

Multifunctional equalizer "Eldorado MF-01"

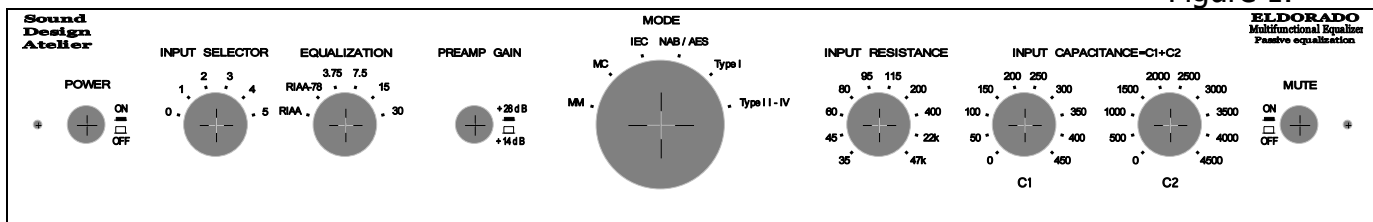
The multifunctional equalizer "Eldorado MF-01" is a preamplifier designed to amplify and equalize signal from MM and MC cartridges for vinyl players and from the magnetic heads of reel-to-reel and cassette recorders. In RIAA MM mode only tube amplification is used, in RIAA MC and IEC, NAB / AES, Type I, Type II-IV modes a semiconductor low-noise preamplifier with the possibility to manually select the gain is additionally used.

The equalizer is made in one case, which makes it more convenient to use at home.

The functionality of the "Eldorado MF-01" can be understood after reading the controls in Figure 1 and in table 1.

Multifunctional equalizer "Eldorado MF-01" front panel.

Figure 1.



Controls "Eldorado MF-01" and their functional purpose.

Table 1.

	Control body and operating modes	Functional purpose
1	Button "POWER"	On / off
2	Switch "MODE" - MM, MC - IEC, AES/NAB - TypeI, TypeII-IV	RIAA equalizer R2R playback amplifier Cassette deck playback amplifier
3	Switch "EQUALIZATION" - RIAA, RIAA-78 - 9,53 cm / sec (3,75 inch / sec) - 19,05 cm / sec (7,5 inch / sec) - 38,1 cm / sec (15 inch / sec) - 76,2 cm / sec (30 inch / sec)	RIAA equalization RIAA-78 - the infra-low pass filter is switched on Speed equalization in IEC, NAB/AES standards
4	Button "PREAMP GAIN"	14 dB or 28 dB
5	Switch "INPUT SELECTOR" - 0 - 1-2 - 3-4 - 5	Inputs are not connected MM RCA inputs MC/R2R/CD RCA inputs MC/R2R/CD XLR input
6	Switch "INPUT RESISTANCE"	35, 60, 80, 105, 130, 160, 200, 400, 22 000, 47 000 (Ohm)
7	Switch "INPUT CAPACITANCE C1"	0 - 450 (step 50 pF)
8	Switch "INPUT CAPACITANCE C2"	0 - 4500 (step 500 pF)
9	Button "MUTE"	Output short circuit

The biggest difference of the multifunctional equalizer "Eldorado MF-01" in the modes IEC, NAB / AES, Type I, Type II-IV from analogues is that for the formation of standard frequency response passive equalization is used. It gives a more natural sound compared to the feedback equalization, which has been used and is used in all tape recorders and devices for reproducing tape recording since the golden era of magnetic recording. The same technical solution is used in the RIAA equalizer mode.

The equalizer makes it possible to use almost any cartridge or magnetic head. Rapid tuning of input resistance, capacitance and gain selection for different operating modes are designed for this.

Multifunction equalizer "Eldorado MF-01" has 5 inputs: two RCA inputs for MM cartridges, two RCA and one XLR inputs for MC cartridges or magnetic heads. The desired input is selected using the input selector. Switching is carried out by specialized low-signal relays. The same relays are used to switch the equalization when changing operating modes. The device has one RCA and one XLR outputs.

Technical characteristics of the device are given in table 2.

Multipurpose corrector "Eldorado MF-01" technical characteristics.

Table 2.

	Technical characteristics	Value
1	Operating frequency range, Hz	10...25 000
2	Maximum output voltage, V	40
3	Gain in MM mode, dB	46
4	Preamplifier gain, dB - 14 dB mode - 28 dB mode	14 28
5	Gain in IEC, NAB / AES mode - in the mode of amplification by the previous amplifier of 14 dB, dB - in the mode of amplification by the previous amplifier 28 dB, dB	50 64
6	Gain in TypeI, TypeII-IV mode - in the mode of amplification by the preamplifier of 14 dB, dB - in the mode of amplification by the preamplifier 28 dB, dB	60 74
7	Ability to overload in the MM mode relative to $U_{in} = 5 \text{ mV}$, dB	32
8	Attenuation at a frequency of 4 Hz in RIAA-78 mode, dB	14
9	Input resistance in the MM mode, kOhm	47
10	The total coefficient of distortion at $U_{out} = 0,775 \text{ V}$, %	0,1
11	The signal / noise ratio at $U_{out} = 0.775 \text{ V}$, dB - in MM mode - in MS mode, IEC (9), NAB / AES (9, 19, 38), Type I, Type II-IV - in IEC mode (19, 38, 76), NAB / AES (76)	- 78 - 74 - 70
12	The inductance of the magnetic head that can be used, mH	10...600
13	Frequency response deviation from standard (without adjustment), dB - in RIAA equalizer mode - in MC mode, IEC (9), NAB / AES (9, 19, 38), TypeI, TypeII-IV - in IEC mode (19, 38, 76), NAB / AES (76) ($f = 200 \dots 20\,000 \text{ Hz}$) - in IEC mode (19, 38, 76), NAB / AES (76) ($f = 20 \dots 100 \text{ Hz}$)	$\pm 0,2$ $\pm 0,2$ $\pm 0,2$ ± 1
14	Adjusting the RF time constant equalization in IEC, NAB / AES, Type I, Type II-IV modes, %	+50
15	Power consumption, W.	60
16	Overall dimensions, mm	430x390x80
17	Weight, kg	9

Tape records work features.

As the wear from the friction of the magnetic tape on the working surface of the magnetic head usually decreases the level of high frequencies during the reproduction of the tape recording. This can be compensated by increasing the time constant of high-frequency equalization. The corresponding **"Time Constant"** controllers in the "Eldorado MF-01" multifunction equalizer are located on the rear panel of the device. The nominal value of the equalization time constants in the modes IEC, NAB / AES, Type I, Type II-IV, which are provided in the initial settings at the time of sale are given in table 3. View of the rear panel in figure 2.

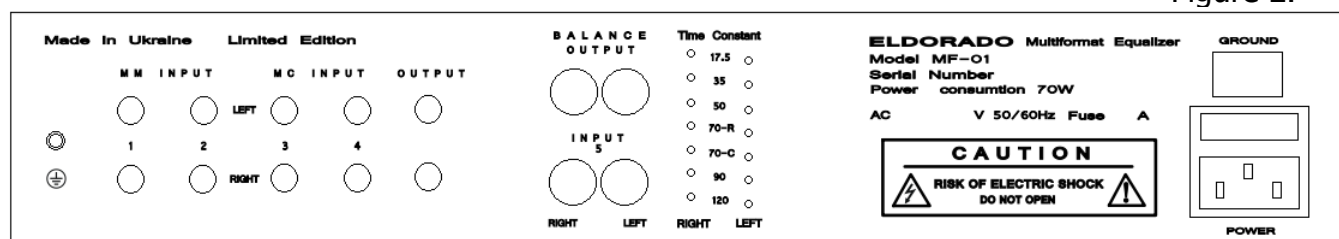
Nominal values of equalization time constants in IEC, NAB / AES, Type I, Type II-IV modes.

Table 3

Recording standard	Tape speed, cm / sec (inch / sec)	LF and HF equalization time constants, μsec	
Time constant equalization in the tape records mode (LF, HF), μs	- IEC	9,53 (3,75)	3180, 90
		19,05 (7,5)	33 000, 70
		38,1 (15)	33 000, 35
		76,2 (30)	33 000, 35
	- NAB/AES	9,53 (3,75)	3180, 90
		19,05 (7,5)	3180, 50
		38,1 (15)	3180, 50
		76,2 (30)	33 000, 17.5
- Type I		3180, 120	
- Type II-IV		3180, 70	

Rear panel of the Eldorado MF-01 multipurpose equalizer.

Figure 2.



It should be noted that in the IEC standards for speeds 19.05, 38.1, 76.2 cm / sec (7.5, 15 and 30 inch / sec) and AES for 76.2 cm / sec (30 inch / sec), the value of the low-frequency equalization time constant is defined as $\infty \mu\text{sec}$, ie it is normalized from 0 Hz. From a practical point of view, the exact frequency response reproduction significantly complicates the device (you need to enter an additional amplification stage), so instead of $\infty \mu\text{sec}$ selected value of 33,000 μsec (in some sources it is recommended to choose this value 9,000 μsec), which gives the accuracy of frequency response in the range of 20 ... 100 Hz less than ± 1 dB.

The **"Ground"** switch on the rear panel connects or disconnects the middle (ground) contact of the power connector to the device housing. Sometimes this affects the nature of the overall sound.

Multifunctional equalizer "Eldorado MF-01" using.

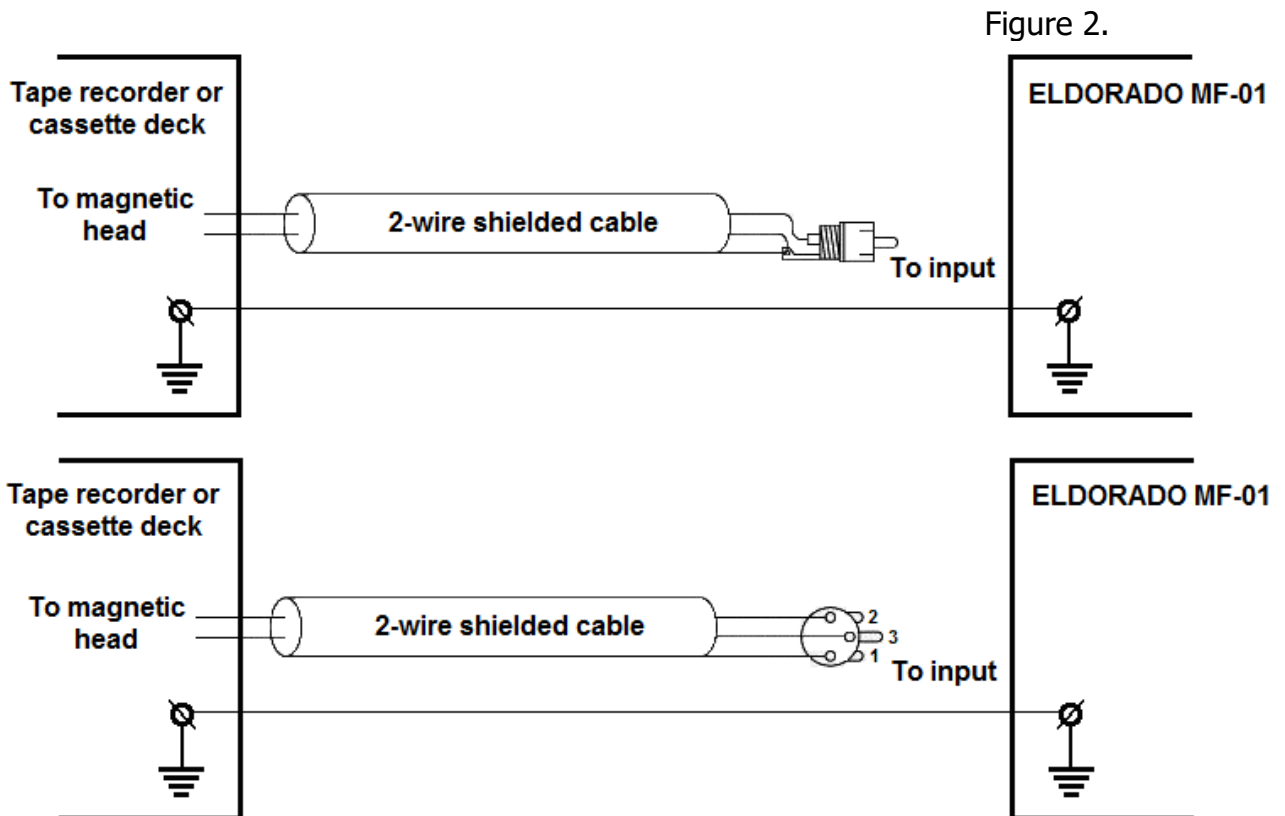
Multifunctional equalizer "Eldorado MF-01" is a complex household appliance that requires special knowledge to use.

The device is a highly sensitive low-frequency amplifier, so there are several features when placing and operating it in combination with other audio equipment:

1. Particular attention should be paid to the quality of the connection of the metal body "Eldorado MF-01" with the metal parts of the vinyl player, tape recorder and cassette deck. Many tape recorders and cassette decks do not have a special contact for this, so it is necessary to make it specially. The connection must be made by a separate wire. Poor connection can lead to high noise at the output of the equalizer.

Connection to "Eldorado MF-01" in the RIAA mode has no features, connections in the IEC, NAB / AES, Type I, Type II-IV modes are given in figure 2.

"Eldorado MF-01" connection in IEC, NAB / AES, Type I, Type II-IV modes.



2. "Eldorado MF-01" works with very low input voltages (rated output voltage from the MC cartridge or magnetic head may be less than 100 μV), so the equalizer can respond to power cables or power transformers located near its input connectors other devices. Place the equalizer away from them.

3. In the working position for "Eldorado MF-01" 5-10 cm of free space from above for cooling needs to be provided. Tubes have the ability to heat up in working condition.

The **"Input capacitance C1"** switch allows you to select the input capacity of the equalizer for the best alignment of the cartridge with the "Eldorado MF-01" in RIAA MM mode. Capacitor selection can be done with a measuring vinyl disc or by ear, according to the sound quality at high frequencies of plates with familiar recordings.

The **"Input resistance"** switch selects the value of the input resistance closest to the cartridge recommended by the manufacturer, or select it yourself according to your auditory preference in RIAA MC mode.

You can compensate for high frequency losses in IEC, NAB / AES, Type I, Type II-IV modes. This is required for most magnetic heads. A capacitor consisting of a cable capacitance, an input capacitance of the equalizer and additional capacitors connected by the **"Input capacitance C1"** and **"Input capacitance C2"** switches is connected in parallel with the magnetic head. The inductance of the magnetic head and the capacitance of the capacitor form a resonant circuit with frequency

$$f = \frac{1}{2\pi\sqrt{LC}}$$

where **f** is the frequency, Hz,

L is the inductance of the magnetic head, **H**,

C - Ccab. + Cin. + C1 + C2, **F**.

The capacity of the cable and the input capacity of the equalizer (Ccab. + Cin.) can be approximately estimated as 100-250 pF.

The resonance frequency is chosen equal to or slightly higher than the upper frequency of the operating range of the tape recorder or cassette deck. Adjusted settings should be made using measuring tapes (cassettes) or by ear for high quality sound in familiar recordings.

The technical characteristics of the magnetic heads change during operation and this leads to a deterioration in the reproduction of recordings at high frequencies. The rear panel of the equalizer has high-frequency time constant control to compensate this effect. In IEC, NAB / AES, Type I, Type II-IV modes time constants equalization are used depending on the recording standard and playback speed:

- 17.5 - 17.5 µsec for AES 76.2 cm / sec (30 inch / sec);
- 35 - 35 µsec for IEC 38.1 and 76.2 cm / sec (15 and 30 inch / sec);
- 50 - 50 µsec for NAB 19.05 and 38.1 cm / sec (7.5 and 15 inch / sec);
- 70-R - 70 µsec for IEC 19.05 cm / sec (7.5 inch / sec);
- 70-C - 70 µsec for Type II-IV;
- 90 - 90 µsec for IEC and NAB 9.53 cm / sec (3.75 inch / sec);
- 120 - 120 µsec for Type I;

The initial values of the equalization time constants, which are set by the manufacturer, correspond to the values in table 3. Increasing the equalization time constants leads to an increase in the level of high frequencies. Appropriate adjusters of the equalization time constant must be rotated clockwise for this.

Design features.

The output signals of the equalizer are blocked, the signal contacts of the output connectors for 1 - 2 minutes are connected to the ground wire at the time of inclusion. This prevents the signals from the transients, which may be when you turn on the equalizer, the input of the amplifier and further into the speakers. In addition, in the process of work in the same way the output signals are blocked, which makes it possible to switch the signal sources without the risk of damaging the acoustics in the **"Mute"** mode.

The equalizer is powered by two toroidal transformers: plating and heating. The plating transformer is a high voltage source for the tubes plate power supply circuits. The heating transformer feeds the heaters of the equalizer tubes, the preamplifier and the switching relay.

The power supply of the relay and preamplifier is stabilized, all other power supplies are unstabilized, which has a very beneficial effect on sound quality. The relays are powered by a voltage stabilizer, the preamplifier by a current stabilizer.

The primary windings of power transformers are connected to the AC mains through a filter, which eliminates the effect of increased distortions of the mains voltage in their presence.

To power the heaters of the tubes, current limiters are used, which limit the current to the cold tube heaters at the time of inclusion of the equalizer.

This technique significantly extends the life of lamps, the price of which is sometimes very inhumane.

Sound Design Atelier

M Shimko St 50

Vinnytsja Ukraine 21034

e-mail: svstube@gmail.com

tel: +380-432-273-971

fax: +380-432-273-971

mob: +380-50-4612282