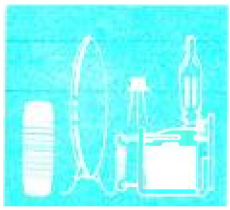


PARTS PROFILES

By DON LANCASTER

COMPONENTS OF THE MONTH

POPULAR ELECTRONICS presents a new, exclusive "Parts Profiles" feature to provide you with exciting information about new—and not so new—electronic components and devices that are inexpensive, interesting, unusual, and useful. More space-age products are now available to individual and commercial users. Also, commercial items formerly available only in quantity lots for industrial buyers may now be available in individual units from the manufacturer or from your parts distributor.

These products will usually enable you to build more interesting projects at less cost, in less time, and with improved performance. Because of the possible uniqueness, or newness, of the "Components Of The Month," some difficulty may be experienced in obtaining some of these items. However, all items covered in "Parts Profiles" will be available nationally from at least one reliable source of supply. The manufacturers of these products will either sell them to you directly, or make them available through their distributors. In most cases, your best bet will be to try the distributor first.

New prices break and new sources of supply appear so fast that it is virtually impossible to keep up with them, but your distributor should be able to keep you informed. Give him a chance to tell you about them. The next time you see him, ask him, "what's new?" If he answers "nothing," hand him a copy of POPULAR ELECTRONICS. Chance are that you will broaden some horizons.

Free data sheets, catalogs, and other descriptive literature are usually available. Ask for them, and take advantage of this material.

FULL-WAVE BRIDGE RECTIFIER MODULE

A fistful of power that can easily satisfy most experimenters' requirements up to 10 amperes, without a heat sink, is contained in a fully insulated case only 2½" long. The full-wave bridge rectifier assembly incorporates four silicon rectifiers which can take up to 125-volt, a.c. input, and can withstand an astonishing instantaneous short circuit on the order of 150 amperes—considerably more than the house mains can supply, particularly if they are properly fused. Because of this fact, the bridge assembly is almost, but not quite, impossible to burn out.

The assembly can be mounted—without a socket or other fittings—directly on a chassis or printed circuit board with two #6 machine screws. Another possibility is to cut the lugs off flush with the top of the terminals and mount the assembly on a printed circuit board. The terminals can then be soldered to adjacent printed conductors. Keep in mind that a 10-ampere current requires at least a ⅛"-wide conductor of 2-oz. (weight-per-square foot) copper. Use heavier gauge or wider strip if possible.

If you use a capacitor-input filter circuit following the rectifier assembly, it's a good idea to insert a low-ohmage resistor in series with the filter to keep surge current down to a safe level. With a capacitor-input

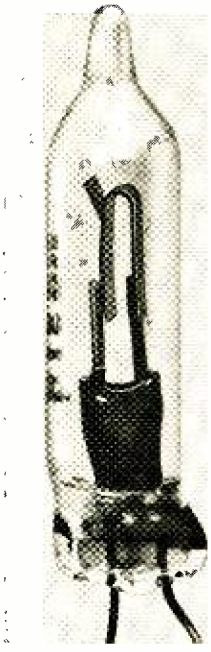
filter the d.c. output of the bridge will be about 1½ (actually 1.414) times the r.m.s. input voltage. Thus, a 117-volt a.c. input will give you about 165 volts of d.c. at the output. This is important to remember, particularly in d.c. filament supplies. Five volts from a transformer can give you more than 6.3 volts of d.c. output if the circuit is lightly loaded.

($4.85 from distributors. Data sheet DS 6022. Motorola Semiconductor Products Inc., Box 955, Phoenix, Ariz. 85001)

MITE-T-BREAKERS

Tiny, foolproof, automatic, self-resetting circuit breakers that cost less than fuse and fuse-holder assemblies, and look like oversize neon lamps, can carry up to four amperes of current—depending upon the model. Each model has a bimetallic element hermetically sealed in an inert atmosphere. Action is independent of ambient temperature.

Although the "Mite-T-Breakers" are intended for 117-volt a.c. operation, they are strictly current-dependent devices, and work equally well on low-battery voltages, or any a.c. or d.c. source up to about 200 peak volts. Current through a breaker in excess of its rating heats up and expands the bimetal element enough to open the contact and break the circuit. It opens on a 100 percent overload. (A two-ampere unit breaks at four amperes, etc.) The breaker will continue to try to make contact every few seconds or so after opening, and will continue to cycle until the load fault is cleared. When the load current returns to normal, the breaker stays closed, for normal operation.



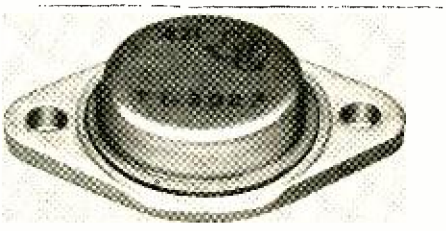
These breakers are ideal circuit protectors for electric motors, motor controls, power tools, light dimmers, etc. Because of their cyclic action, they can be used as high-power flashers. A 400-watt flasher can be built for less than a dollar. A breaker's life is rather short in this type of operation, but by adjusting the load to slightly more than a 100 percent overload, a time cycle of one second on and a few seconds off can be realized, making the breaker quite suitable for temporary displays or exhibits. The short life, in this instance, is more than offset by the very low cost for the high current-handling capability.

(MB-315, 316, 317, and 318, 1, 2, 3, and 4 amperes respectively, 25 cents each from Sylvania distributors. Other models, which light up when there is a circuit fault, are 36 cents each.)

150-WATT POWER TRANSISTOR FOR $1.32

A germanium power transistor (TIX-3027) with a 150-watt, 40-volt rating good to beyond 100 kilocycles can serve almost as a universal high-power solid-state device for hi-fi amplifier output stages, power inverters, d.c.-to-d.c. converters, power supply regulators, audio oscillators, etc.

This transistor has a very interesting combination of ratings that makes it ideal for experimental projects. With a heat sink, it will dissipate up to 150 watts of power;



without any heat sink whatever, it could run at a 2-watt continuous power level.

A pair of these transistors can be used to make a hi-fi output stage with excellent frequency response and a substantial power rating. A typical class B amplifier may have an audio output of 20 watts, 20-cycle to 20-kc. frequency response, and a power gain of 18 db. You would need less than a third of a watt of drive power to obtain full output.

The d.c. current gain is a guaranteed minimum of 70 at low current levels, and can go as high as 250. The 40-volt rating isn't bad, but if you need a higher voltage capability, 100- and 120-volt models are available at a slightly higher price. At high power levels you'll have to watch the heat-sinking just as you would with any germanium power unit. An insulated mounting kit is provided with each transistor. Combine this with some silicone grease and you will be able to run the transistor at full power.

Or, if switching type circuits are more your cup of tea, a power unit can be made to convert a 12-volt battery source into a 117-volt a.c. supply operating at a nominal frequency of 60 cycles. The a.c. output is

usually clean and stable enough to run a phonograph or portable radio, as well as shavers, trouble lights, soldering irons, etc. The transistors can switch an output load of up to several hundred watts. Efficiency is on the order of 75 percent, and can be increased substantially by using a special (fairly expensive) toroidal "square loop" transformer.

If a power transistor is needed just to absorb power, as in d.c. power supply regulators and motor controls, these transistors are well suited to this type of service because of their high-power capability. Handbooks containing circuit design and applications of power transistors can provide you with the necessary data and parts lists to enable you to build your own devices.

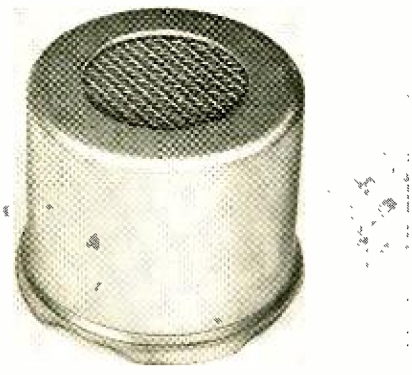
(Model TIX-3027, $1.32 from distributors. Data sheet DL-s 645053. Texas Instruments Inc., Semiconductor Components Div., Dallas 22, Texas)

ULTRASONIC SPEAKER/MICROPHONE

Here's an interesting component for the advanced experimenter. This low-cost 40-kc. transducer is generally used in TV remote controls and burglar alarms, but its small size and good sensitivity make it extremely useful for a wide variety of experimental circuits.

There are a number of circuits that can be built up using one or a pair of these transducers. In a remote control circuit, the transducer acts as a microphone, and picks up any 40-kc. "sound" in its vicinity. This "sound" is amplified, detected, and used to operate a relay. A small aluminum rod of proper dimensions is often used as a tuning fork type of transmitter to create the "sound."

It is possible to have several separate control circuits without adding transducers. For example, four aluminum rods, resonant at 38, 39, 40, and 41 kc.; four filters, each tuned to a different rod; and four relays, each connected to a different filter, can be combined to make up a typical remote control for TV or other multi-function application.



You can make a combination burglar and fire alarm employing the Doppler effect with two transducers; one to act as a 40-kc. oscillator, and the other as a 40-kc. receiver. The received signal is amplified and mixed with the transmitted signal. The difference frequency (which will be zero if there is nothing moving, or will be some low audio frequency if anything is moving within the range of the alarm) is amplified, detected, and used to trip an alarm relay. Because there is considerable movement of hot gases before and during a fire, these heat currents can trip the alarm as effectively as an intruder. Commercial variations of this circuit are so sensitive that small animals can be detected. Anything bigger than about 5 inches square, and moving, no matter how slow, can trip the alarm.

An ultrasonic walkie-talkie for license-free communications can be made by amplitude-modulating a 40-kc. oscillator with a microphone, and feeding the resultant signal to the transducer which emits the energy into the air. Another transducer in another walkie-talkie acting as a receiver, up to several hundred feet away, picks up the 40-kc. energy, amplifies, detects, and then energizes a speaker or set of headphones. Parabolic reflectors can be added to the transducers to direct the ultrasonic energy for use outdoors, or to increase distances between sender and receiver.

Other applications may suggest themselves, but here are a few more you can contemplate. Any object coming between the transmitter and the receiver interferes with the signal path . . . this gives you a proximity detector, or a counter. If you pulse the transceiver and measure the time it takes the signal to bounce back . . . you have a near-distance radar that can be used as a navigation aid for the blind, a distance measuring device, an outdoor area intrusion alarm, or an automotive safety gadget to alert you to tailgaters. How about a garage door opener? There would be one hitch . . . you might have to devise a coding system to prevent someone from just jingling keys to open the door. While you are thinking of more applications, keep in mind that the transducer is a crystal, and can be used as a 40-kc. crystal oscillator.

(Model TR7, $5.00. Data sheet 771. Massa Division of Cohu Electronics, 5 Fottler Rd., Hingham, Mass.)

"POP" RIVETS

Low-cost, shakeproof, easily set rivet-type fasteners (about 2 cents each) replace #6

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nuts and bolts. "Pop" rivets can be set blind (from one side of the work) and require no bucking or backup. They can be removed by drilling.

By now, you've probably seen "Pop" rivets in most of the hardware stores and some of the electronic distributors, under trade names of United, Rivetall, and one or two others. Perhaps you have wondered just what good they would be for electronics work. Well, there are some nut locations that even a plastic nut starter can't get to, particularly if you are doing some replacement work deep inside an already wired chassis. This is a snap for "Pop" rivets.

They look like an eyelet with a nail stuck through it. You insert the eyelet end into the work from the finish side after drilling a #30 or an 1/8" hole (a #30 drill is recommended). A riveting tool is used to grab and pull the nail end to set the rivet. When the eyelet is properly clinched, the nail portion snaps off with a loud pop, completing the operation.

You can use these rivets to hold down parts or assemblies that won't be taken apart too often. such as transformers, tube sockets, terminal strips, chassis brackets, mounting clips, ground lugs, etc. Even more important, the rivets make equipment "child-proof" if covers are riveted in place. Back-up plates are available to reinforce, if necessary, a riveted section of thin sheets of aluminum, or other soft metal. Metal washers (1/8" i.d.) serve the same purpose, and are less expensive. Long rivets are available for fastening parts to heat sinks, or riveting wood or fiberglass panels.

The riveting tool is a one-time purchase. **("Pop" rivets, 25 for 49 cents. Rivet tool, $4 to $6 at distributors or hardware stores.)**