



**Fredenstein**  
*Professional Audio*

**F610**  
**Universal Entzerrer**  
**UE-1**

**Operating Manual**

# Fredenstein F610 Universal Entzerrer UE-1

The Fredenstein F610 Universal Entzerrer UE-1 is a digital controlled stereo analog quad band equalizer and 30 band spectrum analyzer in a double wide 500 series cassette.

For the first time in a 500 series module, we were able to implement a high resolution 3.5" LCD color display including a capacitive touch controller, thus welcoming the 500 Series to the 21st century.

The four filters are all identical and each can be tuned from 20 Hz to 20 KHz. The encoder rotary frequency knob allows access to about 190 different frequencies per filter, while the USB interface allows for 1 Hz frequency resolution. The maximum filter gain is +/- 16 dB. In case more gain is needed, additional filters can be set at the same frequency for a ridiculous up to 64 dB boost or cut. The Q-factor of each filter can be varied from 0.4 to 7.9. The gain can be adjusted from -16 dB to +16 dB in 0.25 dB steps, clearly fulfilling the demands of modern sophisticated mastering. The Filter 1 characteristic can be changed from band-pass to low-shelf and Filter 4 to high-shelf. In addition, a variable 2<sup>nd</sup> order low-cut filter with a range from 20 Hz to 975 Hz is provided as well as a "Color" function giving a tube-like sound. The hard bypass allows for quick evaluation of the eq'ed results.

The 30-band spectrum analyzer features a 60 dB dynamic range with select-able sensitivity from +6 dBu to + 24 dBu in 6 dB steps. The choice to feed either the input or the output signal to the analyzer adds to the versatility of the F610.

Up to 99 complete settings can be stored in the internal non-volatile memory and a Micro-USB interface provides complete control from a connected host computer via RS232 over USB.

The F610 UE-1 name is an homage to the classic K&H UE-100. "Entzerrer" is the German technical term for equalizer.

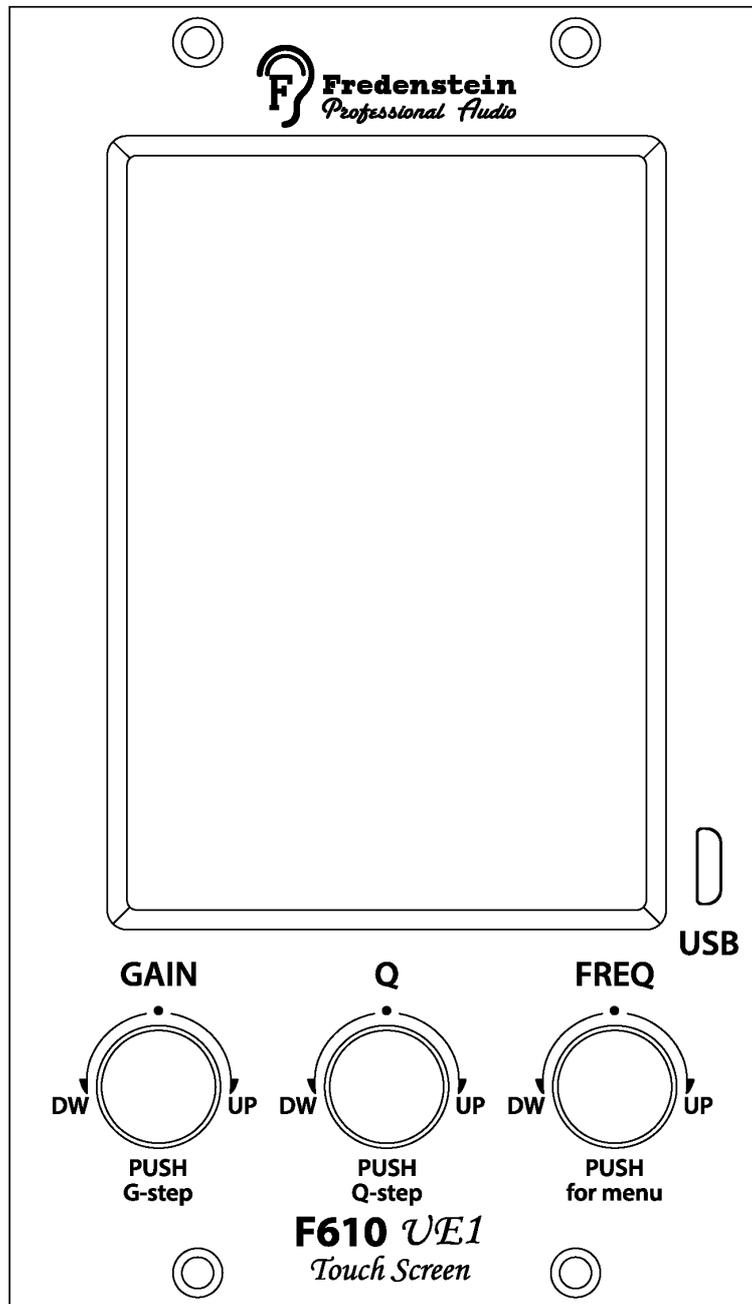
## **Installation:**

**First, please power down your rack or box before inserting the F610. The power requirements are maximum +/-16V, +/-400mA. In case you don't use a Fredenstein Bento 6(D)S or Bento 10 (D)S, please make sure your box or rack can support the current. Bento 2 is not compatible with the F610. Please consult your third party documentation in case of any doubt. Don't forget to fasten the F610 securely to the rack with 4 rack screws.**

The operating temperature of the F610 should stay below 60C / 140F. The temperature can be displayed through the menu system (see Setup Menu section, page ). In case the temperature reaches 60C /140F, please try to increase the airflow of your rack. A fan will kick in at 60C / 140F to prevent overheating.

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## Front View

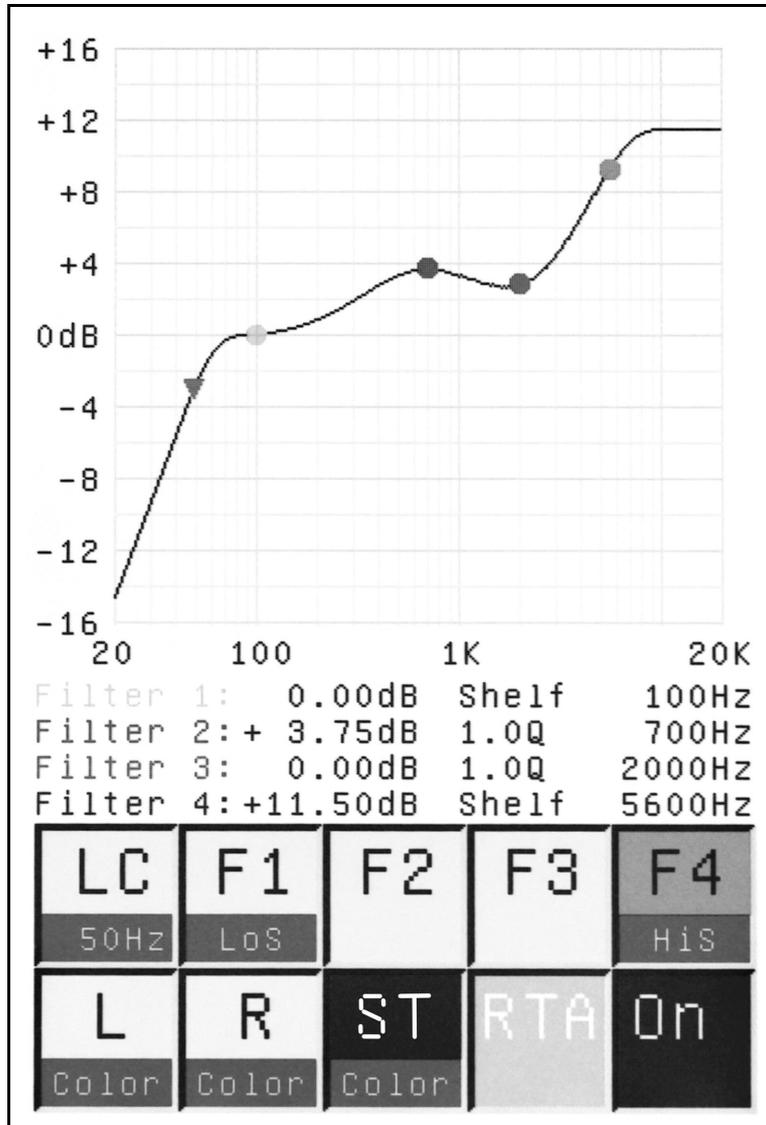


The user interface of the F610 UE-1 consists of a 3.5 inch TFT LCD touch screen with a resolution of 320 by 480 pixels. The touch screen is capacitive for superior precision and responsiveness. In addition, three rotary encoder for gain, Q-factor, and filter frequencies provide a traditional user interface for the most important parameters. The Micro-USB connector is located at the lower right side of the LCD.

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## Equalizer Screen

After booting, the main equalizer screen is displayed:



In the upper part of the screen, the frequency response of the F610 is plotted. Please note: the vertical axis automatically re-scales to up to +/- 64 dB. Touching the RTA field switches to the real-time analyzer mode (see details in the analyzer section of this manual, page 7).

The horizontal frequency axis is displayed on a logarithmic scale.

Between the graph area and the touch fields, the current status of all four filters is displayed.

For easy differentiation between the filters, they are color-coded. The center or shelving frequencies are marked with dots and the low-cut filter is marked by a small triangle. Please note that shelving filter frequencies are defined at -3 dB from the shelving plateau, the low-cut filter cut-off frequency is at -3 dB from the pass band. toggle the "Color" function. A second touch of the channel fields, toggles the color function of the selected channel. Color produces a tube like sound, more mellow and smooth without changing the frequency response by adding harmonics to the spectrum.

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In the lower part of the screen, there are ten touch fields:

**LC:** First touch to select the low-cut filter, second touch to toggle the low-cut functionality on or off. If the low-cut filter is enabled, the lower third of the LC touch field is yellow and states the low-cut frequency. The frequency can then be varied from 20 Hz to 975 Hz by the rightmost knob, just below the screen, labeled "FREQ".

**F1:** First touch to select Filter 1, second touch to toggle the low-shelf functionality on or off. If the low-shelf filter is enabled, the lower third of the F1 touch field is yellow and states "LoS" (Low-Shelf). In regular band-pass filter mode, the gain, q-factor and frequency can be varied with the three knobs below the display, from left to right: Gain, Q-factor, and Frequency. In shelving mode the Q-factor control is disabled.

**F2:** Touch to select Filter 2. Filter 2 is always a band-pass filter. When the F2 touch field is lit, the three control knobs below the display can be used to change the parameters

**F3:** Touch to select Filter 3. Filter 3 is always a band-pass filter. When the F3 touch field is lit, the three control knobs below the display can be used to change the parameters

**F4:** First touch to select Filter 4, second touch to toggle the high-shelf functionality on or off. If the high-shelf filter is enabled, the lower third of the F4 touch field is yellow and states "HiS" (High-Shelf). In regular band-pass filter mode, the gain, Q-factor and frequency can be varied with the three knobs below the display. In shelving mode the Q-factor control is disabled.

**L:** First touch to select the left channel and enable the two channel mode. In two channel mode the F610 allows for different parameters in the left and right channels. When the L touch field is lit, the three control knobs below the display can be used to change the parameters of the selected filter of the left channel. Second touch to toggle the color function of the left channel.

**R:** First touch to select the right channel and enable the two channel mode. In two channel mode the F610 allows for different parameters in the left and right channels. When the R touch field is lit, the three control knobs below the display can be used to change the parameters of the selected filter of the right channel. Second touch to toggle the color function of the right channel.

**ST:** First touch to select the Stereo mode. In the Stereo channel mode the parameters of the left and right channels are identical. When the ST touch field is lit, the three control knobs below the display can be used to change the parameters of the selected filter of the Stereo channel. The Stereo channel is a virtual third channel and does not change the parameters of the L or R channel. Second touch to toggle the color function of the Stereo channel.

**RTA:** Touch to toggle the "Color" function. When the Col touch field is lit, the color function is enabled. Color produces a tube like sound, more mellow and smooth without changing the frequency response by adding harmonics to the spectrum.

**On / Off:** Toggles the hard bypass functionality. If ON is displayed inside the touch field, the corresponding channel (L, R, or ST) is activated, if OFF is displayed, the hard bypass mode is selected. This allows for quick comparisons of the source signal and the eq'ed result.

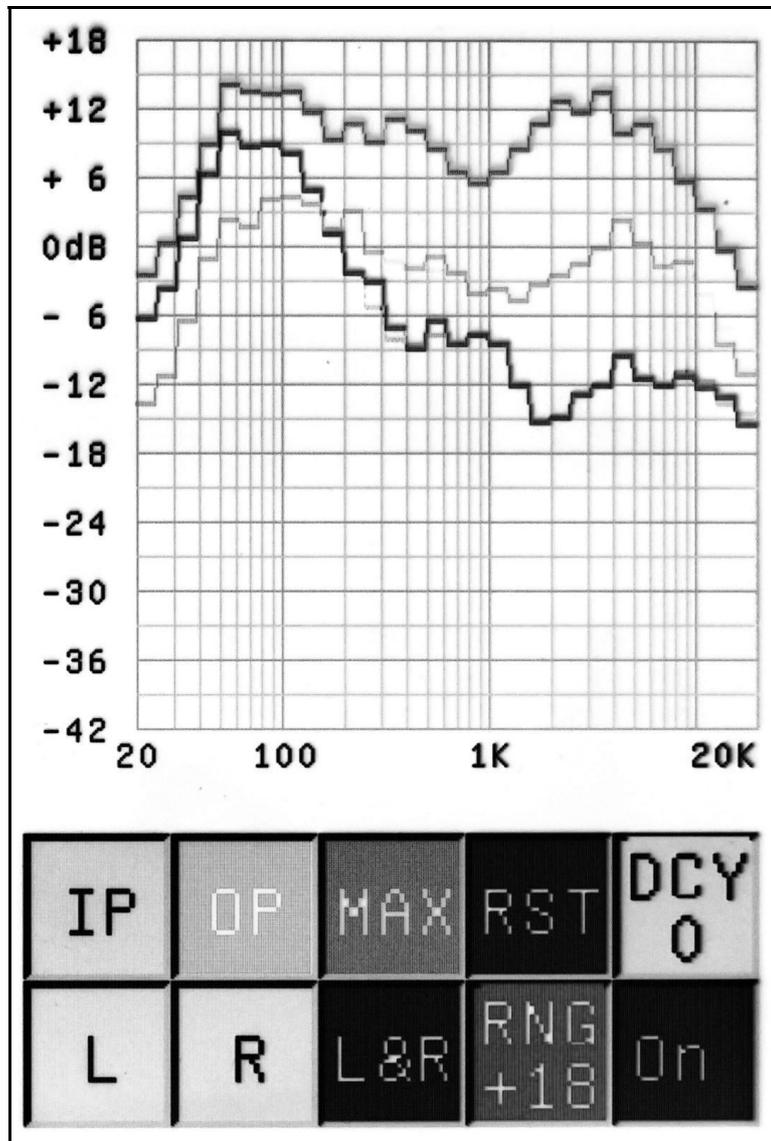
## **Fredenstein F610 Universal Entzerrer UE-1**

To improve the ergonomics of the UE-1, gain and Q-factor stepping functions are implemented. By pushing the gain knob, the gain changes by 3dB , the same is true for the Q-factor knob, the Q-factor will change by a medium value. Pressing the gain knob a little longer will reset the gain to 0 dB, the Q knob will change Q to 1.0.

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## Spectrum Analyzer Screen

After touching the graph area in the Equalizer Screen the Analyzer Screen is displayed:



Up to three different curves will be displayed according to the channel and MAX settings. The green curve represents the left channel, the red curve the right channel, and the blue curve the maximum levels.

The touch fields below the graph area are:

IP: Selects the input signal(s) to be fed to the analyzer

OP: Selects the output signal(s) to be fed to the analyzer

MAX: toggles the MAX function, which shows the blue curve of the highest value for each

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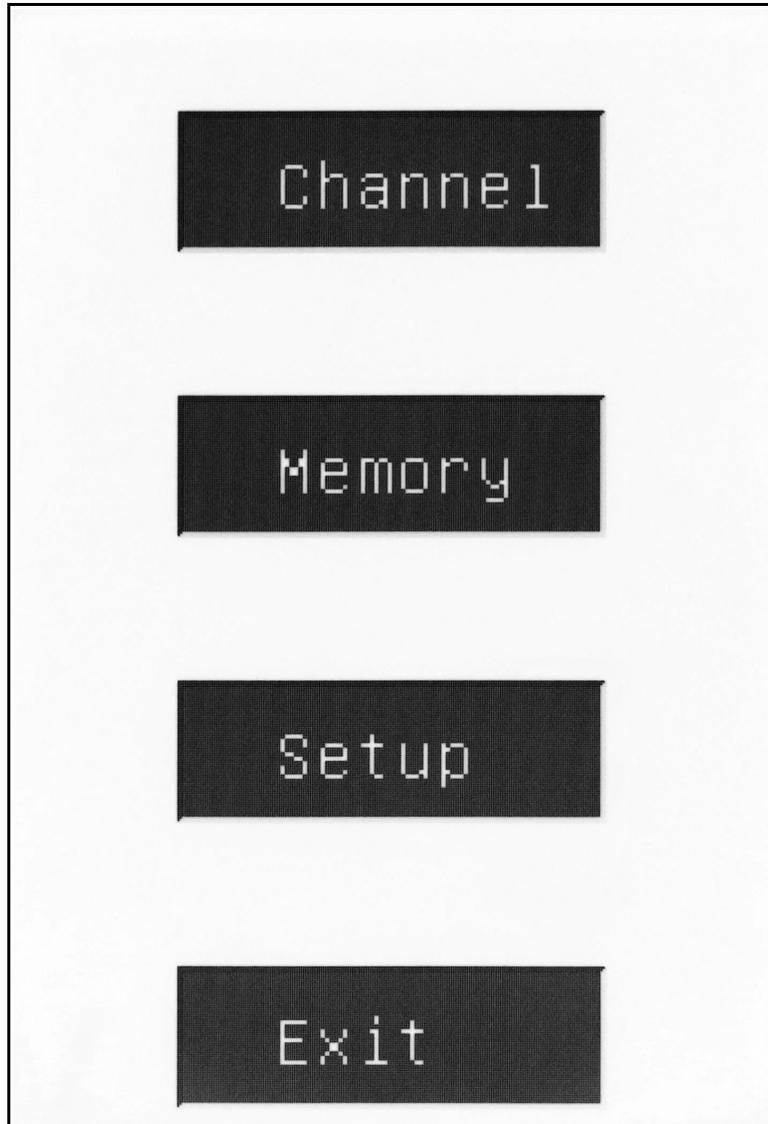
- frequency band and, if MAX is on, the RST and DCY touch fields are displayed
- RST: Only available, if MAX is active, RST resets the maximum curve.
- DCY: Only available, if MAX is active. By repetitively touching DCY, four decay modes for the maximum curve can be selected. DCY 0, disables decay until the user touches RST, useful for determining maximum levels over the duration of a song/take. DCY 1 to DCY 3 offer three different time constants for the decay with DCY 3 being the fastest.
- L: Displays only the green left channel curve, the MAX function will also only be fed by the left channel. This is independent of the channel setting in the equalizer screen.
- R: Displays only the red right channel curve, the MAX function will also only be fed by the right channel. This is independent of the channel setting in the equalizer screen.
- L&R: Displays both the left and right channels, the MAX function will also be fed by both channels. This is independent of the channel setting in the equalizer screen.
- RNG: By repetitively touching RNG, four display ranges can be selected from +6db to +24dB in 6 dB steps depending on your program level.
- On/Off: Toggles the hard bypass functionality. If ON is displayed inside the touch field, the corresponding channel activated, if OFF is displayed, the hard bypass mode is selected. This is dependent on the channel setting in the equalizer screen.

**After touching the graph area on the Analyzer Screen, the Equalizer Screen is displayed:**

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## Menu Subsystem

After pushing the rightmost frequency knob the Menu Subsystem is displayed:



Channel: Touch the “Channel” field to access the channel copy functions

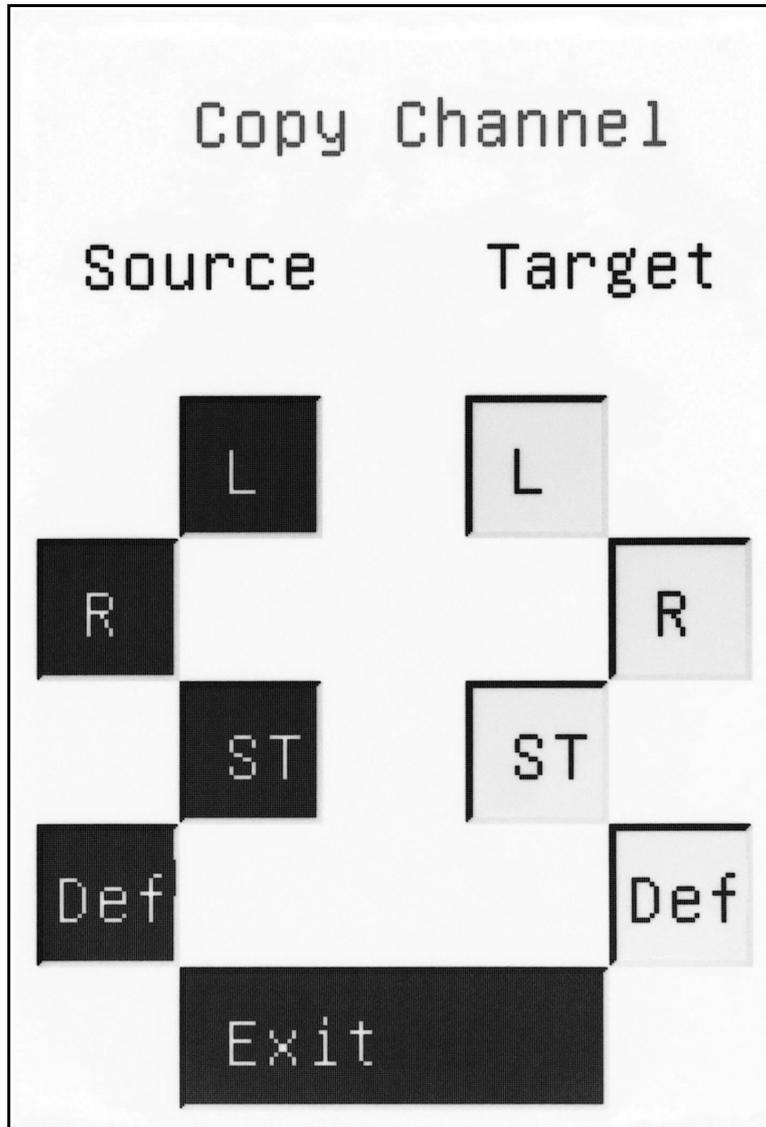
Memory: Touch the “Memory” field to access the non-volatile memory

Setup: Touch the “Setup” field to access Brightness, Auto-Dim and Temperature settings

Exit: Touch the “Exit” field to get back to the equalizer screen

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## Channel Menu



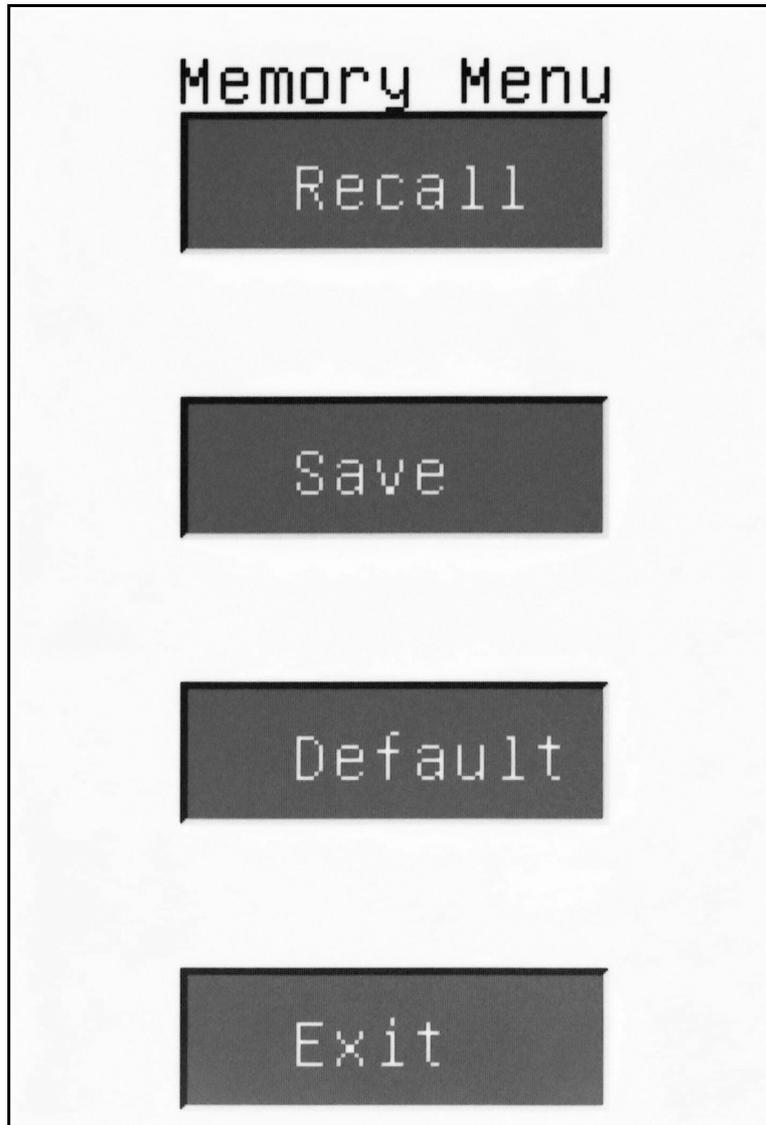
This menu allows for copying of channel settings. First select a source channel on the left side and then a destination channel on the right. The Def channel is a user defined channel setting, i.e. your favorite starting point for equalization. It must be stored first, the factory default sets all filters to 0 dB gain.

One application for the channel copy feature is working on a mix. First, set the F610 to ST channel on the equalizer screen and adjust the settings for optimum results. Then copy the ST in the menu above to the L and R channels, switch back to the equalizer screen and select L or R channel, which allows you to tweak the channels separately.

Touching the "Exit" field brings you back to the main menu.

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## Memory Menu



Recall: Touch the “Recall” field to select memory location to be recalled

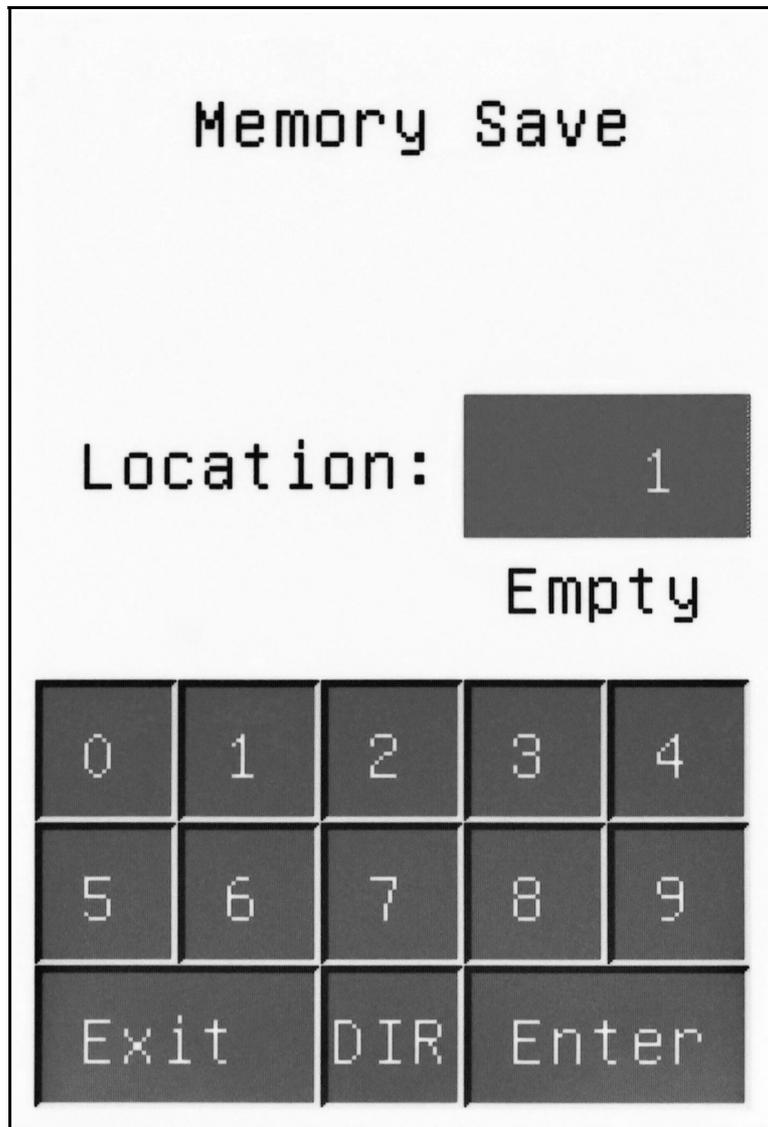
Save: Touch the “Save” field to select memory location for storing

Default: Touch the “Default” field to clear all user memories and get back to factory default

Exit: Touch the “Exit” field to get back to the main menu

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### Memory Recall Screen



The user can input the desired memory location either by keyboard or by selecting the DIR directory listing. When using the keyboard, please always enter two digits, for number 1 please enter 01, etc. The status of the selected memory location is indicated by either an “Empty” or “Used” reference.

**Exit:** Touching the “Exit” field brings you back to the Memory Menu.

**Enter:** Touching the “Enter” field executes the memory recall command. The Enter command is disabled, if the selected memory location is empty.

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## Directory Listing

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36
37	38	39	40	41	42
43	44	45	46	47	48
49	50	51	52	53	54
55	56	57	58	59	60
61	62	63	64	65	66
67	68	69	70	71	72
73	74	75	76	77	78
79	80	81	82	83	84
85	86	87	88	89	90
91	92	93	94	95	96
97	98	99			

Legend:  
Green box: Used  
Red box: Empty

Ret

The directory listing gives the user an overview of the memory status. Green fields indicate empty memory locations and red fields used ones. Touching the desired memory field, brings you back to the Memory Recall or Memory Save screen, depending from which one the DIR function was invoked. The selected memory location is automatically updated in the Memory Recall or Memory Save screen. The user must still touch “Enter” in this screen to execute the command.

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### Memory Save Screen



The user can input the desired memory location either by keyboard or by selecting the DIR directory listing. When using the keyboard, please always enter two digits, for number 1 please enter 01, etc. The status of the selected memory location is indicated by either an “Empty” or “Used” reference.

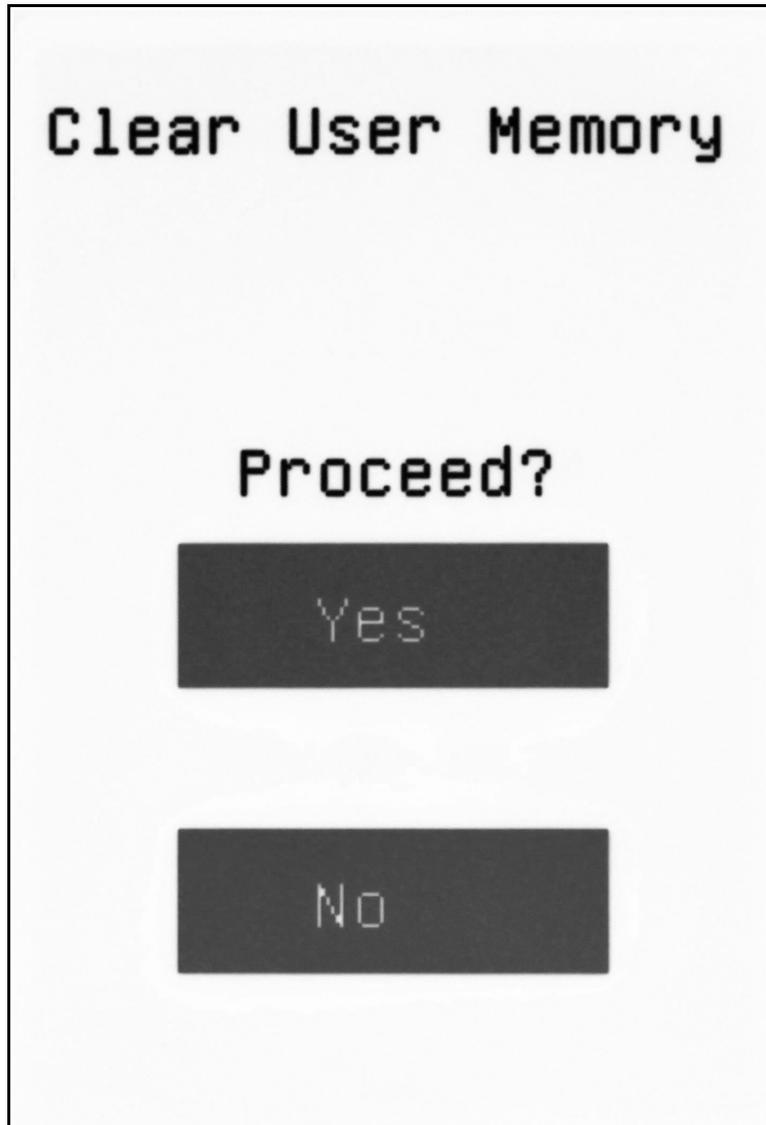
**DEL:** If a used memory location is selected, the DIR touch field will appear, allowing the user to clear this memory location, if its content is no longer needed.

**Exit:** Touching the “Exit” field brings you back to the Memory Menu.

**Enter:** Touching the “Enter” field executes the memory save command. Both empty and used memory locations can be selected, used ones will be overwritten with the current configuration.

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## Memory Default Screen



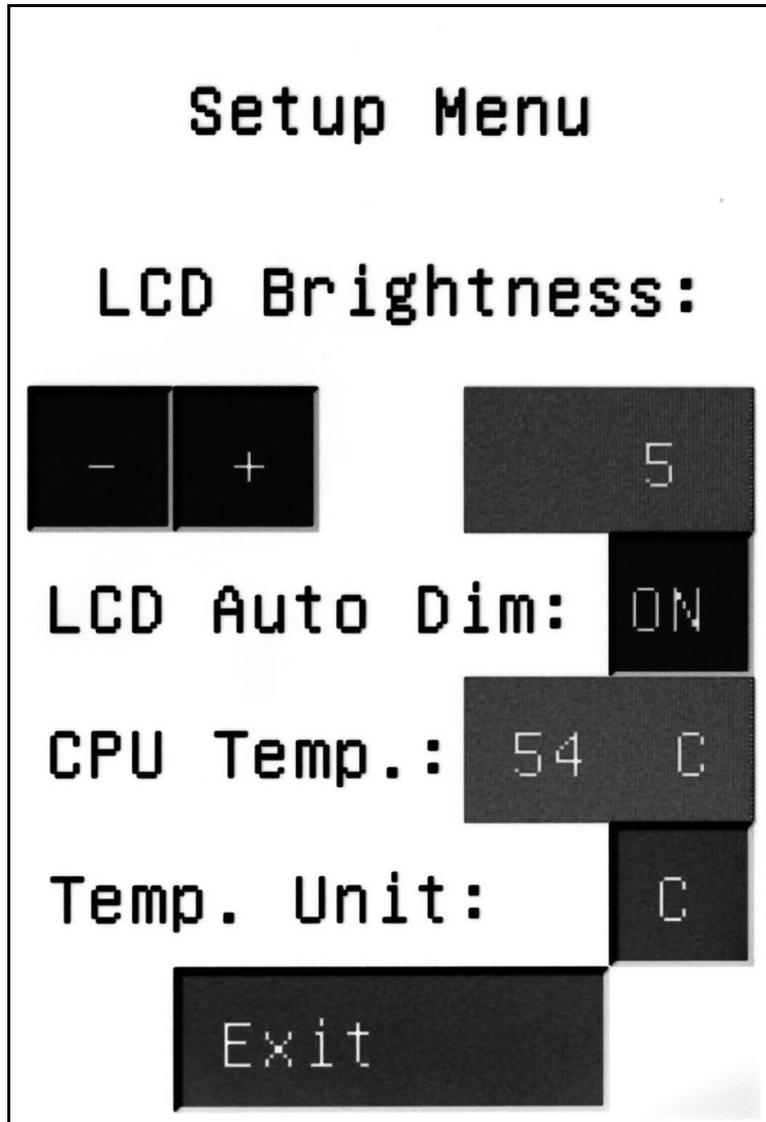
The complete user memory can be erased and the factory defaults are restored.

**Yes:** Executes the erasing process. This will take a few seconds. After successful completion, you will be forwarded to the Memory Menu.

**No:** Cancels the command and brings you back to the Memory Menu.

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## Setup Screen



+: Increases the brightness of the LCD display. Range is from 1 to 9.

-: Decreases the brightness of the LCD display. Range is from 1 to 9.

Auto Dim: Touch the ON/OFF field to enable/disable the LCD Auto Dim function. If Auto Dim is on, the brightness of the LCD is reduced after 90 seconds of inactivity to prolong the life span of the display and prevent the burn-in of ghost images. In case of any user input, the brightness is automatically restored.

Temp Unit: The units of the CPU temperature can be changed from Celsius to Fahrenheit.

Exit: Brings you back to the Main Menu.

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## Technical Data:

Frequency Response :	10 Hz – 30,000 Hz, - 0.5 dB 6 Hz – 60,000 Hz, - 3 dB
Distortion (THD&N):	< 0.004 % at +24 dBu output level
Signal to Noise (S/N):	-106 dB at +26 dB output level
Crosstalk at 10 kHz :	< -102 dB
Max. Input Level :	+ 26 dBu
Max. Output Level :	+ 27 dBu
Input Impedance :	20 kOhms (electronically balanced)
Output Impedance :	44 Ohms (electronically balanced)
Power Consumption	
+16V Rail :	< 400 mA
-16V Rail :	< 350 mA

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## Appendix A:

### USB Commands:

ATA(X): Select Channel L, R, S(T) or 1, 2, 3  
ATB(1-4): Select Filter  
ATC(0-1): Enable(1) or Disable(0) Color  
ATD: Dump Configuration  
ATE(0-1): Local Echo for Terminal Emulation  
ATF(XXXXXX): Set Frequency  
ATG(XX.XX): Set Gain  
ATH: Display Help Screen  
ATI(0-1): Set Filter 4 to High-Shelf  
ATJ: Set Gain of All Filters to Zero  
ATK(0-1): Enable or Disable Low-Cut Filter  
ATL(0-1): Set Filter 1 to Low-Shelf  
ATN(XXX): Set Low-Cut Frequency  
ATO(0-1): Enable Output(1) or Bypass(0)  
ATP: Set Q of All Filters to 1.0  
ATQ(X.X): Set Q  
ATS: Show Status of current Channel  
ATU: Upload Configuration  
ATV: Show Product Version

Command w/o Parameter displays current Value  
Commands are not case sensitive

Frequencies can be set to 1 Hz resolution through the USB interface

Baudrate: 115200 bd  
Character Length: 8 bit, no parity  
Com Port Driver: Silicon Labs CP210x USB to UART Bridge VCP Driver  
Download link: <https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers>  
The driver will create a COM Port on the computer, used for the communication with the F610.  
Please check the COM Port number COM(x).

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## Appendix B:

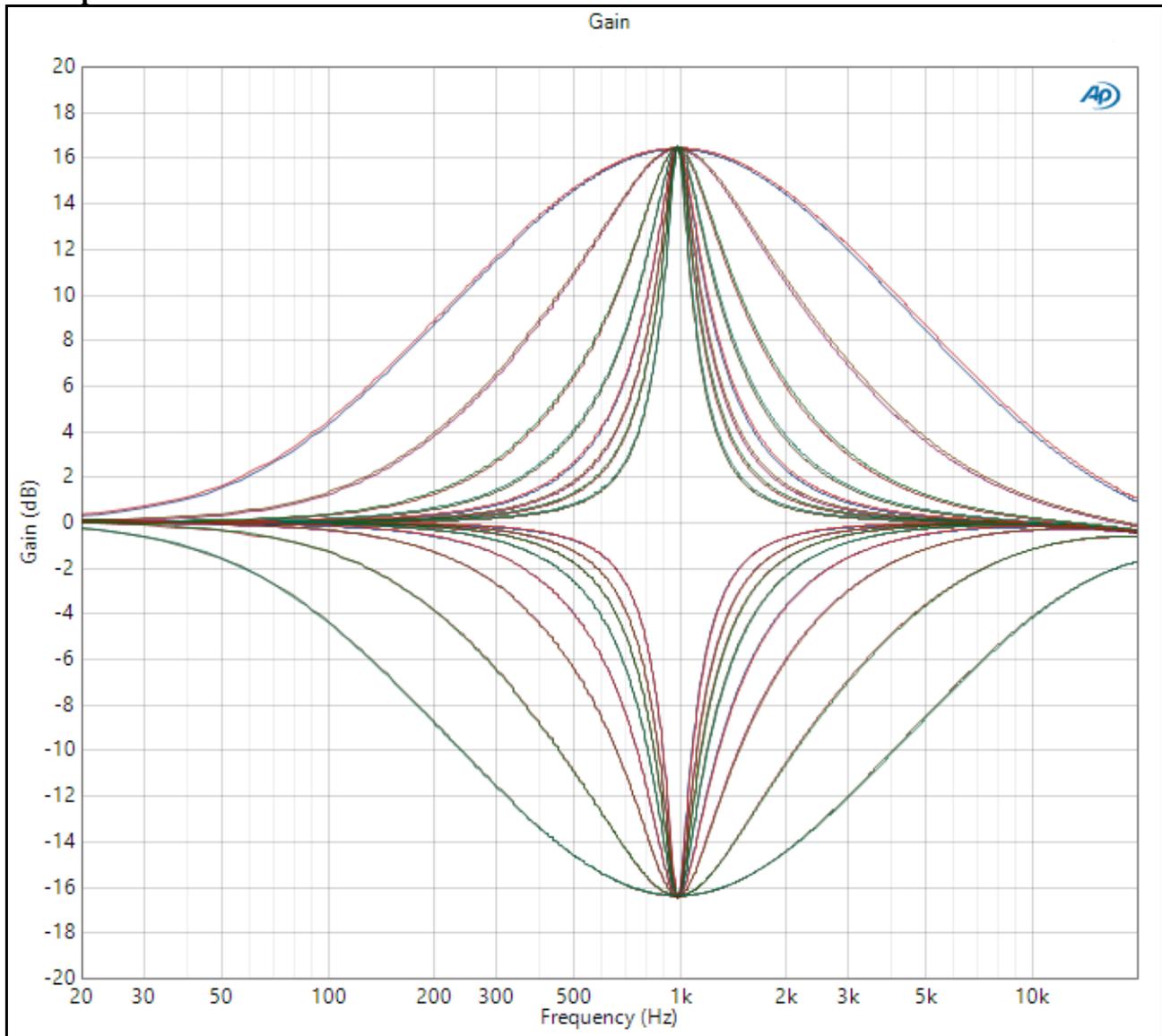
### Encoder accessible frequencies:

20, 25, 30, 35, 40, 45, 50, 55, 60, 65,  
70, 75, 80, 85, 90, 95, 100, 110, 120, 130,  
140, 150, 160, 170, 180, 190, 200, 210, 220, 230,  
240, 250, 260, 270, 280, 290, 300, 310, 320, 330,  
340, 350, 360, 370, 380, 390, 400, 410, 420, 430,  
440, 450, 460, 470, 480, 490, 500, 525, 550, 575,  
600, 625, 650, 675, 700, 725, 750, 775, 800, 825,  
850, 875, 900, 925, 950, 975, 1000, 1050, 1100, 1150,  
1200, 1250, 1300, 1350, 1400, 1450, 1500, 1550, 1600, 1650,  
1700, 1750, 1800, 1850, 1900, 1950, 2000, 2100, 2200, 2300,  
2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300,  
3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300,  
4400, 4500, 4600, 4700, 4800, 4900, 5000, 5200, 5400, 5600,  
5800, 6000, 6200, 6400, 6600, 6800, 7000, 7250, 7500, 7750,  
8000, 8250, 8500, 8750, 9000, 9250, 9500, 9750, 10000, 10250,  
10500, 10750, 11000, 11250, 11500, 11750, 12000, 12250, 12500, 12750,  
13000, 13250, 13500, 13750, 14000, 14250, 14500, 14750, 15000, 15250,  
15500, 15750, 16000, 16250, 16500, 16750, 17000, 17250, 17500, 17750,  
18000, 18250, 18500, 18750, 19000, 19250, 19500, 19750, 20000

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## Appendix C:

### Band-pass Filter Characteristics:



Center frequency: 1000 Hz  
Gain: +16 dB and -16dB,  
Q-factor values: 0.4, 1, 2, 3, 4, 5, 6, and 7.9

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