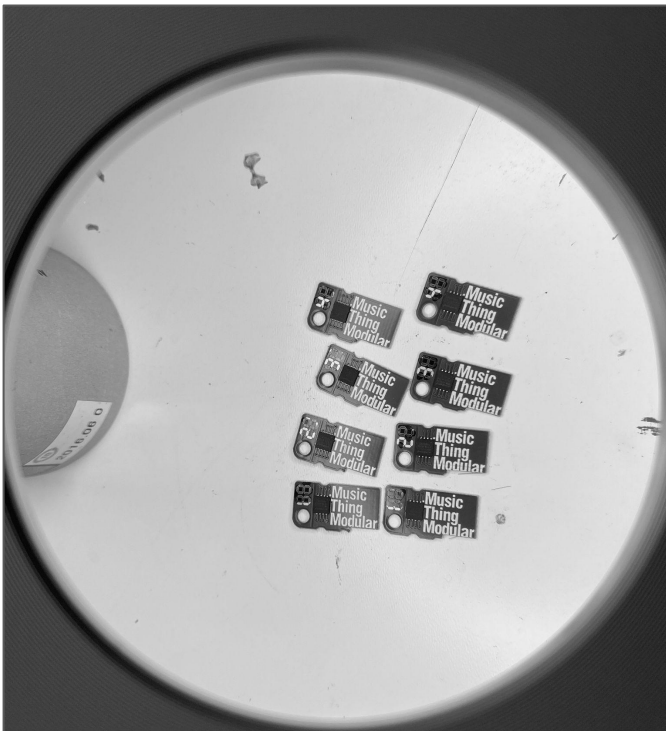


Hello Computer

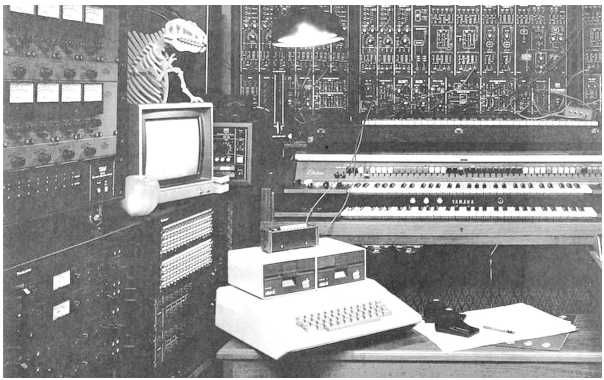
Developer Kit for the Workshop System Computer

By Music Thing Modular

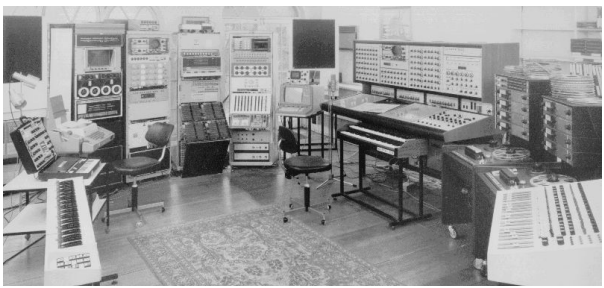
Proto 1
February 2024

GPIO2	PULSE_1_INPUT	Inverted Digital input: Low input = High reading. For example, use a falling edge to track the start of a pulse. NB: Input pin must have the pullup enabled, this powers the transistor.
GPIO3	PULSE_2_INPUT	As above
GPIO8	PULSE_1_RAW_OUT	Inverted digital output: 1/true = low, 0/false = high. Scaled via a transistor. Pin should be input, no pullup.
GPIO9	PULSE_2_RAW_OUT	As above
GPIO10,11, 12, 13, 14, 15	LED_1, 2, 3, 4, 5, 6,	Leds are driven directly from the pin though a 330R resistor. 1/true = LED is illuminated.
GPIO18	DAC_SCK / SCK	MCP4822 Control
GPIO19	DAC_SDI / MOSI	MCP4822 Control
GPIO21	DAC_CS / CS	MCP4822 Control
GPIO22	CV_2_PWM	Inverted PWM output. Two pole active filtered. Use 11 bit PWM at 60khz. 2047 = -6v | 1024 = 0v | 0 = +6v Requires calibration for precise values
GPIO23	CV_1_PWM	As above
GPIO24	MUX_LOGIC_A	This is a 4052 Multiplexer with 2 x 4 channels. Truth table is below
GPIO25	MUX_LOGIC_B	As above
GPIO26	AUDIO_L_IN_1	Inverted bipolar analog input,into 12(?) bit internal ADC +6v = 0 | 0v = 2048 | -6v = 4095 DC Coupled, requires calibration for precise readings
GPIO27	AUDIO_R_IN_1	As above
GPIO28	MUX_IO_1	Analog Input 2, from the Multiplexer
GPIO29	MUX_IO_2	Analog Input 3, from the Multiplexer

Every studio needs a computer. This is the vibe I'm going for:



Or maybe the EMS studio in Putney, with the PDP-8 minicomputer that Peter Zinovieff bought after selling one of his wife's tiaras:



What might the computer module be used for?

- Wavetable and additive and FM and other types of oscillators, perhaps quantized to standard or non-standard tunings
- Playback of short samples stored in up to 16mb flash on the card
- Wild computer music experiments, like Xenakis Gendys
- Short mid-fi modulated delays, and all the resonators, phasers, flangers, chorus, pitch shifting that can come from that. In stereo.
- Lofi reverbs
- Lofi delays
- Polyphonic sound generation / chords (there are 2 x nice multimode filters just to the right)
- Midi or OSC input and output
- Ableton link, maybe
- Generative Drum synthesis or pattern generation
- Speech synthesis
- AI audio analysis and response
- Beat detection and matching
- Physics simulations - bouncing balls and dual pendulums
- Chaos simulations
- Weird browser-based interfaces
- Arpeggiators
- Generative sequencers
- Auto tuning for the analog oscillators
- Self-playing albums released as cards, with instructions for how they should be patched to the rest of the device.
- Noise generators
- Data sonification
- Braids and Grids and other Mutable Greatest Hits
- Euclidean and de Bruijn and other rhythm generators
- A USB midi host, if that's possible
- Things that use flash_get_unique_id() which pulls a unique 64 bit ID from the flash memory, so every card is unique.

I think of these cards as fanzines - quick, exciting experiments that can be made in a week or two, then shared. These are fun ideas that probably don't merit an entire module but would be nice to have on a memory card.

Discord invite

Main Knob
Connected to ADC2
Via Multiplexer 00

Y Knob
Connected to ADC2
Via Multiplexer 10

X Knob
Connected to ADC2
Via Multiplexer 01

Audio Inputs
Connected to ADC0 and ADC1
Inverted, -6v to +6v
DC Coupled

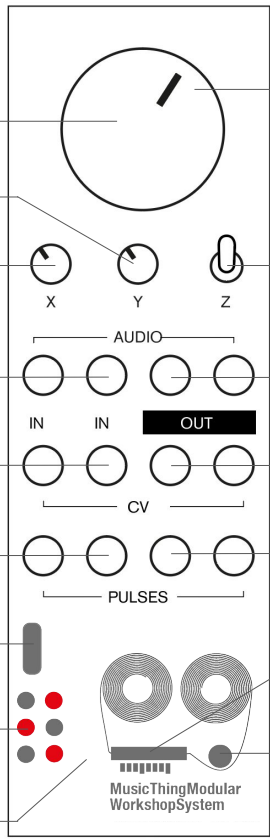
CV Inputs
Inverted, -6v to +6v
Connected to ADC3 via Mux
CV1 = 00 & 10 CV2 = 01 & 11

Pulse Inputs
Inverted
Requires pull up on input pin
to power scaling transistor

USB
Data + 5v power so potential
to use as a USB host?

LEDs
Driven directly by GPIO pins
Not inverted

Debug port
On the PCB, a standard debug
port that will connect directly to
the Raspberry Pi Debug Probe



Boot Select Button
Hidden behind the
main knob. Hold and
tap reset to mount
as a folder on your
desktop.

Z Switch
Connected to ADC2
Via Multiplexer 11
Momentary down
Up = full, Middle =
half, Down = zero

Audio Outputs
From MCP4822 DAC
Inverted, DC coupled
Scaled to ~+/-6v

CV Outputs
Filtered 60hz PWM
Not inverted
Scaled to ~+/-6v

Pulse Outputs
Digital outs
Inverted
Scaled to 0v-6v-ish

Memory Slot
Takes NOR Flash
chips on SD-card
sized holder, 2Mb to
16Mb storage

Reset Button
Grounds the 'Run'
pin to reboot the
RP2040, and load
Flash memory