Tape Stage "Eldorado TS-01"

Tape stage for tape recorders and cassette decks "Eldorado TS-01" is a pre-amplifier for amplify and equalize the signal from the magnetic heads of reel-to-reel tape recorders and cassette decks. In the mode of signal amplification from the magnetic heads of tape recorders in "Eldorado TS-01" to work in the IEC, NAB / AES standards for speeds of 9.53, 19.05, 38.1 and 76.2 cm / sec it is possible, in the mode of signal amplification from the magnetic heads of cassette decks it can work with cassettes Type I, Type II-IV.

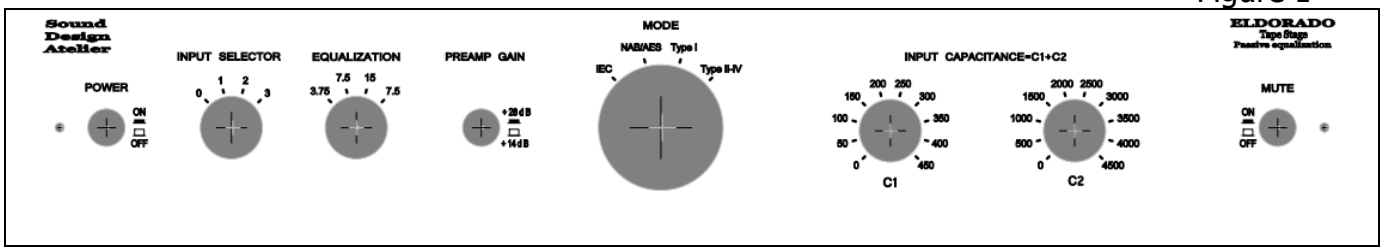
The main amplification in the "Eldorado TS-01" is made on electronic tubes, in addition, a semiconductor low-noise preamplifier with the ability to manually select the gain.

"Eldorado TS-01" is structurally made in one case, which makes it more convenient to use at home.

The functionality of the "Eldorado TS-01" can be understood after reading the controls in Fig. 1 and in Table 1.

Eldorado TS-01 Tape Stage Front Panel

Figure 1



Controls "Eldorado TS-01" and their functional purpose

Table 1

	Control body and operating modes	Functional purpose
1	**"POWER"** Button	On / Off
2	**"MODE"** Switch - IEC, AES/NAB - Type I, Type II-IV	R-2-R tape stage Cassettedeck tape stage
3	**"PREAMP GAIN"** Button	14 dB or 28 dB
4	**"EQUALIZATION"** Switch - 9,53 см/сек (3,75 д/сек) - 19,05 см/сек (7,5 д/сек) - 38,1 см/сек (15 д/сек) - 76,2 см/сек (30д/сек)	Speed correction in IEC, NAB / AES standards in R-2-R tape stage mode
5	**"INPUT SELECTOR"** Switch - 0 - 1-3	Inputs are not connected Signal inputs
6	**"INPUT CAPACITANCE C1"** Switch	0 - 450 (step 50 pF)
7	**"INPUT CAPACITANCE C2"** Switch	0 - 4500 (step 500 pF)
8	**"MUTE"** Button	Output short circuit

The Eldorado TS-01 uses passive equalization in all modes, which gives a more natural sound compared to the feedback equalization used and used in all tape recorders and devices for magnetic reproduction since the golden age of magnetic recording.

The device gives the chance to use practically any magnetic head for what operational adjustments of input capacity and adjustment of circuits of cequalization are intended.

The tape stage "Eldorado TS-01" has 3 inputs for connection of 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 correction when changing operating modes. The device has one RCA and one XLR outputs.

Specifications of the device are given in table 2.

Specifications of the tape stage "Eldorado TS-01"

Table 2

	Specifications	Norm
1	Operating frequency range, Hz	10...25 000
2	Maximum output voltage, V	40
4	Gain in IEC, NAB / AES modes at a frequency of 400 Hz- in IEC modes (19, 38, 76) and AES (76), dB - in IEC modes (9) and NAB (9, 19, 38), dB	 56 70
5	Gain in TypeI, TypeII-IV mode	70
6	Input resistance, kOhm	47
7	Distortion at Uout = 0,775 V,%	0,1
8	The ratio of signal, noise at Uout = 0.775 V, dB - IEC (9), NAB / AES (9, 19, 38), TypeI, TypeII-IV - in IEC mode (19, 38, 76), NAB / AES (76)	 - 74 - 70
9	The inductance of the magnetic head that can be used, mH	10...600
10	Deviation of frequency response from standard (without adjustment), dB - in IEC (9), NAB / AES (9, 19, 38), TypeI, TypeII-IV modes - in IEC mode (19, 38, 76), NAB / AES (76) (f = 200 ... 20 000 Hz) - in IEC mode (19, 38, 76), NAB / AES (76) (f = 20 ... 100 Hz)	 ±0,2 ±0,2 ±1
11	Adjusting the RF equalization time constant in IEC, NAB / AES, Type I, Type II-IV modes,%	+50
12	Power consumption, W.	60
13	Overall dimensions, mm	430x390x80
14	Weight, kg	9

Features of work with magnetic records.

As a result of wear from friction of a magnetic tape on a working surface of a magnetic head the level of high frequencies at reproduction of magnetic record usually decreases. This can be compensated by increasing the time constant of high-frequency correction. The corresponding "Time Constant" controllers in the "Eldorado TS-01" Tape Stage are located on the back 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 back panel in Fig. 2.

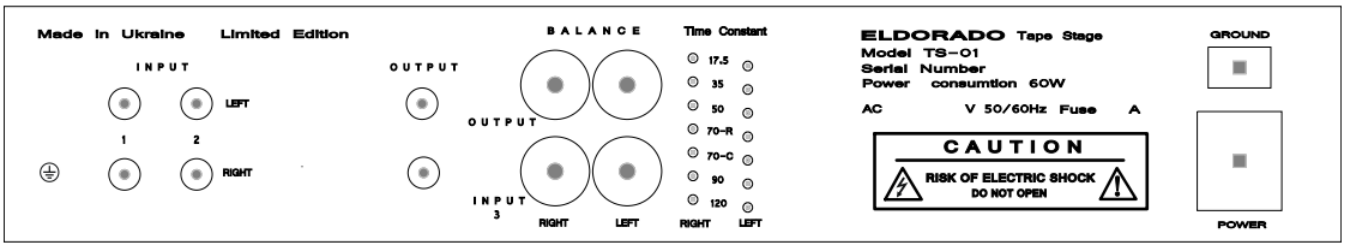
Nominal values of equalization time constants in IEC, NAB / AES, TypeI, TypeII-IV modes

Table 3

Recording standard	Magnetic tape speed, cm / sec (inch / sec)	LF and HF equalization time constants, μsec
Constant time equalizations (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

Eldorado TS-01 rear panel

Figure 2



It should be noted that in the IEC standards for speeds 19.05, 38.1, 76.2 cm / sec and AES for speeds 76.2 cm / sec, the value of the low-frequency equalization time constant is defined as ∞ μsec, 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 ∞ μsec selected value of 33,000 μsec (in some sources it is recommended to choose 9,000 μsec), which gives the accuracy of frequency response 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 corrector housing. Sometimes this affects the nature of the overall sound.

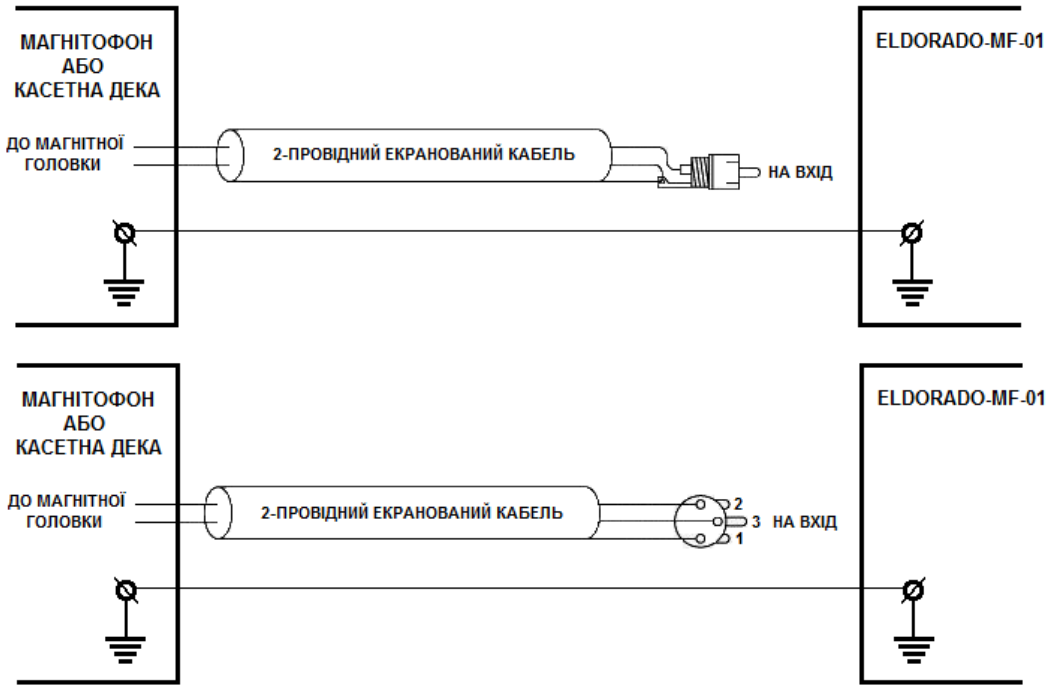
Using the Tape Stage "Eldorado TS-01

Tape Stage for tape recorders and cassette decks "Eldorado TS-01" is a complex household appliance that requires special knowledge to use.
The device is a highly sensitive low-frequency amplifier, so when placing and operating it in combination with other audio equipment, there are several features:
1. Particular attention should be paid to the quality of the connection of the metal body "Eldorado TS-01" with the metal parts of the 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 device.Підключення до "Eldorado TS-01" до магнітофону та касетної деки показане мал. 3.

Connection of "Eldorado TS-01" to a tape recorder and a cassette deck

Figure 3



2. "Eldorado TS-01" works with very low input voltages (rated voltage level from the magnetic head can be less than 100 μV), so the device can respond to power cables or power transformers of other devices located near its input connectors. Place the concealer away from them.

3. In the working position for "Eldorado TS -01" it is necessary to provide 5-10 cm of free space from above for cooling, tubes have property to be heated in a working condition.

Most magnetic heads require high frequency loss compensation. To do this, a capacitor consisting of a cable tank, an input capacitor of the device and additional capacitors connected by the switches **"Input capacitance C1**" and **"Input capacitance C2**" is connected in parallel to 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 – C cab. + C input + C1 + C2, F.

The capacity of the cable and the input capacity of the corrector (C cab. + C input) can be estimated as approximately 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. You need to make fine-tuning with measuring tapes (cassettes) or by ear for high-quality sound in familiar recordings.

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

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

The initial values of the equalization time constants, which are set by the manufacturer, correspond to the standards in table. 3. Increasing the equalization time constants leads to an increase in the level of high frequencies. To do this, turn the corresponding adjustment time constant knobs clockwise.

Features of a design.

At the moment of inclusion output signals "Eldorado TS-01" are blocked, ie signal contacts of output sockets for 1 - 2 minutes are connected to an earth wire. This prevents signals from transients, which may occur when the device is turned on, at the input of the amplifier and further into the acoustics. In addition, during operation in the "Mute" mode, the output signals are blocked in the same way, which makes it possible to switch the signal sources without the risk of damaging the speakers.

"Eldorado TS-01" is powered by two toroidal transformers: anode and heater. The anode transformer is a high voltage source for the anode power supply circuits of lamps. The heater transformer supplies the tubes heater of the device, the pre-amplifier 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 is powered 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 limit the tubes heater, current limiters are used, which limit the current to the cold units of the tubes heater at the time of inclusion of the device.
This technique significantly extends the life of tubes, the price of which is sometimes very inhumane.

Sound Design Atelier