



LABORATORIES

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MU-TRON III+ OPERATING INSTRUCTIONS

While simple to operate once all its functions are understood, the **MU-TRON III+** is capable of producing a number of unique musical effects. Before you can use your Mu-tron as a tool of musical expression, a few minutes should be spent to familiarize yourself with the function of its controls and switches.

BATTERY INSTALLATION:

Make sure the **POWER** switch is in its **OFF** position before attempting to install or change the batteries. Open the battery-access door located on the bottom of the Mu-tron by using a coin to turn the fastener 1/4 rotation counter-clockwise. Insert two fresh 9-Volt batteries into the holders. Make sure the batteries are fully seated in their holders by first pushing down and then firmly toward the top of the unit. Close and lock the battery access door by turning the fastener 1/4 turn clockwise.

NOTE: The batteries may become dislodged during shipping. After transporting your Mu-tron, it's a good idea to make sure the batteries are fully seated in their holders.

CONNECTION:

With a shielded cable, connect your instrument to the **INSTRUMENT** jack on the rear of the Mu-tron. The Mu-tron's output is marked **AMPLIFIER** and may be connected to an amplifier's input or to the input of another signal processor. Do not use a stereo (3-conductor) plug for the **AMPLIFIER** jack connection.

FUNCTIONAL DESCRIPTION:

The **MU-TRON III+** is a filter whose frequency is shifted by your instrument's volume (envelope). This filter has low-pass, band-pass, high-pass and notch outputs. The **MODE** switch selects which of these outputs is routed to the **AMPLIFIER** jack. The **DEPTH** control adjusts the amount of the instrument's signal which is used to shift the filter. The **PEAK** control changes the "Q" of the filter. A low setting of the **PEAK** control produces a filter with very subtle characteristics, whereas a high setting produces a more accentuated effect. The **DRIVE** switch determines which way the filter shifts in response to the instrument's volume (namely, **UP** or **DOWN**). The **RANGE** switch offers two bands of frequencies for the filter (namely, **HIGH** or **LOW**).

OPERATION:

Set the controls of your amplifier in a normal manner and begin with the following settings on the Mu-tron:

MODE switch -	BP	RANGE switch -	LOW
PEAK control -	10	DRIVE switch -	UP
DEPTH control -	0	POWER switch -	ON

Make sure the Mu-tron's **POWER** switch is **ON** and a cord is plugged into the jack marked **AMPLIFIER** before turning the amplifier on. Play a few notes on your instrument while increasing the **DEPTH** control gradually. If no effect is observed, operate the foot switch (the switch was in the bypassed position). Notice how the effect changes with the volume of the instrument and the setting of the **DEPTH** control.

Once a satisfactory setting has been found for the **DEPTH** control, vary the positions of the **MODE**, **RANGE** and **PEAK** controls and observe the variations in the sound produced. The **LP** (low pass) position of the **MODE** switch emphasizes the low or bass range of sound. The **BP** (band pass) position of the **MODE** switch emphasizes the mid-range of sound while rejecting the high and low frequency portions. The **HP** (high pass) position of the **MODE** switch emphasizes the high or treble region of audio. The **N** (notch) position of the **MODE** switch emphasizes both the bass and treble regions rejecting only a narrow band between them. Note: this produces an effect much more subtle than the other selections. Try a low setting of the **PEAK** control.

The foot switch is a push-push type of switch with no visual distinction between the two positions. One position engages the Mu-tron effect. The other position is a true bypass which connects the **INSTRUMENT** jack with the **AMPLIFIER** jack.

A battery-eliminator may be used with the **MU-TRON III+** via the **DC IN** jack on the rear apron. The ideal voltage for the eliminator is between 18 Volts DC and 25 Volts DC. 30 Volts must not be exceeded - damage will occur. The Mu-tron uses whichever voltage is higher, battery (18V) or the eliminator voltage. If an eliminator of less than 18 Volts is connected, it will be used only if the batteries are removed or are "dead".

A feature has been provided to prevent unintentional battery drain. When powered by batteries, the Mu-tron will be "on" when the **POWER** switch is **ON** and the **AMPLIFIER** jack has a mono (2-conductor) plug in it. When the plug is removed, the Mu-tron will be turned off, even if the **POWER** switch is **ON**. When the Mu-tron is battery-eliminator powered, the only requirement is that the **POWER** switch is **ON**.

The **LOW BATTERY** LED will turn on when the voltage (batteries or eliminator) drops below 14.5 Volts.

SUGGESTIONS and CAUTIONS:

The **MU-TRON III+** has been designed to allow even a very low-volume input to produce the full effect. Because of this, it is important to set the **DEPTH** control carefully. It is most desirable to set the **DEPTH** control so that the sound changes (filter shifts) over the whole dynamic range of the instrument. If the **DEPTH** control is set too high, the full effect (shift) will be reached early and quickly and will not seem to track the volume of the instrument.

It is important to minimize unwanted sounds or noise on the Mu-tron's input (**INSTRUMENT**). The Mu-tron will treat string noise, hum, etc. as valid audio and begin to shift the filter. This will reduce the range of sweep and the perceived effect.

This same effect may be noticed on instruments with long sustain. Remember that the Mu-tron responds to the volume of the entire signal, both new notes and sustained previously played notes. If the volume of the sustained passage is sufficiently high to produce the full effect (filter shift), the new passage cannot produce further effect (shift). Try reducing the **DEPTH** control setting.

The Mu-tron produces its most noticeable effect when the instrument's volume changes rapidly. This behavior may be used to advantage by a change in playing style. Try to dampen or mute the strings after playing each note. This small quiet space between the notes allows the filter to shift back to its original position, ready for a full shift on the next note.

With high settings of the **PEAK** control (toward **10**), the filter's gain in the accentuated frequency band is quite high. Generally, this is not a problem because the filter's peak is positioned in the region of harmonics (overtones). These harmonics usually have significantly less amplitude than the fundamental. When using settings which accentuate the frequency region of the fundamental frequencies being played, a large increase in volume can occur. This is particularly noticeable with down drive where the filter sweeps down from the region of overtones into the fundamental range. If this effect is not pleasing, two things may be done to reduce it; reduce the **PEAK** control setting, and/or decrease the **DEPTH** control setting. A compressor or limiter after the Mu-tron will also help this condition.

The **MU-TRON III+** is compatible with any instrument: guitar, bass, electric piano, and mic'd instruments such as drums, cymbals, brass, woodwinds, etc. Some experimentation will be necessary to find the Mu-tron settings which best suit your instrument, equipment and playing style.

OTHER PROCESSORS:

The **MU-TRON III+** is a flexible signal processor which may be used almost anywhere in the signal path. In general, any device which alters the dynamics of the incoming signal is well suited for use ahead of the Mu-tron. Sound (or noise) gates work well because they tend to "quicken" the signal. These may also be used to eliminate false triggering by noise or unwanted sounds. Compressors and limiters should be used with some caution. Since the Mu-tron requires a change in volume to function, too much compression will limit the effect. Some compression may be beneficial by keeping the signal in the useful range of the Mu-tron.

Experiment to determine whether better results are obtained with the other device connected between the instrument and the Mu-tron or between the Mu-tron and the amplifier. The results may be quite different.

Many unusual effects may be produced by using two Mu-trons in series. Use a patch cord to connect the **AMPLIFIER** jack of the first Mu-tron to the **INSTRUMENT** jack of the second Mu-tron. Try one Mu-tron with its **DRIVE** switch in the **UP** position and the other with its **DRIVE** switch in the **DOWN** position. One instrument with which this works very well is the electric piano. It will take some experimentation to find the best control settings for each application.