

ANDROMEDA SPACE ROCKERS MK - 1I Drum Machine

Filter Photocell

The sound from the Andromeda MK-2 comes from an analog white noise generator, which is processed by a resonant filter to create various snare, cymbal, and clap effects.

When light hits this sensor, it raises the frequency of the filter and creates a more high pitched intense sound.

IR Sync IN

This sensor picks up the infrared beam from another Andromeda Space Rockers instrument. The sensor is underneath the board to reduce the ambient light hitting it.

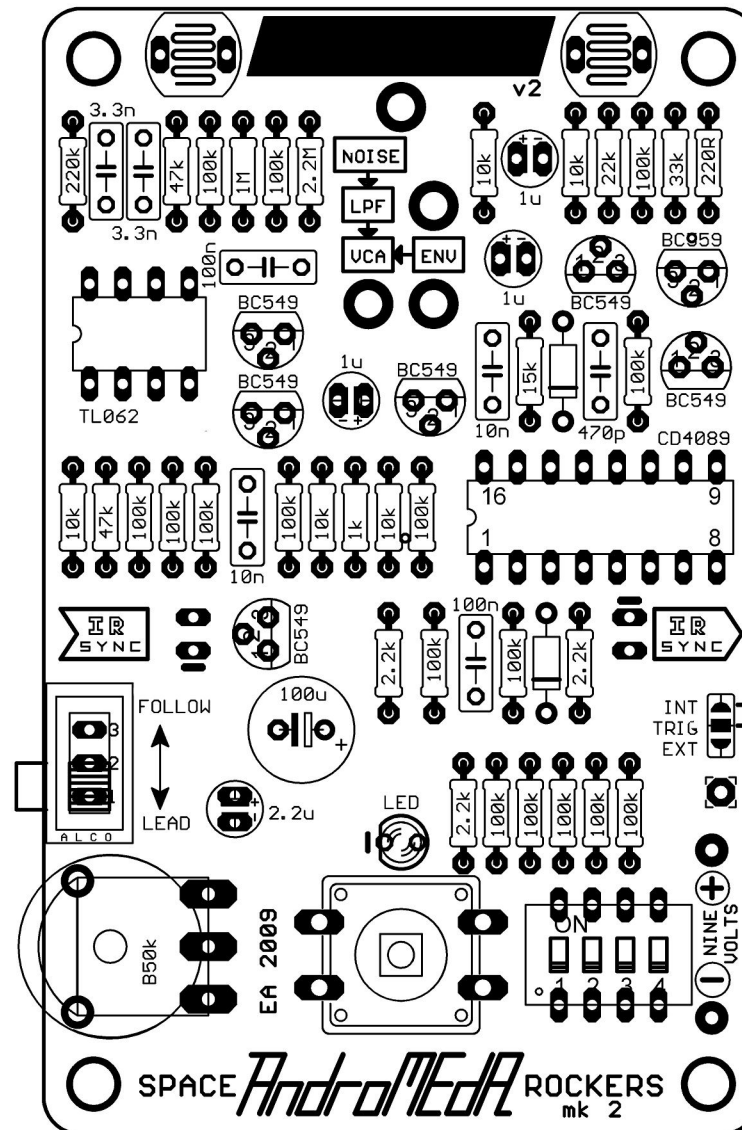
Lead / Follow Switch

When this switch is on FOLLOW, your drum machine matches the tempo of the machine next to it. If there is no signal, the sound will stop.

Set the switch to LEAD and you can adjust the tempo independently with the thumbwheel.

Thumbwheel

The thumbwheel potentiometer controls tempo in LEAD mode. Tempo is variable from 50 – 300 BPM, if we consider the clock as 1/16th notes.



ericarcher.net/devices/mk2

Envelope Photocell

This photocell affects the duration of the sound.

IR Sync OUT

This sends a flashing infrared beam that communicates tempo information to the next device in the network.

INT - EXT Jumper

This functions like a switch, but you configure it by adding a blob of solder. For normal operation, connect INT and TRIG with a blob of solder between them. This connects the internal sequencer to the sound generator.

Or you can experiment with external triggering from a microcontroller, modular synthesizer, etc. Just move the solder blob so it bridges TRIG and EXT. Connect the external trigger source to the EXT pad, its ground should connect to the GND point in the Personality Center.

Rhythm Selector

Brush up your binary skills and think of a number from 0 to 15... For every 16 clock 'ticks', the MK-1 plays a specific number of drum hits. You enter that number into the DIP switch in binary. Here are just a few of the choices:

- 0000 = off
- 1000 = whole notes
- 0100 = half notes
- 0010 = quarter notes
- 0001 = eighth notes
- 1111 = fastest setting

Button

Tap the button once to restart the rhythm from its reference point. Use this feature to shift the position of an accent note, or change the syncopation.

If you hold the button down, two things can happen.

- XXX0 : silence
- XXX1 : drum roll

A N D R O M E D A SPACE ROCKERS MK-1I Drum Machine

16 Preset Rhythms
Analog White Noise Source
PhotoCell Filter + Envelope
Infrared Wireless Tempo

Tools you need for this kit

- Soldering iron (25W - 40W, narrow tip)
- Flush cutting pliers
- Needle nose pliers
- Philips screwdriver

Start here

Resistors

Bend the leads at a 90-degree angle to the resistor's body, then slip them into the holes on the board. Both legs are equivalent so it doesn't matter which way the resistor is rotated. After inserting the resistor, turn the board over, solder its connections, then clip the leads close to the board.

16	100k resistor
5	10k resistor
3	2.2k resistor
2	47k resistor
1	33k resistor
1	22k resistor
1	220 ohm resistor (220R)
1	220k resistor
1	2.2M resistor
1	1M resistor
1	1k resistor
1	15k resistor

Diode

Be sure the striped end of the diode matches the printing on the board.

1	1N914 diode
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Chip Sockets

Make sure the socket is rotated so the notch on its edge matches the printing on the board. If sockets are not included, skip this step.

1	14-pin DIP socket
1	16-pin DIP socket

Potentiometer

1	50k linear thumbwheel
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Switches

The SPDT slide switch's lever faces the outside edge of the board.

1	12mm tactile switch
1	4-position DIP switch
1	SPDT slide switch

Capacitors

The electrolytic capacitors are polarized. Make sure their long leg goes into the hole marked plus (+).

2	3.3n polyester
2	10n polyester
2	100n polyester
3	1u electrolytic
1	2.2u electrolytic
1	100u electrolytic
1	470p ceramic

Photocells

There are spaces for two CdS photocells on the board. Optional step: solder the extra included 10k resistor in parallel with the photocell on the left side.

2	CdS photocells
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Transistors

The transistors' flat side must match the printing on the board.

1	BC559B transistor, PNP
6	BC549B transistor, NPN

Visible LED

This is located just above the button. Install it so its flat edge faces the white line printed on the board. In the kit, be sure not to confuse this with the IR Sync OUT device, which is light pink color. (Your Visible LED will be water-clear, or a bright color.)

1	Visible LED
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IR Sync IN

This is a phototransistor. It looks like a black LED. It goes on the bottom of the board with its flat edge toward the white line on the top side of the board. Bend its leads at a sharp 90-degree angle with needle-nose pliers before soldering it in place. See the illustration on page 4 as a guide. Slip a piece of 1/8" diameter black tubing over the phototransistor.

1	PT204-6B phototransistor
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IR Sync OUT

This component looks like a pink LED and emits 940nm (invisible) light. It is soldered on the bottom side of the board with its flat edge matching the white line printed on the top side of the board. Bend its leads at a 90-degree angle like the phototransistor.

1	Infrared LED (940nm)
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Output Jack

The jack mounts from the underside of the board. Note: Battery power is switched thru the ring terminal of the jack.

1	1/4" Jack
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Battery Pod

The battery holder goes on the bottom side. Solder it to the points marked NINE VOLTS. Install two screws from the top side of the board to keep the battery holder in place. (Drill two holes if needed).

1	9V battery holder
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i can has chipz now plz?

Install the two chips into their places. It helps to bend the leads inward slightly, by pressing against a conductive surface like aluminum foil. Align chips so the printed text on them reads right side up like the printing on the board..

1	CD4089
1	TL062

My Legs My Legs!

Your drum machine needs its two front legs to sit flat on a surface. Install the legs, made of plastic tubing, using the screws provided. To make tightening it easier, you can grip the leg with pliers while you fasten the screw.

Jumper Setting – IMPORTANT!

Before you use your MK-2 Drum Machine, you must configure it for internal triggering. Find the INT / TRIG / EXT symbol on the top of the board. Add a blob of solder that bridges the pads marked INT and TRIG. (EXT lets you connect a separate sequencer)

Clock / Infrared Network

The LEAD / FOLLOW switch sets the role of this opamp. In LEAD mode, the opamp is configured as a *relaxation oscillator*, generating steady square waves at a rate you control with the thumbwheel.

In FOLLOW mode, the opamp is a *comparator with hysteresis*. It looks at the voltage information coming from the IR Sync input, and shapes it into a snappin' square wave clock signal.

IR Sync out is transmitted by an infrared (940nm) LED, mirroring the activity of the clock signal.

The clock waveform is typically a 50% duty cycle square wave at 16-th note intervals.

Preset Pattern Sequencer

The MK-2 sequencer is a simple implementation of the CD4089 *Binary Rate Multiplier* chip. The 4089's 4-bit binary input is connected to the Rhythm Selector (DIP switch) using 100k pull-down resistors. The preset rhythm patterns are inherent properties of the 4089 and cannot be changed.

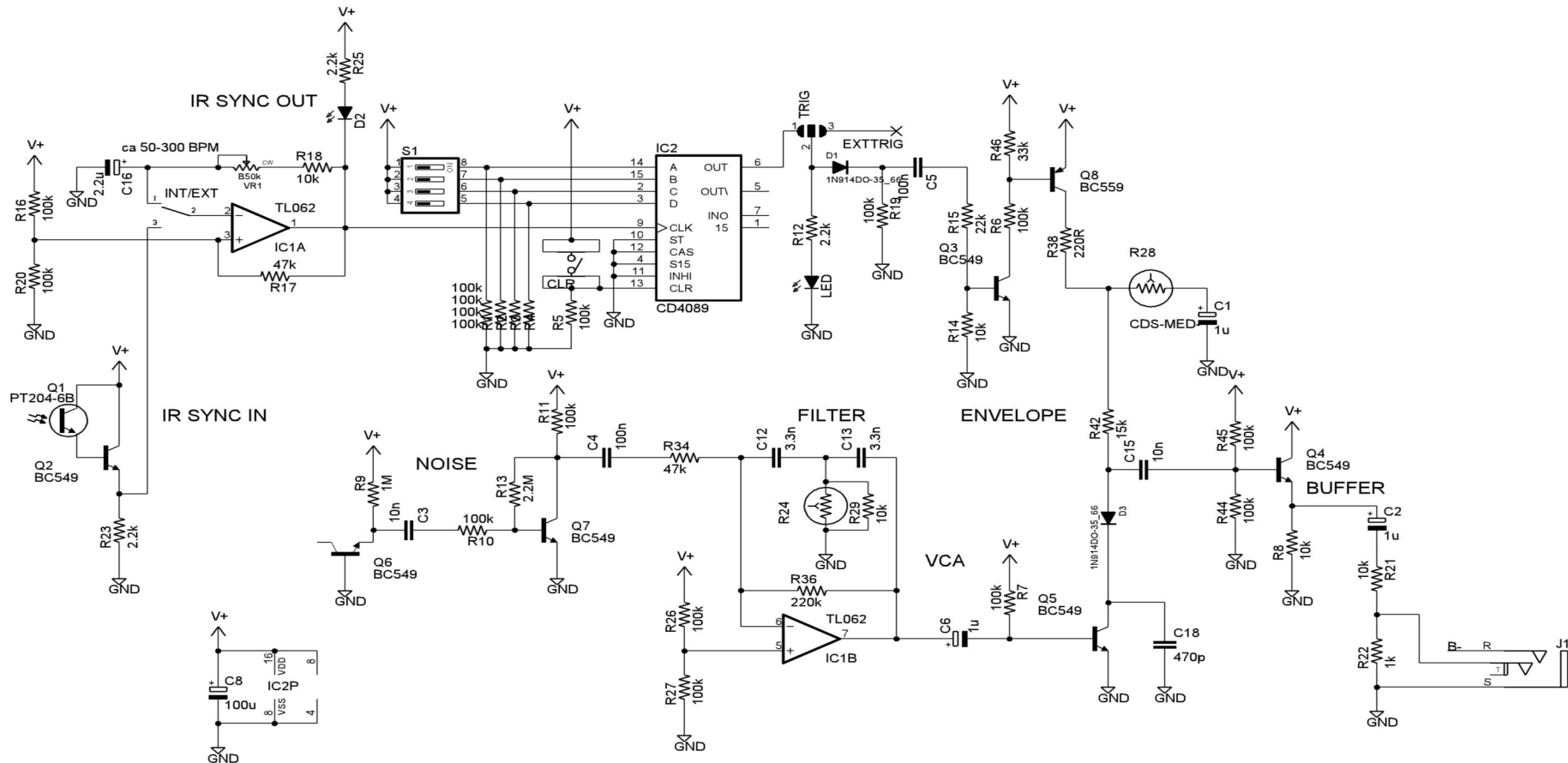
Tapping the button sends a "clear" command, restarting the rhythm pattern from its reference point. This can be confusing because the reference points are located in non-intuitive places... but with practice you get the feel.

Noise Source and Filter

Transistor Q6 is configured with reverse bias to generate analog white noise. The noise is amplified and filtered by IC1B. The center frequency of the filter effect is controlled by the photocell on the left side of the unit. Brighter light increases the filter's frequency and resonance.

Envelope Generator and VCA

Transistor Q5 is configured as a Swing-Type VCA similar to many classic analog drum machines. Diode D3, an 1N914, connects the envelope generator to the VCA. The envelope generator creates a fast voltage contour that determines the duration of the output sound. This envelope is generated whenever the sequencer triggers Q3-Q8, which deposits an electrical charge in C1. This charge becomes the envelope control voltage as it bleeds away thru the VCA. The Envelope Photocell (on the right side of the circuit board) influences the envelope shape. The audio out of the VCA is buffered by Q4.



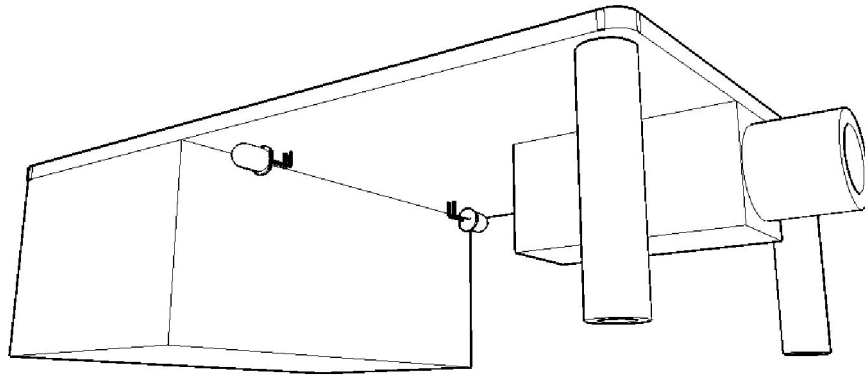
Battery Power

The Andromeda MK-2 circuit uses about 8 milliamps of current, and should provide about 50 hours of playing time from an alkaline 9V battery.

There is no power switch; the power turns ON automatically when a plug is inserted in the jack. This is because the negative lead of the battery (B-) is only connected to the ring terminal of the output jack; when a normal "mono" plug is inserted, the metal of the plug conducts B- to GND, and *poof* the power comes on... this means a stereo (TRS) cable can not be used in the output jack; the unit will not power on in this case.

ANDROMEDA SPACE ROCKERS

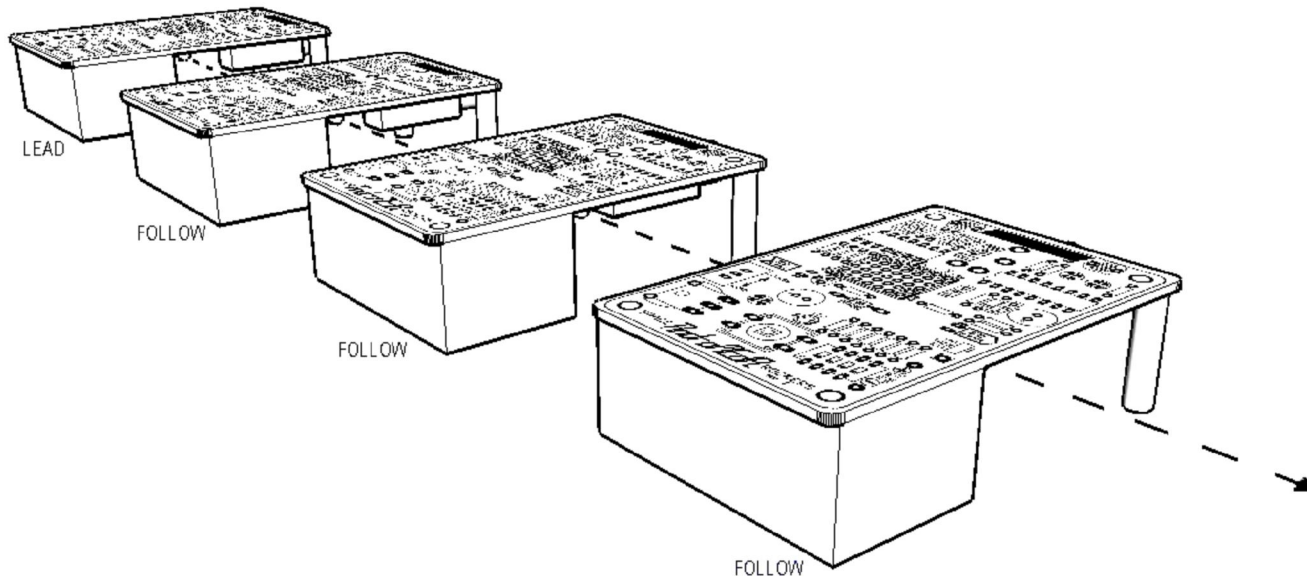
minimal analog drum machines



Underneath the Board

This view shows the correct way to install the IR Sync transmitter and receiver. When installing the IR components, get the polarity right - be sure that the flat edge of the component is lined up with the white line marked on the top side of the board.

A short piece of 1/8" black tubing should be slipped over the IR Sync IN sensor to help it ignore ambient light.



IR Sync Network Connection

Arrange multiple units (up to 12) in a line as illustrated, with their output jacks pointing away from you. Set the unit on your far left to LEAD. Set all the others to FOLLOW mode.

The maximum working distance for the infrared link is about 12 inches (30cm). Bright incandescent lights can interfere with the network and stop reception. This is because incandescent lights emit lots of infrared. If this is an issue, move the drum machines farther from the light source or prevent the light from reaching the IR Sync sensors.