the SWR from the usual formula:

$$SWR = \frac{V_f + V_r}{V_f - V_r}$$

Points to note

To prevent inaccuracies, the voltmeter must have a high resistance, otherwise the current taken by it will be large compared with the current flowing through the arms of the bridge. Alternatively, a high value resistor can be placed in series with the voltmeter, which will also suit the germanium diode rectifier we shall use for converting the RF to DC voltage.

If you wish to measure accurately the actual SWR value, it is also necessary to be able to measure the input forward and reflected voltages separately. When we measure the forward voltage the load has to be disconnected at R1 (either by shorting it out or disconnecting it). When R1 is reconnected (in the shape of our feeder), the load on the voltage source will be different, and could affect the applied voltage leading to errors in the readings.

However, in line with keeping things simple, you can almost certainly get away with just using the reflected voltage meter — this will enable you to tune for a null in the reading, informing you that the SWR is now at a low figure, which is more than adequate.

Hence our practical circuit dispenses with the input rectifier and meter and uses a bit of switching to enable calibration. One advantage of the circuit is that due to the presence of the series resistor, the transmitter sees a relatively constant impedance during tuning up operations which may be of benefit with semiconductor PAs.

Practicalities

The circuit of the practical meter is shown in **Fig. 3.** As shown, it will be suitable for a *maximum* applied RF output of 5 watts or so, providing the resistors are of the specified power rating — they *must not* be wirewound types which have too much inductance. The diode must be germanium — an OA90/91 (not gold bonded) is suitable. The meter can be any 1mA type — it should be possible to achieve full scale deflection with around 50mW of RF power in this circuit.

Construction is not particularly critical except for one point. The bridge arms should be positioned so that coupling between them is minimised. Also avoid coupling between the rectifier diode and the remainder of the circuit. The two 47 ohm resistors should be equal in value (although not necessarily exactly 47 ohms — one can be carefully filed if necessary to bring its value up to that of the other) and have equal lead lengths, both as short as possible. Also, keep all other leads as short as possible to minimise inductance, which would spoil the bridge performance at high frequencies.

The coaxial cable which bypasses the unit should be grounded at both ends. A practical layout is shown in **Fig. 4** — this can either be wired using the SO239 sockets and a few tagstrips as supports, or the bridge could be built on a printed

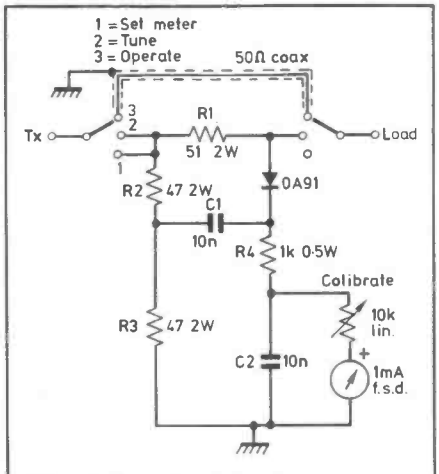

Fig. 3 Practical bridge layout

circuit board.

Using the meter

To check out the finished meter, place the switch in the SET position (which removes any load from the bridge output) and apply a maximum of 5 watts to the input socket (or use the TX at lower power). Now adjust the potentiometer for full scale deflection on the meter. Connecting a suitable dummy load to the output terminals should now give a reading of zero at all frequencies from 1.8 — 30MHz. If the reading increases as the frequency increases, there is some unbalance in the bridge, probably caused by the stray capacitance or inductance in one arm of the bridge not being exactly equal to that of the other. Slight movement of components may cure this. If the meter shows a constant reading ie. it cannot be nulled, then the load resistor is not equal to that of the series resistor (R3).

To use the bridge with a matching unit inserted in the line after the unit, load up the transmitter as before in the SET position, and adjust the pot for FSD on the meter. If the TX is fixed tuned, simply adjust for FSD. Place S1 in the TUNE position with the feeder or antenna connected, and adjust the matching unit for a minimum reading on the meter showing that the SWR is now at a low value, and then switch to the OPERATE position to bypass the unit.

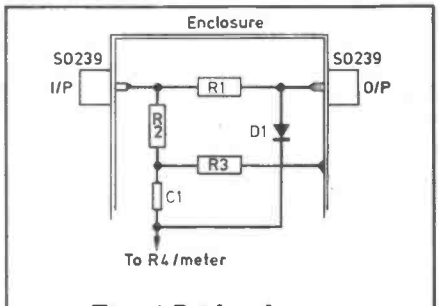

Fig. 4 Bridge layout

"He claims it's something to do with contest operating."