters available for the air inlets?

A. Yes, two sets are included with the amplifier.

Q. Are the air filters required? How often should I change them?

A. Although the amplifier is shipped with air filters, they are not required. If you use the air filters, you should clean or change them frequently depending on the dust level of the environment where they are used. The dust should not be allowed to block the airflow into the amplifier.

Website Links

Following is a list of links to suggested pages and documents for further information about I-Tech Series amplifiers and their use.

I-Tech Website:

<http://www.crownaudio.com/itech>

I-Tech Data Sheet:

<http://www.crownaudio.com/itech/pdf/137251.pdf>

Crown Amplifier Application Guide:

<http://www.crownaudio.com/pdf/133472.pdf>

Crown Amplifier Technical Information (technical/white papers):

http://www.crownaudio.com/amp_htm/ampinfo.htm

Ethernet Overview (Peak Audio / CobraNet Website):

http://www.peakaudio.com/CobraNet/Ethernet_overview.htm

TCP/IQ Network Setup (IQ Network Website):

<http://www.iqaudiosystems.com/support/tcpiq1.htm>

CobraNet Primer (IQ Network Website):

<http://www.iqaudiosystems.com/support/CobraNetPrimer.htm>

Peak Audio (CobraNet) Website:

<http://www.peakaudio.com/Index.htm>

AES Standard for AES/EBU Digital Audio Transmission:

http://www.aes.org/standards/b_pub/aes-standards-in-print.cfm#standards

Note: Scroll down in your browser to "AES3-2003"

JBL VERTEC Application Manual:

http://www.jblpro.com/vertec1/VERTEC_APP_MANUAL_11_25-1.pdf

Harman Professional Company Website Links:**AKG:**

<http://www.akg.com>

BSS Audio:

<http://www.bss.co.uk>

Crown International:

<http://www.crownaudio.com>

dbx Pro:

<http://www.dbxpro.com>

JBL Professional:

<http://www.jblpro.com>

Lexicon Pro:

<http://www.lexiconpro.com>

Soundcraft:

<http://www.soundcraft.com>

Studer:

<http://www.studer.ch>



Notes



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