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A TTL LOGIC CW ID GENERATOR

An ID generator is an important part of any 2-meter repeater, and several designs have appeared in various amateur magazines. There are various ways of doing the job, from code wheels and continuous tape loops to digital integrated circuits. We decided recently to design our own version, based on a digital IC identifier written up by W7PUG in *73* in September 1970.

This design improves on the original W7PUG design in several ways. It uses readily available TTL integrated circuits, instead of the older RTL circuitry. It is built on a single-sided printed circuit board rather than the double-sided one required for the older design. But most important, it uses a simple 32-position diode matrix for storing the call, and does not require the knowledge of Karnaugh maps or any other fancy techniques to decide where to put the diodes. And it is completely compatible with

The ID generator described in this article is part of a solid state repeater control system, the second half of which will be presented next month.

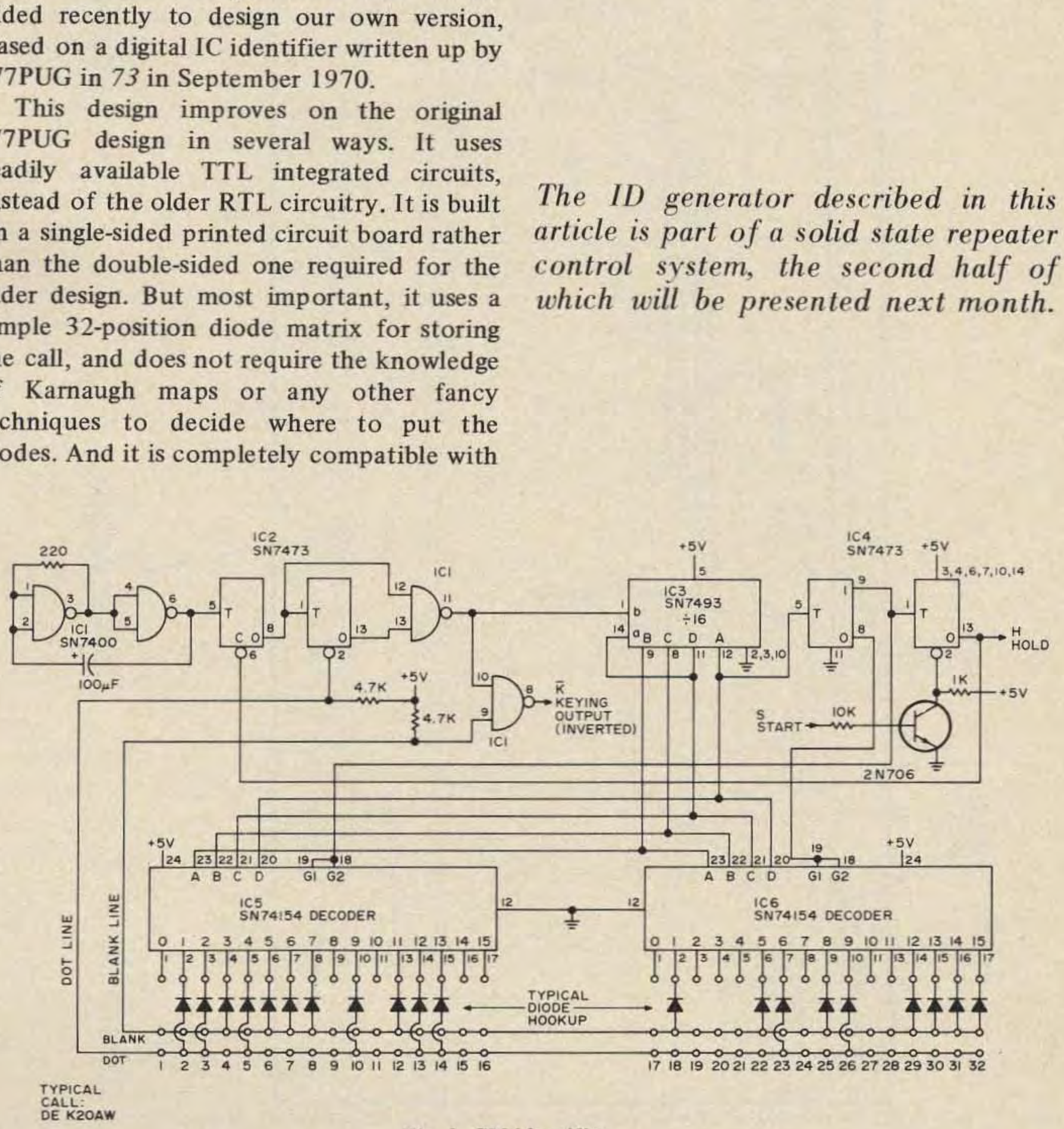


Fig. 1. CW identifier.

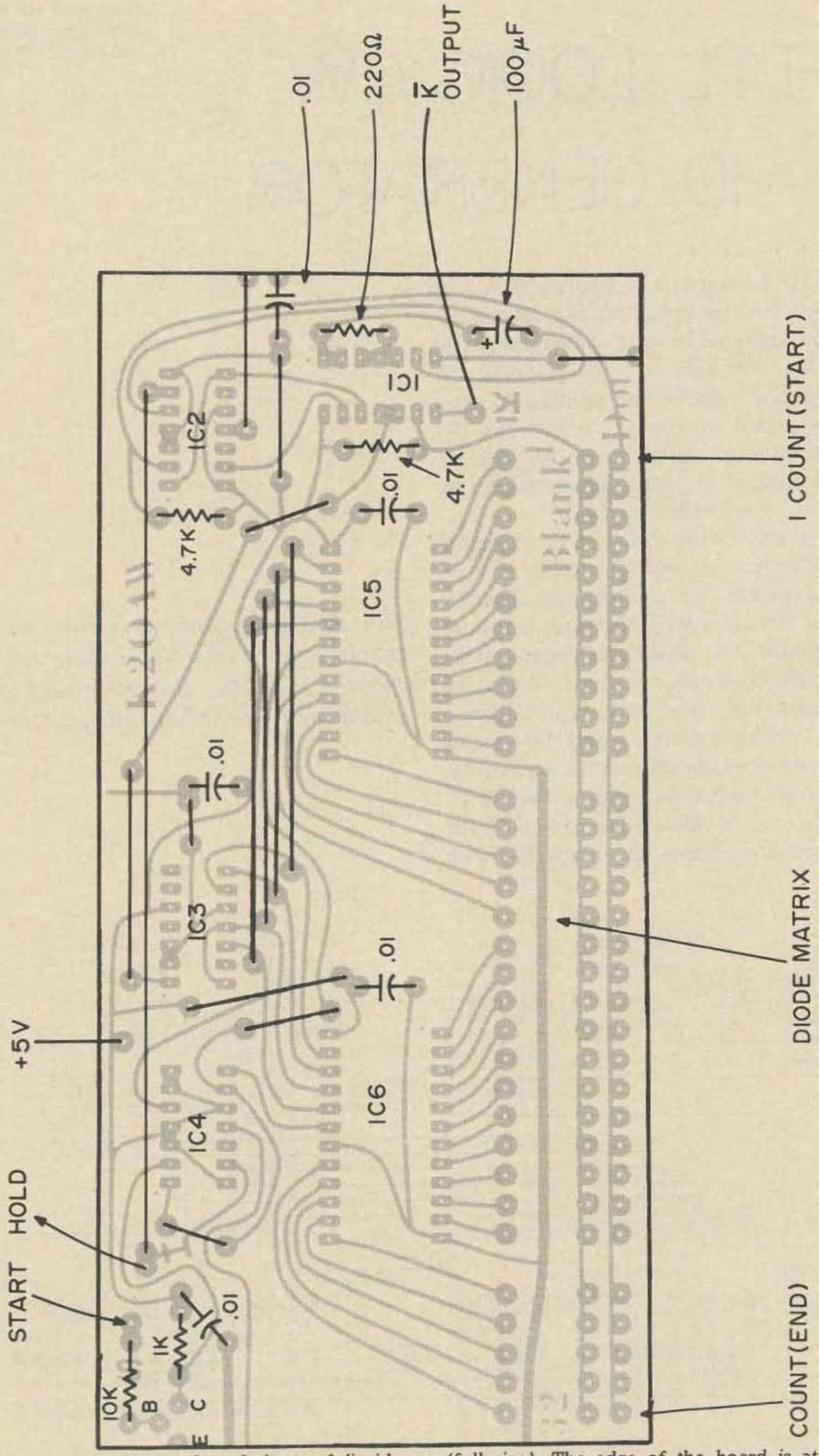
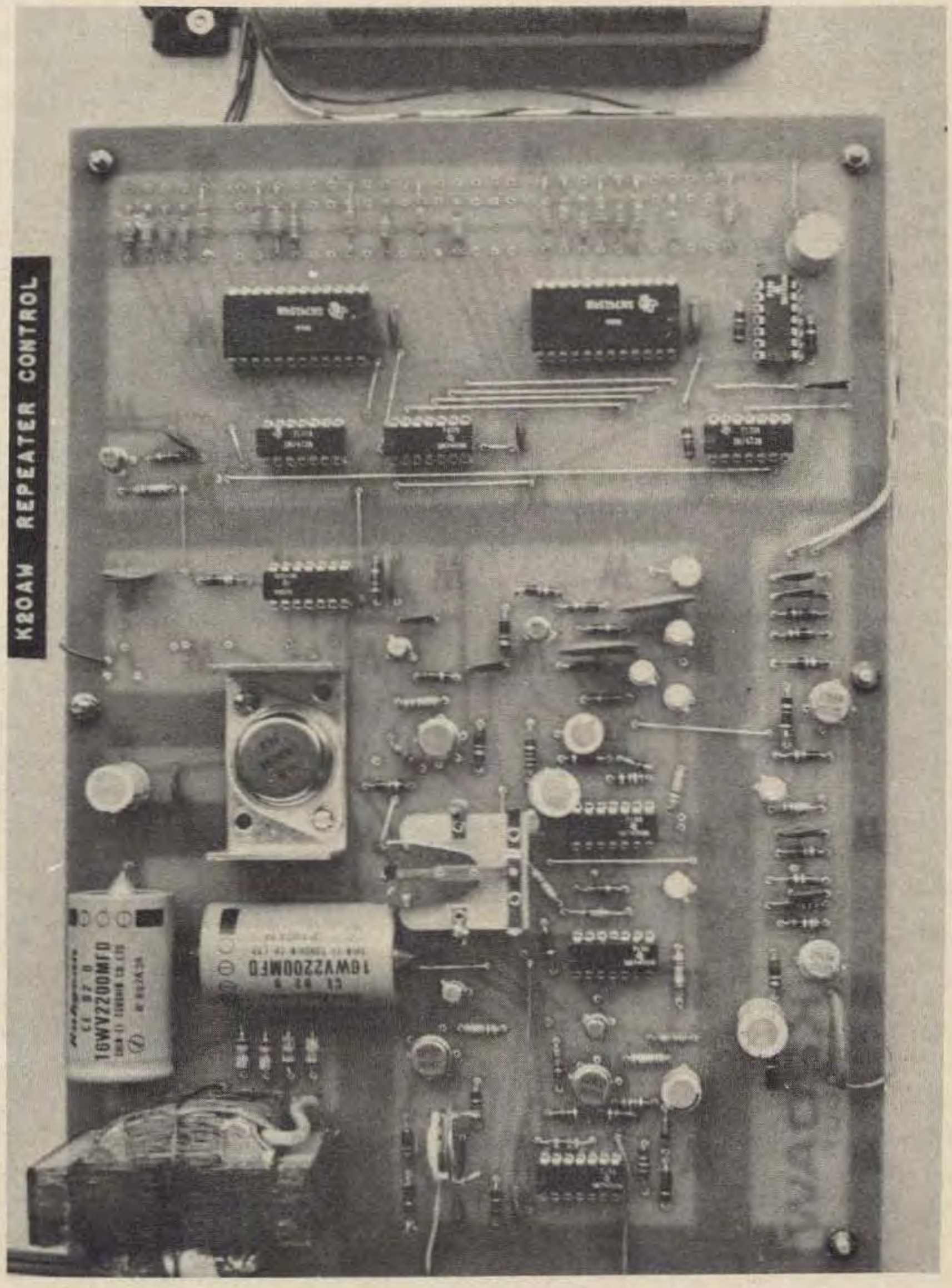


Fig. 2. I.D. parts layout board shown foil side up (full size). The edge of the board is at ground potential. Pin 1 of each IC is identified with a dot.

our all-solid-state repeater control, which will appear in an upcoming article.

Figure 1 shows the complete logic diagram of our unit. Two gates in IC1, in the upper left corner, oscillate and provide the clock for the system. IC2 is the character generator which controls the length of dots and dashes. A dot is exactly one clock interval, while a dash (or a blank) is exactly three clock intervals. After each dot, dash, or blank, a pulse is sent to IC3 which, along with a flip-flop in IC4, forms a divide-by-32 counter. The second flip-flop in IC4 is the start-stop flip-flop.

The output of the divide-by-32 counter is sent to two special purpose MSI IC's, IC5 and IC6. These are called four-line-to-sixteen-line decoders. Each of these two IC's gets the four outputs from IC3, and one output from IC4. The two IC's together provide a total of 32 output lines which are used to scan the diode matrix. In normal operation, 31 of these lines are high (near +5 volts) and only one is near ground. When the ID starts to generate the identification, the ground moves from pin to pin, starting with pin 1 of IC5 and moving down the line, finally winding up at pin 17 of IC6.



The upper third of the circuit board at the right contains the I.D. generator that is described in this article. The lower portion is the power supply and the repeater control circuitry that will be described next month.

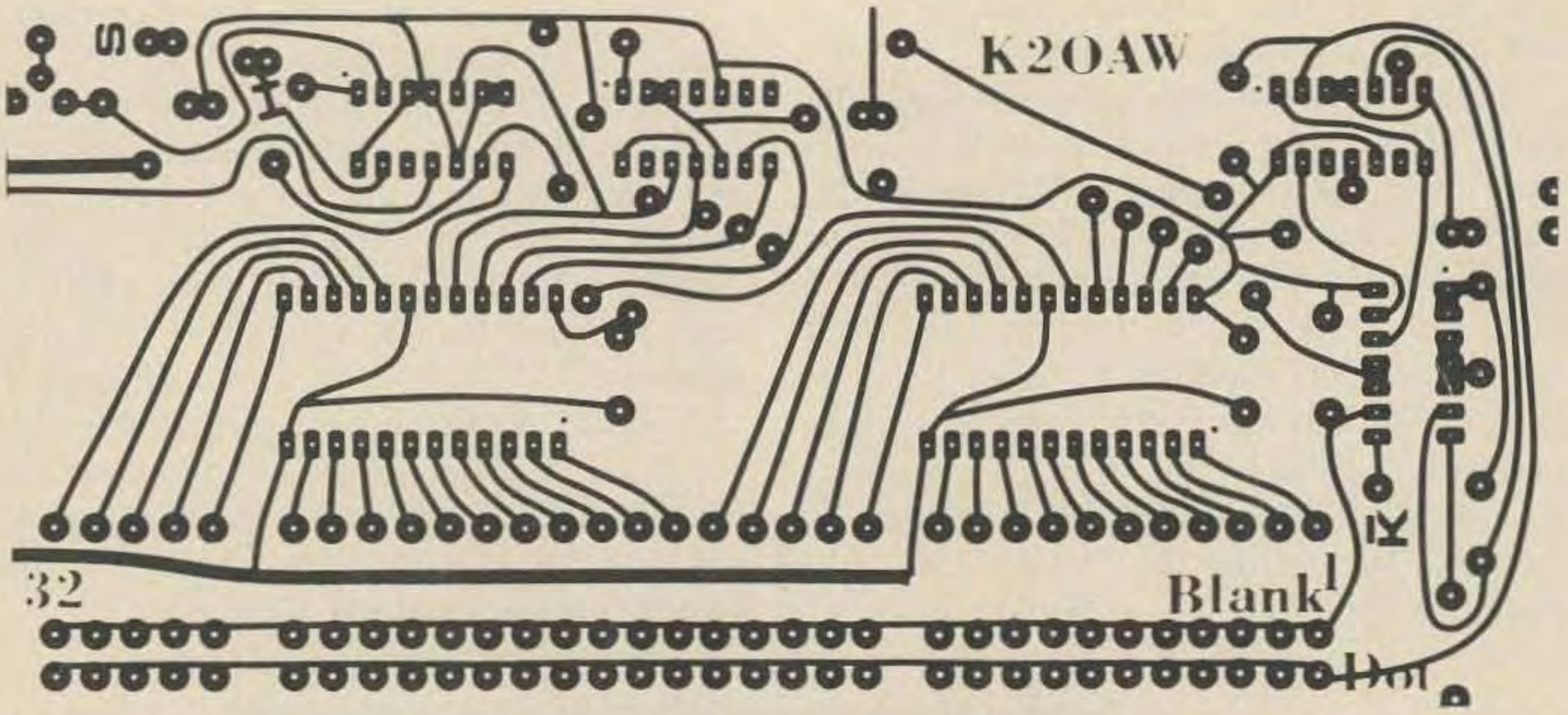


Fig. 3. Identifier board layout (80% actual size).

To program the diode matrix for a call, we separate the call into 32 dots, dashes, and letter-spaces (called blanks). With simple calls having K or W prefixes we generally have enough room to include a DE in front of the call; with a WA or WB call you will have to skip the DE. Then we number the dots, dashes, and blanks with numbers from 1 to 32, which assigns them to a specific position on the matrix. For every dot we place a diode from the corresponding IC output to the dot line; for every blank we connect the diode to the blank line; and for a dash we put in no diode. As shown in Fig. 1, the cathode side of the diode goes toward the decoder IC. You should use only germanium diodes here because we need a low voltage drop when the diode is on. Figure 1 shows the typical diode placement for generating DE K2OAW. Incidentally, if the call requires fewer than 32 positions, you will have to add blanks to stretch it out to 32 counts. It's better to add them at the beginning than the end, since this gives the transmitter time to come up before the code starts.

To use the ID you will need to make five external connections. The ID needs +5 volts regulated within 5%, at several hundred milliamperes and a good ground to the rest of your repeater control. To start the ID connect +5 volts (a digital 1 signal) to the start line (labeled S on the board). Output keying appears on the $\overline{K}$ line and is inverted – that is, this line is normally at +5 volts or so and switches down to ground when generating a dot or dash. The H output (hold) is normally grounded, and switches to +5 volts during the generation of the ID. Except for the $\overline{K}$ output, the other control signals operate the same as those in the W7PUG ID mentioned earlier. If you need complete compatibility, it is easy to add a transistor inverter to the $\overline{K}$ line to invert it back.

The entire ID generator fits on a single-sided PC board about 3 x 7 in. The board layout is shown in Fig. 3, and the parts placement is shown in Fig. 2. Speed of the ID is controlled by the 100 μF capacitor; the value shown generates code at about 5 wpm. To speed up the ID make the capacitor smaller. The five 0.01 μF capacitors are disk ceramics which bypass the +5V line to ground. Etched boards and parts kits are available from *Circuit Specialists, P.O. Box 3047, Scottsdale, Arizona 85257.*

In an upcoming article (soon!) we will present a complete solid-state repeater control, with ID timer, time-out timer, tone burst or PL latch, COR, and all the other necessities to make a complete package. The control fits on a 7 x 7 in. PC board. Alternatively, the control and ID can be built together as a complete package on one 7 x 10 in. board. ...K2OAW