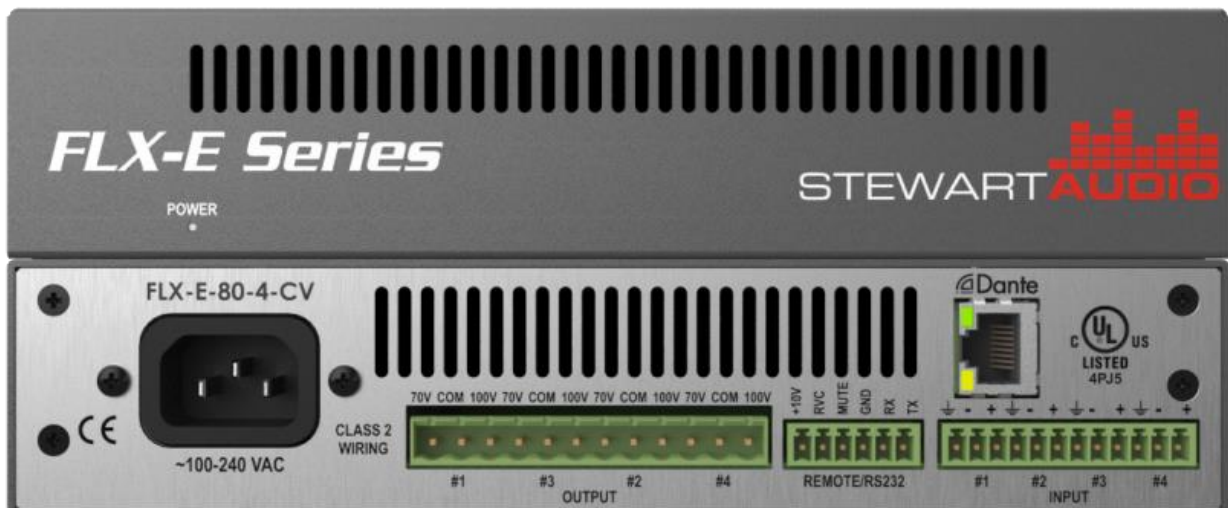


1. FLX-E Operation Manual



(FLX-E-80-4-CV shown)

1 Important safety instructions

1. Please read carefully prior to product installation or operation.
2. Read these instructions.
3. Keep these instructions.
4. Heed all warnings.
5. Follow all instructions.
6. Do not use this apparatus near water.
7. Clean only with dry cloth.
8. Do not block any ventilation openings. Install in accordance with manufacturer's instructions.
9. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
10. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade and/or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
11. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point they exit from the apparatus.
12. Only use attachments/accessories specified by the manufacturer.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate properly, or has been dropped.

3 Warnings

3.1 Explanation of Warning Symbols

3.1.1 Lightning Bolt

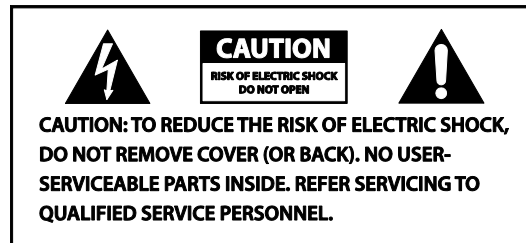
The lightning bolt within arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of un-insulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electrical shock to person.

3.1.2 Exclamation Point

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instruction in the literature accompanying the appliance.

3.2 Warnings

WARNING: TO REDUCE THE RISK OF ELECTRICAL SHOCK, DO NOT EXPOSE THIS AMPLIFIER TO RAIN OR MOISTURE. DANGEROUS HIGH VOLTAGES ARE PRESENT INSIDE THE ENCLOSURE. DO NOT OPEN THE CABINET. REFER SERVICING TO QUALIFIED PERSONNEL ONLY.



Please refer to the following table for AC Line plug information.

Voltage	Line plug (according to standard)
110-125 V (US)	UL817 and CSA C22.2 no 42.
220-230 V (EUROPE)	CEE 7 page VII, SR section 107-2-D1/IEC 83 page C4
240 V (UK)	BS 1363 of 1984. Specification for 13 A fused plugs and switched and unswitched socket outlets.

3.3 User Responsibility

3.3.1 Mains Connection Grounding

Your amplifier must be connected to a grounded outlet. Do not defeat the safety purpose of the polarized or grounding-type plug.

3.3.2 Speaker Output Hazard

Audio power amplifiers are capable of producing hazardous output voltages, especially constant voltage (CV) amplifiers for 70/100V systems. To avoid electrical shock, do not touch any exposed speaker wiring while the amplifier is operating. External wiring connected to the speaker terminals shall be installed by a qualified person. Do not connect or disconnect speaker wires

while the mains power is on. **Do not connect speaker wires together or to ground as this may result in permanent damage to your amplifier.**

3.3.4 Speaker Damage

Loudspeakers may be damaged or destroyed if overpowered. Always check the loudspeaker's continuous and peak power ratings to prevent such an occurrence. Do not rely solely on the amplifier's volume control to reduce output power to a level safe for the loudspeakers. Stewart Audio strongly suggests you use the limiter block in the DSP chain to limit power to the loudspeakers.

3.3.5 Maintenance

Clean regularly with a soft cloth to remove dust and debris. Also check that vent holes and slots are not covered and that there is adequate ventilation for convection cooling. If the amplifier is not rack mounted, be certain that the feet on the bottom of the device allow air to circulate beneath the amplifier. Do not place on a cushioned surface like a blanket as this may impede cooling.

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5 Welcome

Congratulations on the purchase of your new Stewart Audio FLX-E Series audio amplifier. This amplifier has been designed and built to provide you with years of high-quality audio performance and trouble-free operation. If after reading this operation manual you have questions concerning amplifier installation and operation, please contact your Authorized Stewart dealer, or you may contact us directly using the contact information provided on the back of this guide.

5.1 Features

The FLX-E Series amplifiers offer 320W of audio in a half-rack by 1RU, convection-cooled enclosure. The FLX-E-80-4 models provide 80W/channel with 4 local outputs. The FLX-E-160-2 models provide 160W/channel with 2 local outputs. The FLX-E-320 models offer 320W into a single local output. All FLX-E Series amplifiers have built-in DSP for fine tuning your listening environment. (See [Section 7.2](#) for detailed information.) Models with a “D” suffix use the Dante™ and AES67 audio transport protocols to deliver low latency audio over category 5e/6 cables via a 100/1000BaseT network. The low impedance models (“LZ” suffix) operate into 4Ω or 8Ω loudspeakers, while the constant voltage or high impedance model (“CV” suffix) are designed to be used with one or more high impedance loudspeakers per channel. All models offer control and status via the Ethernet control port using Stewart Audio’s FLX-E application. Output level control is also available over an RS-232 interface for legacy controllers or over the network for IP-based controllers.

5.2 Unpacking and Visual Inspection

Every Stewart Audio product is carefully tested and inspected before leaving the factory and should arrive in perfect condition. If any damage is discovered, please notify the shipping carrier immediately. Save the packing materials for the carrier’s inspection and for any future shipping.

5.3 Installation and Setup

5.3.1 Rack Mounting

The FLX-E Series of amplifiers is designed for rack mounting in a standard 19” rack using the optional rack mount brackets. Both single (part number RMK-HLF-S) and side-by-side (part number RMK-HLF-D) rack mounts kits are available from your Stewart Audio authorized dealer. The constant voltage (“CV” suffix) models use autotransformers to step-up the voltage to 70/100V. These transformers add significant weight to the amplifier. **It is strongly advised that the rear of the enclosure be supported when rack-mounted.**

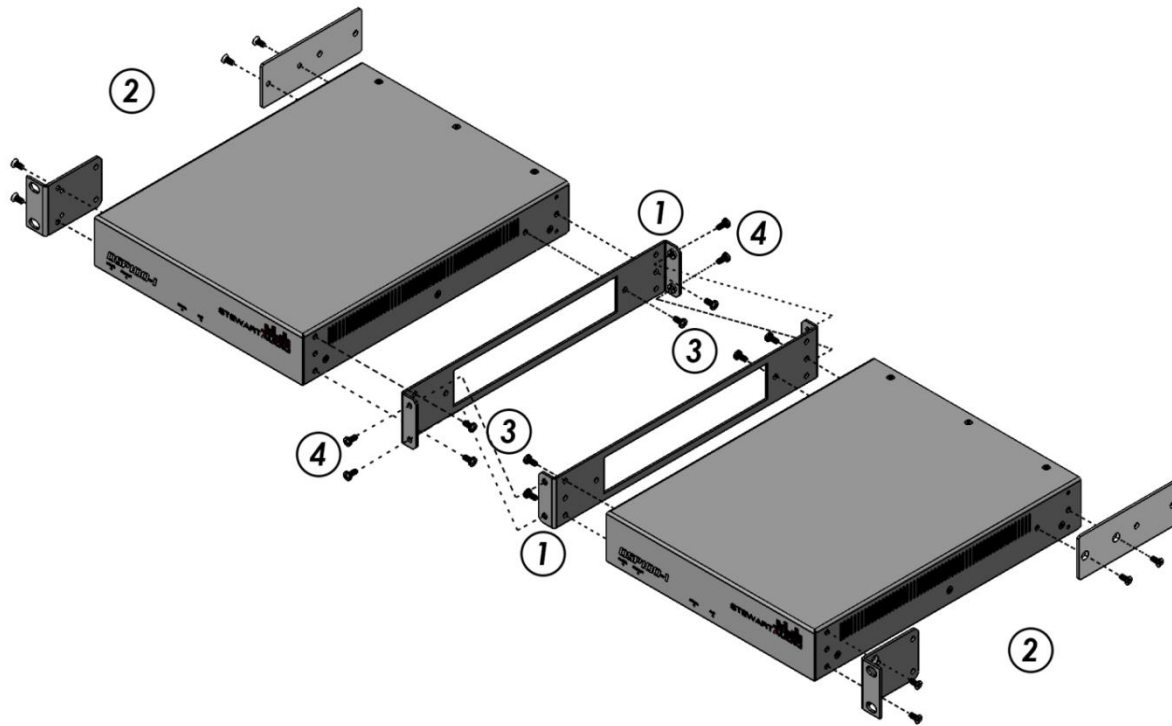
The dual rack mount is designed for easy installation. Refer to the figure on the following page while completing this step-by-step procedure.

Step 1: Note the position of the captive nuts on the inner brackets. One set must be near the front of one amplifier and the other set near the rear of the other amplifier.

Step 2: Attach the right-angle brackets to the front of each amplifier and the rear brackets (if desired) to the rear of each amplifier. A rear support is recommended for the constant voltage (“CV” suffix) models.

Step 3: Attach the inner brackets to each amplifier **as oriented in step 1**. Insert and tighten two screws into the front of each inner bracket and two screws into the rear of each inner bracket.

Step 4: Bring the two subassemblies together, overlapping the flanges on the inner brackets. Both pairs of captive nuts should be inside the flange of the opposing bracket. Complete the assembly by inserting two screws into the front of the pair on inner brackets and two screws into the rear pair of the inner brackets.



5.3.2 Cooling and Ventilation

All FLX-E amplifiers are convection cooled. Ensure that there is sufficient open space around the amplifier, including beneath the amplifier, to allow for free air flow. When mounted in an equipment rack, the amplifier is designed to have air pulled into the amplifier from the front vent holes and exhausted through the rear vents. It is recommended to leave a 1RU rack space between amplifiers or other devices with significant power dissipation. Do not block the ventilation holes or slots. Use the following chart to determine cooling requirements for your application.

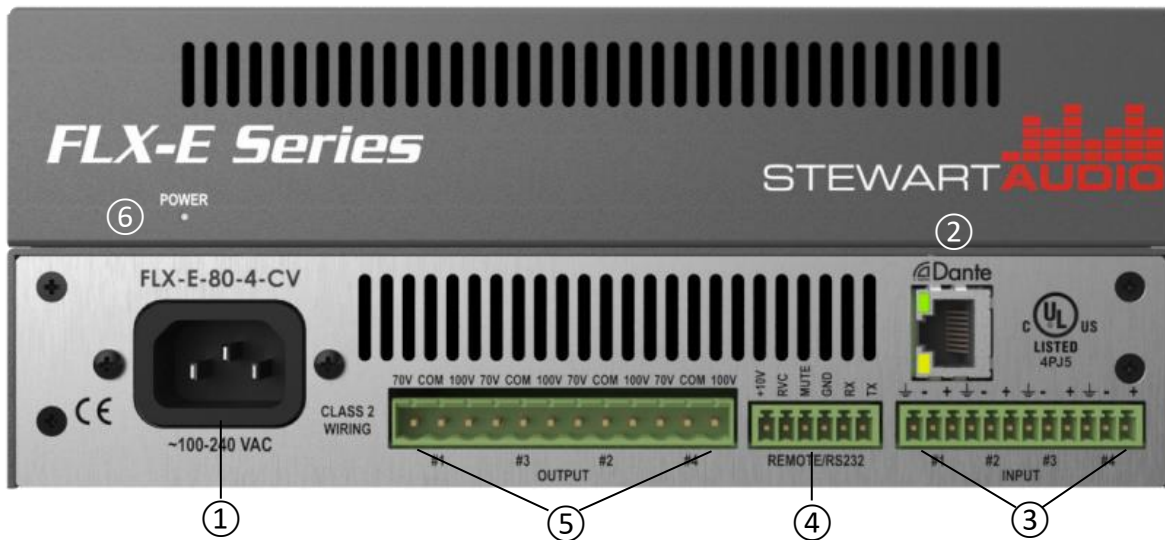
Operating Conditions	Power consumption (W)	Power dissipated (W)	Energy dissipated (BTU/hr)
Idle (operational, no input signals)	12	12	41
1/8 rated audio power	60	20	68

Power consumption and energy dissipated

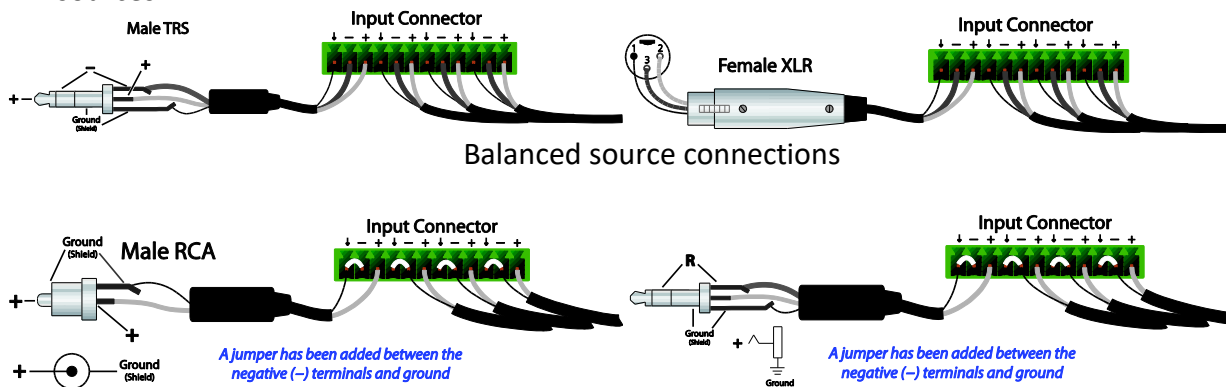
5.3.3 Operating Voltage

FLX-E Series amplifiers use an integral universal power supply that operates on AC mains from 100-240V at 50 or 60 Hz. The power receptacle on the rear panel accepts IEC-60320-C13 power cords. There is no power switch. The amplifier will turn on automatically when AC power is connected to the device.

6 Rear Panel



1. **AC line input** – Connect the included IEC power cable.
2. **Network connector**– Connect one end of a Cat5e or Cat 6 cable to primary port, and the other to the 100/1000BaseT switch carrying audio (if a Dante-enabled model) traffic and control traffic. Note that a single RJ-45 jack is used for both audio and control functions. However, these two functions each have their own MAC address and IP address and therefore can be on the same network, or different networks. The PC running the FLX-E application must be on the same network as the control port.
3. **Analog audio input connectors**– Connect balanced audio inputs here using the removable 3-pin 3.5mm connectors provided. Note the polarity is ground-minus-plus from left to right for each of the four available analog input channels. Single-ended inputs may also be used. See the diagrams below illustrating proper connections for both balanced and single-ended sources.



Single-ended source connections

4. **Remote volume control/mute/RS-232 connector** – Connect a 10K Ω potentiometer between the +10V, RVC, and ground connection as shown in [Section 6.1.2](#). This volume control controls all local output levels. A contact closure is also provided for fire alarms and other security

systems. Ground the MUTE pin to mute all local outputs. Audio will return at previously set levels when the short is removed. An RS-232 controller can be connected between the TX/RX and ground pins. Refer to [section 6.1.3](#) for the RS-232 command set. **Note that the FLX-E is a DCE device, that is, the transmit pin from the RS-232 controller should connect to the transmit pin of the FLX-E, and similarly for the receive connection.**

5. **Speaker connector(s)** – The number of speaker outputs depends on the FLX-E model. The FLX-E-80-4 has 4 output channels of 80W each. The FLX-E-160-2 models have 2 output channels at 160W each, and the FLX-E-320-1 model has a single 320W output. Models with an “LZ” suffix are designed for 4-8Ω speakers, while the models with a “CV” suffix are designed for high impedance speakers. Make certain to check the power-handling capability of the speakers are appropriate. Excess power can damage speakers. Stewart Audio suggests using the signal processing limiter block in the internal DSP (see [Section 7.2.4.3](#))

When connecting speakers, observe proper phasing to prevent a hollow sound resulting from connecting speakers out of phase. When connecting speakers to a constant voltage (“CV” suffix) model, make sure the total tapped power for each channel does not exceed the rated power for the amplifier model being used. Stewart Audio recommends limiting the total tapped power to 75% of the rated power for the model used. Also for constant voltage models, make speaker connections between



The sum of the tapped wattage for all speakers connected to a single output should not exceed the rated output for the model used.



In normal operation, the DC voltage on the speaker output connectors is approximately 24VDC. Do not connect any speaker output to ground or to the amplifier chassis. Do not connect speakers across speaker outputs. (Bridge mode is not supported.)

6. **Power LED** – This blue LED illuminates whenever AC power is applied. A steady LED indicates normal operation, while a flashing LED indicates that the amplifier is in an error condition. The identify command will cause this LED to flash for several seconds. When new firmware is being installed, the power LED also flashes.

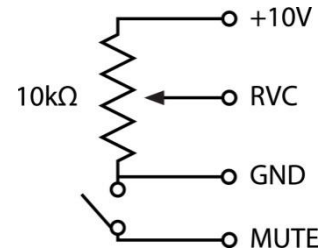
6.1 Operation

6.1.1 Local and Network Audio

All FLX-E Series amplifiers have balanced connectors for 4 local inputs. The Dante™-enabled models use Audinate’s multi-channel digital media networking technology, with near-zero latency and synchronization. Routing audio signals from Dante-enabled transmitters to Dante-enabled receivers is accomplished via the [Dante Controller Software](#) available from [Audinate’s web site](#). Please visit their web site for detailed information regarding this technology, system and network configuration, troubleshooting, and other support. Note that all Dante-enabled FLX-E Series amplifiers support the AES67 standard. To enable the AES67 mode, click on the AES67 Config tab in the Device View in Dante Controller.

6.1.2 Remote Volume Control and Mute

By connecting an external 10K Ω potentiometer between the RVC, +10V and GND pins as shown in the diagram to the right, the output level of all local outputs can be trimmed over a 60+dB range. A contact closure mute pin is also provided for muting all local outputs. Muting is accomplished by grounding the MUTE pin. This is useful for fire alarm and emergency paging situations.



6.1.3 RS-232 Control

An RS-232 port (settings: 9600 baud; 8n 1) allows remote control of selected amplifier functions. These commands operate on the signal after the DSP to change the local output levels. They do not operate on the input signals. Note that the FLX-E is a DCE device, that is, the transmit pin from the RS-232 controller should connect to the transmit pin of the FLX-E, and similarly for the receive connection.

Command Structure

Each command starts with 0x02 (labeled STX in commands below)

The next byte is a one-byte command code.

The next byte is a one-byte channel number.

0x00 = Master, 0x01 for channel 1, 0x02 for channel 2, etc.

The next part of the command is the required parameter for the command, if any.

Each command ends with 0x03 (labeled ETX in commands below)

Response Structure

Each response starts with STX

The next byte is a one-byte command code, indicating which command this is a response to.

The next byte is a one-byte channel number.

0x00 = Master, 0x01 for channel 1, 0x02 for channel 2, etc.

The next byte is a one-byte command response that is specific to the command in progress.

Each response ends with ETX.

Commands

DECREASE ATTENUATION 3dB- 0x01

Command string: STX 0x01 CHAN ETX (Where CHAN is the channel number as (described above))

Response string: STX 0x01 CHAN CURRENT_ATTENUATION_LEVEL ETX

INCREASE ATTENUATION 3dB - 0x02

Command string: STX 0x02 CHAN ETX

Response string: STX0x02 CHAN CURRENT_ATTENUATION_LEVEL ETX

DECREASE ATTENUATION 1dB - 0x03

Command string: STX 0x03 CHAN ETX

Response string: STX 0x03 CHAN CURRENT_ATTENUATION_LEVEL ETX

INCREASE ATTENUATION 1dB - 0x04

Command string: STX 0x04 CHAN ETX

Response string: STX 0x04 CHAN CURRENT_ATTENUATION_LEVEL ETX

SET ATTENUATION LEVEL - 0x05

Command string: STX 0x05 CHAN DESIRED_ATTENUATION_LEVEL ETX

Where DESIRED_ATTENUATION_LEVEL is the amount of attenuation in dB in 1 dB steps (e.g., 0x0A is 10dB attenuation)

Response string: STX 0x05 CHAN CURRENT_ATTENUATION_LEVEL ETX

MUTE TOGGLE - 0x06

Command string: STX 0x06 CHAN ETX

Response string: STX 0x06 CHAN CURRENT_MUTE_STATE ETX

Where CURRENT_MUTE_STATE is 0 for mute off, 1 for mute on

MUTE ON - 0x07

Command string: STX 0x07 CHAN ETX

Response string: STX 0x07 CHAN CURRENT_MUTE_STATE ETX

Where CURRENT_MUTE_STATE is 0 for mute off, 1 for mute on

MUTE OFF - 0x08

Command string: STX 0x08 CHAN ETX

Response string: STX 0x08 CHAN CURRENT_MUTE_STATE ETX

Where CURRENT_MUTE_STATE is 0 for mute off, 1 for mute on

GET ATTENUATION - 0x09

Command string: STX 0x09 CHAN ETX

Response string: STX 0x09 CHAN CURRENT_ATTENUATION_LEVEL ETX

Where CURRENT_ATTENUATION_LEVEL is in 1 dB steps

GET MUTE STATE - 0x0A

Command string: STX 0x0A CHAN ETX

Response string: STX 0x0A CHAN CURRENT_MUTE_STATE ETX

Where CURRENT_MUTE_STATE is 0 for mute off, 1 for mute on

GET CURRENT PRESET - 0x0B

Command string: STX 0x0B 0 ETX

Response string: STX 0x0B 0 CURRENT_PRESET_INDEX ETX

Where CURRENT_PRESET_INDEX is 0 through 9

SET CURRENT PRESET - 0x0C

Command string: STX 0x0C 0 DESIRED_PRESET_INDEX ETX

Where DESIRED_PRESET_INDEX is 0 through 9

Response string: STX 0x0 C 0 CURRENT_PRESET_INDEX ETX

6.1.4 IP Control

FLX-E Series amplifiers can also be controlled via a TCP/IP connection through the control port of the RJ-45 jack. This jack also serves as the Dante port for Dante-enabled models. Note that these two ports may be on the same network or on different networks/subnets. The RS-232 commands as well as a few others are available over the control port. See [Appendix B](#) for command structure and programming information.

6.1.5 Speaker Connections

6.1.5.1 Low Impedance Models (-LZ suffix)

Stewart Audio recommends using high-quality, heavy-gauge speaker wire and connectors to send the output signal of your amplifier to the speakers. Use the table in [Appendix A](#) as a guideline when selecting your wire gauge.

Speaker leads connect by means of removable terminal block connectors supplied with the unit. Strip speaker leads 1/4" and insert into connector observing proper polarity. With a small, flat-blade screwdriver, tighten the screw until the leads are held securely in place. Inspect for possible shorts or broken wires.

6.1.5.2 Constant Voltage (High Impedance) Models (-CV suffix)

Constant voltage amplifiers are designed to facilitate paralleling a number of high impedance speakers on a single output (channel). Ideally the output signal level is set to deliver nominally 70.7V_{RMS} (100V_{RMS} in Europe) at the output terminals. Each speaker transformer is then appropriately tapped to deliver the required volume level for that speaker. Make certain that the total tapped power from all speakers connected to an output channel does not exceed the rated power of that channel. A good rule of thumb is to load the channel no more than 75-80% of rated power.

Care should be used when working around the speaker terminals. Though not officially recognized as a shock hazard in the UL 60065 Safety Requirements, touching these terminals can be quite unpleasant and should be avoided.

Because the current flow in constant voltage systems and speakers is much lower than in 4/8Ω systems, higher gauge (thinner diameter) wire can be used. Please refer to the table in [Appendix A](#) to choose the appropriate wire gauge for your installation.

Speaker leads connect by means of removable terminal block connectors supplied with the unit. Strip speaker leads 1/4" and insert into connector observing proper polarity. The output voltage is selected by positioning the removable terminal blocks between the desired system voltage (70V or

100V pin) and the COM pin. **Do not connect to both the 70V and 100V terminals at the same time.** With a small, flat-blade screwdriver, tighten the screw until the leads are held securely in place. Inspect for possible shorts or broken wires.



NOTE: Class 2 wiring must be used on the speaker terminals to comply with UL requirements.



CAUTION: Do not connect either speaker terminal to ground. This will cause a short circuit which may damage the amplifier, speaker, or both.



CAUTION: The speaker terminals represent a shock hazard as they carry 70.7V and 100V when driven with an audio signal. Disconnect the amplifier from the AC power source when working on these terminals.

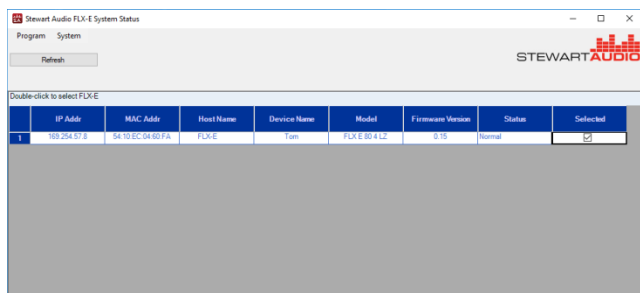
7 FLX-E Application (DSP and System Configuration)

The FLX-E application allows the user to configure the internal DSP, to set various amplifier parameters, and to receive amplifier status information via a network connection. This application is available for Windows operating systems from [Stewart Audio's web site](http://www.stewartaudio.com). **Note that up to 10 instances of the FLX-E application can connect to each FLX-E amplifier simultaneously; however, if more than one instance makes changes to the DSP values, the individual device screens will lose synchronization. Synchronization is restored when the device screen is closed and reopened.**

7.1 FLX-E System Status Screen

When the FLX-E Application is launched, the application automatically discovers all FLX-E Series devices on the network and populates the System Status screen. Selecting the Program and System drop down menus provide options described below. The refresh button causes the application to poll and recreate a list of all FLX-E Series devices on the network.

This list includes the IP address of the control port (note that the control port is different from the Dante audio port, and may be either on the Dante audio network, or on a separate network), MAC address, host name (FLX-E), device name, model, firmware version, and operating status of the device. To connect to a specific device, double-click anywhere along that device row.



	IP Addr	MAC Addr	Host Name	Device Name	Model	Firmware Version	Status	Selected
1	193.204.51.2	04:10:EC:04:8D:FA	FLX-E	Tom	FLX-E 80-4 L2	0.15	Normal	<input checked="" type="checkbox"/>

7.1.1 Program Drop-down Menu

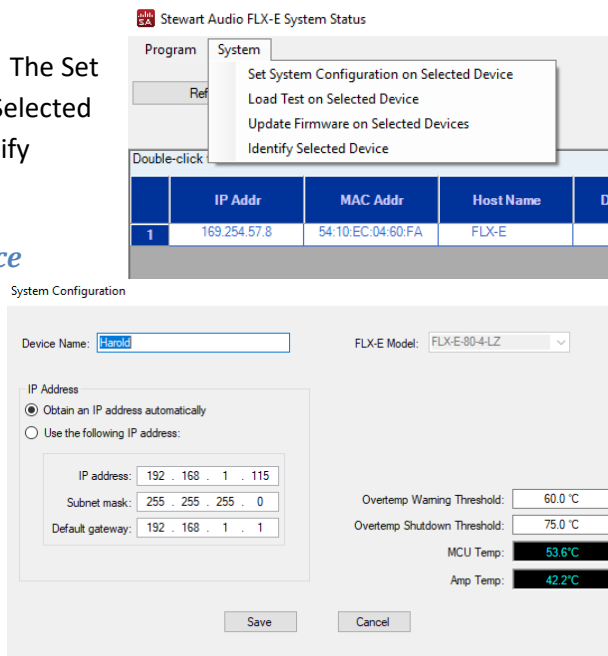
There are two selections on the Program drop-down menu. The About option provides the version information for the application. The Exit option exits the application.

7.1.2 System Drop-down Menu

There are four options on the System drop-down menu. The Set System Configuration on Selected Device, Load Test on Selected device, Update Firmware on Selected Devices, and Identify Selected Device.

7.1.2.1 Set System Configuration on Selected Device

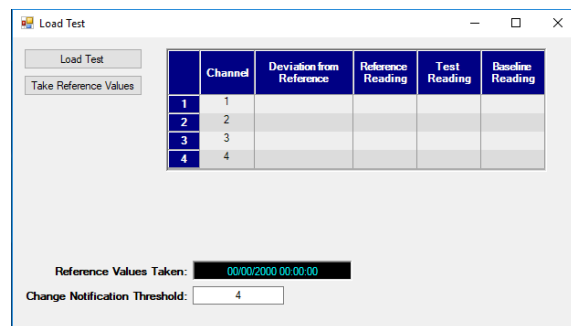
This option allows the user to set the device name, and the overtemp warning and shutdown thresholds. The current MCU and amplifier temperatures are shown for reference. The user can also set the method by which the device obtains an IP address (DHCP –automatically) or set a fixed IP address.



7.1.2.2 Load Test on Selected Device

The FLX-E application provides a convenient method of testing the amplifier output loads. It does not continuously monitor load impedance; nor does it measure impedance during the test process. It is intended to detect significant changes in loads that would indicate a failed speaker or failed speaker connection. It works by muting the input audio program and injecting an 18kHz test tone, and comparing the current load on each channel to a set of reference values the user can establish at any time. This process takes about 3 seconds.

To use this function, connect all low impedance loads, or tap all high impedance speakers to the desired values. Since there is some temperature dependence, allow the amplifier to temperature stabilize for best results. Press the “Take Reference Values” button on the Load Test tab. You will hear several clicks as the channels are cycled through. You will also hear an 18kHz tone. During this process, the application records the amplifier current draw for each channel. Once these values are set, pressing the “Load Test” button will rerun the same sequence and report on the variance relative to the reference values. The repeatability is better than 1%. Taking temperature variation into account, the repeatability is better than 3%.



Note that certain level controls for high impedance speakers (such as those manufactured by Atlas and Lowell) adjust volume by changing the load impedance. In this case, changing the volume will result in a variance reported by the application.

New reference values can be established at any time, and are recommended whenever a change to the load on any channel is changed. However, once a new set of reference values is established, the previous

values cannot be restored. For that reason a message pops up when “Take Reference Values” is selected to verify that this is your intent.

7.1.2.3 Update Firmware on Selected Device

The third option allows the user to update device firmware as enhancements and bug fixes are implemented.. The Update Firmware on Selected Devices option sequentially updates all selected devices. To update firmware, first download the new firmware version from the Stewart Audio web site ([Stewart Audio FLX-E Firmware Update Site](#)) and save it to a known location on your PC. Then select the devices you wish to update and select the Update Firmware on Selected Devices option on the system screen drop-down menu. A window will open for you to select the new firmware hex file. Navigate to the storage location, select the file, and click open.

Note that firmware updating is not available with zero-configuration networks.

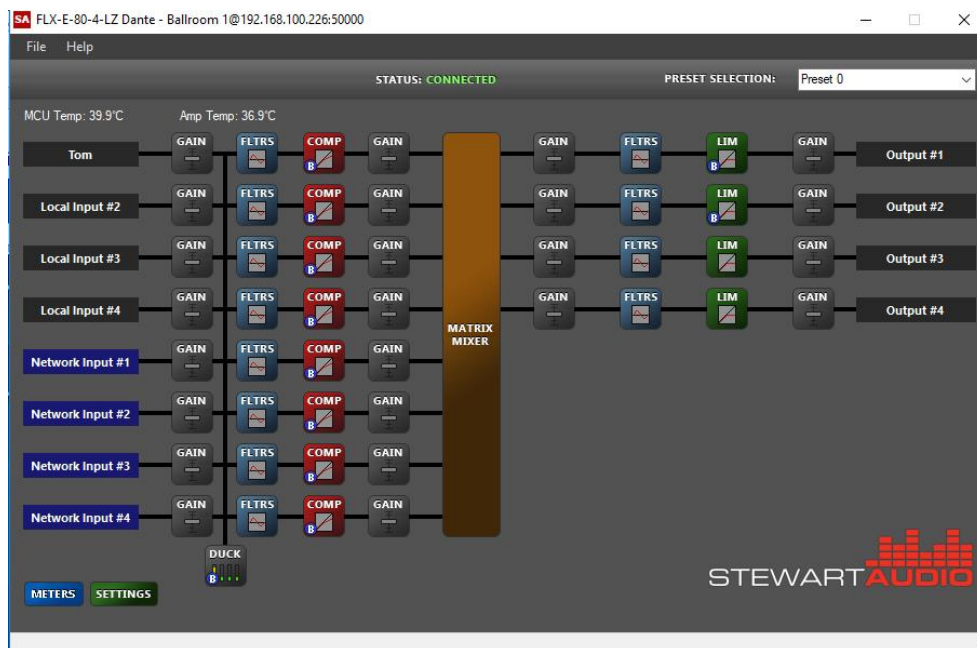
7.1.2.4 Identify Selected Device

This function allows the user to identify the selected device by causing the power LED on the front panel to flash for several seconds.

7.2 FLX-E Device Screen

Double-clicking anywhere along a device row on the System Status Screen launches the device screen for that particular model. Note that the screens will be somewhat different depending on the number of audio inputs (4 for analog models, and 8 for Dante-enabled models) and outputs (1, 2, or 4 plus 4 network outputs on Dante-enabled models).

After establishing a network connection to the control port, the application will read the device configuration into program memory. This operation takes about 17 seconds. The display shows the digital signal processing (DSP) chain for that particular FLX-E model. (The display below corresponds to the FLX-E-80-4-LZ-D model.)

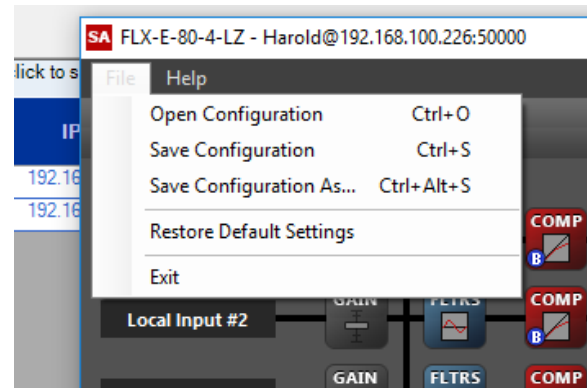


7.2.1 Title Bar

The title bar of the window shows the device model (FLX-E-80-4-LZ Dante), the name given to it in the Set System Configuration drop down on the system status screen, and the IP address including the port number (192.168.100.226:5000).

7.2.2 Menu Bar

Below the title bar is the menu bar. It contains two items: File and Help. The File dropdown has 5 options: Open Configuration, Save Configuration, Save Configuration As..., Restore Default Settings, and Exit. Using these commands, a configuration (including all 10 presets) can be saved and later opened and sent to a new device or to refresh the configuration of an existing device. This is useful when a number of FLX-E devices are to be configured identically (Save Configuration), or with minor changes (Save Configuration As...). When a saved file is opened, it is immediately sent to the device to update its configuration. Restore Default Settings resets all DSP parameters to the factory default.



The Help dropdown provides version information for the model DSP.

7.2.3 Device DSP Configuration

The top of the device DSP configuration window shows the status (connected) and the PRESET SELECTION (Preset 0) for the device. There are 10 presets (0 through 9) to be configured as desired. All signal processing elements can be customized for each preset. Presets can be changed by selecting the preset in the dropdown or via the RS-232 or equivalent IP-based command.

Immediately below the status and preset information are two temperature indicators. These indicate the board temperatures near the MCU and the amplifier IC. Warning thresholds can be set from the System pulldown menu (Set System Configuration on Selected Device) on the system status screen. If these temperatures exceed 70C, the amplifier is not receiving sufficient cooling.

7.2.4 Processing Blocks

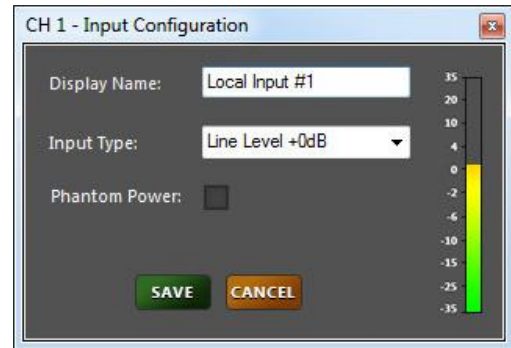
The signal processing is fixed, and cannot be dynamically changed. There is 24 dB of headroom in the signal processing chain. Any signals above 24 dB on the signal meters will be clipped. The maximum output from the DSP (into the following power amplifier) is 0 dBV. It is recommended that the limiter block (in conjunction with the final gain block) be used to ensure that the signal level remains below 0 dBV at the DSP output.

The function of each block is presented below.

7.2.4.1 Input Configuration

Purpose: The Input configuration block configures an input's display property, pre-gain level, and phantom power (if available). This processing block should be configured first as adjusting pre-gain levels will have a dramatic effect on subsequent processing blocks further down the signal path.

Display Name is an editable textbox that accepts all alphanumeric characters as well as a limited number of special characters. The display name will appear on the input label as well as in the mixer matrix.



Input Type is a dropdown menu populated with hardware-specific pre-gain levels. These pre-gain levels include an input device type as well as gain level in decibels (dB). There are 3 gain options: 0 dB (line level), +6 dB (intended for consumer grade signals), and +20 dB (intended for lower level microphone inputs). Note that this is mathematical gain. There are no preamplifiers in FLX-E Series amplifiers. All processing blocks have 24dB of headroom so selecting a pre-gain higher than 0dB will adjust the upper limit of the first gain block to compensate for this loss of headroom.

Phantom Power is a checkbox that is visible for inputs 1 and 2 only. **Note** – this checkbox will be automatically un-checked if a Line Level pre-gain is selected to prevent harm to devices that do not support phantom power. It will display a warning if phantom power is selected after it has been unchecked.

Signal Meter displays the current RMS level in dBV of the audio signal including both pre-gain and input pre-amplification (applied in input type).

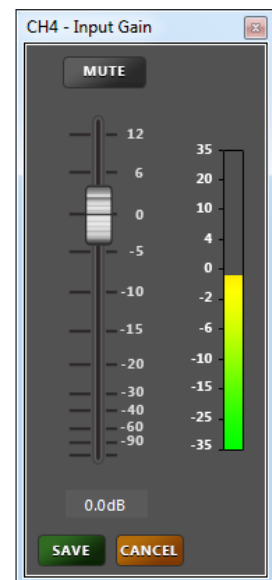
7.2.4.2 Gain Block

The Gain block configures and monitors the gain level at various places along the processing signal path. Bear in mind that the signal processing blocks have 24 dB headroom, so excessive gain may result in signal clipping.

Gain is adjusted using the fader control similar to the interface on an analog mixing console. When moved up and down the textbox below the fader control will update to reflect the current gain setting. The gain slider is disabled when the block is muted.

Mute is an on/off button that will turn red when active. The gain fader will be disabled and >100dB of attenuation will be applied to the signal. A red indicator will appear on the gain block button in the main Device Screen when that block is muted.

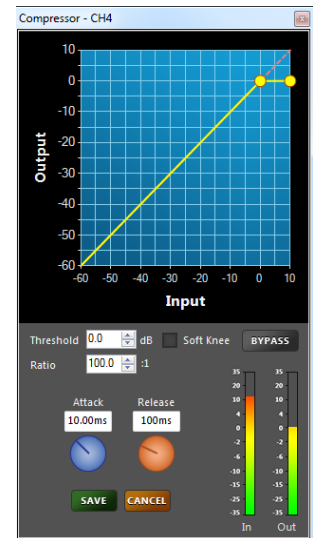
Signal Meter displays the current RMS signal level in dBV of the audio signal at the output of the gain block.



7.2.4.3 Compressor/Limiter Blocks

The Compression block allows configuration of the dynamic compressor/limiter. Audio compression is a specialized function used to reduce dynamic range - the span between the softest and loudest sounds. The use of compressors can make recordings or live-sound mixes sound better musically by controlling maximum levels and maintaining higher average loudness. The Limiter block is derived from a compressor and uses a ratio of 100:1 to provide a fixed upper signal level.

Threshold is a decibel property that can be adjusted by dragging the yellow marker tracking the equality line on the graph. Alternatively, it can be adjusted using the numeric up-down control below the graph. The threshold is the level of the incoming signal at which the compressor amplifier changes from a unity gain amplifier into a gain reducing compressor. The compressor has no effect on the signal below the threshold level setting. Once threshold is reached, the compressor starts reducing gain based on the amount by which the signal exceeds the threshold and according to the ratio control setting. Threshold level could be thought of as the "sensitivity" of the compressor and is expressed as a specific level in dB.



Ratio is property available only in a compressor (not limiter) that can be adjusted by dragging the right-most yellow marker on the graph. Additionally, it can be adjusted using a similar up-down control as the threshold. Ratio is a way to express the degree to which the compressor is reducing dynamic range. Ratio is expressed as the change in output level for a change in input level above the threshold. A ratio of 10:1 specifies an increase of 10 dB above the threshold at the input results in a 1dB increase in the output level. Ratio is a constant value which is independent of the degree of compression taking place; the ratio of the input change to output change is constant.

Soft Knee is an option selected using the checkbox to the left of the bypass button. The level at which the compressor starts gain reduction is called the knee. A Hard Knee is a sudden change from uncompressed to compressed signal once the threshold has been reached. A Soft Knee applies a gradual level of compression and is a less obtrusive change from unity gain amplifier to compressor. Note that a soft knee will result in a small amount of compression starting around 6dB below the threshold.

Attack is a time property that is adjusted using the blue dial of the compressor configuration window, or by entering the attack time (in seconds) in the box above the attack knob. Attack time refers to the time it takes the compressor to start compressing after the threshold level has been reached. Attack time affects the sound quality in terms of overall perceived brightness or high-frequency content. With very fast attack time settings, the compressor will activate very quickly, reducing gain instantly at the waveform level.

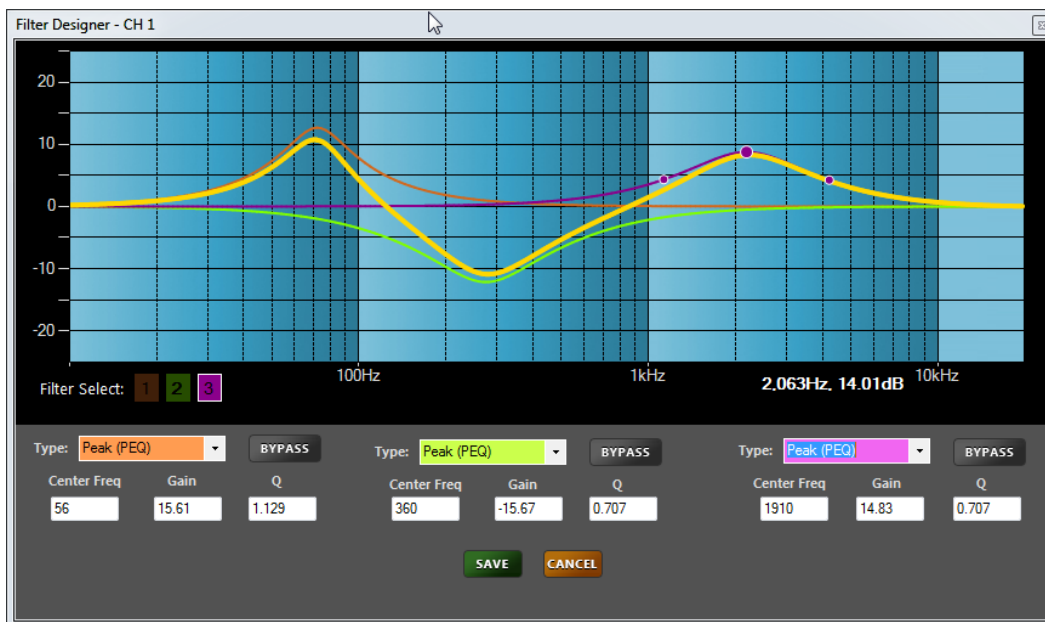
Release is a time property that is adjusted using the orange dial of the compressor configuration window, or by entering the release time (in seconds) in the box above the release knob. Release time is the time the compressor uses to return to unity gain after the input signal has fallen below threshold. It should be noted that very fast attack or release times will distort low-frequency sounds, as the compressor is capable of gain

change within one period (the 360-degree cycle of the lowest fundamental frequency) of the sound's waveform.

7.2.4.4 Filter Blocks

The Filter block is used to configure the parametric filters available on each channel. Each channel has 3 filters available on the input side (pre-mixer) and 6 filters on the output side (post-mixer). These parametric filters alter the frequency response of the audio signal using configurable parameters. These filters can be used to provide cleaner sounding audio, reduce feedback, and to protect speakers. There are 6 different parametric filter types available, low pass, high pass, low shelf, high shelf, peak, and notch. The filter type is selected via the pull down menu below the frequency response graphic.

Once a filter type is selected, it is configured by entering the filter parameters in the text boxes below the filter type box. This interface is convenient when accurate configuration of gain or center frequency is required for matching speaker specifications. The number and type of parameters will depend on the type of filter selected. Alternatively, the filter response is configured by selecting the filter control points on the frequency response graphic, dragging them to the desired position, and dropping them. See “Using the Graphical Filter Interface” below.



3 channel filter designer interface

Filter Type is a pulldown menu that selects the filter type or disables the filter (selecting Not Used).

Bypass is a button that enables or disables the filter bypass. When bypassed, the button will turn red and the filter response curve on the graphical interface will become dotted and no longer be included in the cascaded filter.

Center Frequency is the frequency in Hz at which the filter is centered. For a low pass or high pass filter, it is the corner frequency.

Gain is the gain or attenuation level of the filter in dB. This is not available on all filter types.

Slope is applicable to high/low pass filters and is the rate at which the filter rolls off above or below the cutoff frequency.

Q controls the bandwidth (affected frequency range) of various filter types. A higher Q represents a narrower bandwidth.

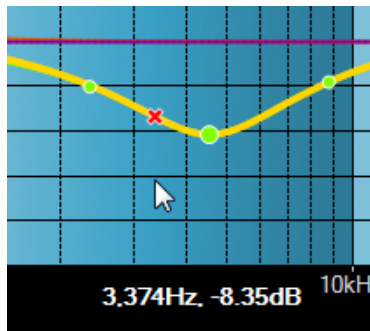
Configuration Using Graphical Interface

The graphical interface of the Filter Designer provides a visual representation of the response curves for both the individual filters as well as the cascaded filter output. Individual filter response is represented by a thin line color-matched to the filter selector in the lower standard filter interface. The cascaded output is represented by a thicker yellow line. Bypassed filters are displayed with a dotted line and are not included in the cascaded output.

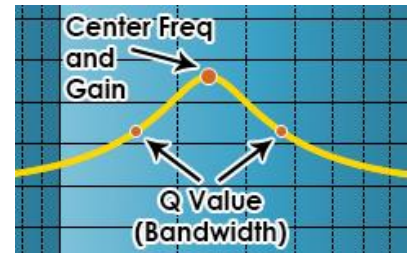
A filter is selected for editing on the graph by using the Filter Select buttons in the lower left-hand portion of the graphical interface. Only filters that are active are displayed in the filter select. Clicking on a filter number will display the control points (drag markers) for the active filter.



When a filter is selected, drag markers appear for that filter to allow configuration of center frequency, gain, and bandwidth (Q).

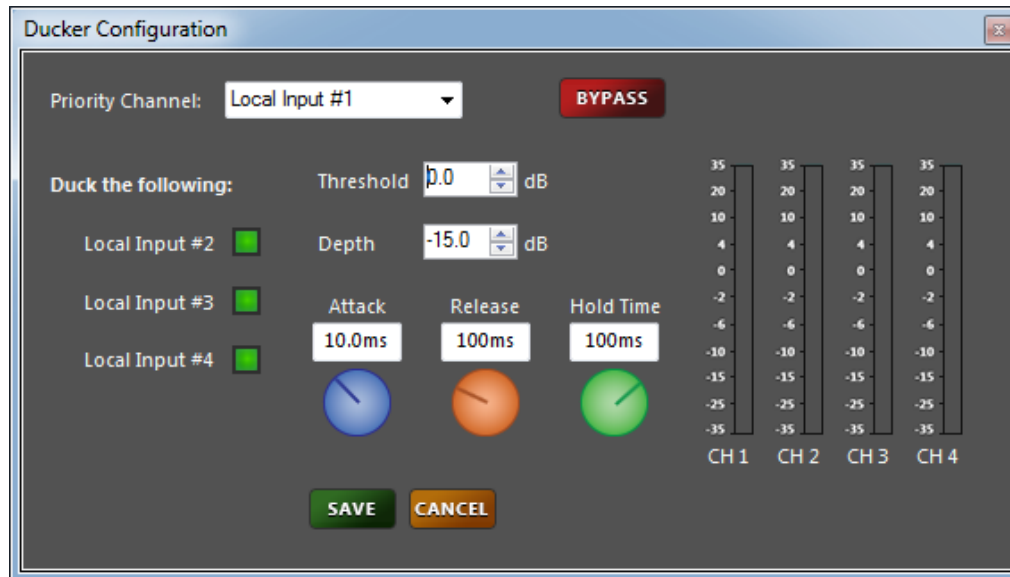


To check values on the cascaded filter frequency response, click anywhere on the graph (other than on drag markers) and red crosshairs will appear on the cascaded filter moving the mouse horizontally will drag the crosshairs along frequency axis displaying the gain level at the corresponding frequency.



7.2.4.5 Ducker Block

The Ducker allows prioritization of one audio channel over other channels. Applications include prioritizing microphone or paging audio over other audio programs.



Priority Channel is a dropdown to select the channel which is given priority and which will activate the ducking (attenuation) of other selected channels, when the signal level of the priority channel reaches the set threshold. The dropdown menu will display the name set in the channel's input configuration.

Duck the Following: Select the channel or channels that will be ducked when the priority channel signal level reaches the threshold. Only the channels where the checkbox is checked (green) will be attenuated by the ducker.

Threshold is a decibel property that can be adjusted using the numeric up-down control. The threshold is the level of the priority channel signal at which the ducker will attenuate non-priority channel signals. Threshold level could be thought of as the "sensitivity" of the ducker and is expressed as a specific level in dB.

Depth is a decibel property that can be adjusted using the numeric up-down control. The depth is the amount of attenuation to be applied to non-priority channels once the priority channel signal has reached the threshold.

Attack is a time property that is adjusted using the blue dial of the ducker configuration window or by entering the time (in seconds) in the textbox. Attack time refers to the time it takes the ducker to start attenuating non-priority channels after threshold has been reached on the priority channel.

Release is a time property that is adjusted using the orange dial of the ducker configuration window, or by entering the time (in seconds) in the textbox. Release time is the time the ducker uses to return non-

priority channels to their previous gain after the priority channel signal has fallen below threshold *and* the hold time has elapsed.

Hold Time is a time property that is adjusted using the green dial of the ducker configuration window, or by entering the time (in seconds) in the textbox. Hold time is the time that the ducker will hold attenuation of non-priority channels after the priority channel signal has fallen below the threshold. This time allows for pauses between spoken words or audio tracks on the priority channel. Increase this time if non-priority signals are momentarily cutting through the priority channel during brief pauses in audio.

7.2.4.6 Output Configuration Block

The Output Configuration block configures the display properties of a local output and the RS-232 volume control. It can also be used to reset the RS-232 levels to 0 dB attenuation, unmuted.

Display Name is an editable textbox that accepts all alphanumeric characters as well as a limited number of special characters. When edited, the display name will update on the output label.

CH 1 - Output Configuration



The window shows configuration for 'Output #1'. It includes a 'Display Name' field with 'Output #1', an 'RS232 Mute' dropdown set to 'Unmuted', and an 'RS232 Level' dropdown set to '0dB'. There are 'Refresh', 'RESET', and 'SAVE' buttons.

RS232 Mute: Shows the RS-232 mute status for the channel.

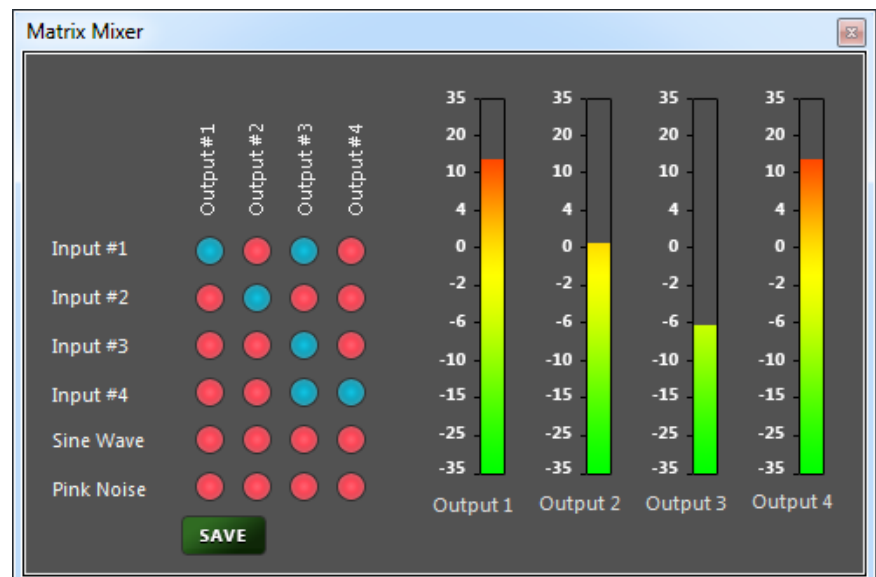
RS232 Level: Shows the RS-232 level (attenuation) status for the channel.

Reset: Pressing this button resets the RS-232 settings on all channels to 0 dB attenuation and unmuted.

7.2.4.7 Mixer Block

The mixer block allows the configuration and monitoring of the matrix mixer which mixes and routes input signals and signal generators to the output busses. Any inputs (local or network) may be routed to any output(s) at any desired level.

Mixer Matrix consists of small round buttons that route the input signal on the left to the output across the top. The inputs are on the left-hand side of the matrix while the outputs are listed across the top. Muted crosspoints will display as red while unmuted crosspoints display as blue. When a crosspoint is selected, a gain slider window will open, allowing the user to set the gain (attenuation) for that input



signal appearing at the mixer output.

Signal Generators are included on the input list in order to provide signals for testing purposes. The generators include a sine wave and pink noise generated at 0dB. The frequency of the sine wave is fixed at 1kHz and is not adjustable.

Signal Meter displays the current RMS signal level in dBV of the mixed audio output.

8 Specifications

Max. Output Power (all channels driven)

FLX-E-80-4-LZ and FLX-E-80-4-LZ-D	▪ 80W _{RMS} x 4 @ 4/8Ω
FLX-E-80-4-CV and FLX-E-80-4-CV-D	▪ 80W _{RMS} x 4 @ 70.7V/100V (selectable)
FLX-E-160-2-LZ and FLX-E-160-2-LZ-D	▪ 160W _{RMS} x 2 @ 4/8Ω
FLX-E-160-2-CV and FLX-E-160-2-CV-D	▪ 160W _{RMS} x 2 @ 70.7V/100V (selectable)
FLX-E-320-1-CV and FLX-E-320-1-CV-D	▪ 320W _{RMS} x 1 @ 70.7V/100V (selectable)

Performance

Frequency Response (+0, -3dB)	▪ 20Hz – 20kHz 4/8 Ω, ▪ 100Hz – 20kHz 70.7V/100V
THD + N	▪ <0.05% @ 6dB below clipping
Signal to Noise Ratio	▪ >95dB
Input Sensitivity (local inputs)	▪ 1V (0dBV)
Input Impedance (Balanced/Single-ended/Phantom)	▪ 7.2kΩ/3.6kΩ/2.4kΩ
Channel-to-Channel Isolation (Crosstalk)-----	▪ >60dB FLX-E-80-4 ▪ >85dB FLX-E-160-2
Dante™ Audio Sampling Rates	▪ 44.1, 48, 88.2, 96, 176.4, 192 ksps
Remote Volume Control	▪ 0-10VDC
Input Connectors	▪ 3.5mm Euroblock; 24V Phantom Power on 2 channels
Dante™/AES67 Network Audio (optional)and Control Port	▪ RJ-45
Output Connectors	▪ 5mm Euroblock
Amplifier Class-----	▪ D
Control and Status-----	▪ RVC, RS-232 and Ethernet
Power Draw/Dissipation Idle	▪ 12W/12W
1/8 Rated Audio Power	▪ 60W/20W
LED Indicators -----	▪ Power
Power Supply Input -----	▪ 100-240VAC 50/60Hz (PFC Universal Input)
Construction -----	▪ Aluminum Chassis
Mounting -----	▪ Single and Dual Rack Mount (optional)
Cooling -----	▪ Convection (no fan)
Dimensions (excluding rack mounts) -----	▪ 1.7" H x 8.3" W x 10.7" D (44 x 213 x 272mm)
Weight-----	
All –LZ models	▪ 3.4 lbs. (1.6 kg)
FLX-E-80-4-CV and FLX-E-80-4-CV-D	▪ 5.9 lbs. (2.7 kg)
FLX-E-160-2-CV and FLX-E-160-2-CV-D	▪ 5.3 lbs. (2.4 kg)
FLX-E-320-1-CV and FLX-E-320-1-CV-D	▪ 4.9 lbs (2.2 kg)
Warranty-----	▪ 3 years

9 Warranty Information

9.1 Warranty Summary

All Stewart Audio amplifiers and accessories, unless excluded in this summary, are covered by a 3-year limited warranty on parts and labor from the date of purchase. In order to be eligible for warranty repairs, the amplifiers and accessories must have been purchased through an authorized Stewart Audio dealer and submitted by the original purchaser. This warranty is only valid in the country in which the amplifier was purchased.

9.2 Eligibility Requirements

Stewart Audio warrants against all malfunctions which come as a result of component or manufacturer defect. The amplifier is also covered from all failures which arise during the warranty period (3 years from date of purchase) that are not a result of misuse. The following actions will void your warranty:

- The power cord or AC plug has been damaged through misuse.
- The amplifier has been exposed to moisture or extreme temperatures.
- The amplifier has been dropped, items have been dropped on the amplifier, or the enclosure has been damaged.
- The amplifier has been opened by the operator.
- The amplifier was improperly packaged when sending to the factory for repair, resulting in damage.
- Any of the precautions or instructions found in this manual were not followed.

Damages resulting to the amplifier which are not covered under this warranty can be factory-repaired at cost to the customer. Use the contact information below to initiate the repair process.

9.3 Non-warranty Repairs

An estimate for all non-warranty repairs will be provided to the customer once the unit has been shipped to the factory. The customer is responsible to approve this estimate within 7 days. If the repairs are not approved within 14 days, Stewart Audio reserves the right to consider the unit scrap and may discard it. Payment for non-warranty repairs must be submitted to Stewart Audio before the product will be returned to the customer.

10 Return Procedure

All returns to the factory for service must be accompanied by a Return Authorization (RA) number. One can be obtained by contacting Stewart Audio at (209) 588-8111 or via e-mail at support@stewartaudio.com.

NOTE: Any defective products received without an RA number will be returned to sender at

their expense.

If Stewart Audio is unable to contact the sender in 14 days, the merchandise will be considered scrap and may be disposed of.

10.1 Shipment Instructions

- If Stewart Audio requests that you ship the defective product back to their service center, please refer to the guide below. To ensure prompt warranty service, be sure to follow all instructions.
- Return Authorization (RA) is required for product being sent to the factory for service.
- See packing instructions in **Section 9.2.**
- Ship the defective product using a method which provides for order tracking or order confirmation. The service center is located at the following address:

Stewart Audio
14335 Cuesta Court Suite C
Sonora, CA 95370

- Use a bold black marker and write the RA number on three sides of the box.

Record the RMA number for future reference. The RA number can be used to check the repair status.

10.2 Packaging Instructions

Should Stewart Audio request that you ship your product to their service center, these instructions must be followed in order to ensure safe delivery. If they are not followed, Stewart Audio assumes no responsibility for damaged goods and/or accessories that are sent with your unit.

1. Please write the RA number on three sides of the box. Include the Stewart Audio RA number inside the box and a brief description of the problem.
2. You will be advised during the RA process what accessories should be included with the amplifier (power supplies, connectors, cords, etc.). This is dependent on the failure assessment.
3. When shipping your amplifier, it is important that it has adequate protection. We recommend you use the original packing material when returning the product for repair. If you do not have the original box, see number 4.
4. If you provide your own shipping pack, use materials adequate to prevent damage during transit. Make certain that the amplifier is NOT free to move within the package, as this is the most common cause of damage.
5. Securely seal the package with an adequate carton sealing tape.
6. Do not use light boxes or “peanuts”.

NOTE: Damage caused by poor packaging will not be covered under warranty.

11 Appendix A—Maximum Speaker Cable Length Tables

Because speaker wires have a finite resistance per unit length, long cables will affect SPL. This is more important for low impedance speakers, since a few tenths of Ohms corresponds to a larger fraction of the speaker impedance, but should still be considered for high impedance systems.

The following tables can be used as a rule-of-thumb to determine the maximum speaker cable length (in feet) for various systems. First, consult the appropriate table for the type of system; low impedance, 25V, 70.7V or 100V. Find the column corresponding to the average power level to be delivered to the speakers. (For 25V, 70.7V and 100V systems, the tables assume the entire load is located at the maximum distance.) Scan down the column until you reach the required cable length, and scan across to find the appropriate wire gauge. This will result in an approximately 0.5dB loss in SPL.

4Ω, 8Ω and 16Ω Speaker Lines (length in feet)			
Wire gauge	4Ω Speaker load (W)	8Ω Speaker load (W)	16Ω Speaker load (W)
10	120	240	480
12	75	150	300
14	50	100	200
16	30	60	120
18	20	40	80
20	12.5	25	50
22	8	16	32

25V Speaker Line (length in feet)									
Wire gauge	7.5W Load	15W Load	30W Load	60W Load	100W Load	125W Load	250W Load	400W Load	500W Load
10	2500	1250	625	313	188	138	69	46	34
12	1550	775	388	194	118	94	47	29	23
14	950	475	238	119	75	56	28	18	14
16	600	300	150	75	46	36	18	11	X
18	375	188	94	47	29	23	11	X	X
20	240	120	60	30	19	14	X	X	X
22	150	75	38	19	12	X	X	X	X

70.7V Speaker Line (length in feet)									
Wire gauge	7.5W Load	15W Load	30W Load	60W Load	100W Load	125W Load	250W Load	400W Load	500W Load
10	20,000	10,000	5,000	2,500	1,500	1,100	550	365	275
12	12,400	6,200	3,100	1,550	940	750	375	230	185
14	7,600	3,800	1,900	950	600	450	225	140	110
16	4,800	2,400	1,200	600	370	290	145	90	X
18	3,000	1,500	750	375	230	180	90	X	X
20	1,920	960	480	240	150	110	X	X	X
22	1,200	600	300	150	95	X	X	X	X

100V Speaker Line (length in feet)									
Wire gauge	7.5W Load	15W Load	30W Load	60W Load	100W Load	125W Load	250W Load	400W Load	500W Load
10	40,000	20,000	10,000	5,000	3,000	2,200	1,100	730	550
12	24,800	12,400	6,200	3,100	1,880	1,500	750	460	370
14	15,200	7,600	3,800	1,900	1,200	900	450	280	220
16	9,600	4,800	2,400	1,200	740	580	290	180	X
18	6,000	3,000	1,500	750	460	360	180	X	X
20	3,840	1,920	960	480	300	220	X	X	X
22	2,400	1,200	600	300	190	X	X	X	X

Shaded cells indicate a violation of the Maximum Current Rating in the National Electrical Code (NEC) and must not be used.

12 Appendix B—FLX-E Ethernet Communications Interface (API) – Rev 1.0

- All data is sent in binary, not ASCII format.
- All floating-point data is sent as a 32-bit (4-bytes) IEEE floating-point number, little-endian format.
- Each command is started by a Start-of-Message byte with a value of 0x1E.
- The next two bytes are the integer length of the payload section, sent little-endian format.
- Following the payload length bytes is a one-byte message sequence number. This is an 8-bit number controlled from the host-side application. In the Stewart Audio FLX-E application, this number is incremented on every message, and rolls over to zero, once it hits 255. The same sequence number is returned by the device-side. It allows the host-side to know which response a received message applies to.
- The next byte is a one-byte command code, followed by the appropriate number of data bytes for that command.
- The final byte of the packet, after any required payload, is a one-byte checksum. This checksum is the 8-bit sum of the bytes starting with the first byte of the payload length field, through the end of any payload data.
- Every command returns a response.
- All the change mute value/status commands will be blocked if the external mute input line to the box is in the active state. The error response to the command will be returned in that case.
- Once a connection has been made to the device, if the device doesn't receive a message for thirty seconds, it will timeout and close the connection. A new connection to the device would then have to be opened.

The GET SYSTEM STATUS message is the recommended choice for the “keep-alive” message.

Commands

1. INVALID COMMAND RESPONSE

Command code: 0x02

Description: returned if the device receives a command with an unrecognized command code

Input parameters – never sent by host - response only

FLX-E sent data

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x02 *low byte of payload length*

Byte 2 = 0x00 *high byte of payload length*

Byte 3 = 0xFF *message sequence number*

Byte 4 = 0x02 *command code*

Byte 5 = 0xXX *8-bit sum of bytes 1 through 4*

2. INVALID PARAMETER RESPONSE

Command code: 0x03

Description: returned in the device receives a command packet with bad parameters

Input parameters – never sent by host - response only

FLX-E sent data

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x02 *low byte of payload length*

Byte 2 = 0x00 *high byte of payload length*

Byte 3 = 0xXX *message sequence number*

Byte 4 = 0x03 *command code*

Byte 5 = 0xXX *8-bit sum of bytes 1 through 4*

3. GET SYSTEM STATUS

Command code: 0x05

Description: command used to get the current system status

Host sent data

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x02 *low byte of payload length*

Byte 2 = 0x00 *high byte of payload length*

Byte 3 = 0xXX *message sequence number*

Byte 4 = 0x05 *command code*

Byte 5 = 0xXX *8-bit sum of bytes 1 through 4*

FLX-E Response

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x0D *low byte of payload length*

Byte 2 = 0x00 *high byte of payload length*

Byte 3 = 0xXX *message sequence number*

Byte 4 = 0x05 *command code*

Byte 5 = 0xXX *current program number*

Bytes 6...9 = *floating-point amp chip temp in deg C*

Bytes 10...13 = *floating-point MCU chip temp in deg C*

Byte 14 = 0xXX *device model code*

Byte 15 = 0xXX *amp state code*

Byte 16 = 0xXX *8-bit sum of bytes 1 through 15*

Device Model Codes:

0 = INVALID DEVICE TYPE

1 = FLX-E 80 4 LZ,

2 = FLX-E 80 4 CV,

3 = FLX-E 160 2 LZ,

4 = FLX-E 160 2 CV,

5 = FLX-E 320 1 CV,

6 = FLX-E 80 4 LZ Dante,

7 = FLX-E 80 4 CV Dante,

8 = FLX-E 160 2 LZ Dante,

9 = FLX-E 160 2 CV Dante,

10 = FLX-E 320 1 CV Dante,

Amp State Code:

0 = POWER UP

1 = NORMAL

2 = AMP OVERTEMP WARNING

3 = AMP OVERTEMP SHUTDOWN

4 = AMP OVERTEMP SHUTDOWN RECOVERY DELAY

5 = AMP OVERLOAD SHUTDOWN

6 = CHANNEL RESET DELAY

7 = CHANNELS DISABLED

8 = CHANNELS RESET TO NORMAL

9 = SYSTEM WAKEUP

10 = SYSTEM LOAD TEST

11 = SYSTEM IN OVERTEMP WARNING

12 = SYSTEM IN OVERTEMP SHUTDOWN

13 = AMP IN OVERLOAD DISABLE

4. START LOAD TEST

Command code: 0x2A

Description: command to start a system load test

Host sent data

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x03 *low byte of payload length*

Byte 2 = 0x00 *high byte of payload length*

Byte 3 = 0xFF *message sequence number*

Byte 4 = 0x2A *command code*
 Byte 5 = 0x02 *take load test values*
 Byte 6 = 0xFF *8-bit sum of bytes 1 through 6*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x50 *command code*
 Byte 5 = 0xFF *command response, 0 = error, 1 = success*
 Byte 6 = 0xFF *8-bit sum of bytes 1 through 5*

5. DECREASE ATTENUATION 3 dB

Command code: 0x2E

Description: command used to decrease system attenuation by 3 dB

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x2E *command code*
 Byte 5 = 0xFF *channel number*
 Byte 6 = 0xFF *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x2E *command code*
 Byte 5 = 0xFF *command response, 0 = error, 1 = success*
 Byte 6 = 0xFF *8-bit sum of bytes 1 through 5*

6. INCREASE ATTENUATION 3 dB

Command code: 0x2F

Description: command used to increase system attenuation by 3 dB

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x2F *command code*
 Byte 5 = 0xFF *channel number*
 Byte 6 = 0xFF *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x2F *command code*
 Byte 5 = 0xFF *command response, 0 = error, 1 = success*
 Byte 6 = 0xFF *8-bit sum of bytes 1 through 5*

7. DECREASE ATTENUATION 1 dB

Command code: 0x30

Description: command used to decrease system attenuation by 1 dB

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x30 *command code*
 Byte 5 = 0xFF *channel number*
 Byte 6 = 0xFF *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xXX *message sequence number*
 Byte 4 = 0x30 *command code*
 Byte 5 = 0xXX *command response, 0 = error, 1 = success*
 Byte 6 = 0xXX *8-bit sum of bytes 1 through 5*

8. INCREASE ATTENUATION 1 dB

Command code: 0x31

Description: command used to increase system attenuation by 1 dB

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xXX *message sequence number*
 Byte 4 = 0x31 *command code*
 Byte 5 = 0xXX *channel number*
 Byte 6 = 0xXX *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xXX *message sequence number*
 Byte 4 = 0x31 *command code*
 Byte 5 = 0xXX *command response, 0 = error, 1 = success*
 Byte 6 = 0xXX *8-bit sum of bytes 1 through 5*

9. SET DISCRETE ATTENUATION

Command code: 0x32

Description: command used to set the system attenuation to a specified value

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Parameter 2 - 8-bit integer value for desired attenuation, 0...80

Sending a value of 80 will set the attenuation to -80dB.

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x04 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x32 *command code*
 Byte 5 = 0xFF *channel number*
 Byte 6 = 0x3C *set attenuation to -60dB (0x3C = +60 decimal)*
 Byte 7 = 0xFF *8-bit sum of bytes 1 through 6*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x32 *command code*
 Byte 5 = 0xFF *command response, 0 = error, 1 = success*
 Byte 6 = 0x35 *8-bit sum of bytes 1 through 5*

10. GET CHANNEL ATTENUATION

Command code: 0x33

Description: command used to get the attenuation for a specified channel

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 3 = 0x33 *command code*
 Byte 4 = 0xFF *channel number*
 Byte 5 = 0xFF *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x04 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*

Byte 3 = 0x33 *command code*
 Byte 4 = 0xXX *channel number*
 Byte 5 = 0x32 *example: attenuation is -50dB (0x32 = 50 decimal)*
 Byte 6 = 0xXX *8-bit sum of bytes 1 through 6*

11. GET CURRENT PROGRAM NUMBER

Command code: 0x38

Description: command used to get the current device program number

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x02 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xXX *message sequence number*
 Byte 3 = 0x38 *command code*
 Byte 4 = 0xXX *8-bit sum of bytes 1 through 3*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x04 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xXX *message sequence number*
 Byte 4 = 0x38 *command code*
 Byte 5 = 0xXX *low-order 8-bits of current program number*
 Byte 6 = 0xXX *high-order 8-bits of current program number*
 Byte 7 = 0xXX *8-bit sum of bytes 1 through 6*

12. SET CURRENT PROGRAM NUMBER

Command code: 0x39

Description: command used to set the current device program number (0...9)

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x02 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xXX *message sequence number*
 Byte 4 = 0x39 *command code*
 Byte 5 = 0xXX *low-order 8-bits of desired program number*
 Byte 6 = 0xXX *high-order 8-bits of desired program number*

Byte 7 = 0xXX *8-bit sum of bytes 1 through 6*

FLX-E Response

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x03 *low byte of payload length*

Byte 2 = 0x00 *high byte of payload length*

Byte 3 = 0xXX *message sequence number*

Byte 4 = 0x38 *command code*

Byte 5 = 0xXX *command response, 0 = error, 1 = success*

Byte 7 = 0xXX *8-bit sum of bytes 1 through 5*

13. TOGGLE CHANNEL MUTE

Command code: 0x45

Description: command used to toggle mute on specified channel

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x03 *low byte of payload length*

Byte 2 = 0x00 *high byte of payload length*

Byte 3 = 0xXX *message sequence number*

Byte 4 = 0x45 *command code*

Byte 5 = 0xXX *channel number*

Byte 7 = 0xXX *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*

Byte 1 = 0x03 *low byte of payload length*

Byte 2 = 0x00 *high byte of payload length*

Byte 3 = 0xXX *message sequence number*

Byte 4 = 0x45 *command code*

Byte 5 = 0xXX *command response, 0 = error, 1 = success*

Byte 6 = 0xXX *8-bit sum of bytes 1 through 5*

14. GET LOAD TEST RESULTS

Command code: 0x4F

Description: command used to request result from load test

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x02 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x4F *command code*
 Byte 5 = 0xFF *8-bit sum of bytes 1 through 4*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x22 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xFF *message sequence number*
 Byte 4 = 0x4F *command code*
 Byte 5 = 0xFF *0 = load test data not available, 1 = data available*
 Byte 6 = 0x02 *data is load test data*
(if byte 5 is zero, then there is no more data in the message)
 Byte 7 = 0xFF *reference value timestamp seconds*
 Byte 8 = 0xFF *reference value timestamp minutes*
 Byte 9 = 0xFF *reference value timestamp hours*
 Byte 10 = 0xFF *reference value timestamp day*
 Byte 11 = 0xFF *reference value timestamp month*
 Byte 12 = 0xFF *reference value timestamp year*
 Byte 13 = 0xFF *channel 1 baseline value low-order 8-bits*
 Byte 14 = 0xFF *channel 1 baseline value high-order 8-bits*
 Byte 15 = 0xFF *channel 1 reference value low-order 8-bits*
 Byte 16 = 0xFF *channel 1 reference value high-order 8-bits*
 Byte 17 = 0xFF *channel 1 load-test value low-order 8-bits*
 Byte 18 = 0xFF *channel 1 load-test value high-order 8-bits*
 Byte 19 = 0xFF *channel 2 baseline value low-order 8-bits*
 Byte 20 = 0xFF *channel 2 baseline value high-order 8-bits*
 Byte 21 = 0xFF *channel 2 reference value low-order 8-bits*
 Byte 22 = 0xFF *channel 2 reference value high-order 8-bits*
 Byte 23 = 0xFF *channel 2 load-test value low-order 8-bits*
 Byte 24 = 0xFF *channel 2 load-test value high-order 8-bits*
 Byte 25 = 0xFF *channel 3 baseline value low-order 8-bits*
 Byte 26 = 0xFF *channel 3 baseline value high-order 8-bits*
 Byte 27 = 0xFF *channel 3 reference value low-order 8-bits*
 Byte 28 = 0xFF *channel 3 reference value high-order 8-bits*

Byte 29 = 0xXXchannel 3 load-test value low-order 8-bits
 Byte 30 = 0xXXchannel 3 load-test value high-order 8-bits
 Byte 31 = 0xXXchannel 4 baseline value low-order 8-bits
 Byte 32 = 0xXXchannel 4 baseline value high-order 8-bits
 Byte 33 = 0xXXchannel 4 reference value low-order 8-bits
 Byte 34 = 0xXXchannel 4 reference value high-order 8-bits
 Byte 35 = 0xXXchannel 4 load-test value low-order 8-bits
 Byte 36 = 0xXXchannel 4 load-test value high-order 8-bits
 Byte 37 = 0xXX8-bit sum of bytes 1 through 36

15. CHANNEL MUTE ON

Command code: 0x50

Description: command used to mute a specified channel

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xXX *message sequence number*
 Byte 4 = 0x50 *command code*
 Byte 5 = 0xXX *channel number*
 Byte 7 = 0xXX *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*
 Byte 1 = 0x03 *low byte of payload length*
 Byte 2 = 0x00 *high byte of payload length*
 Byte 3 = 0xXX *message sequence number*
 Byte 4 = 0x50 *command code*
 Byte 5 = 0xXX *command response, 0 = error, 1 = success*
 Byte 6 = 0xXX *8-bit sum of bytes 1 through 5*

16. CHANNEL MUTE OFF

Command code: 0x51

Description: command used to unmute a specified channel

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1...4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*
Byte 1 = 0x03 *low byte of payload length*
Byte 2 = 0x00 *high byte of payload length*
Byte 3 = 0xFF *message sequence number*
Byte 4 = 0x51 *command code*
Byte 5 = 0xFF *channel number*
Byte 7 = 0xFF *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*
Byte 1 = 0x03 *low byte of payload length*
Byte 2 = 0x00 *high byte of payload length*
Byte 3 = 0xFF *message sequence number*
Byte 4 = 0x51 *command code*
Byte 5 = 0xFF *command response, 0 = error, 1 = success*
Byte 6 = 0xFF *8-bit sum of bytes 1 through 5*

17. GET CHANNEL MUTE

Command code: 0x52

Description: command used to get the mute status for a specified channel

Input parameters –

Parameter 1 - 8-channel number, 0 = master channel, 1..4 is single channel

Host sent data

Byte 0 = 0x1E *start of message character*
Byte 1 = 0x03 *low byte of payload length*
Byte 2 = 0x00 *high byte of payload length*
Byte 3 = 0xFF *message sequence number*
Byte 4 = 0x52 *command code*
Byte 5 = 0xFF *channel number*
Byte 6 = 0xFF *8-bit sum of bytes 1 through 5*

FLX-E Response

Byte 0 = 0x1E *start of message character*
Byte 1 = 0x04 *low byte of payload length*
Byte 2 = 0x00 *high byte of payload length*
Byte 3 = 0xFF *message sequence number*

Byte 4 = 0x52 *command code*
Byte 5 = 0xXX *channel number*
Byte 6 = 0x01 *mute state is on*
Byte 7 = 0xXX *8-bit sum of bytes 1 through 6*