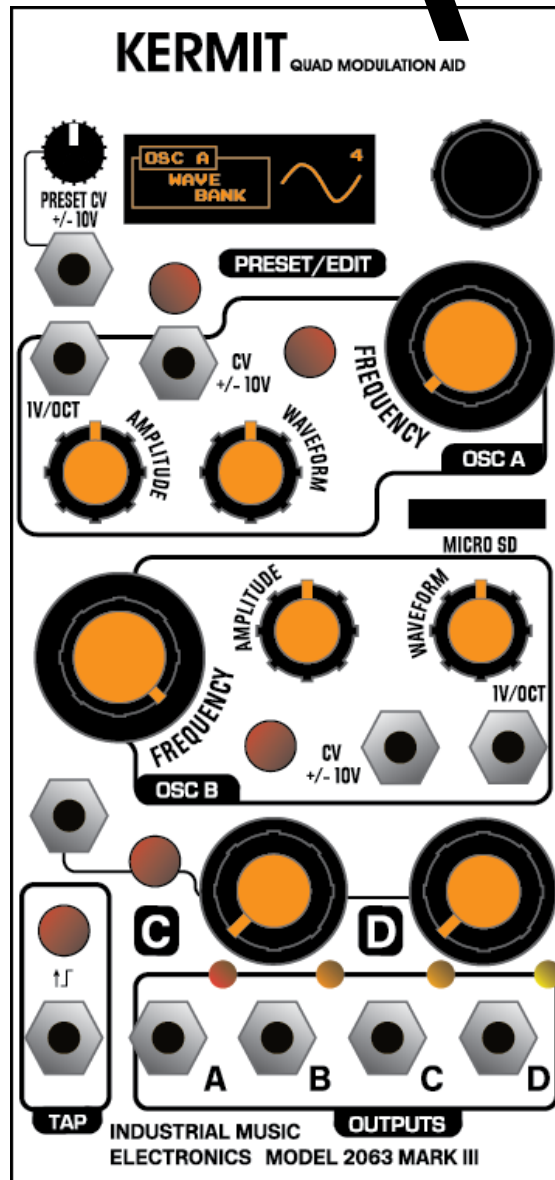


INDUSTRIAL MUSIC ELECTRONICS



KERMIT MARK III

OPERATIONS MANUAL • FIRMWARE V1.0

FUNDAMENTALS

Kermit is a 4-channel tempo-synced wavetable oscillator (optimized for LFO operation) that has many generation modes. The A and B channels have full controls and a high sampling rate. The C and D channels have some shared controls, but with nearly the same capability of the A and B channels. Kermit is only a 12HP module, so the user interface is economized. Some controls are shared. "Deep" parameters and CV/modulation assignments are made by using "hotkeys". Each channel has a button that, when held down, changes the action of all the knobs on the module. For example, on channels A or B, you can access the deep parameters of fine tune, phase, and waveform bank by holding down the channel button and turning the frequency, amplitude, or waveform knob respectively.

To assign the channel's external CV input to a parameter, hold down the rotary encoder's button and turn the destination knob. To cross-modulate a parameter with the output of another channel, hold down the source channel's button and turn the knob of the desired destination parameter. When any of these hotkey actions are used, a window will pop up on the display showing the name of the parameter being changed and a visual representation of the modulation amount. After a few seconds, this popup display will go away and the main screen will reappear. To exit from the popup sooner, press a nearby channel button.

Channels C and D have limited controls. The single knob for each channel normally controls the coarse frequency. The following table shows the assignment key combinations necessary to program the modulation matrix for channels C and D.

HOLD DOWN THE FOLLOWING BUTTONS WHILE TURNING THE C/D KNOBS TO ACCESS ALL PARAMETERS:

Amplitude	Waveform	Fine Tune	Phase	Wave Bank
A	B	C/D	A+C/D	B+C/D

Each channel has an LED near its output which displays its absolute voltage from -6V (led OFF) to +6V (led brightest). When the amplitude of the channel is attenuated, the LED will tend towards medium brightness instead of OFF. Use the channel at full scale amplitude to make full use of the LED indicator.

SCREEN SAVER

The Kermit's display is an OLED. It is set to a brightness to provide the best balance between visibility and long life. To preserve the life and maximum brightness of the OLED, it will turn off if a button or encoder is not used for 10 minutes. To turn it back on, press a button or turn the encoder.

MK III MENU SYSTEM

Most buttons on Industrial Music Electronics modules have hidden menus associated with them. To access them, hold down the rotary encoder button and push a button. The menu will appear on the display. Turn the encoder to select the desired menu item. Push the encoder to select the item, and turn the encoder to change the value of the selected item. Push the encoder button again to enter your selection. Exit the menu by pressing any of the other buttons. If a button does not have a menu associated with it, then the button press combination will usually invoke another shortcut function.

The menus for channel C and D are shared, and accessed by the one channel C/D button. To access the channel D menu, enter the channel C menu and keep scrolling down.

GETTING STARTED

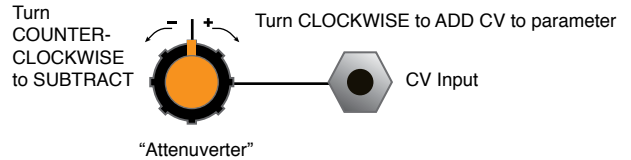
Select modes for each channel. Enter the menu for each channel and look at the parameters "Channel Type" and "Mode". The Type option selects the class of functions: LFO, oscillator, envelope, random, or S+H. Each oscillator type has three Modes associated with it. Details are given in the "MODE OVERVIEW" section.

MODE SELECT SHORTCUT

Hold down the PRESET button and press one of the channel buttons to increment the channel's mode/type selection. You can quickly cycle through the 12 possible modes this way. To increment channel D, hold down both the Preset and Tap buttons, then press the channel C/D button.

TAP TEMPO

On the lower right corner of the main screen, the global tempo of Kermit is shown. You can set the tempo by using the "Tap" controls on the lower left of the module. By rhythmically tapping the button or using an external clock signal, the global tempo will update. Many of Kermit's channel modes are aware of the tempo, and will modify their frequency according to changes in the tempo. Should one of these channels become desynced from the other channels due to parameter modulation, hold down the encoder button and press the tap key to reset all Tempo-aware channels on the next tap event. You can also send a trigger to the Preset CV input if the preset mode is not active. If Preset mode is active, simply change to a different preset, the channels will reset their phase.



CV INPUTS

Each of Kermit's control blocks have a CV input. The voltage at this input can be assigned to any of the main parameters of frequency, amplitude, and waveform. To begin assignment, hold down the rotary encoder and turn the desired knob. The display will change to show the selected assignment and a bar graph of its amount. This control assignment works as an "attenuverter", where the center position means that there is NO assignment.

All CV inputs on the Kermit accept full-scale, bipolar control voltages with a range of +/-10v. The response of the various inputs are scaled to provide a musically useful range of motion within the typical range of +/-5V, with additional reactivity far outside of this range. The virtual attenuverters use a nonlinear curve to allow a typical control voltage to subtly modulate a small range of the parameter, or full-swing travel without the use of external amplification.

	CV → Freq	CV → Amp	CV → Wave
Channel A,B	Hold Encoder, turn Freq	Hold Encoder, turn Amp	Hold Encoder, turn Wave
Channel C	Hold Encoder, turn knob	Hold Encoder + A, turn knob	Hold Encoder + B, turn knob
Channel D	Hold Encoder, turn knob	Hold Encoder + A, turn knob	Hold Encoder + B, turn knob

KEY/KNOB COMBINATIONS FOR CV ASSIGNMENT

MODULATION MATRIX: Hold down buttons in order while turning the destination knob

SOURCE

	Channel A	Channel B	Channel C	Channel D
Channel A	---	B	C/D	C/D, Encoder
Channel B	A	---	C/D	C/D, Encoder
Channel C/D Freq	A, C/D, Encoder	B, C/D, Encoder	C/D, Encoder	C/D, Encoder
Channel C/D Amp	A, C/D, Tap	B, C/D, Tap	C/D, Tap	C/D, Tap
Channel C/D Wave	A, C/D, Tap, Encoder	B, C/D, Tap, Encoder	C/D, Tap, Encoder	C/D, Tap, Encoder

Like the CV input assignment, you can also assign the output of any Kermit channel to modulate any of the main parameters on another channel. The assignment principle is the same: hold down a key combination while turning the knob of the destination parameter.

VIEWING/EDITING MODULATION ASSIGNMENTS

When you are on the main screen of the module, simply hold down the encoder button to view a table of all currently active CV and modulation assignments. To clear assignments, go to the menu for the desired channel and select the "Clear CV", "Clear Mod", or "Clear All" options. You can clear singular assignments by simply using the same assignment key combination, and returning the destination control to the center position.

MAKING YOUR OWN WAVES

You can make your own wavetables for use on Kermit. The free, open-source "WaveEdit" program by the Synthesis Technology company allows convenient creation, editing, and sharing of files that may be loaded directly into Kermit. We recommend this program as a first solution to creating custom waveform data, but any means of generating samples in WAV format properly aligned to the 256-sample boundary will work (see FILE FORMAT DESCRIPTION)

FILE FORMAT DESCRIPTION

1-channel .WAV file, 16 bits, 32Kbytes (256 2-byte samples per waveform. 64 waveforms per file total).

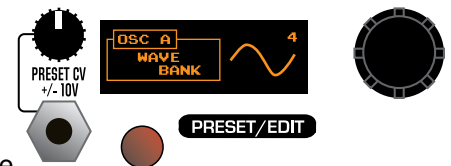
LOADING CUSTOM WAV FILES

You must collect 1 properly formatted WAV file onto the root directory of a SD card (formatted with the FAT file system). The filename MUST be ".wav". Properly eject the card from your computer and insert it into theKermit. Go to the Global options menu and scroll down to the "Load Waves from SD" option. Select it, and the loading process will begin. The module will display the progress of checking the format of the file and the subsequent loading of the data. If the file is not correctly named or if the card is corrupt, the loading will fail. If the loading is successful, the new wave data will be written to memory and the module will restart. You may now remove the SD card until the next time you'd like to update the waves. It is safe to remove and re-insert the SD card while the module is turned on, but not while the file load operation is running.

You can download the original factory wave set from <http://www.industrialmusicelectronics.com/>

PRESET MANAGER

The Preset Manager provides an easy way to manage the entire state of the control panel and menu system from a single set of controls. Eight presets are available and they can be stored to nonvolatile memory within the Kermit. To enable the Preset Manager, push the PRESET button underneath the display. It will light up red and the upper right corner of the display will change to say "P" followed by the currently selected preset number. Managed controls will be locked and set to the values stored in that preset slot. To change the preset, rotate the encoder. The settings will change according to the stored data in memory. The "Preset scope" setting in the GLOBAL OPTIONS menu will determine if all panel settings are affected by the preset change, or just the waveform selection controls. The CV input and attenuator knob just below the display also changes the active preset. The behavior of the CV and knob is defined in the GLOBAL OPTIONS menu with the CTL option.



EDITING PRESETS

To write your own data into the preset slot, "double-click" the rotary encoder button while the preset manager is active. The EDITING indicator will appear on the screen. Any controls that you move while the editing indicator is active will be written into that preset slot. Any changes you make to the oscillator menu will be written to the preset whether the EDITING indicator is present or not. To exit EDITING mode, double-click the rotary encoder again. IMPORTANT: You must choose "Save Presets" from the PRESET menu to write your changes to memory. They will not be stored permanently unless you do this. The "Save to Preset" command will also commit the edited data to your preset of choice.

PRESET MORPH

When in PRESET mode, press the preset button again to enter MORPH mode. All controls under the scope of the preset manager are locked and unable to move (the CV inputs will still respond). Set the "base" preset for the morph by turning the rotary encoder to select. The base preset will determine the state of unison, channel mode and other button/menu settings that cannot be smoothly morphed. When the base preset is changed, these menu-based settings may change depending on the preset data. . Next, apply a CV to the preset CV input. The presets will smoothly morph from one to another.

MODE OVERVIEW

LFO MODE:

LFO (FREE RUNNING)

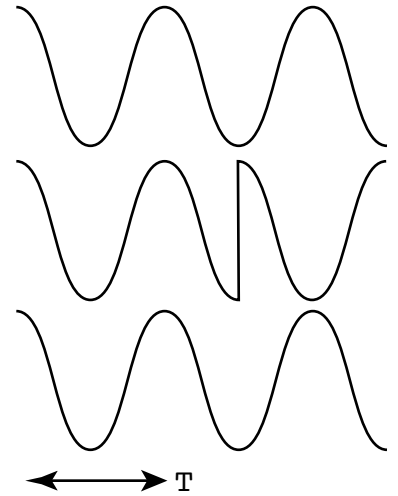
This first mode is a simple free running LFO. You can modulate its frequency, waveshape, and amplitude. The 1v/octave input operates as labeled.

LFO (RESET)

This mode is similar to the Free Running LFO mode but its 1v/octave input instead operates as a sync input. When a trigger signal is received at the jack, the oscillator will be reset to the position in its waveform defined by the Phase setting.

LFO (TAP TEMPO)

This LFO cycles at a rate that is a division or multiplication of the global BPM rate. The 1v/octave jack resets the channel to its starting value upon the next tempo input event. Change the Phase parameter to make the wave reset at a non-zero point.



OSCILLATOR MODE:

OSCILLATOR

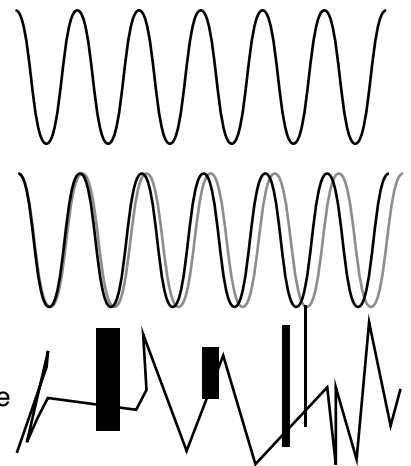
This is an audio rate oscillator. It is useful from 16Hz to 1Khz. The character is slightly unstable and fuzzy, in Kermit tradition. The oscillator "Character" parameter distorts the signal in various interesting ways, most noticeable in any of the Oscillator modes.

UNISON

This mode is similar to the normal Oscillator mode, but is "doubled" with a second, slightly detuned oscillator mixed with the normal signal. It has a thicker sound.

CODE SCAN

This is a special mode that derives an audio signal from the actual program code of the module. It has a very noisy and harsh character. The Waveform control changes the section of code that is being read.

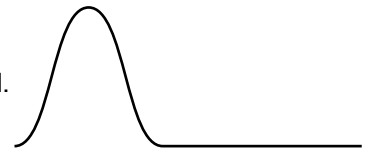


ENVELOPE MODE:

The envelope modes require the use of an external trigger or gate signal. For channels A or B, patch the trigger into the channel's 1v/octave input. For channels C or D, patch the trigger into the shared CV input.

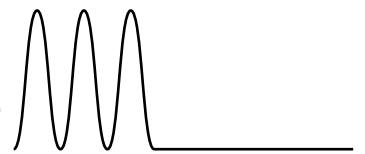
1-SHOT ENVELOPE:

Upon receipt of a trigger signal's rising edge, the selected wavetable will play one full cycle. It will retrigger if a new trigger is received before the cycle has completed. When the envelope is not active, the channel output will be 0 volts. Use the "bias" setting in the channel menu to select unipolar or bipolar operation, and carefully consider the type of wavetable to be used for the envelope. In the factory waveform set, wave banks 6 and 7 are full of unipolar envelope shapes suitable for use with the 0-6V Bias mode. The channel's frequency, amplitude, and waveform controls all function as normal in this mode.



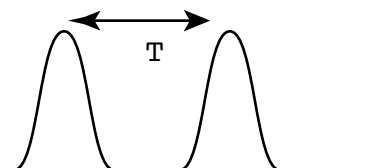
GATED REPEAT:

This mode is similar to the 1-shot, but the envelope will keep cycling as long as the signal present at the trigger jack remains in a high state.



TEMPO ENVELOPE:

This special mode automatically triggers the envelope to emit a single cycle at a division of the master tempo clock. Use the frequency control to adjust the tempo division. Use the channel's Fine Tune parameter to adjust the time of the generated envelope event.



MODE OVERVIEW (continued)

RANDOM MODE:

SMOOTH RANDOM:

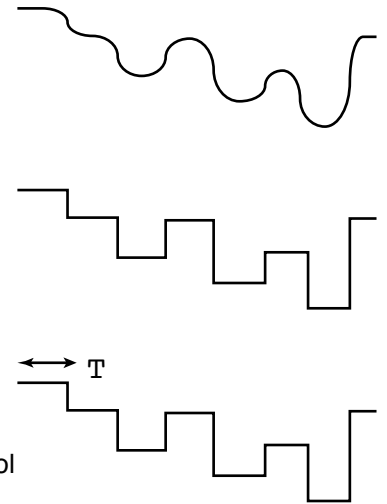
This mode generates “fluctuating random voltages”. The probable rate of change is controlled with the channel’s Frequency control. The amplitude control functions normally, but waveform and phase controls have no effect.

STEPPED RANDOM:

This mode generates stepped random voltages at a rate determined by the frequency control. The waveform control has no effect in this mode.

TEMPO RANDOM:

This mode is similar to the stepped random mode, but the new voltages are generated at divisions of the master tempo clock. The channel’s frequency control determines the division.



SAMPLE AND HOLD MODE (CHANNELS A OR B ONLY):

The sample and hold modes require the use of an external trigger or gate signal, as well as an external voltage input. Because they require two inputs, they do not function on channels C or D (see OSC COPY mode). Patch the trigger into the channel’s 1v/octave input. Patch the voltage to be sampled to the channel’s CV input.

SAMPLE + HOLD:

When a trigger is received at the channel’s 1v/octave input, it will sample the instantaneous value present at the channel’s CV input, and pass it to the output. The waveform control has no effect in this mode. The Amplitude control will attenuate the output voltage. When it is at maximum amplitude (in 12Vpp bias mode), the output voltage will resemble that of the input. The CV input is not calibrated for accuracy in this mode.

TRACK + HOLD:

When a gate signal is received at the channel’s 1v/octave input, it will pass the voltage present at the channel’s CV input to the output. When the state of the gate input is low, the voltage will be held at its last position. The waveform control has no effect in this mode. The Amplitude control will attenuate the output voltage. When it is at maximum amplitude (in 12Vpp bias mode), the output voltage will resemble that of the input. The CV input is not calibrated for accuracy in this mode, and the sampling rate is rather low. Expect interesting and artifacted CV output instead of a perfect reproduction of the input voltage.

TEMPO S+H:

This mode is similar to the Sample + Hold mode, but the sampling of new voltages is determined by a division of the master tempo clock. The channel’s frequency control determines the division.

OSC COPY (CHANNELS C OR D ONLY):

Osc Copy mode lets you copy most parameters from any of the channels in the module. The only parameter that is not copied are Phase. This mode is for setting up quadrature or other phase offset modes.

MENU OVERVIEW

CHANNEL MENU

Access the Channel Menu by holding the Encoder button and pressing one of the channel buttons. The channel C and D menus are shared. To access the channel D menu, keep scrolling past the options for channel C.

CHANNEL TYPE

This selects the main class of output functions for the selected channel.

CHANNEL MODE

This selects from one of three possible modes within the selected channel Type.

VOLTAGE RANGE

This selects the bias of the output voltage. **12Vpp** centers the voltage swings around 0 volts in a bipolar manner. Attenuating the voltage will cause it to retract towards zero. This mode is recommended for use with all channel types other than Envelope. **0-6V** is a unipolar mode that does not introduce negative voltage swings. It is recommended for use with Envelope mode, as the voltage will be zero when the envelope is not running (the waveforms must be specially designed for Envelope use for best results). **1vpp** is an attenuated mode meant for use with video synthesizers.

CLEAR CV, CLEAR MOD, CLEAR ALL

These options remove any applied CV or mod matrix assignments on the channel.

CHARACTER

This option introduces discontinuities and distortions into the waveform. They are most noticeable in the Oscillator mode. The 12bit mode slightly degrades the audio quality. The NoMorph mode is at full quality, but morphs between wavetables are disabled, with hard transitions between waves instead. The 8 bit mode is degraded further. The "Depraved" mode is also of 8 bit resolution, but morphing is disabled and the horizontal resolution of the waves are limited to essentially give a 32-sample waveform. The character of a Depraved waveform is roughly similar to waveforms generated by the old "SCC" sound processing chip.

GLOBAL/PRESET MENU

Access the Preset Menu by holding down the encoder button and pressing the button closest to the display.

RANDOMIZE CURRENT

When selected, the random preset generator will create a new sound setting. The parameters to be changed are subject to the "Preset Scope" setting. This function works even if Preset Mode is not active. NOTE: Randomized presets are NOT automatically saved to memory. You must use the "Save Presets" or "Save to Preset" menu command to write the data to memory.

SAVE TO PRESET

If you are designing a sound and modulation setup and want to save it to the preset memory, choose this menu option. You must select the preset slot number to activate the save. This feature also works if the preset manager isn't active. The preset will automatically be stored in nonvolatile memory.

SAVE PRESETS

This option writes the current state of all preset slots to nonvolatile memory. Presets are stored on a nonremovable EEPROM inside the module, and will survive firmware upgrades.

Note: This will overwrite all of the preset memory with the new data, so subsequent uses of the "Reload Presets" command will recall that data instead of what was there before.

RELOAD PRESETS

This option reloads the saved memory contents of the Preset Manager to active memory. Use this if you have mistakenly initialized or randomized saved data that you would like to keep. Note: You cannot reload presets after initiating "Save Presets."

INIT ALL PRESETS

Initializes all preset slots and replaces the data with a simple sound. This function does not automatically clear the saved data in memory. You must use the "Save Presets" command to make your changes permanent.

INIT CURRENT

Initializes the currently playing sound and replaces it with a simple sound. This function works even if the Preset Manager is not active.

Note: After initializing the current preset, the frequency of the filter will be set to the minimum in lowpass mode. Adjust the frequency controls to hear an audible signal once again.

PRESET CONFIGURATION (IN GLOBAL/PRESET MENU)

PRESET SCOPE

This parameter controls which channels are managed by the preset manager. When the preset manager is enabled, the channel buttons will illuminate IF they are being controlled by the manager. When Channel D is being controlled, the behavior of the TAP button's illumination will reverse (briefly blinking off on each beat).

CTL

This menu option determines the behavior of the Preset CV input and attenuator.

CV+OFFSET

Allows the CV input to directly cycle through the bank of 8 presets. The attenuator knob will act as a manual offset. This is useful if you need a manual control to smoothly morph the preset data in Morph mode.

CV+ATTEN

Works like CV+Offset, but the knob becomes an attenuator for the incoming CV. This mode is useful for changing presets within a strictly controlled range, or subtly morphing within a narrow range of preset data.

TRIG + OFFSET

Treats the CV input as a trigger input instead. When a trigger or gate event is received, it will advance the preset number by one. The attenuator knob will manually scan through the presets.

TRIG RANDOM

Randomizes all parameters subject to Preset Scope when a trigger event is received at the CV input. Note that random patch results must be written to memory using the PRESET menu's "Save Presets" command for permanent storage of these changes.

STARTUP

This menu item allows you to enable the preset manager when the modular system is powered on. You may choose to leave PRESET OFF or select either PRESET or MORPH mode ON. This parameter is used when you have several Mark III modules in a live performance setup, to avoid setting the preset state on each one at startup.

CLOCK DIV

This will prescale the incoming tempo clock so you can, for example, use a 16th note sequencer clock output or a Sync24 pulse. When Clock Div is set to anything other than x1, the action of the tempo button will also be divided.

LOAD WAVES FROM SD

This option will load the file "1.wav" from the inserted SD card and write its contents to Kermit's internal waveform memory. The module will reboot afterwards.

REBOOT

Restarts the module without the need to power your system down.

UPGRADING FIRMWARE

You will need an inexpensive "Pickit3" programmer device and a computer with a USB connection to install any available upgrades for this module. You may download new firmware and detailed upgrade instructions from <http://www.industrialmusicelectronics.com> on the relevant product page. Note that upgrading the firmware will not disturb your presets or user settings.

The Pickit3 is available from your local electronics distributor, Microchip part number PG164130. The new Pickit4 programmer will also work, part number PG164140.

FACTORY RESET

To perform a factory reset, make sure that NO patch cables are plugged into the module. Turn the module on while holding the Preset Mode button. The menu settings, CV input calibrations, and preset data will be reset.

MORE INFORMATION

Find the latest firmware, waveforms, and other information:

[HTTP://WWW.INDUSTRIALMUSICELECTRONICS.COM/PRODUCTS/24](http://www.industrialmusicelectronics.com/products/24)

Need more help?

[WRITE TO SUPPORT@INDUSTRIALMUSICELECTRONICS.COM.](mailto:SUPPORT@INDUSTRIALMUSICELECTRONICS.COM)