Build guide
508: Loop Detected ec500 i/o expander

Introduction:

The ec500 is an expandable analog video synth system based on the ideas laid out by Jonas Bers in his CHA/V project. Briefly, the core concept is this: VGA monitors are still fairly ubiquitous, especially older flat-panels (although CRTs are more fun, sure). The VGA standard is readily hackable because it breaks out the six necessary components – red, green, blue, hsync, vsync, and ground – into separate pins. It's also fairly forgiving of signals out of spec (although the ec500 tries to keep those to a minimum).

This i/o expander is useless without an ec500 error.core, so if you don't have one of those already, stop what you're doing. The error.core provides power to the rest of the system, so you won't be able to use this without that.

This i/o expander adds the following to the system:
- One on-board microphone
- Two line-level inputs
- Two triangle-wave LFOs
- A lighted pushbutton switch
- An infrared receiver
- Three attenuators
- Two pots providing 0-5V directly to headers
- Four pots providing 0-5V to a set of headers; these settable voltages round-robin between the four output headers when a trigger is applied
- A trigger input to take the incoming R,G,B channels from the error.core and shuffle them to different outputs before returning them
- A trigger conditioner (aka a comparator)
- Three AND logic circuits

You can read more about all of this stuff in the owner's manual.

A caution to builders:

Well over half the components here are surface-mount. Most of them are pretty widely spaced, but a few are necessarily bunched up. There are quite a few surface-mount ICs in addition to the passives (which are all 0805 size). As DIY projects go, this is an intermediate project and you should probably have a few previous builds under your belt, including some previous SMT work.

These build notes are going to be brief because for the most part, you'll just be following the BOM and there's not a lot of commentary necessary. In addition, the build process for this unit

is **very** similar to the process for the error.core, so please direct yourself to the build guide for it, and read it thoroughly, before tackling this. I'm just going to highlight problems/differences unique to this board.

The build:

Surface-mount passives + ICs on the back should go pretty much exactly the same as with the error.core, so refer to that build guide for tips.

Label-wise, R41 and R1 might be confusing. R41 is the resistor sandwiched between R28 and R29, and R1 is the resistor running at 90 degrees to those, along the top of R41 and R29. I think everything else is pretty clear if you take your time & doublecheck before you place components.

On the front side, the electret microphone capsule should have its pins off-center, and thus should only line up one way with its footprint.

The two 3.5mm audio jacks are asymmetrical, pin-wise, so they only go one way. That way results in the metal jacket being on the west, north & east sides when they are in position, so doublecheck. The holes in the panel are big enough to drop these through, but I find it easier to mount them before the panel goes on.

The IR receiver has a dome on one side, which corresponds to a curve facing south on the footprint.

The pushbutton switch has six legs – the four on the corners are for the switch itself, and the two in the middle are for the LED in the switch. Fancy! If you look closely at those two center legs, one is longer than the other, just like on a regular LED. The longer leg goes in the hole marked +

All of the electrolytic caps are polarized, and their longer legs go into the holes marked + as well. Note that if you sourced caps that are taller than ~8mm, you may have to bend them over a bit so they'll fit under the panel, so plan ahead.

Other than those notes, pretty much everything else is exactly the same as on the error.core, so again, please read those build notes before you start this build.

You won't be able to test this board in isolation, since it's powered from the main ec500 error.core board. You'll need a 14-pin ribbon cable, which you can get from 508.loopdetected.net, although you should have gotten one with your order, unless you ordered bare boards.

Good luck!
-- Ross Grady, July 16, 2019