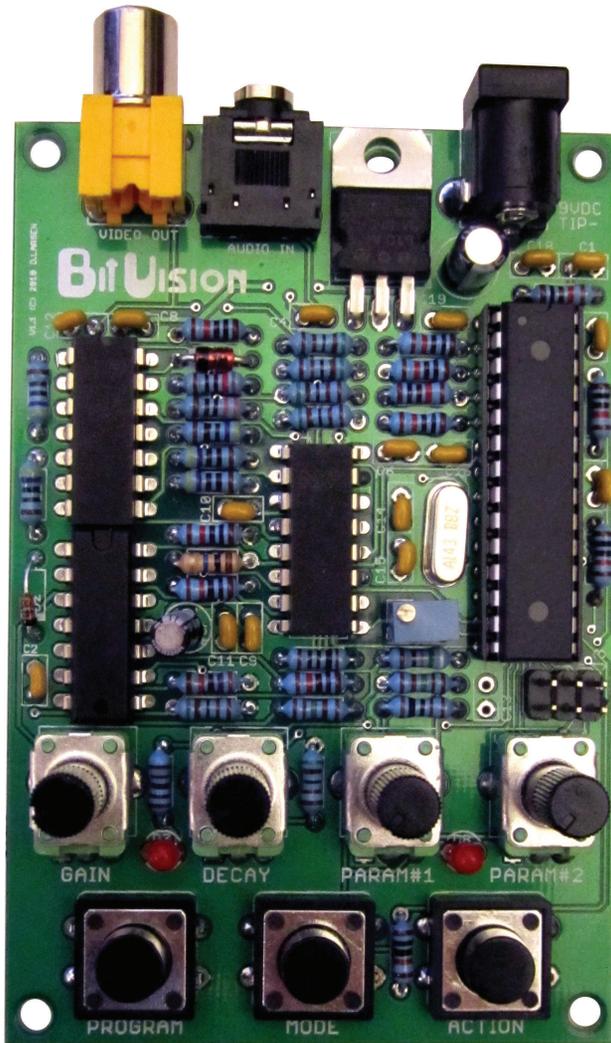


# BITVISION VIDEO SYNTHESIZER OPERATION & ASSEMBLY MANUAL



[LZXINDUSTRIES.NET/BITVISION](http://LZXINDUSTRIES.NET/BITVISION)

## INTRODUCTION

**BitVision** is a compact visual synthesizer designed for audiovisualization. It creates a Composite Video output signal which displays a 32x32 pixel image using the currently selected 16-color palette.

Transformations can be applied to the current color palette and horizontal/vertical display modes in realtime, creating animation and movement. The manner in which the external audio and the internal counter transform the image can be changed via various modulation modes.

The goal of this project was to create a versatile video generator with a vintage/imperfect response to color and shape, such as what you might see when playing your Atari 2600 on an old CRT television in 1977. Colors will bleed and slew due to the voltage-controlled color phase shifter, giving a degree of chaotic analogue response and noise missing when viewing simple pixel graphics on a modern computer.

In addition to generating the video image, we packed in as many modulation capabilities and controls as we could in such a small package. In the tradition of the Atari Video Music, an analogue envelope follower and frequency counter track external audio signals and can modulate shape and color via many variable modulation routings. We wanted an audiovisualizer that could potentially provide live video for an entire musical performance, so 16 separate preset image/palette options are stored inside.

Finally, we wanted BitVision to be an expandable and continually useful tool for creating video art. To this end we've included an AVR-ISP programming header on the circuit board which can be used to reprogram BitVision with new images, palettes, or entirely alternate applications.

## SETUP

In order to use the BitVision you will need a standard wall-wart adapter providing 9VDC power (Negative Center/Tip) and at least 100mA. Connect the wallwart to the DC input jack and the other end to the wall.

Connect your audio source (such as a stereo or instrument) to the Audio In jack using a standard 3.5mm (1/8") cable. An 1/8" adapter or adapter cable can be used for sources with only RCA or 1/4" jack outputs.

Connect the Video Out jack on the BitVision circuit board to a Composite Video input jack on your television or other video device.

You should now be seeing video output from the BitVision. If you just built your BitVision from a kit, adjust TR1 trimmer with a small flathead screwdriver for desired color range.

For suggestions on where to buy cables or a wall-wart power adapter, visit [www.lzxindustries.net/bitvision](http://www.lzxindustries.net/bitvision).

## OPERATING INSTRUCTIONS

### Adjust GAIN knob

Controls amplitude of the external audio signal and consequently the sensitivity of the peak detector trigger. The LED in between GAIN & DECAY knobs indicates peak detector.

### Adjust DECAY knob

Controls the smoothness of the external audio signal's modulation.

### Adjust PARAM#1 knob

Controls the frequency of the internal counter (indicated by the LED between PARAM#1 & PARAM#2 knobs.) Rate is adjustable between 1 frame (1/30th of a second) and 255 frames (8.5 seconds.)

### Adjust PARAM#2 knob

Controls bias level for audio modulation modes. Tip: start with PARAM#2 turned fully counter-clockwise, and adjust to control overall intensity of the audio modulation as the song builds.

### Press PROGRAM button

Cycles current image and palette (16 sets).

### Press MODE button

Cycles current audio modulation mode. 4 modes: off, positive envelope, negative envelope, frequency-counter.

### Press ACTION button

Cycles current peak detector action. 4 modes: off, horizontal, vertical, horizontal+vertical.

### Hold PROGRAM button + Press MODE button

Cycles current counter action. 13 modes: rotate palette, shift hue (entire palette), shift value (entire palette), random color (entire palette), random hue (entire palette), random value (entire palette), invert hue (entire palette), shift hue (random index), shift value (random index), random color (random index), random hue (random index), random value (random index), invert hue (random index).

### Hold PROGRAM button + Press ACTION button

Cycles current display mode (all horizontal & vertical combinations.)

### Hold MODE button + Press PROGRAM button

Cycles current palette (without changing image)

## WHAT'S NEXT?

Once you've become familiar with your new video synthesizer, you may want to dig deeper into its' functionality. There is immense potential for reprogramming the BitVision hardware for many exciting video generation applications, or loading in your own images and palettes to the current program. Stay tuned to [www.lzxindustries.net/bitvision](http://www.lzxindustries.net/bitvision) for more information on tools and resources.

# KIT ASSEMBLY INSTRUCTIONS

This DIY kit assembly guide assumes that the builder is familiar with basic thru-hole soldering techniques and has the ability to identify and mount the electronic components included. A resistor color-code and capacitor code cheat-sheet has been included for ease of reference. A complete bill of materials are included on the opposite column.

If you're new to DIY electronics kits or find anything confusing about these directions, please visit [www.lzxindustries.net/bitvision](http://www.lzxindustries.net/bitvision) for links to helpful resources and videos about soldering and component identification.

## STEP BY STEP

- 1) Mount D1 & D2 diodes, ensure that the black band on the diode matches the orientation of the white band shown on the PCB layout. Solder and clip leads.
- 2) Mount all resistors, solder and clip leads. We recommend doing a few at a time.
- 3) Next mount IC1, IC2, IC3 and the 28-pin IC socket (in the space for IC4.) Ensure that the notch on the top of each chip and socket matches the orientation of the notch shown on the PCB silkscreen. Solder and clip leads. Take care to not overheat IC pins while soldering, and to not disturb the pre-soldered surface-mount diodes near IC2's pins.
- 4) Mount Q1. Solder and clip leads.
- 5) Mount IC5, bending pins so that the protruding metal portion of the TO220 package is flat against the circuit board. Solder and clip leads.
- 6) Mount D7 & D8 LEDs, taking care that the shorter of the two leads (the cathode) is oriented towards the left side of the PCB (while oriented as shown on the previous column.) Solder and clip leads.
- 7) Mount all ceramic capacitors, solder and clip leads. We recommend doing a few at a time.
- 8) Mount both electrolytic capacitors, ensuring that the long lead (positive side) is placed thru the square solder pad with the + sign next to it. Solder and clip leads.
- 9) One at a time, mount jacks, headers, potentiometers and switches and solder in place. We recommend to solder only one pin first, then check to make sure the part is resting flush against the PCB. If not, the joint can be reflowed and the part repositioned before soldering in the remaining pins and mounting tabs.
- 10) Mount IC4 in the 28-pin socket. Thoroughly check your work for accidental solder bridges or overlooked solder joints. You're done!

# BILL OF MATERIALS

### Diodes

D1	1N4730A
D2	1N4148
D3*, D4*, D5*, D6*	SMV1255
D7, D8	3MM Red LED

### Resistors

R21	100 ohm
R14	330 ohm
R10, R11, R12, R13, R27	470 ohm
R16	820 ohm
R24	953 ohm
R33, R34	1K
R20, R29	1.15K
R7, R23, R26, R30, R32, R35	5.1K
R3, R4, R5, R6, R8, R9, R17, R19, R22, R25, R28, R31	10K
R15	27K
R18	10M

### Ceramic Capacitors

C14, C15	22pF (220)
C12	27pF (270)
C13**	220pF (221)
C10	470pF (471)
C11	1000pF (102)
C1, C2, C3, C4, C5, C6, C8, C9, C16, C18, C19	0.1uF (104)

### Electrolytic Capacitors

C7	2.2uF
C17	100uF

### Crystal

Q1	14.1818MHz Crystal
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### Integrated Circuits (ICs)

IC1	TLC074
IC2	74HC14
IC3	74HC4053
IC4***	Atmega328
IC5	7805

### Jacks, Headers, Potentiometers & Switches

TR1	5K Trim Potentiometer
VR1, VR2, VR3, VR4	100K Potentiometer
S1, S2, S3	12MM Tactile Switch
J1	1/8" Audio Jack
J2	RCA Video Jack
J3	2X3 Pin ISP Header
J4	DC Power Jack

\* Pre-soldered surface-mount components

\*\* Optional capacitor, makes edges more sloped/fuzzy

\*\*\* 28-pin IC socket included

# RESISTOR IDENTIFICATION

