pushing the braid against the body. Remove any excess solder below the threaded area. Cut off the center conductor flush with the end of the center pin and solder. Remove any excess solder that appears on the side of the pin. Now slide the connector nut up and thread it over the connector body.

The job isn't completely done until the cable is checked out! Use your ohmmeter, set for the low-ohms scale, to check for near zero ohms, one end of the shield (connector body) to the other end. Do likewise for the center conductor. The final test is to set the ohmmeter on the high-ohms scale and test again for any resistance between shield and center conductor. Properly, the reading should be infinite.

For RG-8/U I suggest combing the shield into four bundles. File off the nickel plating all around and tin the same area all around. Following the steps outlined will provide excellent mechanical and electrical bonds that will ensure trouble-free life. — *E. Raymond Hardy, W3BSS, Delmar, Delaware*

SHOOTING A FISHING LINE OVER A TREE

Maybe this has been tried before, but it was a first time for me and surely saved a tangled fishing line! In preparation for installing an antenna I needed to get a line over the top of a tree. My gimmick was to use a Zebra 202 closed-face spinning reel attached to a fishing rod. The procedure is to lay the lower part of the fishing rod on the ground. Fasten the line to the arrow. Push the reel release button, grab the bow and arrow and fire away. The method sure works! — *Larry Briggs, W3MSN, Oxon Hill, Maryland*

MODIFIED CAPACITOR FOR THE UNIVERSAL TRANSMATCH

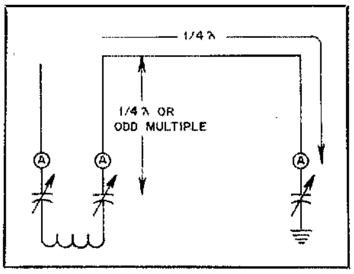
To provide a differential capacitor for the Universal Transmatch described in the 1975 edition of *The Radio Amateur's Handbook* I removed the rotor from a Millen 16250 variable capacitor, loosened the clamping nuts and rotated one set of the plates 180 degrees to give a differential action. The circuit adjustment is now much smoother and matches a wider range of impedance than I was able to obtain with the two-section variable suggested in the parts list.

A good initial adjustment procedure is to start with C2 fully meshed and C1 at midrange. C1 and L3 are then varied for a minimum SWR reading. If a null cannot be obtained, open C2 about 10 degrees and again adjust C1 and L3. Repeat until a perfect match is obtained. — *Frank C. Getz, N3FG, Newark, Delaware*

THE OLD TIMER'S NOTEBOOK: A MARCONI-ZEPP ANTENNA

With this system, a Zepp designed for 80 meters can be used on 160, or one designed for 40 can be used on 80. Plenty of amateurs with small backyards can use it to advantage since the flat-top is only a quarter-wave affair.

Since accurate tuning of the flat-top is a little ticklish, it calls for a bit more care than with an ordinary Zepp. First, the system should be tuned at the transmitter end with the condenser (capacitor) set about midway. Observe the current in each feeder. If the currents balance, everything is okay. If not, the flat-top will call for some tuning of C1. C1 should have a fairly



Grounding the far end of a Zepp antenna permits using it as a quarter-wave Marconi with end feed. With this arrangement the antenna may be operated on a lower frequency than the fundamental.

high capacitance (350 pF). Adjusting this capacitor moves the current loop around. When the loop is in the center of the coupling coil (where it should be) the currents will balance and cancellation results.

The idea can be carried a bit further by making the length of the antenna between the end of the feeder and the connection to C1 equal to a half wave for the next-higher frequency band. Then install a switch at C1 so that the condenser and ground connection can be opened when the antenna is to operate as a half-wave Zepp. The length of lead between C1 and ground can be any convenient length, provided that the total length is not more than three-eighths of a wavelength since the series condenser will shorten the electrical length. — *George Underwood, W1GPE, North Providence, Rhode Island,* "For the Experimenter," August 1934 *QST.*

THE OLD TIMER'S NOTEBOOK: REMEMBER THE WONDER BAR ANTENNA — A 10-METER BOW TIE?

We receive many requests at the ARRL for information about the simple loaded dipole, only 8 feet long, that was described by Dr. Edwin T. Bishop, K6OFM, in November 1956 *QST.* This miniature 10-meter antenna, made from the elements of a conical TV antenna, became a hit because of the low cost and good performance. In summarized form, therefore, here are the details.

If you can obtain a conical television antenna, you will have all the parts needed except two standoff insulators, a B & W Miniductor no. 3013 (12 turns no. 16 wire, 1-inch dia, 3 inches long) and a few nuts and bolts — it's that simple! If a TV antenna is not available, 1/2-inch OD aluminum tubing can be substituted. Dimensions are shown in the drawing.

The outer ends of the four 48-inch antenna elements and the ends of the 30-inch bars are flattened for a distance of 1 inch. These ends are then drilled to accept whatever size machine screw you choose to use.

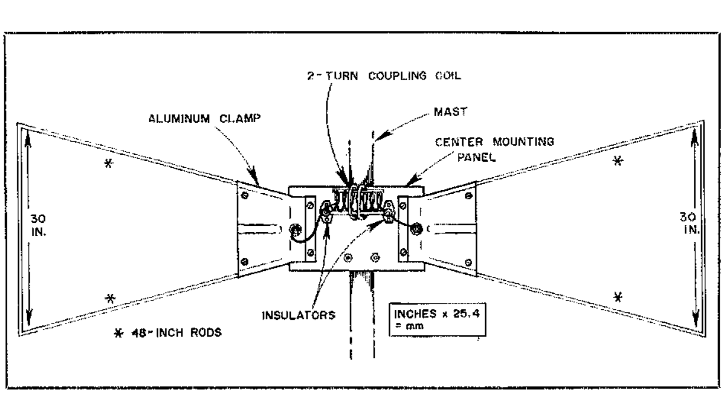
Any nonconducting weatherproof material may be used for the center panel. The dimensions are not critical, but should be large enough and strong enough to accommodate the antenna and mounting hardware.

Two of the original clamp mountings hold the halves of the revamped TV antenna. The aluminum clamps and the antenna should be well cleaned before assembly. Application of Mosley's Penetrox at all connecting joints will ensure good continuity. In order that both sections of the bow tie lie in the same plane, mounting plates should be straightened for that purpose.

The Miniductor coil is supported by two 1-inch standoff insulators placed 3 inches apart on the center mounting panel. One end of this coil is connected directly to one of the antenna sections by means of a short length of no. 12 wire. Another short length of no. 12 wire, connected to the other section of the antenna, is tapped onto the coil so that there are approximately 10-3/8 turns between the connections. The transmission-line coupling coil consists of two turns of plastic-covered solid no. 14 electricians wire, loosely coupled around the center of the loading coil. The coils should be adjusted for minimum SWR.

Either RG-8/U or RG-58/U may be employed for the transmission line, which may be terminated at the antenna by means of coaxial connectors or simply wired directly to the coupling coil. In any case, the end of the line should be waterproofed. One means of waterproofing is Duxseal, available at some plumbing and heating supply houses, and also from Motorola Communications equipment branches.

In order to maintain the centered position of the coupling coil, the author elected to cement the leads to the mounting panel with water-



The Wonder-Bar 10-Meter Antenna. This bow-tie was originally described in November 1956 *QST.* In response to continued reader interest, it is presented once again. This antenna is fashioned from a conical TV antenna.

proof cement. This was done at the point where the leads pass through holes in the panel. Several light coats of Krylon spray, applied to the antenna, help resist the effects of weather.

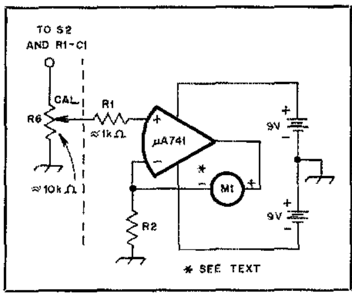
Keep in mind that this is not a form of folded dipole. The rods for each section of the bow tie converge at an electrically common point — a common point for the right section and a common point for the left. In this respect, the construction is the same as a conical TV antenna.

To conclude his article, Dr. Bishop said: "Signal reports really bring home the bacon to the ham! Try it and I do believe you'll agree with me!" — *Stu Leland, W1JEC*

A USEFUL METER AMPLIFIER

K4KI's tune-up bridge, described in December 1979 *QST*, is an outstanding circuit. Every amateur station should have one or something similar to relieve tune-up QRM. His circuit calls for a 50 μA meter. Other circuits in *QST* have specified various meter values. I frequently do not have the proper value meter in my junk box, and since I am not a wealthy person, my hamming is done on a very modest budget. My solution is to use the simple meter-driver circuit shown in the accompanying drawing. With it you can adapt a meter of any value to practically any circuit.

Basically this amplifier is a voltage-to-current converter that is well described in many IC handbooks. It has a very high input impedance that will not load the sensing circuitry. A 1-mA movement can therefore be used in place of a 20-μA movement. Low current drain permits the use of inexpensive batteries for power. Voltage is not critical.



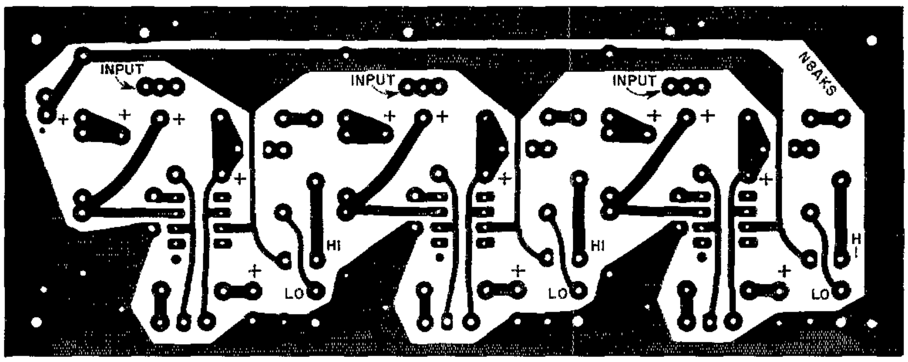
This circuit, provided by KA7CDR, permits the substitution of meters other than the one specified for a given project. The circuit as shown will adapt a 0-1 mA meter to the K4KI tune-up bridge described in December 1979 *QST*. The value of R2 is determined by dividing the maximum voltage at the + terminal of the 741 by the meter current required. R6 may be as little as 2 kΩ but higher values decrease the loading effect. The upper limit is about 100 kΩ.

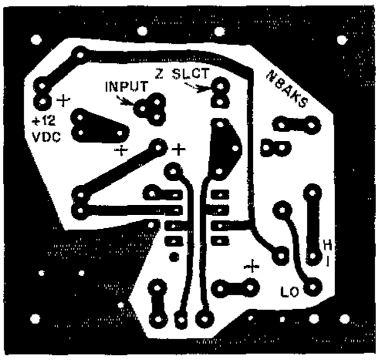
The circuit, as shown, will adapt a 0-1 mA meter to K4KI's circuit. Resistor values are also not critical and are selected according to the value of whatever potentiometer is on hand. R1 should be no more than 1/10 the value of R6. The voltage "felt" at the + terminal of the μA741 will also be found across R2. The μA741 will supply whatever current is required to maintain that voltage balance (limited to about 25 mA). A good choice for R2 is to use a 1-kΩ pc-board style potentiometer that can be adjusted during assembly and checkout and then ignored. Different meters have different V-I characteristics. Therefore use of a one-time-adjusted potentiometer will eliminate any design calculations with this circuit. Any meter movement can be used by simply experimenting with a few resistors. If the maximum input voltage is known, just divide that voltage by the meter-current requirement to obtain the value for R2. If the voltage is not known, then a potentiometer or some experimenting is in order. The entire driver circuit, including batteries, can be glued to the back of the meter. A dpst switch can be included to conserve the batteries if desired. The 741 is an experimenter's delight. I can burn dozens of them up for the price of one good meter. — *Michael C. Trull, KA7CDR, Las Vegas, Nevada*

[Editor's Note: Also see "A Tune-up Bridge Note" in the "Technical Correspondence" section of this issue.]

ANTENNA HINT FOR DXERS

A word of caution on special low-noise receiving antennas — put them as far away from your vertical or semi-vertical transmitting antenna as possible. The distance should be one wavelength or more. If there is insufficient separation, the receiving antenna will pick up the same noise and crud you've tried to avoid. The noise can be reradiated from the transmitting antenna. — *Stewart Perry, W1BB, Winthrop, Massachusetts*





Circuit-board etching patterns for the adjustable-gain microphone amplifier (see Figs. 3 and 4, pages 13 and 14 of this issue). Patterns are shown at actual size from the etched side of the board, with black representing copper. The pattern at A is for the 3-channel amplifier, and that at B for the single-channel amplifier. Boards have copper on one side only.