



Fredenstein
Professional Audio

F660
Limiting Amplifier

Operating Manual

Overview:

The Fredenstein F660 Limiting Amplifier is a valve (tube) based compressor and limiter with the same very short signal path as the famous Fairchild 660/670. It uses the exact type of tubes, the 6386 LGP, as the Fairchild. Fortunately, new production tubes are available today, since original tubes are hardly available anymore. The four tubes form a single stage push-pull Class A amplifier and the whole signal path consists only of an T-type input attenuator, input transformer, Class A amplifier and finally an output transformer. At this point the similarities end. The F660 uses a DSP to control the operating points of the tubes, guarantying perfect working conditions all the time. The side chain amplifier is designed with semi-conductor components since it “only” generates the control voltage for the tubes. The final result is a compressor with the compression characteristics of the Fairchild, but with an extended frequency response, lower noise and lower distortion. The perfect buss compressor for today's high resolution audio. Since this a “Variable-Mu” type of compressor the relationship between anode currents and compression is almost quadratic, causing the anode currents to be very small at high compression rate. As with all “Variable-Mu” is not advised to go beyond 10dB of compression since audible distortion will be present. Setting compression to around 5 dB yields the best results.

Installation:

Located on the front panel, there are the LCD display, the rotary control button, the output level meter and the gain reduction meter.

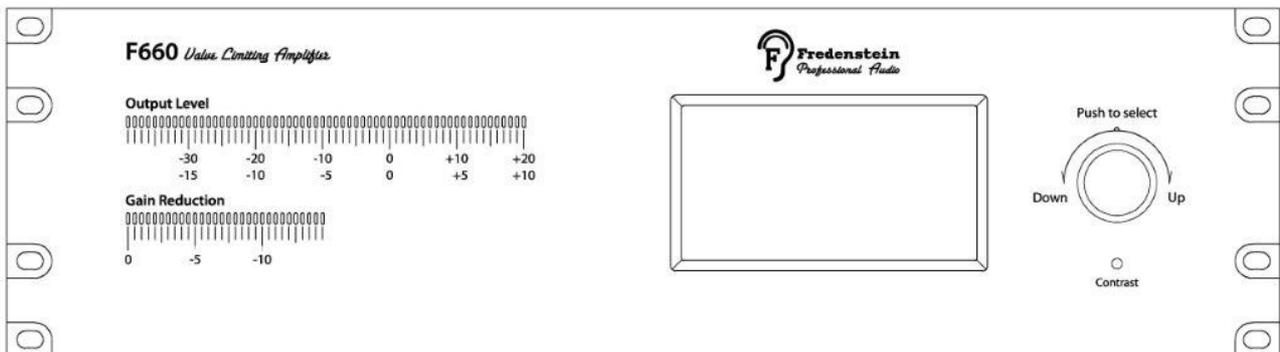


Fig. 1 F660 Front Panel

On the rear panel, there are the XLR connectors for MAIN INPUT, MAIN OUTPUT, SIDECHAIN INPUT and SIDECHAIN OUTPUT, as well as the RJ11 LINK Connectors, the IEC MAINS POWER connector, MAINS SWITCH, and most importantly the MAINS VOLTAGE SELECTOR.

Please select your local mains voltage first before connecting to power!

For basic operations, only the MAIN INPUT, MAIN OUTPUT and, of course, the MAINS POWER have to be connected. The SIDECHAIN INPUT and SIDECHAIN OUTPUT can be used to insert filters and other equipment into the side chain. In case of using several F660s the supplied link cable (RJ11) should be used to link all the units. Both link connector are identical and it does not matter which one is used.

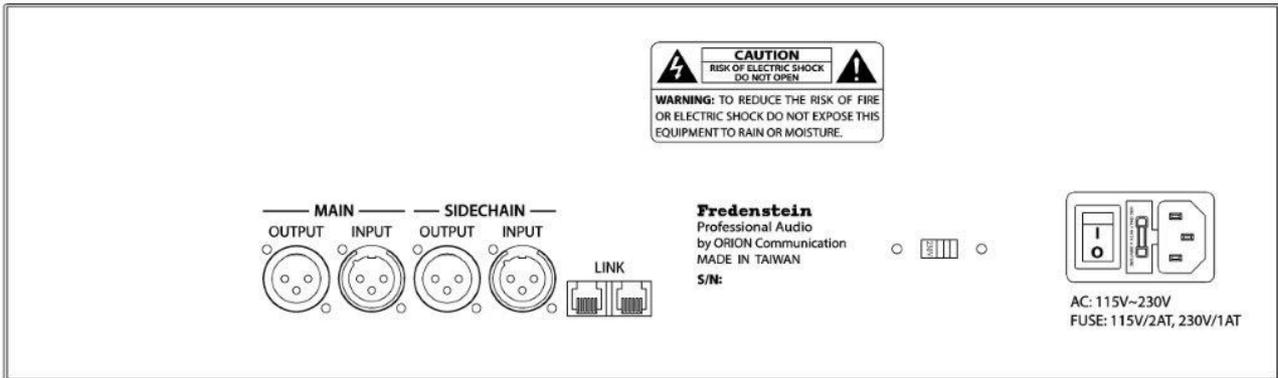


Fig. 2 F660 Rear Panel

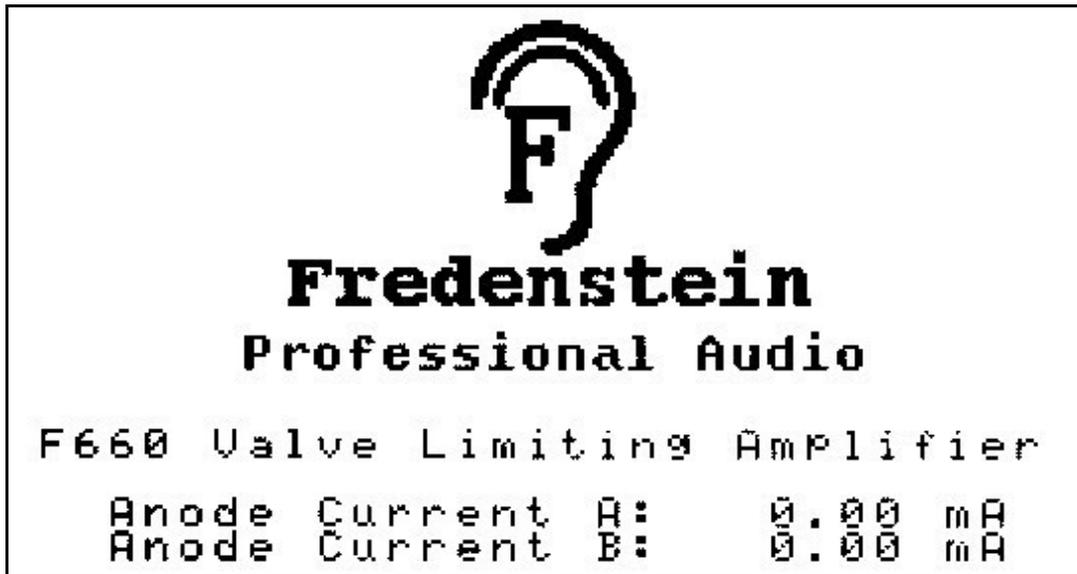
Operations:

After turning on the MAINS SWITCH on the rear panel, the unit performs a self test and after successful completion you will see the following screen:

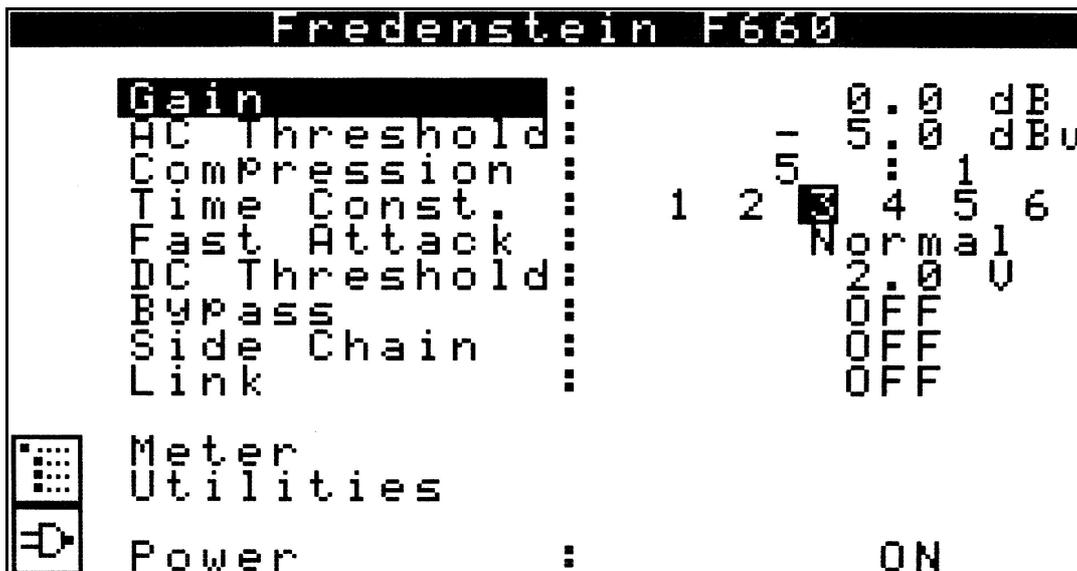


At this point the unit is in stand-by mode and the audio circuitry and the tubes are still powered-off, the unit is in bypass mode, but the output meter is connected to the main output. This allows the user to measure the level even in bypass mode.

To turn the F660 on, please push the rotary control. The F660 will power up and go through a tube calibration cycle. During this cycle you will see the anode currents in both halves of the push-pull Class A amplifier.



After the currents settled, the unit is fully operational and the user will be forwarded to the main menu.



The Main Menu allows to modify the following parameters:

Compressor Gain:

The gain of the compressor without gain reduction can be adjusted in 0.5dB steps in the range of -11db and +11 dB. To adjust the gain move the cursor with the rotary control to the gain field and then press the rotary control.

The cursor will move from the left to the right and the rotary control becomes the level “pot”. The change is applied immediately, therefore the engineer can hear the changes right away. When

satisfied with the gain, push the rotary control again and the cursor will move back to the gain field and can be moved down to select different items. This procedure applies to all parameter adjustments

Compression AC Threshold:

The compression AC threshold determines at which level the compressor activates. Please note it is displayed in dBu not in the standard U.S. studio level of +4 dBu. This allows to easier match the maximum input of A/D converters almost always specified in dBu.

Compression Ratio:

This parameter determines the “strength” of the compression, higher numbers indicate more compression. It is the relationship between output level and input level if the output level is above the AC threshold.

Time Constant:

The F660 employs the same 6 different time constants as the original Fairchild 660/670. Number one is the fastest and shortest and number 6 is the slowest and longest. Number 3 is always a good starting point.

Fast Attack:

The attack time can be changed in all 6 time constants by selecting faster attack times. Since the Fairchild time constants are more than simple integrating filters, it is impossible to set a value for this parameters. The actual attack is a combination of the selected time constant and the selected fast attack mode.

DC Threshold:

The Fairchild 660/670 has a fixed DC threshold of 2 volts. The F660 allows the user to select between 0.5 and 5 volts. Lower values result in stronger compression. The 2 volt setting is the default and used to reference the AC threshold.

Bypass:

If bypass is turned on, the main input and outputs are connected and the F660 is taken out of the signal pass. This is very useful for comparisons of the direct and compressed sounds.

Side Chain:

If Side Chain is set to ON, the side chain input is activated and the side chain is disconnected from the output. Inserting a high-pass filter between the side chain output and input can be used to avoid compression in unwanted frequency ranges. An example is using a high pass filter to form an de-esser.

Link:

This enables the multi-channel link capability. Please note that this feature has to be turned on on all participating units.

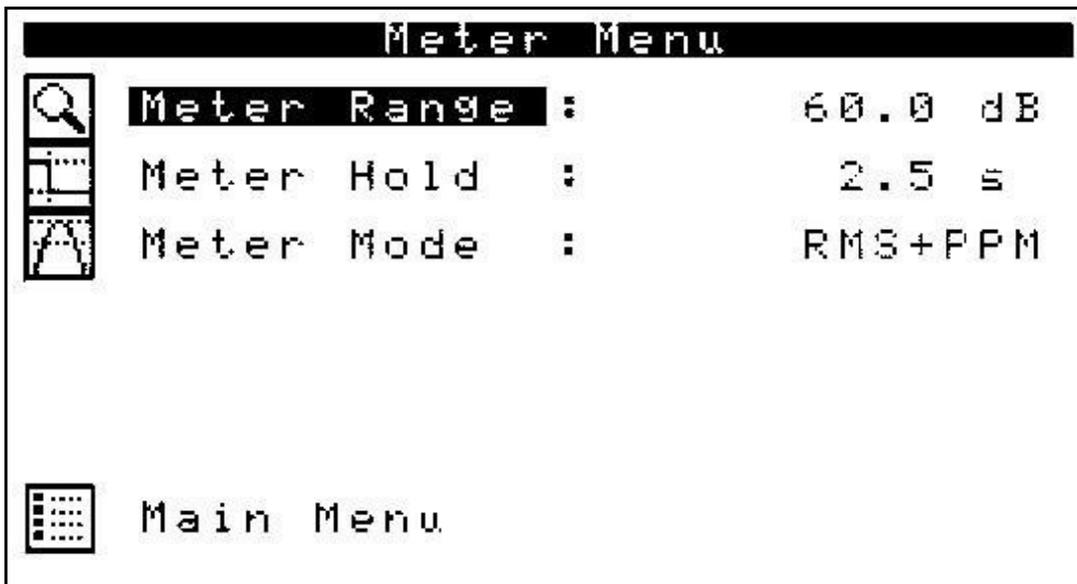
Sub-Menus:

There are three sub menus available to adjust the following parameters:

- Meter:** Output Meter adjustments
- Utilities:** Safe/Recall Parameters, Calibration etc.

Meter Sub Menu:

After selecting the meter menu on the main menu page the screen below will be displayed.



Meter Range:

The meter range of the peak meter can be switched between 60dB (one LED per dB) and 30dB (one LED per 0.5dB). In the 60dB setting the overall range is from -39dB to +20dB, in the 30dB setting from -24.5dB to + 5dB.

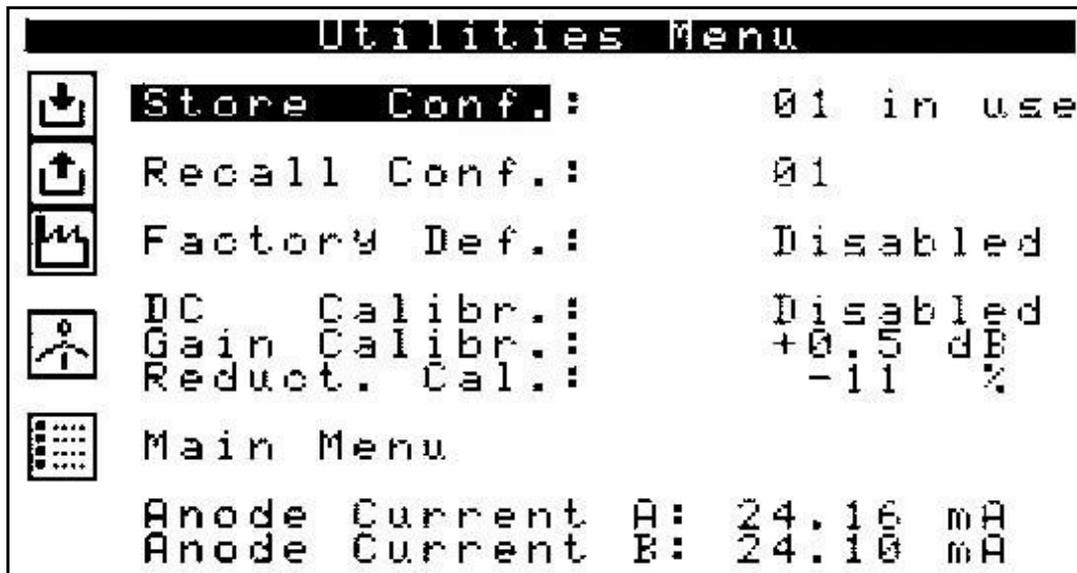
Meter Hold :

The peak hold time can be selected between 0s, 2.5s and indefinitely. In the 0s setting no peak hold is performed and in the indefinitely setting the user has to manually reset the hold value by selecting a different hold time.

Meter Mode:

The meter is capable to display peak and RMS values. The two modes are peak only as a bar graph or peak and ppm displayed simultaneously. In this case the PPM result is displayed as a bar and the peak result is displayed as a dot.

Utilities Sub Menu:



Store Configurations:

The F660 allows to store 99 complete setups. Please select the storage location by turning the rotary control. If the location was previously used, it is indicated, but you can overwrite it.

Recall Configuration:

You can recall the store configurations. Only previously stored configurations will be displayed and allowed to recall.

Factory Default:

The F660 can be reset to factory defaults. First select Factory default and then turn the rotary control to enable, then press the control to perform the reset to the factory defaults.

DC Calibration:

Executing the DC calibration by enabling the feature and then pressing the rotary control. Audio bypass will be applied during calibration.

Gain Calibration:

Due to the fact that no negative feedback is used in the audio circuitry, the actual gain is dependent of the state of tubes, therefore the 0dB gain level can be adjusted. Apply a 1kHz test tone at 0db level at the main input and adjust the AC calibration for 0dB gain on the output. The range is -3dB to +3dB in 0.5dB steps.

Reduction Calibration:

To calibrate the gain reduction meter, apply a 1kHz test tone at 0db level at the main input and adjust the threshold control until the output Level is -10dB. Then modify the Reduction Calibration until the gain reduction meter reads 10 dB.

Main Menu:

Push main menu to get back to the root menu.

Specifications:

Frequency Response:	20Hz – 20Khz +- 0.5dB
Distortion:	< 0.1% (no compression)
Signal-to-Noise Ratio:	>85db at 0db gain
Gain Range:	-14dB to +11dB minimum
Threshold:	-24dBu to + 16.5dBu
Mains Voltage	110V to 120V in the 115V range or 220V to 240V in the 230V range (user selectable)
Power Consumption:	< 100W
Dimension (LxHxD):	480mm x 135mm x 250mm
Net Weight:	7.5kg

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