clinic

READERS WRITE FOR HELP WITH TECH PROBLEMS

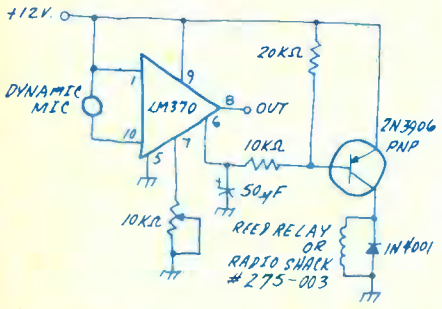
BY JEFF SANDLER

Voice actuated relay

I'm one of the many future subscribers to Modern Electronics, and have been enjoying assembling and applying your circuits around my shop. Can you provide me with a circuit for a voice actuated relay using ICs and a circuit that would provide a verbal output so my computer can talk to me directly?

R.J.R., Kinston, NC

I'm afraid I can't help you with the verbal output circuit—maybe one of our readers has such a circuit. If so, I'd like to see it. Fortunately, I can do a little better on the other circuit. This one, taken from the National Semiconductor Linear Applications Handbook, Volume 1. It's built around an LM370



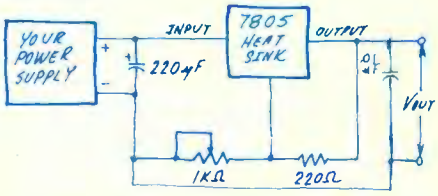
IC. The level at which the circuit trips is set by the 10K pot connected to pin 7 of the IC. When activated, the relay is switched on. How the contacts are wired is left to you. By the way, the LM370 seems to be the IC of choice for voice actuated circuits.

Sloppy supply regulated

I have a fixed 14 volt power supply stripped off a slot car set. It can deliver about a half-amp, but has very poor regulation. I'd like to convert it into a variable, regulated supply, but I don't want to spend more than $5 or so. I buy most of my parts from Radio Shack, so I'd appreciate your using their parts.

T.W.W., Woodland, WA

Here's a simple circuit that will give you the regulated supply you want using Shack parts. The key to the circuit is a 7805 regula-



tor IC. Normally, the 7805 is a fixed voltage regulator producing five volts output. But by adding a 220 ohm fixed resistor and a 1K pot, the IC is tricked into producing a variable output determined by the control setting. One drawback to this circuit is that it can't get down to voltages much below five volts. If you need lower voltages, you can substitute an LM317, an excellent regulator, but not currently available at Radio Shack.

PC pitfall

Whenever I try to build a project from scratch, using a homemade PC board, I run into the same problem. The holes for the pins on the ICs don't line up, and I end up breaking two or three on every IC. How can I get my PC boards to work out right?

S.F., Fair Lawn, NJ

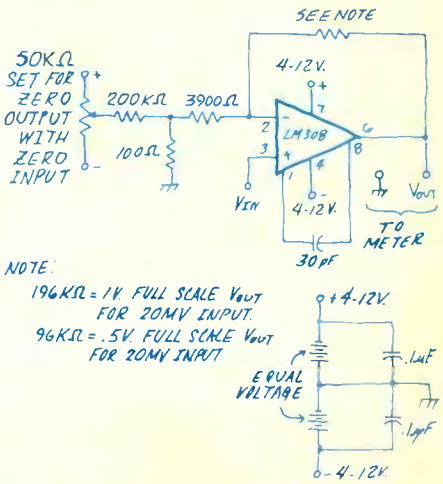
I can really sympathize with your problem. I suffered with it myself when I first started making PC boards. There really isn't enough room in Clinic to describe the best ways to make PC boards, but I hope to have a feature article on the subject in the not too distant future. In the meantime, let me suggest that you use IC pad tapes, which you can get at any art supply store that carries technical or drafting equipment. Make sure the pinhole in the center of each pad is open and etched out. You might also use a center punch to emboss the board before drilling. Otherwise, your drill bit will dance around on the pad. The result will be a misalignment of the holes, and those broken IC pins. You didn't mention what you used to drill out the holes in the PC board. If you plan to do a lot of fabricating, you might consider buying a small drill press stand to hold your drill. It will minimize the danger of misalignment.

Meter amplifier

I'm building an amplifier for my VTVM so I can get accurate readings in the 0 to 20 mV dc range. The circuit I'm using has an input impedance of only 1 megohm. Do you have a way of converting my circuit into a high impedance amplifier? I'm really only interested in using the amp to measure—20 to +20 mV with the VTVM.

S.H., Boulder, CO

The circuit you're using is built around a MC1456G. I think you'll get better results using an LM308. For one thing, it has a .40 megohm input impedance. Another big advantage is that it's inexpensive and readily available. In the circuit shown, it's wired as a non-inverting amplifier with a gain of 25 or 50, depending on whether you want a half-volt or one volt full scale reading with a 20 mV signal. Since you have a half-volt scale, use the 96K feedback resistor. One problem you might run into is that of offset. Most op-



amps have an offset null input, but the LM308 does not. But it does have the high

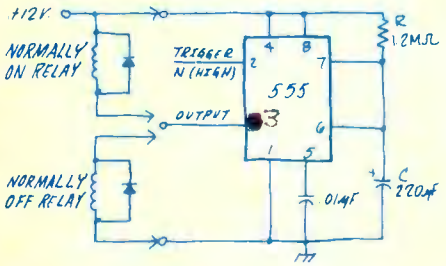
impedance you wanted. Fortunately, you can use an external offset null circuit, as shown. You can use any battery voltage from four to12 volts, providing that the same voltage is used for both the positive and negative supply. The 0.1 mfd capacitor across each battery helps prevent unwanted oscillations. You can add a pair of protection diodes, as shown, to prevent the needle of your VTVM from slamming against the stop. By the way, you may want to take a look at the twin electronic multimeter elsewhere in this issue. It's battery powered, has high input impedance, and can measure dc levels in the millivolt range without using an external amplifier.

Five minute relay

I'm currently building a home security system and would like to include an automatic shut-off. What I need is a circuit that will allow a 12-volt relay to close a circuit and then shut if off after five minutes. Can you help?

T.N., Rochester, MN

Every so often a reader sends me a letter complaining that I never use 555s in my



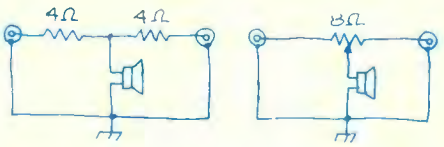
timing circuits. Well this time the old 555 is just right. In fact, all you need in addition to the 555 is a 1.2 meg resistor, a 220 mfd electrolytic and a .01 mfd disk. And your relay with its protection diode, of course. The length of time the relay stays closed is equal to 1.1 x R x C. In this case, the 1.2 meg resistor and 220 mfd capacitor give you about 4.8 minutes. If you need exactly five minutes, you can replace the 1.2 meg resistor with a 1 meg potentiometer in series with a 470K fixed resistor. Then set the control with a stop watch. You didn't say anything about a reset. If you need one, just connect a switch to pin 4 of the 555 that switches it from the positive supply to ground. Although the 555 is rated at 200 mA, I recommend you use a relay that draws 100 mA or less. Don't forget to put a silicon diode across the relay coil as shown.

Two into one

Because of space limitations, I would like to parallel the output of my Teac AC-5 stereo automobile cassette player to power just one speaker. I've been told that this isn't a good idea because one channel will drive the other and cause serious damage to the circuit. Is there a simple circuit which can do the job for me?

G.H.S., Manchester, CT

Parallel a stereo output to feed a mono circuit is a common problem. Your friends gave you



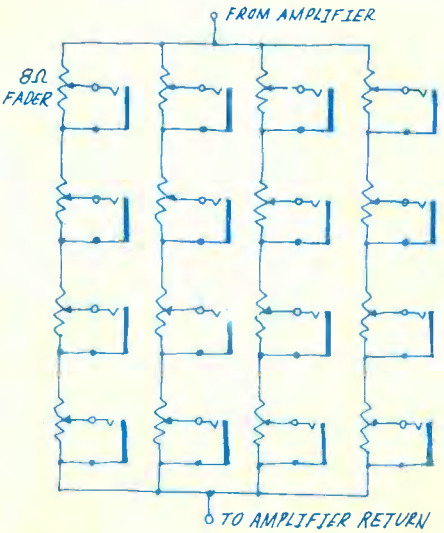
good advice because it is possible for one channel to drive the other. You can get around the problem by connecting the circuit so that each channel still sees a reasonable load. You can use a pair of four ohm resistors, or an eight ohm control between the two outputs, with the speaker connected from the junction or wiper to ground.

Navy phones

I'm stationed aboard a destroyer and have had a brainstorm. In our berthing compartment we have room for 16 men. I have a Fisher stereo receiver with about 45 watts rms per channel. I want to install it in the berthing compartment, but can't use speakers because someone is always sleeping. I'd like to set some kind of headphone system with a jack and separate volume control at each bunk.

ET1 D.S.O., FPO NY

Here's a fairly simple solution to your problem. Just connect the headphone jack to an eight ohm stereo fader control. If you can live with mono, inexpensive surplus fader controls can be used. They're available from several mail order sources for about a half-dollar each or less. The controls are wired into four parallel circuits, each containing four



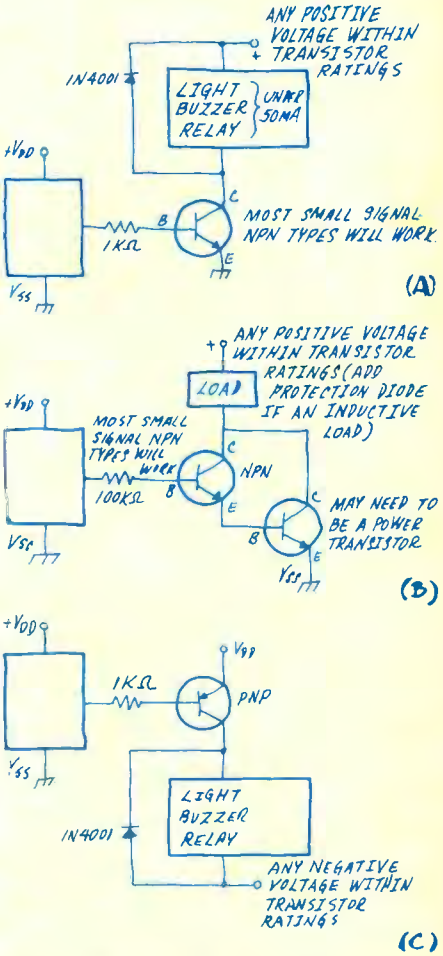
faders in series. The net impedance of the circuit is eight ohms, an ideal load for your Fisher. One nice feature of this simple circuit is that changing the volume setting of any of the outputs has virtually no effect on the volume of the others.

Wake up alarm

I recently built a digital clock using a Radio Shack number 277-1001 clock chip. How can I add an audible alarm to it?

G.G.J., Hollywood, FL

On page 13 of the Shack's new Semiconductor Reference book you'll find a clock circuit



built around the 277-1001. Included is an alarm using a pair of 2N2904 transistors. You can also use the output of the 1001 to trigger a circuit that can be used to power virtually any electrically powered device. You can use almost any NPN transistor connected through a 1K isolation resistor to pin 4, as shown in (a). If your load is relatively high, you can use the circuit shown in (b), replacing the 1K resistor with a 100K unit. If you happen to have PNP transistors on hand, you can use them, connecting the circuit as shown in (c).

If you have a question about electronic circuit design or operation, write to Clinic, Modern Electronics, 14 Vanderventer Ave., Port Washington, NY 11050.