

Technical service manual

Finalizer Epress



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1st Edition, Finalizer Express service manual

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Introduction

The purpose of this manual is to support skilled technicians in repairing the Finalizer Express.

The manual begins with a Quick Trouble Shooting table. Here, hints, advices and possible problems are described.

If the problem is more serious, the next step is to use the Built-in Test Program. With this program the problem can often be narrowed down to a specific section, channel or even component.

The next section consist of disassembly and exchange procedures. Please be aware of warranty rights before disassembling. Refer to the warranty card.

The Block diagram gives a quick overview of the signal flow.

Circuit description is a brief description of the circuits on the different boards.

LED error codes and Jumper settings are described on page 12.

Appendix contains Schematics, Part lists and Component Layouts.

The schematics start with a main sheet, where sub sheets are shown as blocks. Even sub sheets might have sub sheets. In the schematics some connections have label names to help the reader. If a label name is framed, it means that it is "connected" to another sheet. Label names followed by the symbol "*" mean that the signal is active low, i.e. RESET*: the reset function takes place when the signal is low.

Part lists contain a column called TCcode/ Item no. Use this code/no. when ordering spare parts. If the field is empty; it means the component cannot be ordered separately.

The coordinates in the column Pos. refer to the PCB layout page. The column named Page refers to page no. in the schematics. In column comments a short explanation of the function is stated. For some components, alternative types are mentioned.

Some PCB layouts are made as gatefolds (fold-out page).

Finally appendix contains a list for mechanical parts.

This service manual does not contain schematics for the power supply module, because any attempt to repair the power supply module must be completed with some safety tests such as high voltage and EMC tests. Hence, it is strongly recommended that the entire power supply module is replaced in case of malfunction.

Quick Trouble Shooting

Use this table to solve problems or find out what to do next.

Symptom	Comments / Action:
Analog in/out fails	Try with other cables or read section "Built-in Test program". Note: When analog in/out is connected to unbalanced equipment, XLR pin 3 must be connected to pin 1. Note: If IC35 or IC36 or IC41 are defective, they should be replaced with type MC33079 Note: When running this test the input Meter must show -12dB for the channel on test.
Cannot turn power off with power switch at front	The switch must be pressed for at least 1 second to turn off power. The delay provide unintended power off during recording.
Cannot run application software.	Enter the Software BOOT menu, by pressing the SYNC FROM button at power on. Select the option "V" by use of the up and down arrow keys to check the application software. Press the FINALIZE SOFTCLIP key to execute. If corrupted; load the application software again. Or try to run the self test prom, see section "Built-in Test program".
Bad LED's, keys or Pots.	See section "Built-in Test program".
Digital or Midi in/out fails	Try with other cables or read section "Built-in Test program". Digitech pedals are incompatible.
External Control In fails	Try with other cables or read section "Built-in Test program".

Software Boot Menu

To access the Software Boot Menu; press the SYNC FROM button while powering on. An option letter will appear in the FINALIZE LED matrix. Use the Up and Down arrow buttons to select between the options. To leave the Software Boot Menu; turn off the power.

Option	Description
L	Load Application or Boot software directly from PCMCIA card.
R	Master Reset. Run this command and all settings are reset! Press the FINALIZE SOFTCLIP button twice to execute.
A	Display BOOT version. Press the FINALIZE SOFTCLIP button to execute.
V	Display the Application software version. Press the FINALIZE SOFTCLIP button to execute.
n	Display the serial Number. Press the FINALIZE SOFTCLIP button to execute.
S	Starts the loaded software. Press the FINALIZE SOFTCLIP button to execute.

Built-in Test Program

The Finalizer Express has a Built-in Test Program. To run the program; Press the BYPASS button while powering on. Each test has a number which is displayed in the FINALIZE LED matrix. Use the left and right arrow buttons to select between the tests. Use the FINALIZE SOFTCLIP button to execute/leave a test.

To leave the Built-in Test Program; turn off the power.

Finalizer Express Built-in-Test Program has following tests:

No.	TEST	Function / Comments
0	LED test	Turns on all LEDs. If no light; check soldering at the LED and at the flat cables between the front boards.
1	Test of pots	This test is used for calibration of the pots. All pots must be set in middle position. If any of the pots are outside the specified range, a minus "-" will be shown and the LED above the faulty pot will flash. A Plus "+" confirms that all controls are within the specified range. If new pots are mounted the new values can be stored by pressing the SELECT INPUT button. "+" confirms the new values were stored successfully.
2	Analog I/O test	A sine wave is generated on both analog outputs. When connected directly to one of the analog inputs the LED matrix should read "+". Note: When running this test the input Meter must show -12dB for the channel on test. Note: In case of defective IC35, IC36, IC41 they should be replaced with type MC33079
3	AES I/O test	A digital signal is generated on the AES/EBU output. When connected directly to the AES/EBU input the display should read "+".
4	S/PDIF I/O test	A digital signal is generated on the S/PDIF output. When connected directly to the S/PDIF input the display should read "+".
5	OPTO I/O test	A digital signal is generated on the OPTO output. When connected directly to the OPTO input the display should read "+".
6	Midi I/O	A midi signal is generated on output. When connected to the input the display reads "+" if the signal is correct. The midi signal from input is sent on to MIDI THRU. If "-" is shown; try with another midi cable or check soldering and components in the midi circuit.
7	EXT. CONTROL IN test	Tests the status on the EXTERNAL CONTROL IN. When no jack plug is inserted the display should read "-". If a jack plug is inserted and the tip of the plug is connected to ground, the display should read "+".
8	Battery test	Tests the DC voltage at the Back up battery. If low; check the battery voltage is min +2.9VDC. Check also the standby current by measuring the voltage across R27; max. 20mV (numerical value). If the voltage is higher; check IC4, IC8, C35. If necessary; refer to section "exchange of battery"
9	System test	Tests the MPU, DSP, DARC and SOUND RAM to some extent.
10	Ext. FADER calibration	Connect the TC MASTER FADER (or similar) to EXTERNAL CONTROL IN. Move the Fader to position MAXimum when the "arrow up" is shown. Then press the FINALIZE SOFTCLIP button. Move the Fader to position MINimum when the "arrow down" is shown. Then press the FINALIZE SOFTCLIP button to finish the calibration. If the calibration went Ok the display should read "+"

Disassembly Procedure for Main Board

1. **Turn Off Power and Disconnect Power Cord.**
2. Loosen 5 screws, see fig. 1, and remove the top cover.
3. Disconnect front connector, J1, see fig. 2.
4. Remove screws at MT7, MT8, MT2 on the main board, see fig. 2.
5. Remove 9 screws at the XLR connectors on the back panel, see fig. 3.
6. Remove the screw at the SPDIF in/out connector, see fig. 3.
7. Remove the screws at the ADAT in/out connector, see fig. 3.
8. Remove the jack nut at the EXT. CONTROL IN connector, see fig. 3.
9. Push the main board into the front profile a little to free the connectors from the back panel, then lift out the board.
10. Desolder the wires from power supply - see fig. 7.

Fig. 1: Screws at top lid

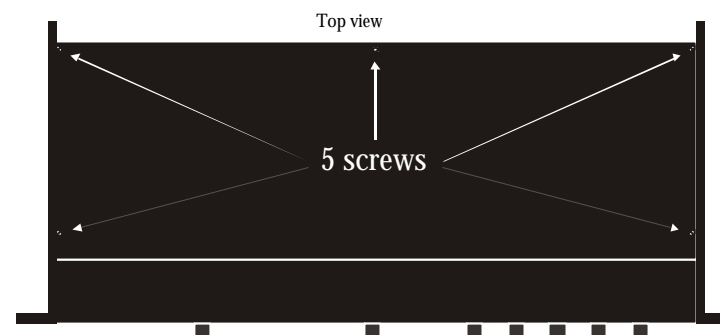


Fig. 2: Screws and front connector at main board

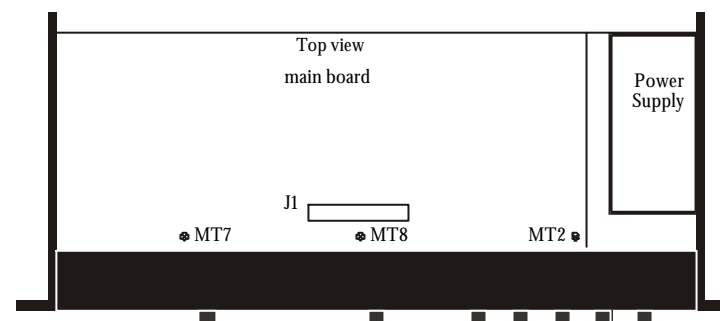
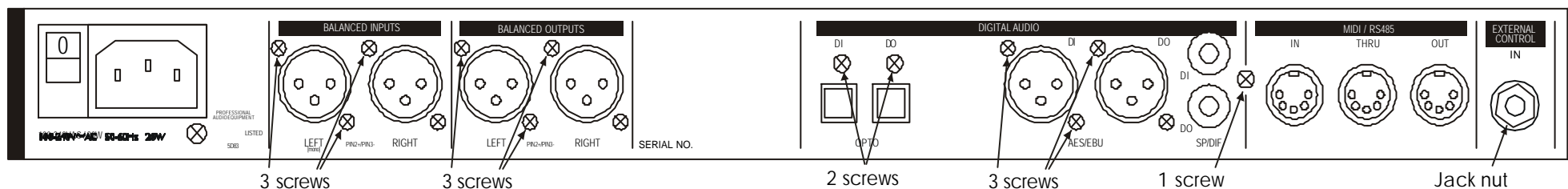


Fig. 3: Screws at back panel.



Disassembly Procedure for Front Section

1. **Turn Off Power and Disconnect Power Cord.**
2. Loosen 5 screws, see fig. 1, and remove the top cover.
3. Disconnect front connector J1, see fig. 2.
4. Remove the side panels by unscrewing 4 screws at each side, see fig. 4.
5. Remove the front section.
6. Pull off the seven pot knobs by hand.
7. Place the front profile horizontally with the buttons facing down.
8. Pull out the two white PCB guides. Opening up the profile a little will lighten the pressure at the PCB guides, see fig. 5.
9. Note: The Power button is loose in the profile after removing the guides.
10. Use the ribbon cable to lift up the front board assembly a little and then slide it out gently at the end named "OUTPUT" .

Fig. 4: Screws at side panels.

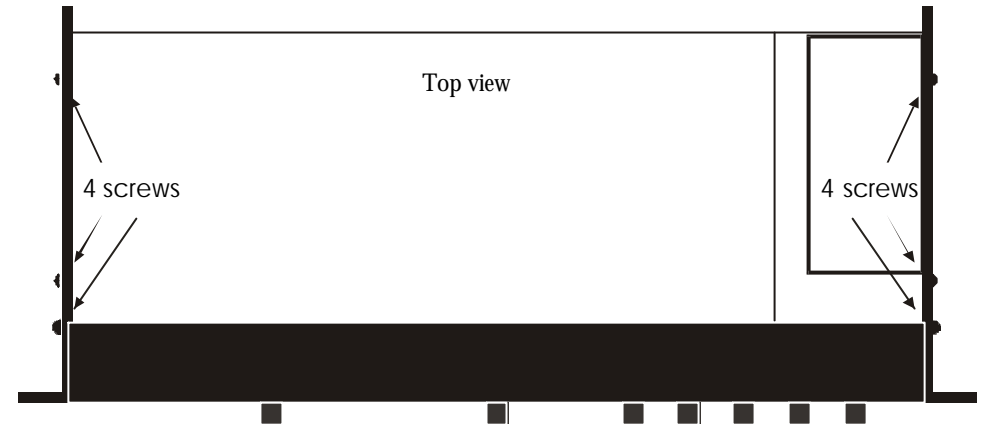
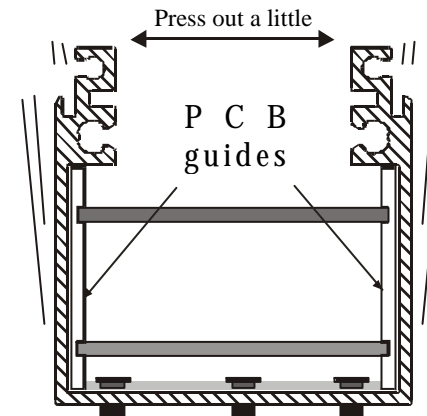


Fig. 5: Front profile shown from the VALUE knob end.



Exchange of Power Supply Module

1. **Turn Off Power and Disconnect Power Cord.**
2. Loosen 5 screws, see fig. 1, and remove the top cover.
3. Disconnect the front connector J1, see fig. 2.
4. Loosen the front section by removing two small screws at each side panel, see fig. 6.
5. Press out the side panels a little and gently push out the front section.
6. At the main board, desolder all power supply wires.
7. Dismount the power supply by removing the screw, just below the AC inlet at the back panel, see fig. 6.
8. Mount the new power supply with the screw at the back panel.
9. Solder the power wires into the main board - see fig 7.
10. Make sure the wire ends don't short circuit to the bottom panel!
11. Remount the front section with two screws in each side panel.
12. Make sure the edge of the bottom panel is pressed into the front profile.
13. Connect the front connector J1.
14. Mount the top lid with five screws.
15. Connect power cord and turn on power.

If the unit has a malfunction; turn off power and check the following:

Is the front connector mounted correctly?

Are the power supply wires correctly placed?

Do the wire ends short circuit to the bottom panel?

Fig. 6: Screws at side panels.

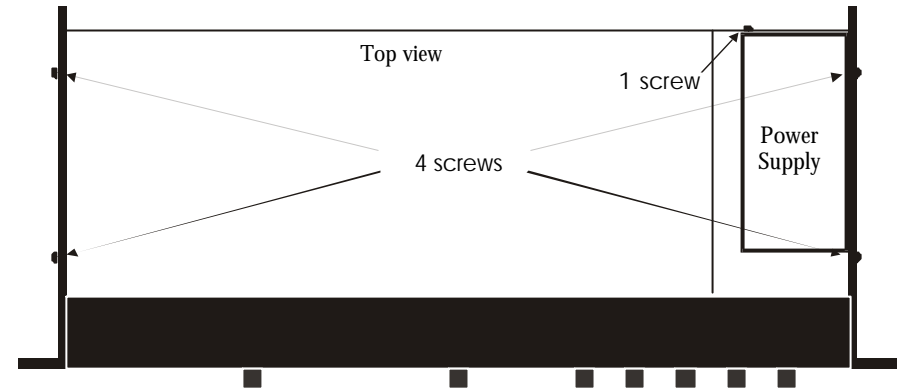
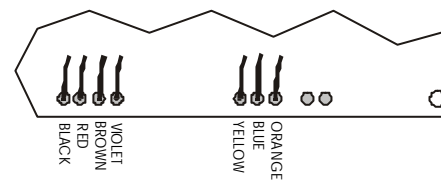


Fig. 7: Placement of power wires



Exchange of Battery

CAUTION:

DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURERS INSTRUCTIONS.

VARNING:

Felaktigt batteribyte kan medföra fara för explosion. Använd därför endast samma typ eller likvärdig typ enligt apparattillverkarens rekommendation.

Kassera förbrukade batterier enligt tillverkarens anvisning

ADVARSEL:

Lithiumbatteri. Eksplosionsfare ved fejlagtig håndtering. Må kun udskiftes med batteri af samme fabrikat og type.

Lever det brugte batteri tilbage til leverandøren.

Recommended battery type: CR2032-FT-4-2.

TC stock no. (TCcode) for battery: 342 0000 11

Exchange procedure

1. **Turn Off Power and Disconnect Power Cord.**
2. Loosen 5 screws, see fig. 1, and remove the top cover.
3. Desolder the old battery by warming up each terminal one by one. Avoid any short circuit of the terminals. Be careful not to damage the wiring on the board.
4. Insert new battery and solder the terminals one by one. Avoid any short circuit of the terminals.
5. The voltage measured directly across the terminals of the new battery should be higher than 3.0VDC.
6. Do not discard the old battery. Hand it over to a recycling company or your dealer.

Block Diagram

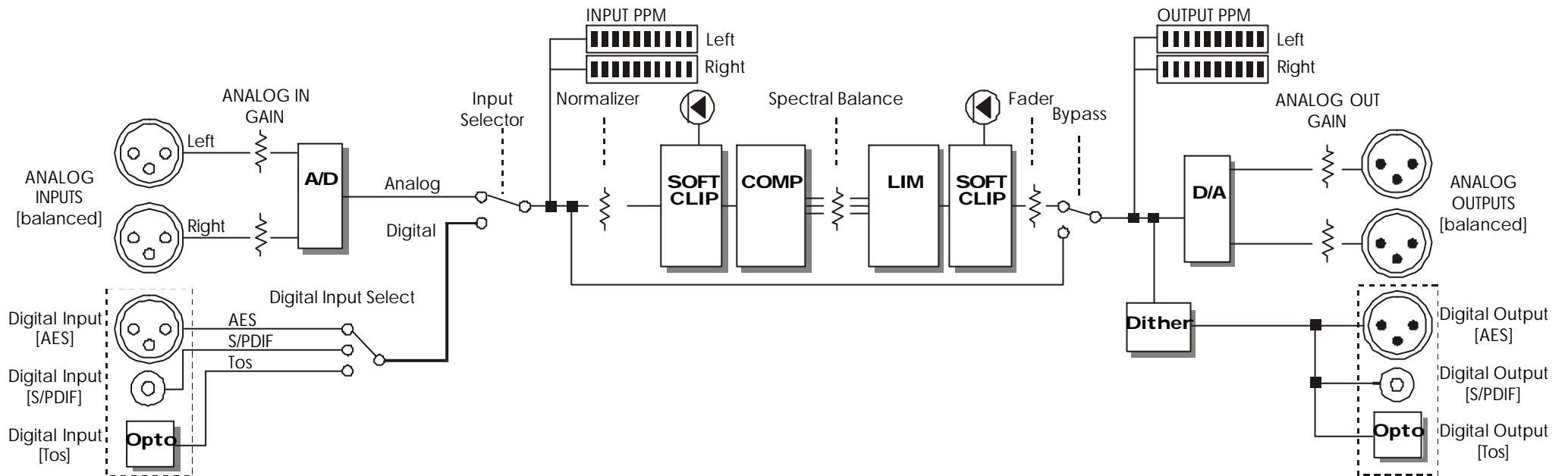


Fig. 8: Block diagram for the signal flow in the Finalizer Express.

Circuit Description

The Finalizer Express consist of a front, a digital, an analog and a power supply section. Here is a brief description of the sections:

Front section consist of two boards placed in the front profile. The main front board has two matrix circuits; one for LED's and one for keys. The 7 pots are scanned by IC8. The EEPROM contains the serial no.

The LED front board is fitted with the LED's and key switches.

Digital section is placed mainly in the middle and in the left side of the main board.

The digital section contains the Reset, MPU, SRAM, DSP, DARC, Sound RAM, FLASH, Interfaces and PLL circuit.

Reset controls the MPU and the DA.

The Software for MPU is loaded into the FLASH. The MPU controls DSP, SRAM, Jeida, Front, MIDI, External Control In and analog gain settings.

The major task for the DSP is to "calculate" sound. It also generates the 80MHz clock for the DARC chip.

The DARC chip controls the sound data to/from; DSP, Sound RAM, digital in/outputs and AD/DA converters.

Interface for MIDI and External Control In consist almost of discrete components.

The interface for the front has an integrator, which converts a 3.3kHz square wave to a negative DC voltage for the display contrast. By changing the duty cycle of the square wave the DC voltage and thereby contrast will also change. An attenuator allows the MPU to measure the contrast voltage.

The PLL circuit (placed on a separate board) makes a very stable frequency at 256 x sample rate, this frequency is divided down to 64 x sample rate and to 1 x sample rate by the DARC. The PLL has its own power regulation.

Analog section is placed mainly on the right side of the main board.

The analog input is balanced, thus pin 3 should be connected to pin 1 when used with unbalanced equipment.

Analog Input levels and Analog Output levels are controlled by digital potentiometers. These potentiometers are located in a single chip, IC33.

The A/D converter is a 24bit converter . The A/D and D/A converters have also a separate power regulation.

The D/A converter is also 24bit. A DC voltage is applied to the left & right signal output at the converter.

After the D/A comes a 2nd order filter, then the output level and then a 1st order filter.

An electronic balanced circuit perform the output stage. Again, XLR pin 3 should be connected to pin 1 when used with unbalanced equipment.

Power supply section consist of a separate Power Supply Module and some regulation circuits on the main board.

One of the regulation circuits has an electronic switch for the +/-15V. But the electronic switch for the +5V is mounted inside the Power Supply Module. The switches are controlled by the Stand By circuit. The Stand By circuit is supplied from a separate power wire from the Power Supply Module.

This service manual does not contain schematics for the Power Supply Module, because any attempt to repair the module must be completed with some safety tests such as high voltage and EMC test. Hence it is strongly recommended that the entire Power Supply Module is replaced in case of malfunction.

LED Error Codes

LD1	LD2	LD3	Code explanation	Comment
Off	off	off	Normal	
On	on	on	Checksum error in boot software	Reload boot software

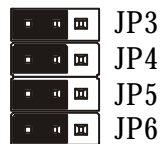
LD4 has two functions: 1: Show power on. 2: Define clean power for IC33 pin 6.

Jumper settings

Main board version PC13001-3 and PC13001-4:

JTAG is unused. JP3, JP4, JP5 & JP6 controls boot mode:

Boot from Flash
(normal mode)



Boot from PCMCIA
(for service only)



Booting from PCMCIA requires a PCMCIA card loaded with special boot software: Lboot160.ins

Technical Specifications

Digital Inputs and Outputs

Connectors:	XLR (AES/EBU) RCA Phono (S/PDIF) Optical (Toslink)
Formats:	AES/EBU (24 bit), S/PDIF (24 bit), EIAJ CP-340, IEC 958, EIAJ Optical (Toslink)
Output Dither:	HPF TPDF dither 16, 20 and 24 bit
Sample Rates:	44.1 kHz, 48 kHz
Processing Delay:	0.2 ms @ 48 kHz
Frequency Response DIO:	DC to 23,9 kHz \pm 0,01 dB @ 48 kHz
Compressor THD+N:	-122 dB (0,00008%) @ 10 dB Comp, 20 Hz to 20 kHz

Analog Inputs

Connectors:	XLR balanced (pin 2 hot)
Impedance:	20 kohm
Max. Input Level:	+22 dBu (balanced)
Min. Input Level (for 0 dBFS):	-10 dBu
Sensitivity:	@ 12 dB headroom: -22 dBu to +10 dBu
A to D Conversion:	24 bit (1 bit, 128 times oversampling)
A to D Delay:	0.8 ms @ 48 kHz
Dynamic Range:	>103 dB (unweighted), >106 dB(A)
THD:	-95 dB (0,0018 %) @ 1 kHz, -6 dBFS (FS @ +16 dBu)
Frequency Response:	10 Hz to 20 kHz: +0/-0.2 dB
Crosstalk:	< -80 dB, 10 Hz to 20 kHz typical -100 dB @ 1 kHz

Analog Outputs

Connectors:	XLR balanced (pin 2 hot)
Impedance:	100 ohm (active transformer)
Max. Output Level:	+22 dBu (balanced)
Full Scale Output Range:	-10 dBu to +22 dBu
D to A Conversion:	24 bit (1 bit, 128 times oversampling)
D to A Delay:	0.57 ms @ 48 kHz
Dynamic Range:	>100 dB (unweighted), >104 dB(A)
THD:	-86 dB (0,005 %) @ 1 kHz, -6 dBFS (FS @ +16 dBu)
Frequency Response:	10 Hz to 20 kHz: +0/-0.5 dB
Crosstalk:	< -60 dB, 10 Hz to 20 kHz typical -90 dB @ 1 kHz

EMC

Complies with:	EN 55103-1 and EN 55103-2, FCC part 15 class B, CISPR 22 class B
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Safety

Certified to:	IEC 65, EN 60065, UL 1419 and CSA E65
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Environment

Operating Temperature:	32° F to 122° F (0° C to 50° C)
Storage Temperature:	-22° F to 167° F (-30° C to 70° C)
Humidity:	Max. 90 % non-condensing

PCMCIA Interface

Connector:	PC Card, 68 pin type 1 cards
Standards:	PCMCIA 2.0, JEIDA 4.0
Card Format:	Supports up to 2 MB SRAM

Control Interface

MIDI:	In/Out/Thru: 5 Pin DIN
GPI, Pedal, Fader:	¼" phone jack, 0 ohm to 50 kohm

General

Finish:	Anodized aluminum front Plated and painted steel chassis
Dimensions:	19" x 1.75" x 8.2" (483 x 44 x 208 mm)
Weight:	5.2 lb. (2.35 kg)
Mains Voltage:	100 to 240 VAC, 50 to 60 Hz (auto-select)
Power Consumption:	<20 W
Backup Battery Life:	>10 years

Warranty

Parts and labor:	1 year
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Note: Due to continuous development and standardization all specifications are subject to change without notice

Appendix list: Schematics, Part lists, PCB Lay-out

The list below show the contents and the order of appendix.

Schematic for Main board ver. PC13001-4	14 pages
Part list for Main board ver. PC13001-4	16 pages
PCB lay-out for Main board ver. PC13001-4	2 pages
Schematic for Main board ver. PC13001-3	14 pages
Part list for Main board ver. PC13001-3	16 pages
PCB lay-out for Main board ver. PC13001-3	2 pages
Schematic for Front boards ver. PC12507-1	3 pages
Part list for Front boards ver. PC12507-1	6 pages
PCB lay-out for Front boards ver. PC12507-1	1 page
Schematic for PLL board ver. PC12903-3	3 pages
Part list for PLL board ver. PC12903-3	2 pages
PCB lay-out for PLL board ver. PC12903-3	1 page
Spare Part list for Finalizer Express	2 pages