

# Field strength - power meter

Versatile unit indicates transmitter tune-up.

TWO PIECES OF equipment which are almost essential to the CB'er, novice, or amateur alike, are a field strength meter and a power meter. This design combines the two in a simple easy to construct circuit comparable to equipment many times its cost.

Measurement of field strength is useful for antenna tuning, especially where an antenna tuning unit is used, or for checking the radiation pattern of a directional antenna. If the meter is left in a fixed position well away from but at the same height as the antenna, and the antenna rotated, a circular plot of the antenna radiation pattern can be drawn up. When tuning an antenna the meter should be placed in a convenient position where it can be seen and the tuning adjusted for maximum reading.

The power meter is used to tune the output of a transmitter, or can be left in the transmission line as a monitor of power output. The reading on the meter will only be accurate if the antenna has low VSWR. For accurate power measurement, and for transmitter tuning, a dummy load should be connected to one of the power sockets. If only the 20 watt range is suitable, a small CB dummy load is suitable, a larger load of course being necessary for the 200 watt range. Table 1 gives the power calibration for both ranges for a 50  $\mu$ A meter or the scale can be cut from page 118.

## Construction

Figure 2 shows the wiring layout for the unit. This layout should be strictly adhered to, otherwise performance may





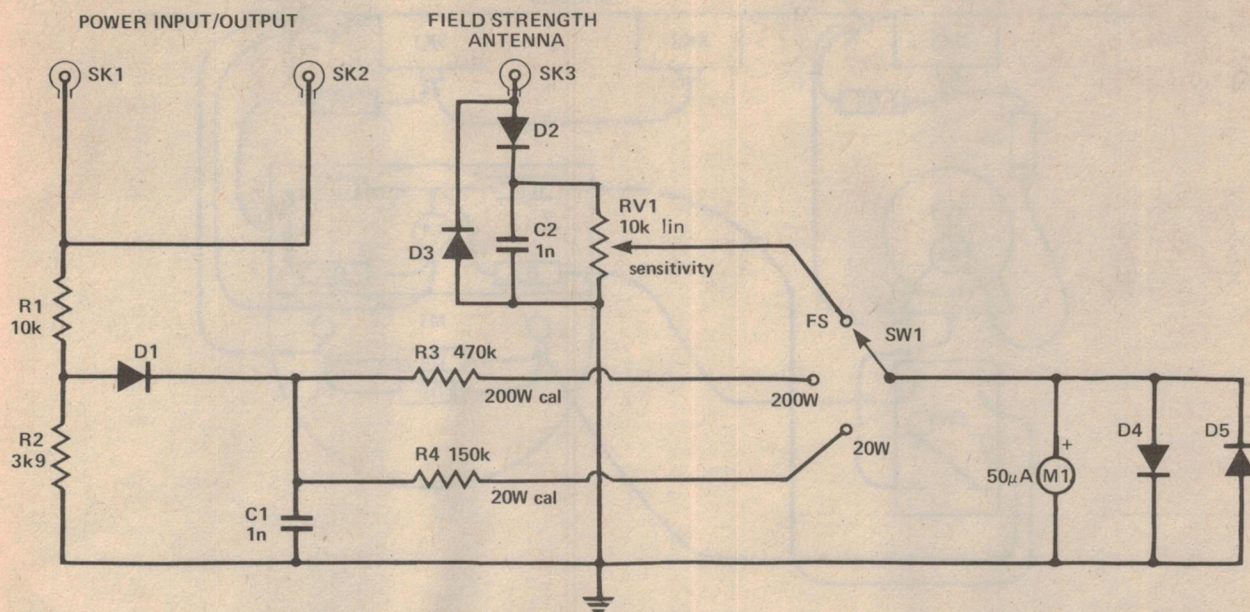


Fig. 1. Circuit of the Field Strength/Power meter.

be affected. All leads, especially the earth leads, should be kept short.

Components for the power meter are assembled on a small piece of matrix board, which is then held in place by the meter terminal screws.

We used a Horwood instrument case type 32/2/D, available from Radio Dispatch Service or Dick Smith Electronics, which measures only 75 mm x 100 mm x 50 mm deep. A C&K type 7211 toggle switch is used for the function switch, although any suitable switch which will fit into the constraints of the box will do equally as well.

A whip antenna for the field strength meter was made by soldering a length of brazing rod into a PL259 UHF plug and filling the space with Araldite. The sensitivity of the meter will increase with the length of the antenna.

### How It Works – ETI 719

Let's look at the field strength meter first.

Some signal is picked up by the whip antenna and is detected by D2 and C2. The capacitor, C2, charges to a voltage proportional to the field strength of the signal. A return path for the charging of C2 is provided by D3. The sensitivity control, RV1, varies the current fed from C2 to the meter, via the function switch SW1. The meter will give a reading proportional to the field strength of the signal. The diodes D4 and D5 provide meter overload protection by conducting when the voltage across the meter terminals exceeds about 0.7 volts.

#### Power Meter

The power meter is similar in operation to the field strength meter, but instead of taking the signal from the antenna it

measures the voltage on a 50 ohm transmission line. R1 and R2 form a voltage divider to reduce the voltage to be measured and to provide isolation between the measuring circuit and the transmission line. The RF signal is then detected by D1 and C1, the voltage across the capacitor being proportional to the voltage on the transmission line. The power in the line is then proportional to the square of this voltage ( $P = V^2/R$  and  $R = 50\Omega$ ). This voltage is measured by a dual range peak reading voltmeter formed by R3, R4 and M1. The meter is calibrated for 20 watts and can also be used for the 200 watt range. The voltmeter gives an accurate reading for both carrier power (AM), and peak envelope power (PEP).

### METER CALIBRATION

Power	Scale		
0.5	8	9	33.5
1	11	10	35
2	16	11	37
3	19	12	38.5
4	22	14	42
5	25	16	44.5
6	27.5	18	47.5
7	29.5	20	50
8	31.5		



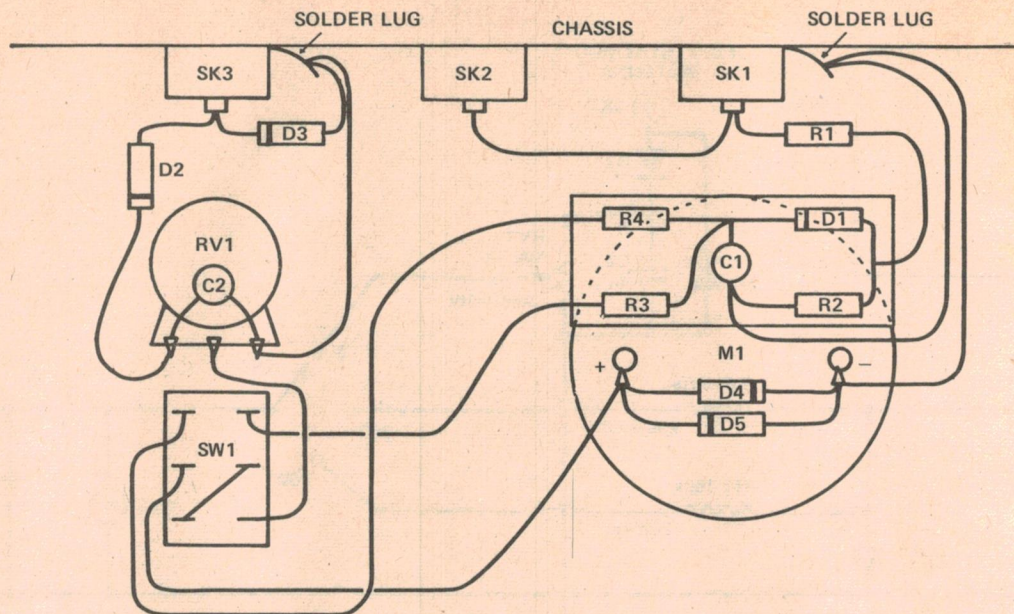
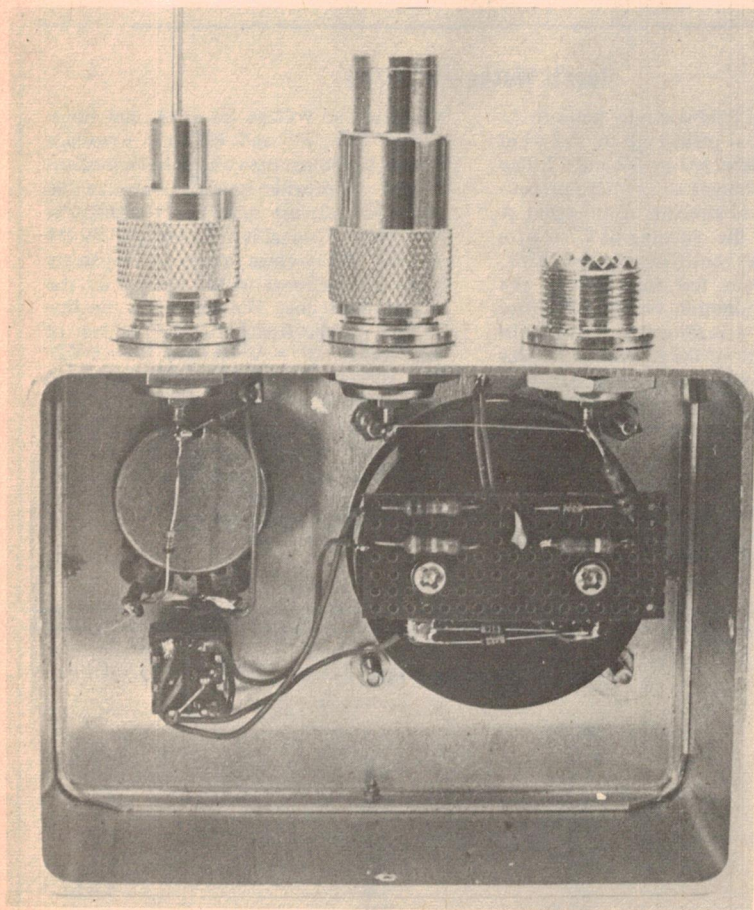


Fig. 2. Wiring layout of the unit. Matrix board is used to mount the components for the power meter.



The completed meter. All leads, especially the earth leads, should be kept as short as possible.

## PARTS LIST – ETI 719

### Resistors all 1/4W 5% except R1

R1	.....	.10k 5% 1/2W
R2	.....	.3k9
R3	.....	.470k
R4	.....	.150k

### Potentiometer

RV1	.....	.10k lin.pot.
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### Capacitors

C1, 2	.....	.1n ceramic
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### Diodes

D1 – D5	.....	.1N914
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### Miscellaneous

SW1	.....	.C&K 7211 (see text)
SK1 – SK3	.....	.S0239 UHF socket
M1	.....	.50 $\mu$ a 50 mm meter
		Horwood instrument box 34/2/D
		(see text)

### Accessories

		50ohm CB load
		PL259 UHF
C2	.....	.1000u 25VW electro
SW1	.....	.SPDT min. toggle