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devoted entirely to Amateur Radio

The IARU "Project Goodwill" Transmitter

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THE COVER

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Give Your Repeater Some Identity

Let your repeater have a chance to tell people about itself instead of merely saying who it is.

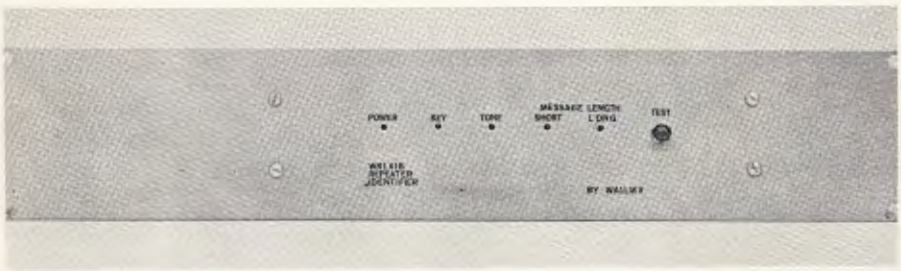
By Rick Swenton,* WA1LMV

If you think this is just another diode matrix identifier article, don't stop reading yet. Most i-d units function well in the station identification mode, but very few i-d units tell a story! Did you ever have a repeater function that you wished to be indicated on the air as to its status . . . is it on . . . or off? The old trick was to change the pitch of the i-d tone to signal the function status. An example of this is the method of indicating a commercial power failure at WR1ABM in Bristol, CT. When the repeater is operating on emergency power, the i-d tone changes from its usual low pitch to a higher pitch. This signals the users to conserve battery power. But wouldn't it be nice to have the cw i-d send a message indicating such a status? Here is such a circuit.

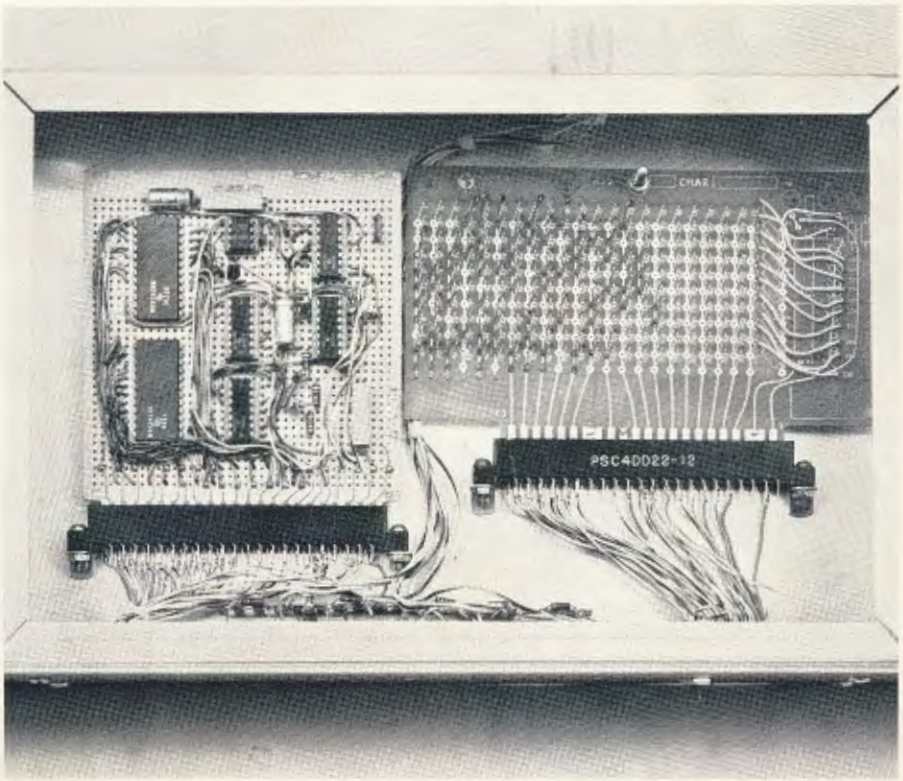
This i-d unit performs the usual station identification. It is user programmable with diodes in a read-only memory (ROM) matrix. There are 256 positions (or bits) in the memory. Most repeater identifiers (such as DE WR1AAA) will occupy less than 100 memory locations. This leaves about 150 memory locations for the special message. Such a message might be EME PWR indicating emergency power operation, or LINK indicating a crossband link is activated. The difference between this i-d unit and other units is the presence of a control input which selects either the station i-d only or the station i-d plus the message. The circuit uses inexpensive, reliable TTL ICs which are readily available at most outlets such as Radio Shack.

The circuit diagram of the identifier is shown in Fig. 1. U1 is a 555 timer IC used as an astable multivibrator. This provides pulses to the counters, U2 and U3. The code speed of the identification is adjusted by the 10-kΩ pot connected to pin 6

*19 Allen Street, Bristol, CT 06010



Front panel of the dual-purpose identifier from the WR1AIB 450-MHz repeater. It is built on a standard rack panel and has LED indicators to display the status of the various functions.



The control logic for the identifier is located on the board at the left. The board on the right contains the diode matrix, and was obtained from surplus (original manufacturer was Cubic Corp.). Both boards can be unplugged to simplify servicing or modification of the units.

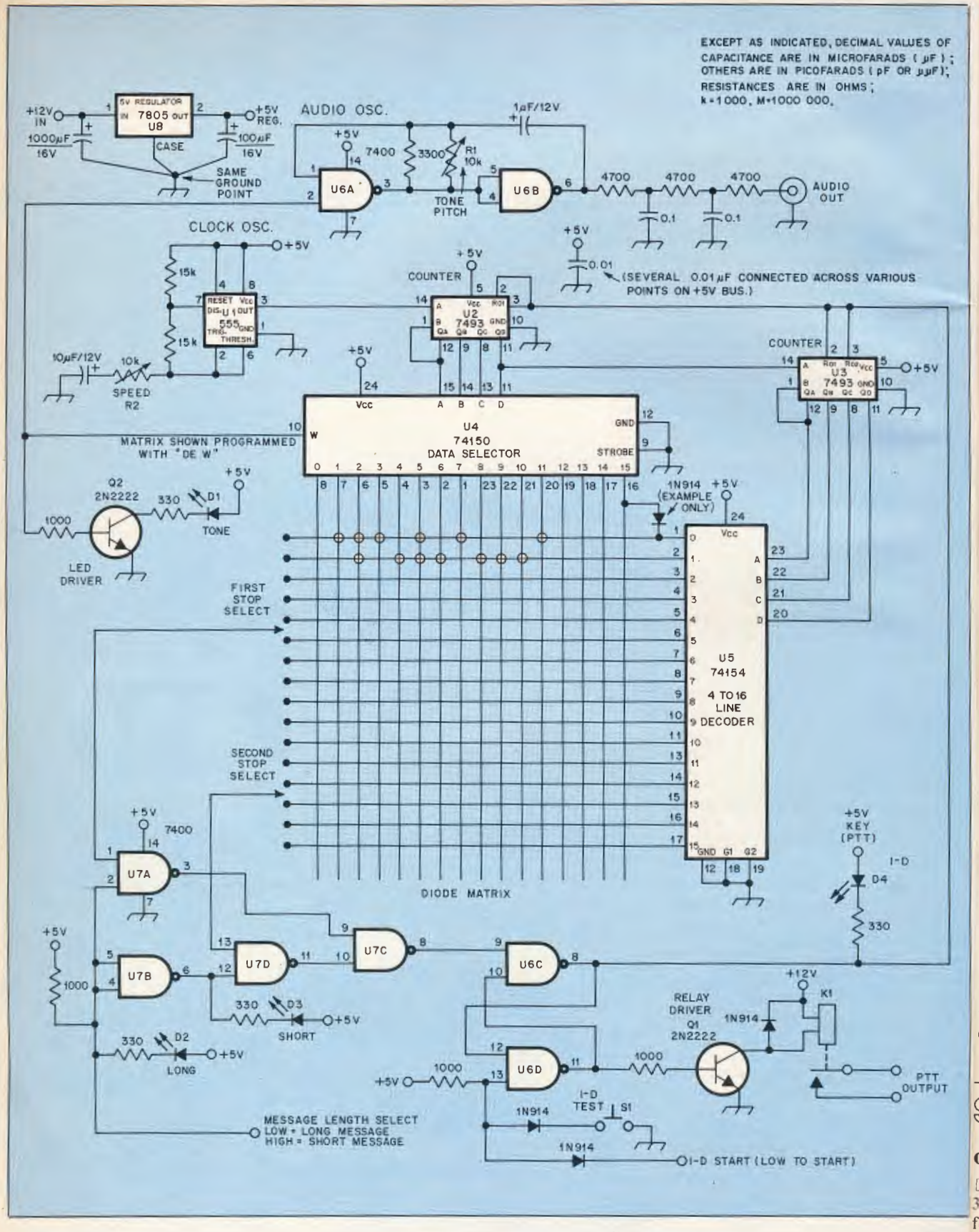


Fig 1 — The schematic diagram of the identifier with the message DE W programmed. The 1N914 diode shown in the matrix is only given as an example to illustrate the proper method of installation. Diodes are soldered into the matrix at all the intersecting points marked with a circle in this example. All resistors are 1/4-watt. Capacitors with polarity markings are tubular electrolytic; others are mica.

D1-D4, incl. — LED, Radio Shack 276-041 or equivalent.
K1 — 12-volt relay, Radio Shack 275-003 or equiv.
R1, R2 — Trimpots.
S1 — Momentary contact push-button spst.
U1 — Timer, NE555.
U2, U3 — TTL counter IC, type 7493.
U4 — TTL multiplexer IC, type 74150.
U5 — TTL 4-line to 16-line decoder IC, type 74150.
U6, U7 — TTL quad NAND gate IC, type 7400.
U8 — 5-volt regulator, type 7805.

on U1. Speeds from a slow crawl to an almost impossible rate can be achieved. The counter ICs U2 and U3 provide the 256-bit count. The binary count from the outputs of the ICs U2 and U3 (7493) are converted from binary to two separate groups of 16 lines. These two groups of lines perform the diode matrix "scanning." The 74150 IC, U4, is a data selector. Its function is to select and thereby scan the matrix columns. The 74154, U5, is a four- to 16-line decoder. It enables the matrix rows. While U4 is scanning the columns, U5 is enabling the rows by pulling each low, one row at a time. (The other 15 rows remain high.) The output of U4, pin 10, feeds U6A, a 7400 IC used as a tone oscillator. The 10-kΩ pot connected between pins 1 and 5 on U6 A and B adjusts the pitch of the i-d tone. Q2 is a driver for D1 which flashes along with the i-d tone (this circuit is optional). An RC low-pass filter eliminates the harmonics of the square wave produced by U6 A and B to provide a clean sine wave at the output of the i-d unit. U6 C and D and all of U7 provide the start/stop and message-length select control. The i-d is started by either grounding the i-d start line or pressing the test switch. The i-d stop signal will come from either the first or second stop-select lines. The connection of the stop-select lines is described below in the matrix programming instructions. U7, a 7400, performs the stop-signal selection. Depending on the logic level present on the message-select line, the i-d will be either a long message or a short message. Grounding the line will provide the total message. Allowing the line to float or go to +5 V will provide a short message. U7 selects which stop-select line will reset the i-d. The PTT relay in the collector circuit of Q1 should be any small, general-purpose 12-V dc relay. The relay is energized when the unit is identifying. The 7805 IC, U8, provides regulated 5 V from a 12-V dc source.

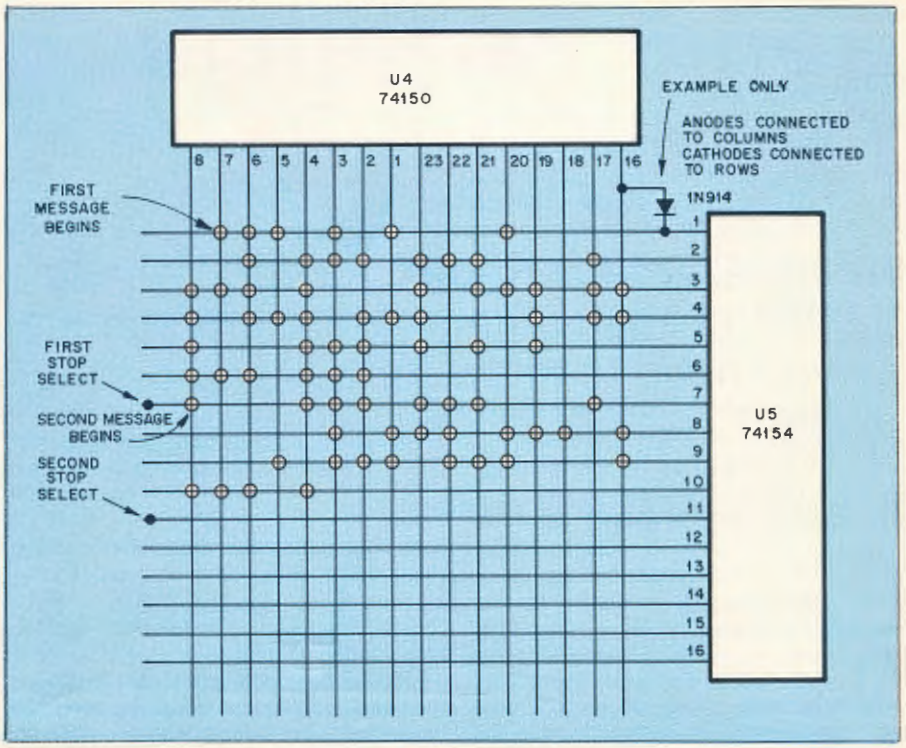


Fig. 2 — The diode matrix is shown with the message DE WR1ABM EME PWR programmed. A diode is installed at each circled position. For normal operation, only DE WR1ABM will be sent. For the first stop select, start the second message on a new line. Connect the first stop select to the line which begins the second message. For the second stop select, connect the second stop select to the next line after the second message ends.

Programming the Matrix

Type 1N914 silicon diodes are used in the matrix. Do not place the first diode in location "00"! When the i-d is in the reset mode, the first memory location is addressed. If you place a diode in the first location, there will always be a tone present on the output when in the reset mode.

Three diodes in a row constitute a dash, one diode constitutes a dot. Three spaces in a row constitute a space between letters. One space constitutes a space between code elements. I used six spaces to constitute a space between words. (Although "perfect machine-sent code" calls for seven spaces, the difference between 6- and 7-unit spacing is hardly noticeable by ear, and the saving in matrix bits may be significant on long messages.) The diodes are placed in the matrix just as the code appears on paper in a dot-dash format as shown in the example in Fig. 2.

To wire the stop-select lines, connect the first stop-select line to the row line which contains the beginning of the second message. Note that you should not begin the second message on the same row where the first message ends. The i-d will reset itself to zero on the signal which begins to read the row containing the start of the second message.

The same is true for the end of the matrix. Don't place any diodes in the last row. This line is reserved for the second stop-select signal if the matrix is fully loaded to the second-to-last row. The example in Fig. 1 shows how the stop-select lines are implemented.

Your repeater can now tell the users about itself. This feature can pay for itself by helping to extend operating time when the repeater is on emergency power. Also it can help keep autopatch testers in the woodwork when the patch isn't working.

Strays

OSCAR 8 GOES TO SCHOOL

☐ OSCAR 8 went to class in more than 30,000 junior high schools this fall, in the form of an article and a 45-rpm record included in the October issue of *Current Science* magazine. Editor Vincent Marteka and Science Editor Charles AB1P and Bernie Glassmeyer, W9KDR, put together a tape of OSCAR sounds and supplied background information to Xerox Educational Publications, which puts out *Current Science*. Published as the feature article, the piece was entitled "OSCAR 8 Is Number One With Student Hams." Also included was a two-page science quiz sheet. The whole production was a first-class effort, and our hats are off to Xerox for a job well done.

are available from Xerox Education Publications, Middletown, CT 06457. No copies are available from ARRL hq. — *Bernie Glassmeyer, W9KDR*

GEORGIA TRAINING NET

☐ Georgia hams can now learn how to handle traffic, improve their code speed or just have a change of pace by checking into the Georgia Training Net. GTN meets daily on 3.718 MHz at 2230 UTC.