

Circuit & Design Ideas

Interesting circuit ideas from readers and technical literature. While this material has been checked as far as possible, the circuits have not been built and tested by us. As a consequence, we cannot accept responsibility, enter into correspondence or provide constructional details.

Low cost light chaser/controller

This circuit was designed to decorate the house during the festive season but was adapted as a light show for any occasion.

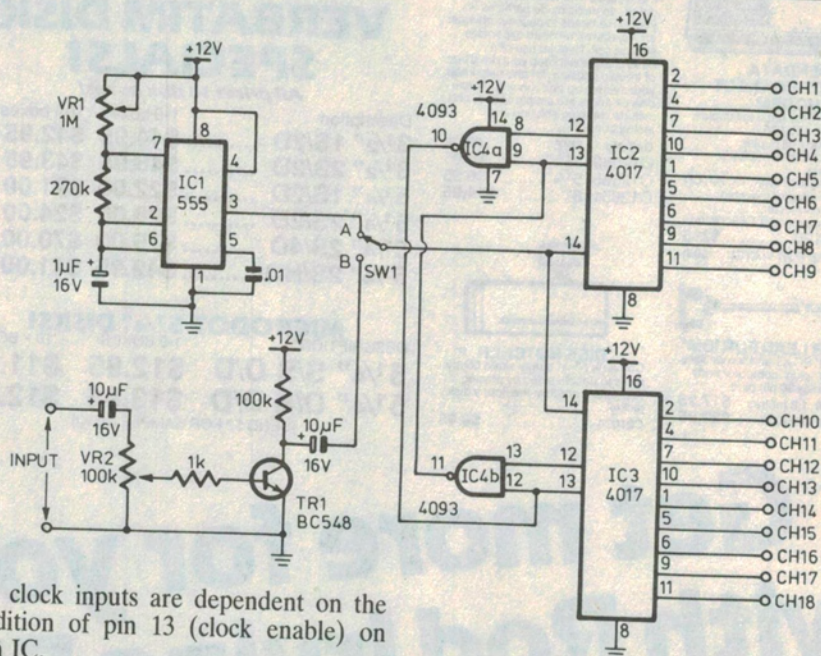
The circuit can be divided into three major parts. These are discussed in detail as follows.

1. Clocking system
2. Counting section
3. Final output configuration.

Firstly, the clocking system for the light chaser can either be digital or analog, depending on the setting of switch SW1. Assuming the switch is in position A, this connects IC2 and IC3 to the digital clock oscillator provided by IC1 (555) and associated components. IC1 is wired in the astable mode with operating frequency between 1Hz — 3Hz approximately, depending on the setting of potentiometer VR1 (1M).

With the switch in position B, an audio signal from an amplifier can be used to trigger the chaser. The analog signal is converted into a square wave by transistor TR1. The sensitivity of the unit can be adjusted using VR2, a 100k potentiometer.

The series of pulses selected by SW1 are fed directly into the clock inputs of IC2 and IC3 (4017 decade counters).



The clock inputs are dependent on the condition of pin 13 (clock enable) on each IC.

Assuming that pin 13 of IC2 is grounded, the clock input (pin 14) will permit the counter to increment until the count of 9. When this occurs, a carry-over output is available at pin 12, which is allowed to enter IC4a via pin 8.

IC4a and IC4b form a flipflop, which will change state when a high is on pin 8 of IC4a. The output (pin 10) will be high, hence initially disabling IC3. How-

ever pin 12 of IC4b is high simultaneously, giving rise to a high at pin 11. This disables IC2 and causes IC4a to change state, enabling IC3. The cycle repeats after this.

Finally, there are many combinations for connecting the output channels to produce variety of light patterns.

The simplest and easiest to construct is to construct a number of LED drivers, as shown in Fig.1. This option

Simple D-A & A-D converters for Apple II

These simple D-to-A and A-to-D converters for the Apple II+ computer are designed to operate with the I/O interface published in Circuit and Design Ideas of November 1987.

I constructed circuit 2, the D-to-A converter, on a small board, using uniform lengths of tinned copper wire soldered into the board as a "plug", to fit into the DIL socket of the I/O interface described in the November 1987 interface. The circuit consists of a "back to basics" converter, using only an LM301 op-amp and some resistors, diodes and miscellaneous components. At about \$3.30, it is surely the cheapest D-to-A converter around. I connected the output to the tape input of my stereo amplifier.

Circuit 1 consists mainly of the Ana-

log Devices AD670 A-to-D converter IC, which may be obtained fairly cheaply from Parameters. The IC is ideally suited for use with the Apple I/O and so connects straight to the slot (the I/O interface is not used here). There is only one other component, the 8-pin DIL socket, which I used as a cheap switch between bipolar and unipolar operation, and format.

This circuit has a conversion time of about 10 microseconds, so is suitable for audio applications, whereas most converters for the Apple rely on the primitive paddle inputs, which are too slow for audio. I found that a dynamic microphone has sufficient output to drive the converter without amplification.

Listing 1 is a primitive low frequency storage CRO. Press the space bar to halt the display and the arrow keys to vary the delay D which is printed at the bottom of the screen.

1 screen = 1252D + 36301 microseconds

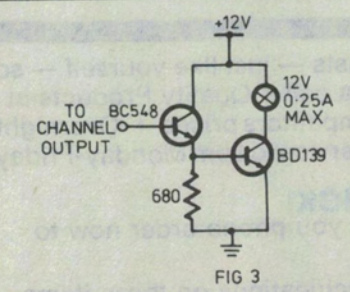
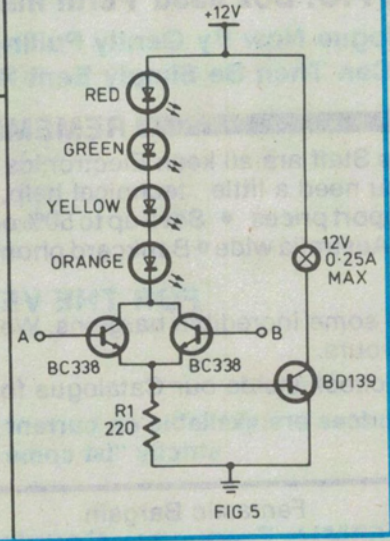
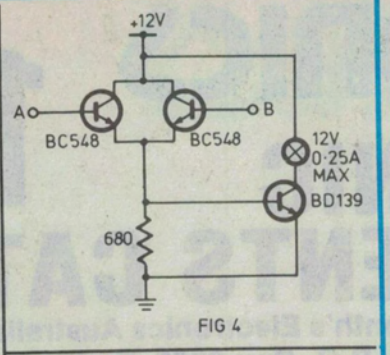
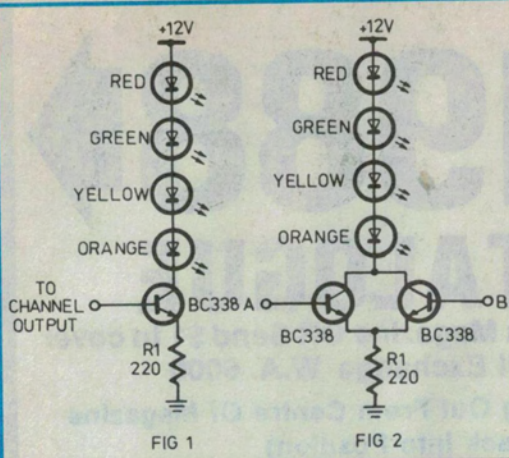
Listing 2A is a voice special effects program. The voice is first recorded, then an envelope is drawn, then it is played back at line 10000. 20000 onwards is a voice repeater. The keys (A, Z, .) are used to vary the start and end of the repeated section. Listing 2B is its machine code subroutine.

I also have available listings for a 2-channel music program using a conventional music score on the low-res screen. The commands are single letters based on assembler commands. Tunes are stored in text files.

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For listings 1 and 2 please see page 80.



Pin Connections

A	B
Ch 1	Ch 18
Ch 2	Ch 17
Ch 3	Ch 16
Ch 4	Ch 15
Ch 5	Ch 14
Ch 6	Ch 13
Ch 7	Ch 12
Ch 8	Ch 11
Ch 9	Ch 10

All LEDs are 5mm

only involves a series of different colour LEDs. Each transistor's base is connected to an individual channel. When in operation, the outputs from either IC2 or IC3 are turned on in sequence hence switching the transistors on, giving a display involving 72 LEDs. The

transistors should be able to handle more LEDs per string, although R1 may have to be lowered.

However the design shown in Fig.1 only permits unidirectional motion. The circuit shown in Fig.2 overcomes this problem. This involves the use of two transistors, connected in parallel; hence each can turn on the series of LEDs. Using the pin connections shown in Table 1, the LEDs will light sequentially, then reverse (count backwards). With random connections of the two inputs to the controller outputs this will give interesting effects. The circuits shown in Fig.1 and 2 can be used to decorate windows or Christmas trees.

For decoration of a room. LEDs are a bit small; the design in Fig.3 solves this problem. The simple option shows a BC548 connected as a Darlington pair with a BD139. The latter transistor is used to control a standard Christmas tree light globe, thus many colours could be used. The total number of lights to be used is 18 however if the BD139 was substituted with a 2N3055 with suitable heatsinking, more globes per string can be used. Once again, this only operates unidirectionally.

For bidirectional operation, Fig.4 can be used. The operation of this option is very similar to Fig.2 except for the use of light globes.

Finally, all of the above designs are combined to produce a "light show" which can involve LEDs and lights. This is shown in Fig. 5, although any number of combinations are possible.

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