

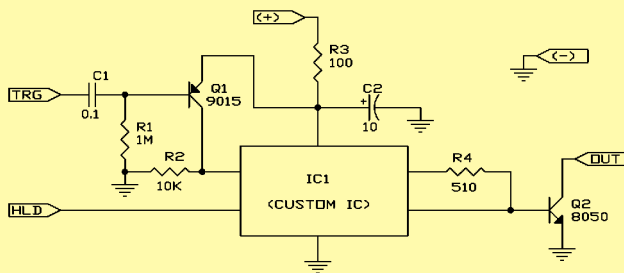
More about the ICs in Snap Circuits

Although Snap Circuits includes several parts that are called integrated circuits, they are actually modules containing a number of parts. The modules contain specialized sound-generation and amplifier ICs and other supporting components

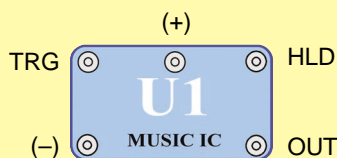
(resistors, capacitors, and transistors) that are always needed with them. This was done to simplify the connections you need to make to use them.

Music IC

The **music IC** module contains sound-generation ICs and supporting components. It can play several musical tunes that are recorded in it. Its actual schematic is complex and looks like this:



Its Snap Circuits connections are like this:



Music IC:

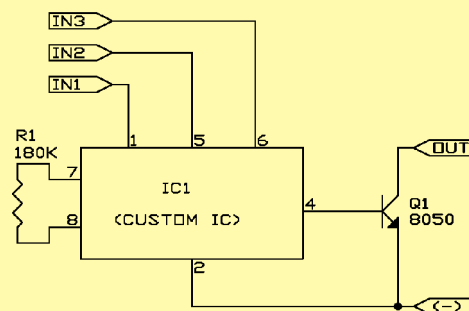
(+) - power from batteries
(-) - power return to batteries
OUT - output connection
HLD - hold control input
TRG - trigger control input

Music for ~20 sec on power-up, then hold HLD to (+) power or touch TRG to (+) power to resume music.

This module has two different control inputs. The OUT connection pulls current into the module (not out of it), usually from a speaker. This current is adjusted to make the music. Snap Circuits projects 15 and 16 show how to connect this part and what it can do.

Alarm IC

The **alarm IC** module contains a sound-generation IC and supporting components. It can make several siren sounds. Its actual schematic looks like this:



Its Snap Circuits connections are like this:



Alarm IC:

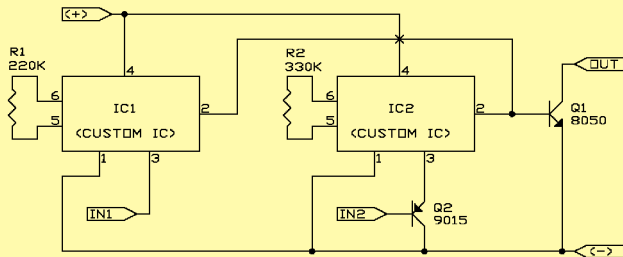
IN1, IN2, IN3 - control inputs
(-) - power return to batteries
OUT - output connection

Connect control inputs to (+) power to make five alarm sounds.

This module has three control inputs, and can make five siren sounds. The OUT connection pulls current into the module (not out of it), usually from a speaker. This current is adjusted to make the siren sounds. Snap Circuits project 17 shows a simple way to connect this part, and projects 113-117 show the connections needed to make the five possible sounds.

Space War IC

The **space war IC** module contains sound-generation ICs and supporting components. It can make several siren sounds. Its actual schematic looks like this:



Its Snap Circuits connections are like this:



Space War IC:

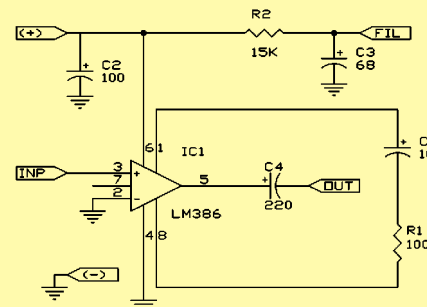
(+) - power from batteries OUT - output connection
(-) - power return to batteries IN1, IN2 - control inputs

Connect each control input to (-) power to sequence through 8 sounds.

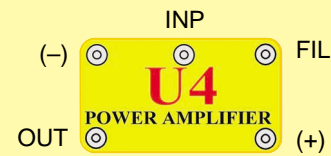
This module has two control inputs that can be stepped through 8 sounds. The OUT connection pulls current into the module (not out of it), usually from a speaker. This current is adjusted to make the space war sounds. Snap Circuits project 19 shows how to connect this part and what it can do.

Power Amplifier IC

The **power amplifier IC** module (not included in model SC-100) contains an LM386 audio amplifier IC and supporting components. Its actual schematic looks like this:



Its Snap Circuits connections are like this:



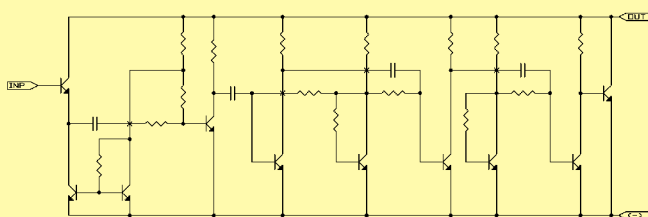
Power Amplifier IC:

(+) - power from batteries INP - input connection
(-) - power return to batteries OUT - output connection
FIL - filtered power from batteries

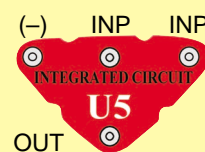
This module amplifies a signal from its input. The OUT connection will usually be directly to a speaker. Amplifiers like this let a small amount of electricity control a much larger amount, such as using a tiny signal from a radio antenna to control a speaker playing music. Snap Circuits projects 242 and 293 show how to connect this part and what it can do.

High Frequency IC

The **high frequency IC** (not in SC-100) is an TA7642 (or other equivalent) AM radio IC. It is a specialized amplifier used only in high frequency radio circuits. The circuitry looks like this:



Its Snap Circuits connections are like this:



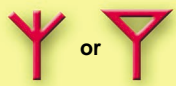
High Frequency IC:

INP - input connection (2 points are same)
OUT - output connection
(-) - power return to batteries

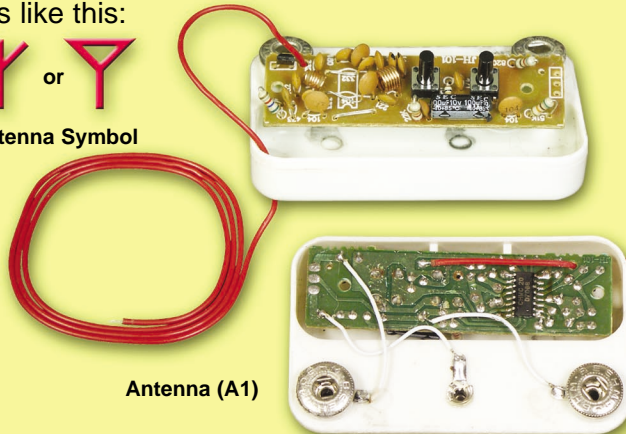
This module converts an AM radio signal at its input into an audio signal at its output. Snap Circuits project 242 shows how to connect this part and what it can do.

FM Module

The **FM Module** (not in SC-100 or SC-300) contains an integrated FM radio circuit. The inside looks like this:

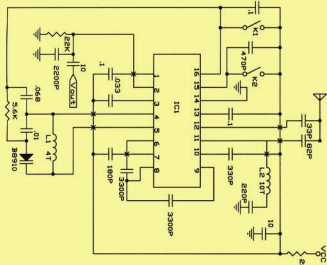


Antenna Symbol

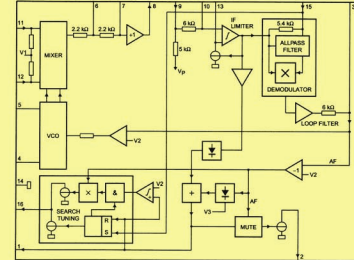


Antenna (A1)

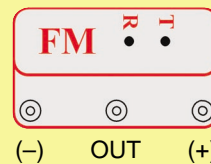
Its actual schematic looks like this:



This circuit is actually much more complex than it appears here, since it is built around an integrated radio circuit. A schematic of the circuitry within this part would be too large to show here, but this block diagram gives a summary of it:



Its Snap Circuit's connections are like this:



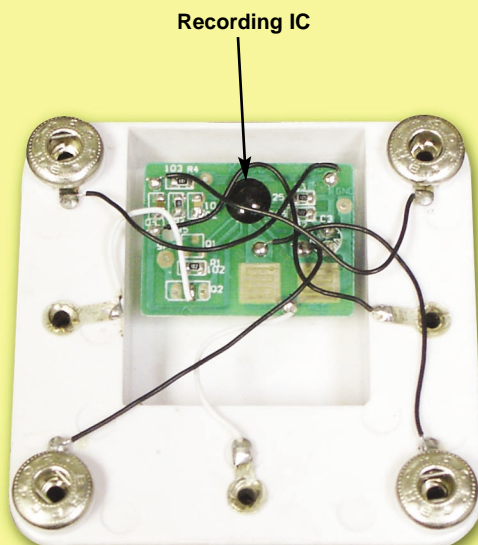
FM Module:

- (+) - power from batteries
- (-) - power return to batteries
- T - tune up
- R - reset
- OUT - output connection

The antenna (Y) is a loose wire that should always be left unconnected and spread out for best radio reception.

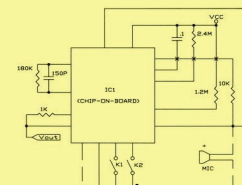
Recording IC

The **Recording IC** (not in SC-100 or SC-300) is a module containing a specialized recording integrated circuit and supporting resistors and capacitors that are always needed with it. The inside looks like this:

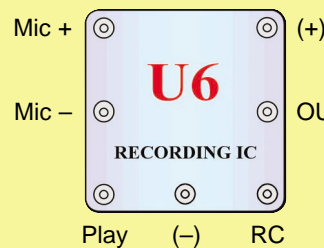


Recording IC (U6)

Note that the parts here are miniaturized and "surface-mounted" to the printed circuit board. The actual recording IC is under the black blob of protective plastic. Its actual schematic looks like this:



Its Snap Circuits connections are like this:



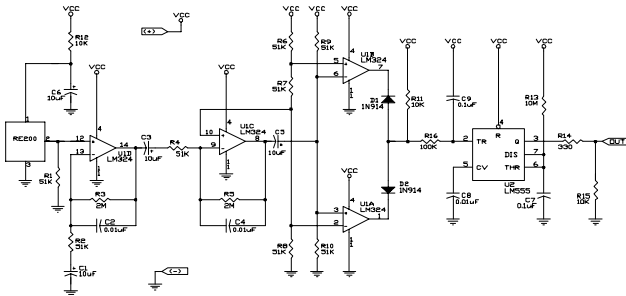
Recording IC Module:

- (+) - power from batteries
- (-) - power return to batteries
- RC - record
- Play - play
- OUT - output connection
- Mic + - microphone input
- Mic - - microphone input

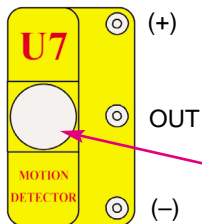
The recording IC can record and play back a message up to eight seconds long. There are also three pre-recorded songs.

Motion Detector

The **motion detector** module (only in SCP-03) contains an infrared detector, amplifier-filter circuit, and timing circuit. Its actual schematic is complex and looks like this:



Its Snap Circuits connections are like this:



Motion Detector:

- (+) - regulated power from batteries
- (-) - power return to batteries
- OUT - output connection
- Lens

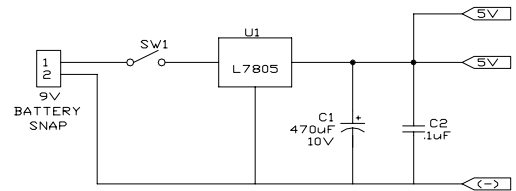
All objects (including people and animals) produce infrared radiation due to the heat in them. Infrared radiation is similar to visible light but has a longer wavelength that our eyes cannot detect. The lens on top of the motion detector module filters and focuses the radiation, it is most sensitive to the radiation produced by our bodies.

Inside the motion detector module is an infrared detector with pyroelectric crystals, which create a tiny voltage when exposed to infrared radiation. A circuit amplifies and filters this voltage, but only responds to changes in the radiation level - so is only triggered by moving objects (motion). When motion is detected a timing circuit is used to control other snap circuits devices for a few seconds, such as an alarm.

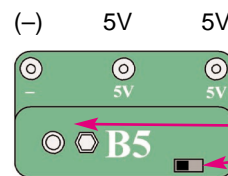
This module is very sensitive and requires a very stable voltage from the batteries, so it should always be used with the 9V battery holder (B5). The Motion Detector kit SCP-03 shows how to connect this part and what it can do. Other projects with this motion detector will be available on our website.

9V Holder & SW

The **9V battery holder & switch** module (only in SCP-03) contains a voltage regulation circuit and on/off switch. It provides a very stable 5V that is needed for modules like the motion detector. Its schematic is looks like this:



Its Snap Circuits connections are like this:



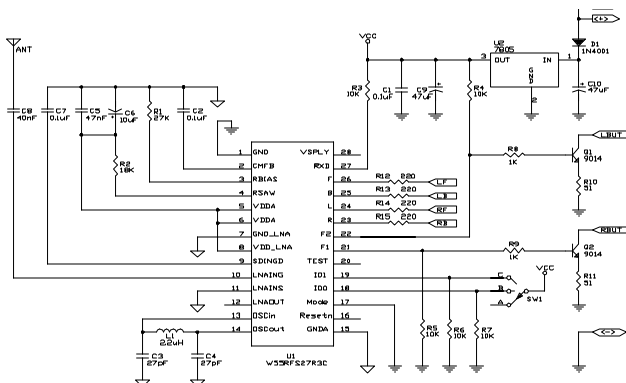
9V Holder & SW:

- 5V - regulated 5V outputs
- (-) - power return to battery
- Snap for 9V battery
- ON/OFF switch

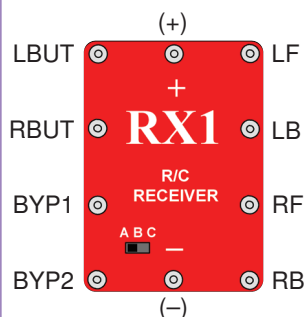
This module uses a 9V battery and has an output of 5V, until the battery gets very weak. The voltage from the battery may vary a little as the circuit current changes, but the 5V output from the module will not vary nearly as much. This module will not work properly if the circuit current is higher than 500mA.

R/C Receiver

The **R/C receiver** module (only in SCROV-10 R/C Snap Rover) contains a radio receiver circuit, a specialized radio decoder integrated circuit (W55RFS27R3C or equivalent), and other supporting components. Its actual schematic is complex and looks like this:



Its Snap Circuits connections are like this:

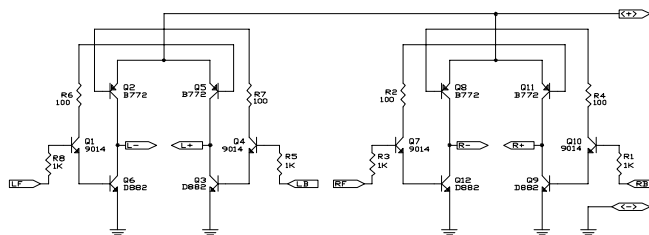


R/C Receiver:

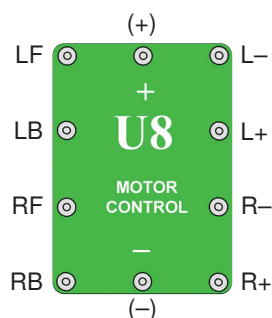
- (+) - power from batteries
- (-) - power return to batteries
- LBUT - left button function (active low)
- RBUT - right button function (active low)
- BYP1 - low frequency bypass
- BYP2 - high frequency bypass
- LF - left forward output (active high)
- LB - left backward output (active high)
- RF - right forward output (active high)
- RB - right backward output (active high)
- ABC switch - selects radio channel

Motor Control IC

The **Motor Control IC** module (only in SCROV-10 R/C Snap Rover) contains 16 transistors and resistors that are usually needed to control the motors. Its schematic looks like this:



Its Snap Circuits connections are like this:



Motor Control:

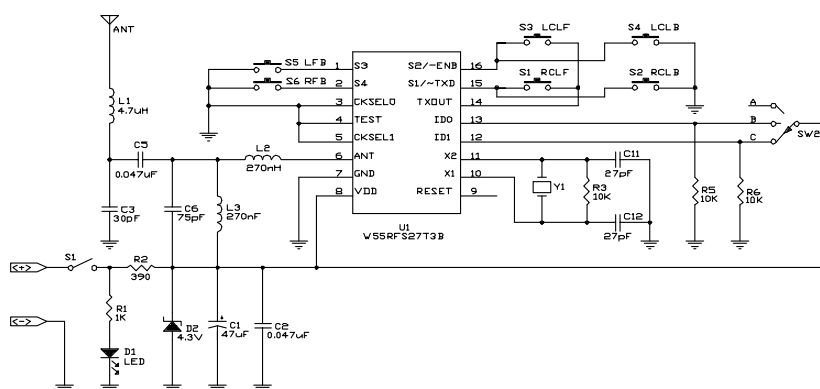
- (+) - power from batteries
- (-) - power return to batteries
- LF - left forward control input
- LB - left backward control input
- RF - right forward control input
- RB - right backward control input
- L+ - left forward motor drive
- L- - left backward motor drive
- R+ - right forward motor drive
- R- - right backward motor drive

This module is needed because the R/C receiver module cannot provide enough power to operate the motors directly. The transistors inside also control the direction the motors spin.

R/C Transmitter

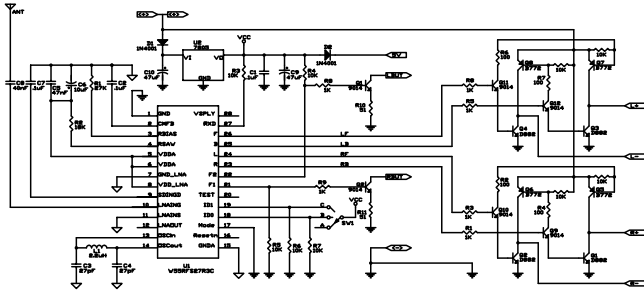


The **Remote Control Unit** (in all Snap Rover models) contains a radio transmitter circuit, a specialized radio encoder integrated circuit (W55RFS27T3B or equivalent), and other supporting components. Its actual schematic is complex and looks like this:

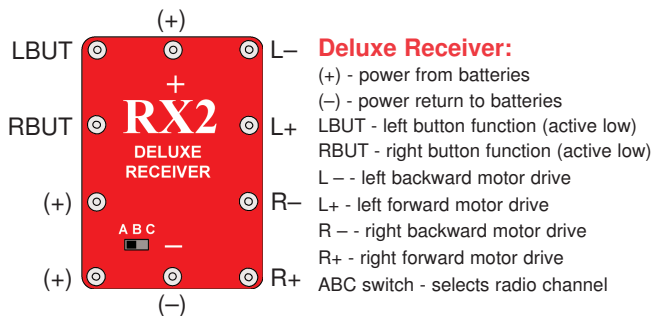


Deluxe Receiver

The **Deluxe Receiver** module (only in SCROV-50 Deluxe Snap Rover) is a combination of the RX1 R/C Receiver and U8 Motor Control IC modules shown on the preceding page. These modules were combined in one package to make room on the base grid for additional modules in Deluxe Snap Rover. The schematic looks like this:

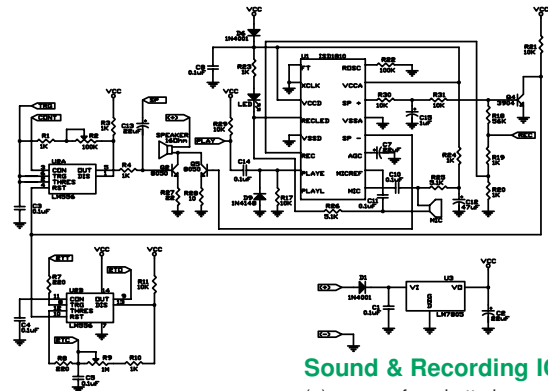


Its Snap Circuits connections are like this:



Sound & Recording IC

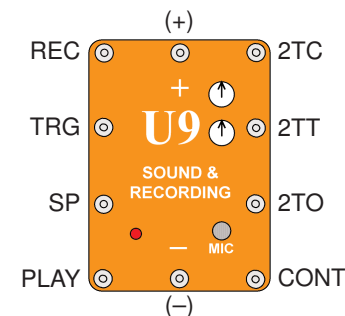
The **Sound & Recording IC** module (only in SCROV-50 Deluxe Snap Rover) contains an integrated recording circuit, a dual timer integrated circuit for making audio tones, microphone, speaker, filtering circuitry, and other supporting components including 24 resistors (2 are adjustable), 13 capacitors, 3 transistors and 4 diodes. Its schematic looks like this:



Sound & Recording IC:

(+) - power from batteries
 (-) - power return to batteries
 REC - recording control
 TRG - main tone activation/disable
 SP - external speaker control
 PLAY - play recording
 2TC - modulating tone control
 2TT - modulating tone activation/disable
 2TO - modulating tone output
 CONT - main tone control
 Knobs: upper controls modulating tone lower controls main tone frequency
 Red light: this is a recording indicator

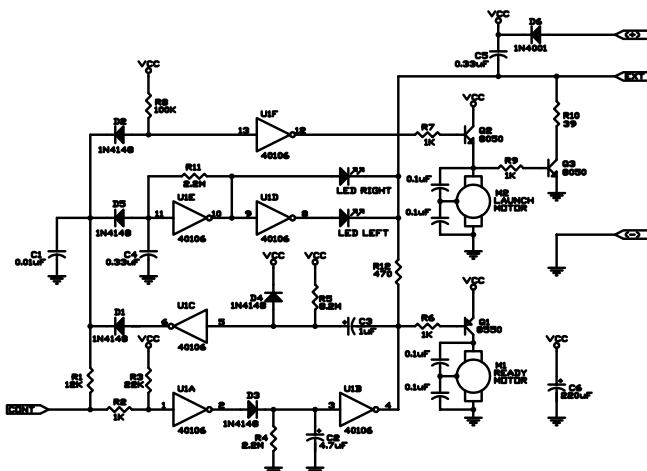
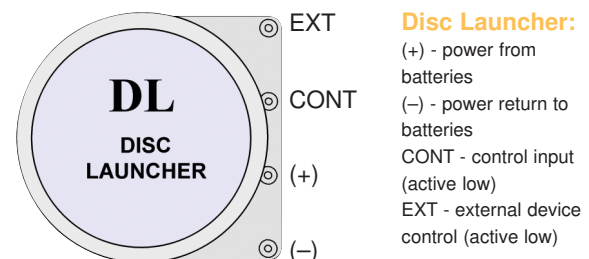
Its Snap Circuits connections are like this:



Disc Launcher

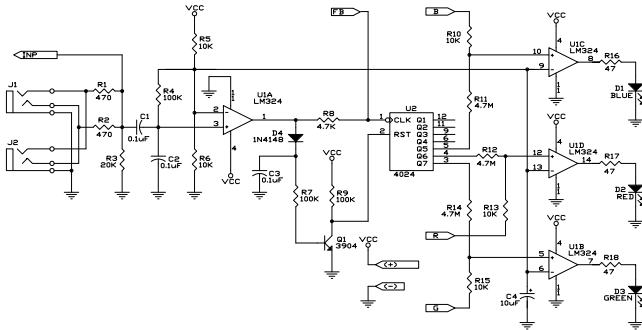
The **Disc Launcher unit** (only in SCROV-50 Deluxe Snap Snap Rover) contains a complex electronic circuit to control when the loading and launching motors start up and shut down, and to flash the lights in the "eyes". Its schematic is shown at left.

Its Snap Circuits connections are like this:

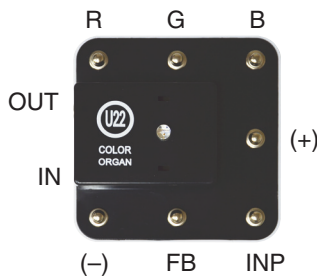


Color Organ

The **color organ** module (only in SCL-175) contains resistors, capacitors, transistors, a tri-color LED, and integrated circuits. The LED in it can change colors by direct control, or in synch with an audio input signal. Its actual schematic is complex and looks like this:



Its Snap Circuits connections are like this:

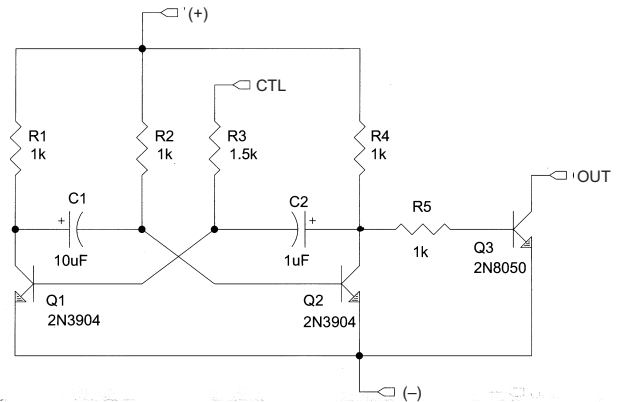


Connections:

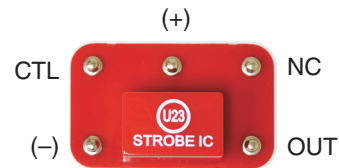
R - red color control
G - green color control
B - blue color control
(+) - power from batteries
INP - circuit input
FB - feedback connection
(-) - power return to batteries
IN - audio input jack
OUT - audio output jack

Strobe IC

The **strobe IC** module (only in SCL-175) contains resistors, capacitors, and transistors that are needed to make a strobe light circuit. Its schematic looks like this:



Its Snap Circuits connections are like this:

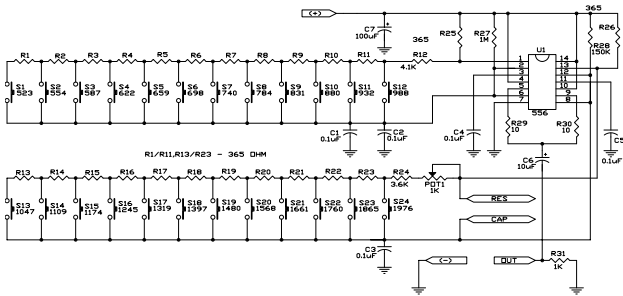


Connections:

(+) - power from batteries
(-) - power return to batteries
OUT - output connection
CTL - strobe speed control
NC - not used

Keyboard

The **keyboard** (only in SCS-185) contains resistors, capacitors, switches, and an integrated circuit. It can produce two adjustable audio tones at the same time. The tones approximate musical notes, and may not be exact. The tone of the green keys can be adjusted with the tune knob or using external resistors and capacitors. Its schematic looks like this:



Its Snap Circuits connections are like this:

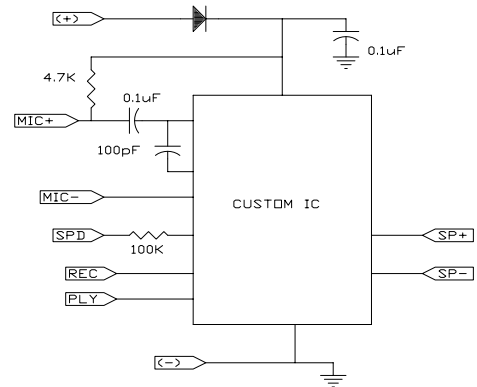


Connections:

- (+) - power from batteries
- RES - resistor freq adjust
- CAP - capacitor freq adjust
- OUT - output connection
- (-) - power return to batteries

Voice Changer

The **voice changer** (only in SCS-185) contains resistors, capacitors, and an integrated circuit that are needed to record and play back sound at different speeds. Its schematic looks like this:



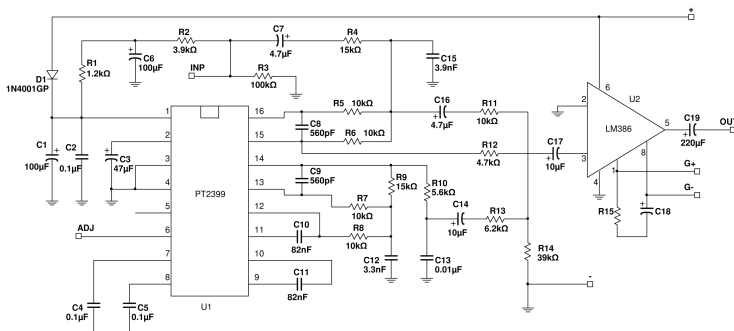
Its Snap Circuits connections are like this:



Connections:

- (+) - power from batteries
- SPD - speed adjust
- SP+ - speaker (+)
- SP- - speaker (-)
- MIC+ - microphone (+)
- MIC- - microphone (-)
- REC - record
- PLY - play
- (-) - power return to batteries

The **echo IC** (only in SCS-185) contains resistors, capacitors, and integrated circuits that are needed to add echo effects to a sound. Its schematic looks like this:



Echo IC

Its Snap Circuits connections are like this:



Connections:

- (+) - power from batteries
- G+ - gain control
- G- - gain control
- ADJ - echo adjust
- INP - input connection
- OUT - output connection
- (-) - power return to batteries