



**MU-TRON III+™ OPERATING INSTRUCTIONS**

While easy and intuitive to operate, the **MU-TRON III+™** is capable of producing a wide range of unique musical effects. We would like to help you get the most from your new **MU-TRON III+™**, so please take a few minutes to familiarize yourself with its functions, features and options.

*FUNCTIONAL DESCRIPTION:*

The **MU-TRON III+™** is a filter whose frequency is controlled 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 filter's sensitivity to the signal from your instrument. 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 strongly accentuated effect. The **DRIVE** switch determines which way the filter shifts in response to an increase in volume (namely, **UP** or **DOWN**). The **RANGE** switch offers two bands of frequencies for the filter, **HIGH** and **LOW**. The frequencies for the **HIGH** and **LOW** bands are customizable via DIP-switch settings (see the *CUSTOMIZATION* section).

*POWER:*

Open the battery-access door, located on the bottom of the **MU-TRON III+™**, using a large 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 pushed onto the the snaps. Close and lock the door by turning the fastener 1/4 turn clockwise.

**NOTE:** The batteries may become dislodged during transportation. After transporting your **MU-TRON III+™**, it's a good idea to check the batteries' connections.

The optional **MU-TRON™ AC ADAPTER PS-1** may be used alone or in combination with batteries via the **DC IN** jack on the back. The **MU-TRON III+™** will draw from which ever source has the higher voltage, batteries (18V) or the eliminator voltage. The **MU-TRON III+™** is protected against reverse-polarity connections for both batteries and battery-eliminator. To avoid possible damage, please use the **MU-TRON™ AC ADAPTER PS-1**.

*CONNECTION:*

Connect your instrument (or other source) to the input jack, marked **INSTRUMENT**, located on the rear of the **MU-TRON III+™**. The **MU-TRON III+™** 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.

*OPERATION:*

Set the controls of your amplifier in a normal manner and begin with the following settings on the **MU-TRON III+™**:

<b>MODE</b> switch -	<b>BP</b>	<b>PEAK</b> control -	<b>10</b>	<b>DEPTH</b> control -	<b>0</b>
<b>RANGE</b> switch -	<b>LOW</b>	<b>DRIVE</b> switch -	<b>UP</b>	<b>POWER</b> switch -	<b>ON</b>

Make sure the **MU-TRON III+™ POWER** switch is **ON** and a cord is plugged into the jack marked **AMPLIFIER** before plugging the cord into the amplifier. Play your instrument while increasing the **DEPTH** control gradually until the **LOW BATTERY** light blinks on with the loudest notes. The **LOW BATTERY** light also serves as a sweep limit indicator. If no effect is heard, 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 III+™** effect. The other position is a true bypass which connects the **INSTRUMENT** jack with the **AMPLIFIER** jack.

A feature has been provided to prevent unintentional battery drain. When powered by batteries, the **MU-TRON III+™** 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 III+™** will be turned off, even if the **POWER** switch is **ON**. When the **MU-TRON III+™** 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 15 Volts.

**NOTE:** It is normal for the low-battery light to turn on momentarily when turning the **MU-TRON III+™** on and off.

*CUSTOMIZATION:*

Several powerful and unique features have been added to your new **MU-TRON III+™** allowing you to fine-tune it to your instrument, playing style and preferences. These features are controllable via a six-position DIP switch located between the battery holders inside the case. **NOTE:** Depending on your instrument and playing style, the differences between some DIP switch settings may be subtle.

◇ Switches **ONE** and **TWO** alter the frequencies of the high and low frequency ranges (selected by the **RANGE** switch). There are four possible combinations of these two switches. The initial setting of these switches (1=OFF, 2=OFF) provides the highest frequencies for both high and low ranges. Switch **ONE** affects only the low range whereas switch **TWO** drops the frequencies of both high and low ranges. The effect of the switches is additive (i.e. both switches **ON** provides the lowest frequency for low range).

◇ Switches **THREE** and **FOUR** govern how the envelope-generator treats your instrument's signal. With both switches **OFF**, the **MU-TRON III+™** will have its slowest and smoothest sweep. The response of the sweep is very linear.

Switch **THREE ON**, gives the envelope-generator increased sensitivity to the louder 75% of the input. This gives a more "lively" and responsive feel, compared to the (3=OFF, 4=OFF) setting.

Switch **FOUR** ON, gives the envelope-generator *greatly* increased sensitivity to the loudest 50% of the input. This makes the effect much more reliant on the loudest (early) portion of the signal (i.e slap, strike, pick, pluck, etc.). The settings with switch **FOUR** ON give the impression of greater speed and have more snap than settings with switch **FOUR** OFF. Turning switch **THREE** ON (with **FOUR** ON) will give a sense of support to the middle of the signal.

**NOTE:** Changing DIP switches **THREE** and/or **FOUR** will also change the setting of the **DEPTH** control required to reach full sweep.

- ◇ Switch **FIVE** OFF slows the decay response of down drive. When the input signal contains several notes of similar volume (e.g chords), the “difference” or “beat” frequency also shifts the filter. This can, under certain conditions, create a “synthetic” note, related in pitch to the notes being played. This effect is not noticeable under most conditions and may not be unpleasant. In the event that it is a problem, set switch **FIVE** to OFF.

For an instrument such as an electric bass, this side-effect is not at all noticeable and the increased response speed of the envelope (especially in down drive) is very desirable. Set switch **FIVE** to ON wherever possible.

- ◇ Switch **SIX** ON permits the **LOW BATTERY** light to function as a sweep-limit indicator. The light indicates only that the envelope level is 100% (i.e. the filter is fully shifted) and is not an indicator of audio overload. If your primary use of the **MU-TRON III+™** is powered by batteries and you don't find the sweep-limit indicator useful, disabling the light will extend the life of the batteries. To disable the sweep-limit indicator feature, set switch **SIX** to OFF. **NOTE:** The **LOW BATTERY** indicator will still light to warn of a low battery condition with switch **SIX** OFF (or ON).

Summary of DIP switch settings

Switch	Function	SUGGESTIONS		
		Bass	Guitar	Default
1	ON lowers the frequency of the low range (only).	OFF	OFF	OFF
2	ON lowers the frequencies of low and high ranges.	ON	OFF	OFF
3	ON increases the sensitivity of the envelope generator to all but the quietest part of the input signal.	either	ON	ON
4	ON greatly increases the sensitivity of the envelope generator to the loudest part of the input signal.	ON	either	OFF
5	ON increases the response of down-drive.	ON	ON	ON
6	ON enables the low-battery light to function as a sweep-limit indicator.	ON	ON	ON

**NOTES:** The settings for bass and guitar are *only* suggestions — **please experiment**. The switches may be used individually or in any combination.

*SUGGESTIONS and CAUTIONS:*

The **MU-TRON III+™** has been designed to allow even a 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 will be reached early and quickly and will not seem to track the dynamics of the instrument. If the sweep-limit indicator stays on for much of the time, try reducing the **DEPTH** control level.

It is important to minimize unwanted sounds or noise on the **MU-TRON III+™** input (**INSTRUMENT**). The **MU-TRON III+™** 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 III+™** 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 III+™** 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 III+™** 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 III+™** settings which best suit your instrument, equipment and playing style. Beyond the more intuitive settings, here are some additional combinations you should try:

MODE=HP,	PEAK = 10,	RANGE=LOW,	DRIVE=UP,	DEPTH=3 (or about half of what gives full effect)
MODE=N,	PEAK = 0,	RANGE=HIGH,	DRIVE=DOWN,	DEPTH=6 (or what gives full effect)
MODE=LP,	PEAK = 0-2,	RANGE=LOW/HIGH,	DRIVE=DOWN,	DEPTH=6 (or what gives full effect)

*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 III+™**. Sound (noise) gates work well because they quicken the attack of the signal. These may also be used to eliminate false triggering by noise or unwanted sounds. Compressors, limiters, and distortion effects should be used with some caution. Since the **MU-TRON III+™** requires a change in volume to function, too much loss of dynamic range will limit the effect. Some compression may be beneficial by keeping the signal in the useful range of the **MU-TRON III+™**. Distortion effects are much more dramatic when placed after the **MU-TRON III+™**.

Experiment to determine whether better results are obtained with the other device connected between the instrument and the **MU-TRON III+™** or between the **MU-TRON III+™** and the amplifier. The results may be quite different.

Many unusual effects may be produced by using two **MU-TRON III+™** in series. Use a patch-cord to connect the **AMPLIFIER** jack of the first **MU-TRON III+™** to the **INSTRUMENT** jack of the second **MU-TRON III+™**. Try one **MU-TRON III+™** 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.

*FEEDBACK:*

We'd like to know what you think of the **MU-TRON III+™**. Please write to us at: HAZ Laboratories, 39 Hartmans Corner Rd, Washington NJ 07882.