HAM NEWS
TUBES

MAY-JUNE, 1961

LOW-COST RF WATTMETER

By A. F. Prescott, W8DLD,
and W. C. Louden, W8WFH

THE RF WATTMETER is a highly useful item of test equipment for the amateur radio station, or the "library" of test equipment which many amateur radio clubs maintain. W8DLD and W8WFH give complete construction information here for a unit which offers a choice of meter current ranges.

A recent series of tests on new linear amplifiers for mobile SSB operation created the demand for an RF wattmeter with which to determine their power output capabilities. After running some of these tests with a commercially built wattmeter, it was decided to build a wattmeter, so that it would be available all of the time.

The RF wattmeter is simply an extension of the basic VSWR (voltage standing wave ratio) bridge, such as the Monimatch.[1] Actually, the wattmeter to be described is like having two separate wattmeters in one box, since, in addition to measuring RF watts in the forward direction, it also measures reflected power. It consists primarily of one current transformer and two capacitive voltage dividers, plus two diodes and their filter circuits for the indicating instrument.

Looking into published information on RF wattmeters, an excellent article was found in the April, 1959 issue of *QST*.[2] If this article is really studied, it gives almost the complete story on the subject. However, this article also assumed that the reader would "know all of the tricks" in constructing this type of instrument. Our article gives complete constructional information.

In designing and constructing an RF wattmeter, two important design objectives must be kept in mind in order to achieve an instrument capable of accurate and consistent measurements. These are:

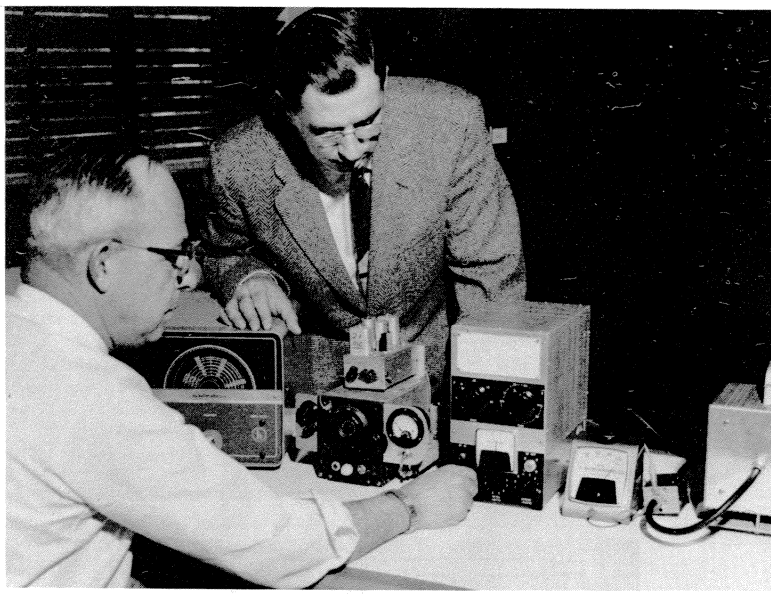
1. The current transformer must be *inductively* coupled to the r.f. transmission line, and not a combination of inductive and capacitive coupling; and
2. The capacitive voltage divider must consist of the ratio of capacitance in the two divider capacitors, and not a conglomeration of stray capacitances, plus some inductive coupling from long leads, and lead dress.

The first objective is accomplished with a simple electrostatic shield in the current transformer which will be described in detail later. The second is realized by selecting miniature components, and placing them in the proper physical locations.

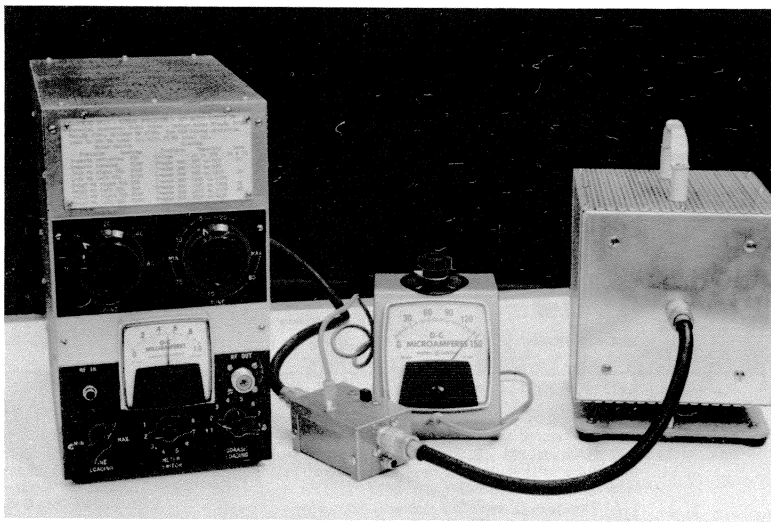
THE CIRCUIT for the complete RF wattmeter is shown in the schematic diagram, Fig. 1. A toriodal type current transformer was designed with an electrostatic shield between the primary (the coaxial cable center conductor running straight through the box) and the secondary (L_2, wound on the toroid form).

In the capacitive voltage dividers (C_1 — C_3, and C_2 — C_4), the smaller capacitances (C_1 and C_2) are adjust-

(continued on page 2)



W8DLD (left) and **W8WFH** put their RF wattmeter through its paces, checking it against the RF wattmeter built into the SSB-600 linear amplifier (center unit). Converted Command set receiver and crystal controlled converter at left of SSB-600 was described in the September-October, 1960 issue of **G-E HAM NEWS.**



CLOSEUP VIEW of the test setup for the RF wattmeter. Pickup unit is connected into coaxial cable running between SSB-600 amplifier and 500-watt, 50-ohm dummy load (right), which will be described in a coming issue.

IN THIS ISSUE