

Circuit & Design Ideas

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

Electronic detent circuit

Most modern amplifiers incorporate a mechanical centre detent in the balance control to allow an even balance to be easily set. Unfortunately, this type of potentiometer is not readily available to the hobbyist, so the accompanying electronic detent circuit was developed. It lights a LED when the pot is in the centre position.

The system requires that the existing single balance pot be replaced with a dual type. This is connected between the main supply rail (V_{CC}), typically 12V, and chassis (V_{EE}). The wiper selects a voltage between these two limits and applies it to the inverting input of one op-amp (upper limit) and the non-inverting input of a second op-amp (lower limit).

The LED is controlled by the BC548 transistor, the base of which is fed from the 12V rail via a 10k Ω resistor. This would normally turn the transistor on but the two diodes form an AND gate so

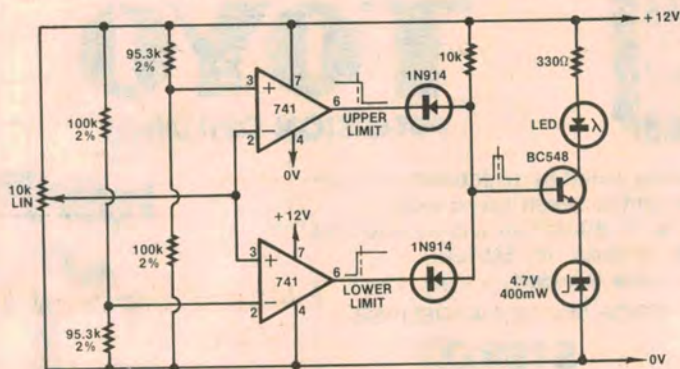
that, if either op-amp is low, the base is pulled down and the transistor does not conduct.

Thus, the transistor is turned on only when the output of both op-amps is driven high and this occurs only when the pot wiper is at, or near, its centre position. The actual degree of rotation over which the LED lights is determined by the dividing networks at the inputs to the comparators. For the values shown it is about 4 $^\circ$.

One of the values shown (95.3k Ω) is standard in the 2% preferred range, but may not be readily available. An alternative is to use a 100k Ω shunted by 2M Ω , which approximates the wanted value very closely. (2.2M Ω would still be acceptable.)

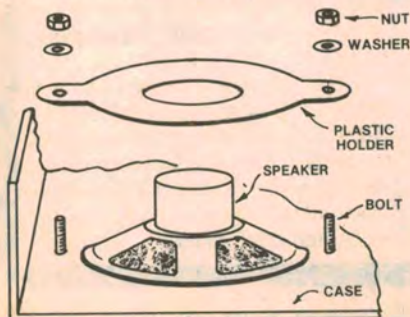
The 4.7V zener diode in the emitter of the BC548 is to ensure that the transistor is turned off when the op-amps go low, which is still about 2.5V above V_{EE} .

Mr G. Ingram,
Pagewood, NSW.



Mounting small speakers

There is a frequent need for a simple, effective means of mounting small speakers inside project cases. The

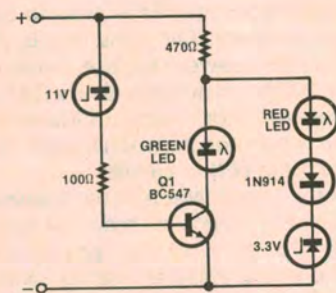


following method has proved to be more effective than just using washers and nuts, particularly with small plastic cases.

From a piece of plastic (from an icecream container) cut a circle having approximately the same diameter as the speaker and having two tags, diametrically opposite each other. Next, cut a hole in the centre of the plastic just large enough to fit over the magnet on the rear of the speaker.

A hole is drilled in each tag, and matching holes are drilled in the case. The holder may then be secured using machine screws with nuts and lock washers.

W. Elphick,
Wolumla, NSW.



Battery indicator for small boats

This simple indicator is designed to minimise the risk of being caught with a flat battery in a boat. It gives a GO/NO-GO indication based on the battery voltage.

When it is connected to the battery, voltage is applied to both the 3.3V and the 11V zeners. If the voltage is above 11V, current flows through the 11V zener the 100 Ω limiting resistor, and the base-emitter junction of the DS 547, biasing it on and lighting the green LED.

Under these conditions the red LED circuit is effectively by-passed and the red LED does not light. If the voltage falls below 11, Q1 turns off, the green LED is extinguished and current now flows through the 3.3V zener lighting the red LED.

This indicator is best housed in a waterproof case and mounted near the steering wheel where it can be easily monitored.

R. Williamson,
New Town, Tas.

Transient muting for preamplifier

This circuit was developed for use with a stereo preamplifier to eliminate annoying switch-on/switch-off transients. It does this by shorting the preamp output during these times.

The normally closed contacts of a relay are used to short the output for two or three seconds after switch-on, and before complete switch-off by sensing when the regulated supply voltage falls by three volts.

At switch-on the output is shorted by

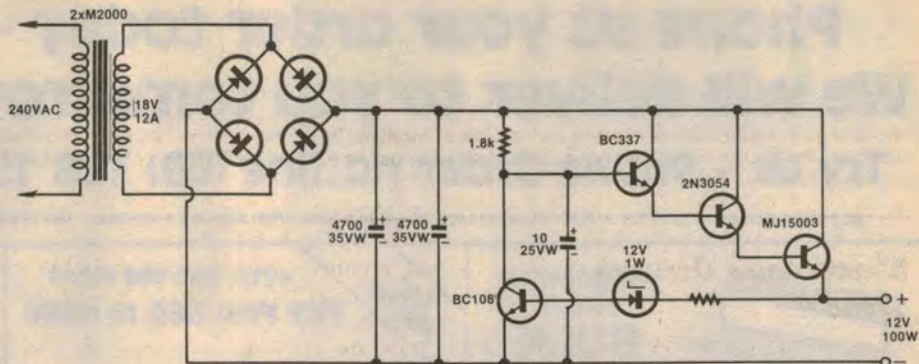
Regulated enlarger power supply

For darkroom enthusiasts here is a regulated power supply design for the popular 12V, 100W quartz-iodine enlarger lamp. It will take care of most line voltage variations which otherwise play havoc with precision colour printing, by altering the "colour temperature" of the lamp.

The circuit uses two 18V transformers (Dick Smith type M2000) connected in parallel to give a total rating of 12 amps. These feed a bridge rectifier and the DC output is filtered by two 4700 μ F capacitors. A single 10,000 μ F unit would be better, but these are generally unavailable.

(Editor's note: Since the DC current is high, the associated 100Hz ripple current through these capacitors will also be high. If the unit is to be used continuously for long periods then the filter capacitors should have a total ripple rating of at least 10 amps.)

The regulated output is taken from a heavy duty power transistor, MJ15003, controlled by a 2N3054 and BC337 in a



Darlington triple arrangement. The BC337 is controlled, in turn, by a BC108, the collector of which is fed from the main rail via 1.9k Ω load resistor.

To provide the regulation necessary for accurate colour work the base of the BC108 is fed from the output rail via a 1.5k Ω resistor and a 12V zener diode. This gives an output voltage stability of 0.2% over a mains variation from 230 to 250VAC.

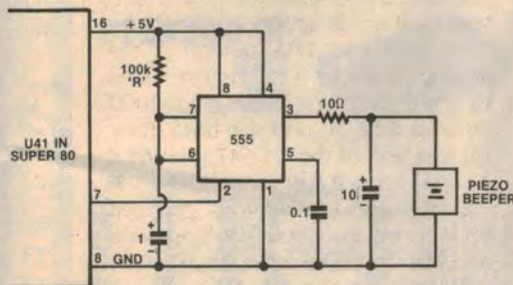
Note that the MJ15003 transistor, while capable of handling the power involved, should be provided with a large heatsink or, better still, a small fan. Do not be

tempted to use a type 3055; it cannot handle the power.

Also, because of the heavy current involved, individual output transistors may deliver up to 0.5V above or below the required 12V. Quartz-iodine lamps are quite critical in regard to supply voltage if long life and colour stability are to be expected.

If adjustment is necessary to obtain exactly 12V, the zener may be changed and/or diodes connected in series with it until the correct output results.

D. Tischler,
Engadine, NSW.



Beeper for the Super-80

The addition of an audible signalling device to a computer can prove extremely useful. With it fitted, signalling instructions can be written into the program wherever it is desirable, and will at-

tract the operator's attention when, say, a certain operation has been completed.

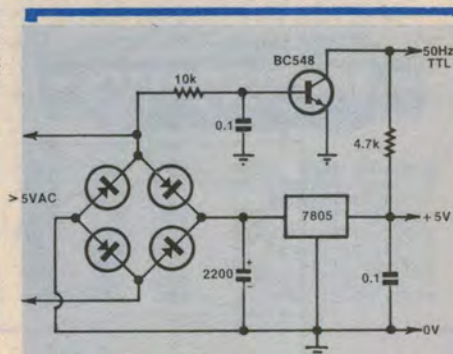
In the case of the Super-80 this is particularly easy to provide using a decoded input/output enable signal which appears at pin 7 of U41.

Only three wires are required to be connected to the Super-80; one for a 5V rail, one for ground, and one for the signal from pin 7. The connections are shown in the accompanying circuit.

Either one of the two codes may be written into the program for the beep; OUT 243,0 or IN (243).

The beep oscillator is built around a 555 and is quite straight forward. The 100k Ω resistor may be varied to lengthen or shorten the duration of the beep.

A. Harding,
Glenhuntly, Vic.



Mains derived TTL clock

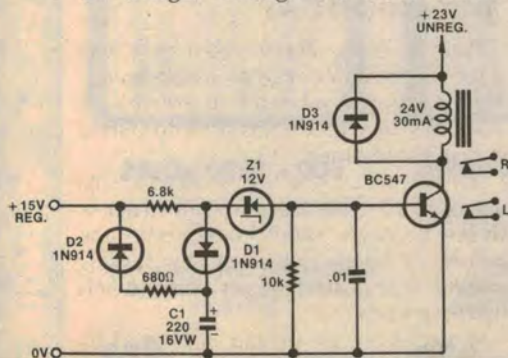
The accompanying circuit shows a cheap and simple method of deriving a 50Hz TTL level square wave as an "add-on" connection to a typical power supply; a simple 5V regulated supply in this case.

This circuit works by switching low whenever the selected transformer lead becomes more positive than ground. The high and low times are equal.

The prototype is being used as the "oscillator" for a simple real-time clock. The advantage of using mains frequency for clocks is that, over long periods, it is far more accurate than most cheap oscillators (eg, 555).

R. Sinclair,
Mt Waverley, Vic.

the relay contacts. The 220 μ F capacitor C1 charges through the 68k Ω resistor



and diode D1 until there is sufficient bias to turn on the 12V zener diode and hence the transistor TR1. This activates the relay and unmutes the circuit.

Diode D2 and the 680 Ω resistor provide a quick discharge path for C1 so that the delay will be repeated even if the mains is switched on immediately after being switched off. When the regulated voltage falls below 12V the zener ceases to conduct and the relay drops out, providing the required switch-off muting.

P. Allison,
Summer Hill, NSW.