

# 3 Unique Projects

*Looking for electronic projects to occupy a few evenings? If so, consider one or two of these unique circuits. Study the text and diagrams carefully to insure completion.*

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## ONE-STATION INTERCOM



HERE'S A DELUXE SINGLE-STATION INTERCOM that incorporates many of the features usually seen only on the very most expensive commercial sets, yet its simpler single-station design enables you to build it for almost half the cost.

The unit incorporates a commercially styled telephone handset, complete with a push-to-talk button in its shank. The associated power and control junction box, connected at the other end of the commercially styled flexible retracting coiled cord, provides not only the power necessary to run the intercom, but current limiting, a PRIVACY switch, and a uniquely wired Tri-Status LED.

Looking at the circuit shown in Fig. 1, the battery provides current only when the push-to-talk bar is depressed—thus

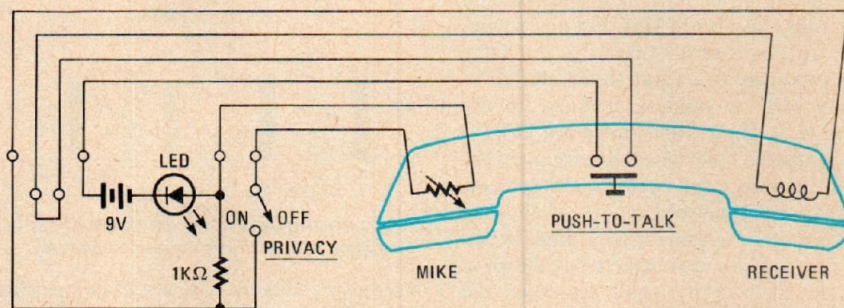


FIG. 1—ONE-STATION INTERCOM is powered by a 9-volt transistor battery and has an LED status indicator.

providing excellent battery life. The battery, earpiece, 1K resistor and LED comprise the complete circuit with the PRIVACY switch open (mike not connected). This assures that audio present in the room does not leak into the earpiece circuit. It also makes the 1K resistor the brightness-setting element for the LED.

With the PRIVACY switch closed (in other words, in the *normal* operating mode), the microphone is connected in parallel with the 1K resistor. Since this is a carbon mike, its resistance varies in value with impressed audio. Please note that in carbon mike elements, the carbon granules can occasionally pack, thus yielding poor audio quality. A few sharp raps of the knuckles will usually clear this up.

Since the parallel combination of two resistors is always lower in resistance than the resistance of either resistor alone, closing the PRIVACY switch causes the LED to glow more brightly. So the single LED, with its off-on-bright Tri-Status modes, not only signals a push-to-talk

### PARTS LIST FOR INTERCOM

- 1—telephone handset with push-to-talk switch
- 1—SPST toggle switch
- 1—9-volt transistor radio battery
- 1—jumbo size LED, red or your favorite color
- 1—1000-ohm resistor, 1/16 watt to 5 watts.
- Miscellaneous hookup wire, phone cradle.

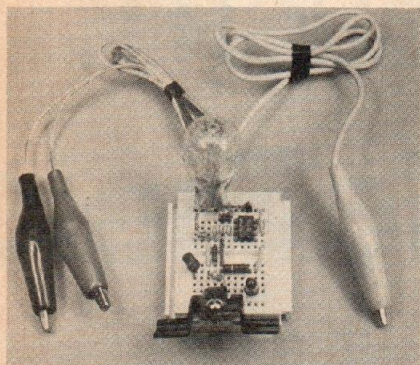
(and confirms battery vitality), it also indicates the status of the PRIVACY switch.

The audio provided by the combination of components shown is adequate even for the moderately hard of hearing. You may want to try substituting other component values, or the battery voltage.

The One-Station Intercom is suggested for use in high security and government applications, and for people with a genuine need for a better way to talk to themselves.

The circuit we built was constructed using a set of APR-1 experimenter's tools.

## SINGLE SHOT LOGIC INDICATOR WITH MEMORY



HERE'S A CIRCUIT THAT COMBINES THE 555, a VMOS FET and some unusual electronics to provide a pulse indicator you can't ignore.

A careful look at the circuit shown in Fig. 2 will show that the NE555 and the 2N3394 power transistor are plugged in so as to short themselves out.

This particular circuit configuration was chosen to reduce the likelihood of static damage to these components. Inductors L1 and L2 are waveshaping components that are included because good textbook design deems their inclusion necessary. Although the circuit will function without these components, they tend to increase the likelihood of repair.

As a testimony to good circuit design, a DC supply of virtually any size will power the circuit through the alligator clip leads. The LED confirms application of power.

The actual switching function neces-

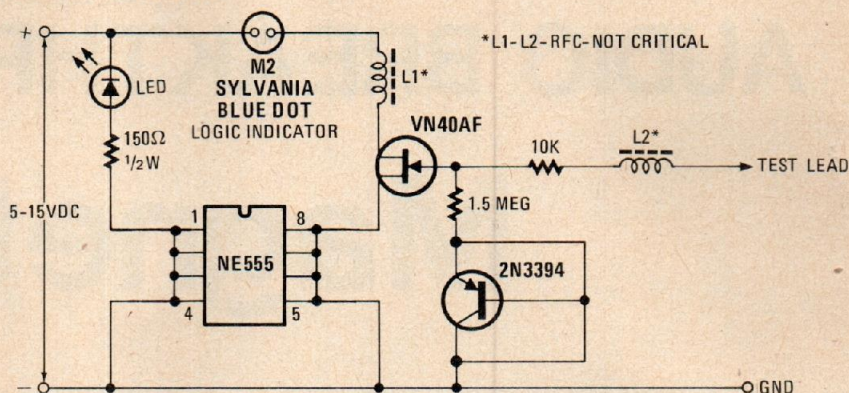


FIG. 2—LOGIC INDICATOR produces a visible indication that's hard to ignore.

sary to drive indicator lamp I1 is provided by the VN40AF VMOS FET. VMOS is a relatively new FET technology that cuts grooves into the semiconductor substrate to allow greatly increased output currents. Still, its input is very, very sensitive and triggers quite easily at CMOS levels.

In this circuit, of course, the shape of the pulse being awaited is inconsequential, since the VN40AF does not need to turn fully on. Also, its high (greater than 1 megohm) input impedance will allow it to trigger even from exceptionally weak pulses.

The unique output indicator lamp is a Sylvania Blue Dot flashbulb. It is the use of this indicator which gives the circuit both its unique one-shot characteristic and its memory capability. When triggered, the indicator (I1) will emit a brief but unforgettable stream of visible photons. After triggering, the characteristic

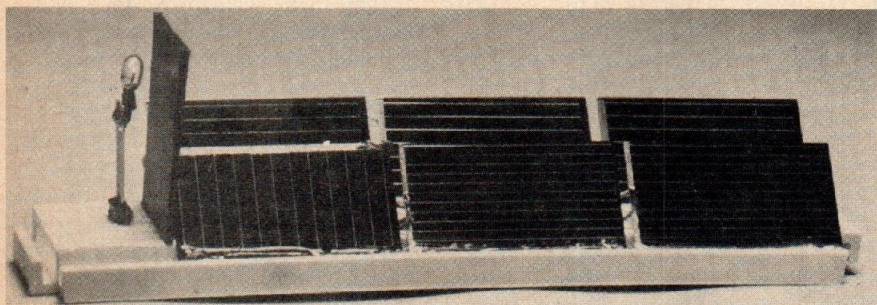
### PARTS LIST FOR LOGIC INDICATOR

- 1—LED indicator, red, green or yellow
- 1—resistor, 150 ohms, 1/2 watt,
- 1—resistor, 1.5 megohm, 1/4 watt
- 1—resistor, 10,000 ohms 1/4 watt
- 2—inductors, L1-L2, optional. 0.25  $\mu$ H to 88 mH.
- 1—NE555 IC timer, see text
- 1—2N3394 PNP transistor, see text
- 1—VN40AF VMOS FET transistor
- 1—logic indicator, Sylvania M2 Blue Dot or equal with holder

blue dot on the bulb will no longer be blue; this is the memory indicator.

Other indications may also be apparent. The shape of the lamp's glass envelope, for example, may distort. And the clear plastic envelope surrounding the glass may become translucent, as compared to its original transparency.

## SOLAR POWERED NIGHT LIGHT



AS ALTERNATIVE ENERGY SOURCES become more and more important to our future, even the little niceties of life may have to adapt. Here is one adaptation we can try now to get us ready for tomorrow.

This simple circuit is a Solar-Powered Night Light. The six solar cells produce about 1/2-volt each in bright sunlight. Here, they are connected in series to provide 3 volts. The solar cells are made on very thin, very fragile glass and can

break if not properly and carefully handled. A small incandescent lamp completes the circuit.

In bright sunlight, the small lamp glows quite vigorously. But since the efficiency of this circuit is low, a small black card helps make its glow visible.

Barring a nearby nova, the solar cells are not likely to stress the lamp enough to ever burn it out, so this device should continue to operate for a very, very long time without attention or maintenance.

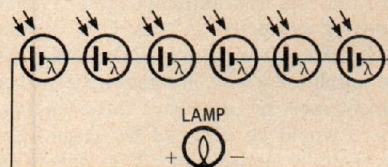


FIG. 3—SOLAR-POWERED NIGHT LIGHT will help reduce energy demands.

### PARTS LIST FOR SOLAR-POWERED NIGHT LIGHT

- 6—0.5-volt solar cells
- 1—3-volt flashlight bulb

While hardly giving enough light to illuminate a room, the small lamp is actually quite adequate for many night light purposes. More pragmatically, it can be used when it is not needed as a primary source of illumination during those nights when the sun is shining bright enough to light it.