MIDI/CV Conversion with the Vesta Fire MDI-1

If you'd like to use your warm-sounding, pre-MIDI, analog synthesizer with your MIDI sequencer or keyboards, here's how.

John J. Volanski

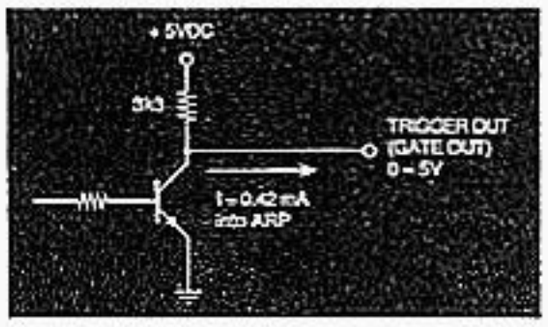

FIG. 1: MDI-1 Gate output stage.

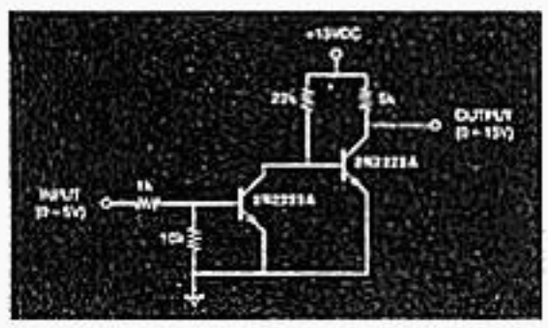

FIG. 2: Level-shifting circuit.

Many of us have hung on to at least one favorite analog synth depite being deluged with the wave of ever-evolving digital synthesizers introduced over the last few years. (If you don't have a pre-MIDI analog synth, you can often pick one up for a veritable song and dance in **EM**'s classifieds or from the listings in your local "shopper's gazette.")

In order to integrate a synthesizer that's based on control voltages rather than MIDI into a MIDI system, we need one of those mystical black boxes that will convert MIDI data into the analog format CV (Control Voltage) and Gate signals required by most pre-MIDI synthesizers. Control voltages are used in analog synthesizers to control various parameters, such as frequency and amplitude, in a linear or exponential manner. Gate signals determine when a parameter is activated and the duration of activity. For a functional description of typical pre-MIDI analog synthesizers, control voltages, and gate signals, see the first chapter in *MIDI For Musicians*, by Craig Anderton (available from EM Bookshelf; see page 6 of this issue for details).

I purchased the Vesta Fire MDI-1 MIDI-to-CV/Gate interface converter for about $150 from MIDCO, International, the United States distribution and service point for Vesta Fire equipment. (MIDCO, International, PO Box 748, Effingham, IL 62401; tel. [217] 342-9211 or [800] 637-9705. Contact Larry Morton, Vesta Fire Product Manager.) My intent was to connect an old ARP Odyssey to my Yamaha DX11 synthesizer using the MDI-1 as the interface.

The MDI-1's metal case is black (which makes it a bona fide "black box"), so I figured I was on the right track. I connected the MDI-1 between the DX11 and the Odyssey, connected the Odyssey to my mixer, powered up all the equipment, hit a note on the DX11, and. . . nothing came out of the ARP. Had I just wasted $150?

ABOUT THE MDI-1

The Vesta Fire MDI-1 was designed to interface between a MIDI synthesizer and the Vesta Fire DIG-420 (a digital delay/sampler that allows the pitch of the sampled sound to be altered in three octaves via a CV/Gate synthesizer). The MDI-1 is a handy little unit. It has the following modes of operation:

1. MIDI Initialize: By hitting just one note on your MIDI synth, this mode automatically determines the MIDI channel, MIDI mode, and highest MIDI note (called the base note) you will be using when controlling your CV/Gate synthesizer. (Note that the MDI-1 operates within only a sliding, three-octave window. You must tell it what the highest note of that window will be.)

2. MIDI Play: This allows a CV/Gate-equipped synthesizer to be played via MIDI. This is the main mode used when slaving a CV/Gate synth to a MIDI master. The voltage provided by the MDI-1's CV output can be trimmed approximately ±0.1V with a tuning control, thus controlling the analog synth's pitch. There is also a volts/octave potentiometer that adjusts the scaling of the CV output.

3. MIDI Record: This mode causes the Vesta Fire DIG-420 to start sampling when it receives a MIDI Note On signal.

4. Trigger In Record: This mode causes the Vesta Fire DIG-420 to start sampling when triggered by a signal connected to the MDI-1's Trigger In jack.

5. Trigger Out Polarity: This lets you change the Gate Out polarity from positive-going to negative-going. (Your analog synth may require a negative-going gate instead of the more standard positive-going type; this mode will accommodate it.)

Modes 1, 2, and 5 have fairly obvious uses, as described in this article. Mode 3 appears to be useful only in conjunction with the DIG-420. Mode 4 can be used to drive a MIDI drum machine via older

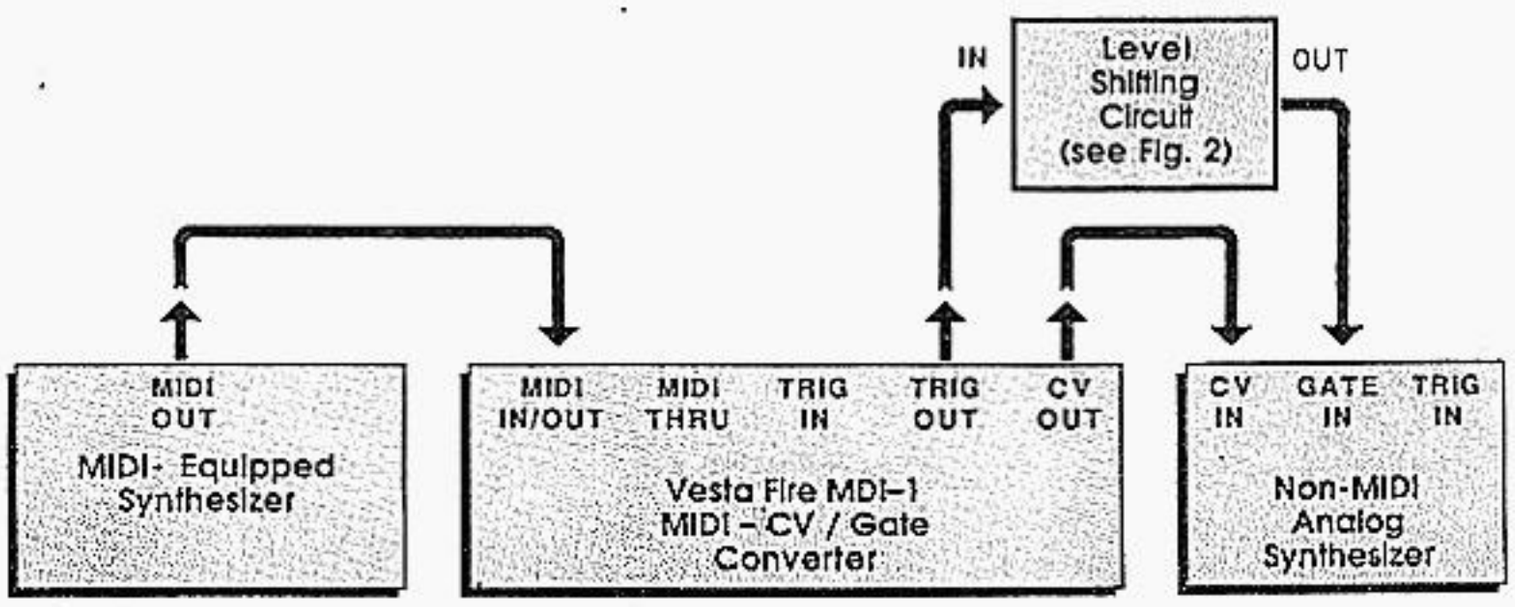

FIG. 3: System Interconnection.

synthesizers, sequencers, or drum machines that provide trigger outs (don't throw that old equipment away!). In this mode, the MDI-1 will transmit a MIDI Note On/Off of the base note selected in Mode 1 for each trigger that appears at its trigger input jack.

UNDER THE HOOD

In the lab, I collaborated with a fellow electrical engineer/musician, Bob Bockstahler, to take the enclosures off the MDI-1 and the Odyssey and reconnect the cabling between them. We powered up the units and probed the MDI-1's CV output with an oscilloscope. It seemed fine: the voltage was increasing or decreasing in accordance with the notes being played on the DX11. But when we probed the MDI-1's Gate signal, we found that the Odyssey would not trigger unless the triggering signal's amplitude exceeded 4.4 volts. Bad news in MIDI-land: the Odyssey's Gate input was presenting too much of a load to the MDI-1's output circuitry, which was not powerful enough to handle the load without sagging slightly. (Note: the MDI-1 calls one of its outputs a "trigger out"; it's actually a Gate Out type of signal as far as any ARP synthesizer is concerned.) **Fig. 1** shows the MDI-1's existing Gate output circuitry.

To increase its available output, we needed a level-shifting circuit to boost the gate comfortably above the Odyssey's 4.4-volt trigger threshold. The level-shifting circuit in **Fig. 2** takes the 0- to 5-volt MDI-1 Gate signal and transforms it into a 0- to 15-volt trigger. The Odyssey's Gate circuitry won't ignore that! (This will not harm the Odyssey, as its analog circuitry operates from an on-board ±15 VDC power supply. *Do not* use this level-shifting circuit to drive TTL-type components unless you want to let the smoke out of them; the stock output will probably work satisfactorily.) You could probably accomplish the same effect using an op amp for level shifting (amplification), but the two-transistor circuit given above is cheap and simple.

We hooked up all the equipment as shown in **Fig. 3**, applied power, and this time experienced success. A quick check with the oscilloscope showed that the Odyssey was pulling the level-shifting circuit output down to 10.0 volts, which means the Odyssey was drawing about 1 mA into its Gate input (calculated by observing a 5-volt drop across the 5k resistor in the output collector leg of the level-shifting circuit). This was still well above the magic 4.4-volt threshold, and all was well.

Now for the finishing touches. I installed the level-shifting circuit inside the ARP Odyssey, since the ARP's warranty is long gone (and so is ARP, for that matter). The installed circuit is powered by +15 VDC from the Odyssey's on-board power supply. Make sure you use the correct power supply voltage, as -15 volts will render the circuit inoperable. The beauty of the level-shifting circuit is that it is transparent to the user and to any other 5-volt, trigger-out units you might connect to the Odyssey.

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The circuit has no critical parts in it. I built it on a 1.5-inch, square piece of perf board and mounted it on a single standoff near the Gate Input jack inside the Odyssey. You should be able to scrounge the circuit components from your junk box, as I did. If not, you can buy all the circuit components you need from Radio Shack (except for the MDI-1, of course) for about $2.50.

The MDI-1 provides a simple, easy way to bring the thundering bass of a Minimoog, the delicate growl of an ARP Odyssey, or the extensive cross-modulation capabilities of Korg's Mono/Poly into a current MIDI system. However, the MDI-1 is not compatible with synthesizer oscillators that require linear control voltage scales, such as early PAiA, Korg, and some Yamaha units. Fortunately, these are far less common than the exponential types accommodated by the MDI-1.

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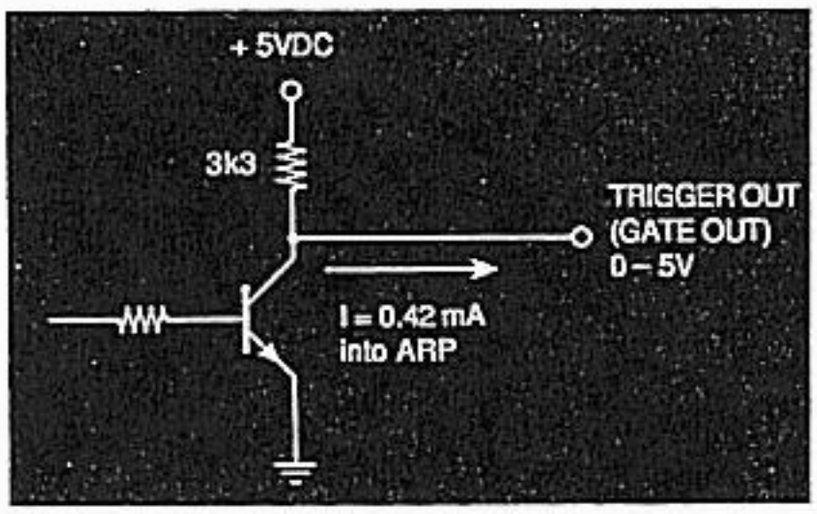

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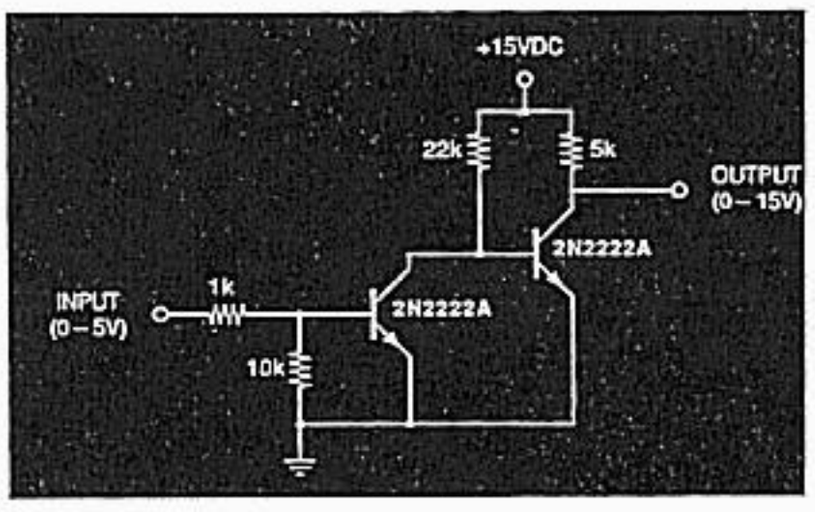

FIG. 2: Level-shifting circuit.