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It is my hope that you find the file of use to you personally – I know that I would have liked to have found some of these files years ago – they would have saved me a lot of time !

Colin Hinson
In the village of Blunham, Bedfordshire.

OPERATING INSTRUCTIONS

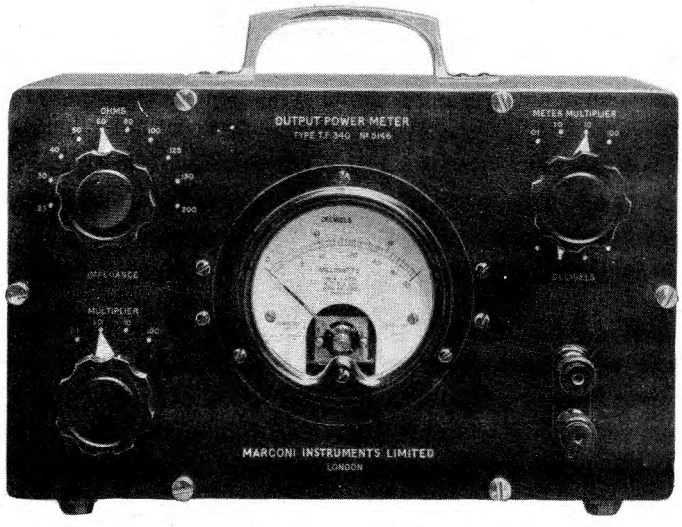
OUTPUT POWER METER

TYPES TF 340, TF 340/1, TF 340/2.

MARCONI INSTRUMENTS LTD

LONDON ENGLAND

OUTPUT POWER METER



TYPES TF 340, TF 340/1, TF 340/2

ENGINEERING BULLETIN NO. EB 340

CONTENTS,

1. DESCRIPTION
2. OPERATION
3. SERVICE.
4. SPECIFICATION

GUARANTEE

We guarantee this instrument free from defects in material workmanship and design.

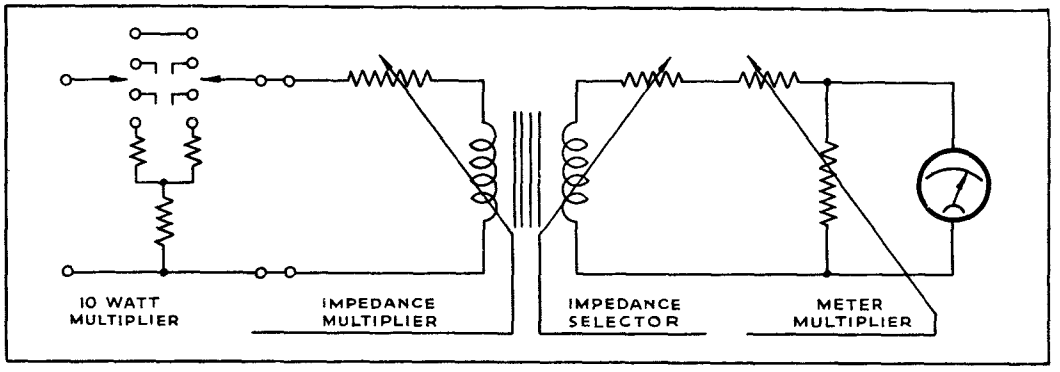
During a period of one year after date of despatch to the original purchaser we will make good any defects developing in parts of our own manufacture under proper use and arising from faulty design, workmanship or material, provided such parts are promptly returned to our laboratories and provided that neither they nor the apparatus of which they form part have been tampered with or modified.

EB 340
4B-1/42

1. DESCRIPTION

The Output Power Meter gives a direct indication of the power delivered by any audio frequency system into an external load, which is provided by the Meter. The indicator is a constant impedance rectifier voltmeter having four ranges. The meter circuit includes a network which compensates transformer errors at high frequencies.

The meter is matched to the desired impedance by means of a multi-ratio transformer, and the impedance switching includes a compensatory network which maintains the transformer efficiency at a constant value. The "input power" calibration of the meter is thus independent of the impedance setting.



Design Limitations. The instrument is designed particularly for measurements at frequencies in the middle part of the audible band, where the impedance accuracy is high and the accuracy of power indication is limited only by that of the rectifier type meter.

At the extremes of the frequency range, the various imperfections of the transformer have a progressively greater effect resulting in increased errors at both high and low frequencies. The design adopted is such as to make these errors as small as possible over the whole range. In all cases the error depends mainly on the setting of the IMPEDANCE SELECTOR switch, and to a much smaller extent on the setting of the IMPEDANCE MULTIPLIER switch.

Low Frequencies: At low frequencies the error is due to the shunting effect of the primary inductance of the transformer. This results in the impedance being lowered and having an inductive component, with consequent errors in power indication.

The impedance errors are small at the low settings of the IMPEDANCE SELECTOR switch, increasing steadily as the switch is moved to the higher values, where the impedances are low. The power errors vary somewhat with the range: in general, the indication is high at the low impedance end and low at the high impedance end.

High Frequencies. At high frequencies the leakage inductance of the transformer and the inter-winding capacities affect both the impedance and the power calibration.

The impedance errors are small at the end settings of the switch, and are a maximum at the centre setting, where the impedances are high. The power errors depend somewhat on the range and are generally small near the low impedance setting, while the indication is high near the central setting, and accurate or low near the high impedance end.

2. OPERATION

Note. This instrument was calibrated with the meter face horizontal and, to ensure accurate readings, it should always be used in this position.

Procedure (Power levels up to 5 watts) Before making connection to the instrument, set the METER MULTIPLIER switch to x 100, in order to avoid over-deflection. The power delivered into any load impedance (selected by the IMPEDANCE switches) is read directly on the indicator meter in conjunction with its multiplier. The power level in decibels above one milliwatt is also directly indicated.

The internal impedance of any tone source is readily determined by connecting the Meter and adjusting the IMPEDANCE switches for maximum output power. The meter impedance is then equal to the impedance of the source.

Procedure (Power levels up to 10 watts) In the special model TF 340/2 measurements up to 10 watts are possible at impedances of 100, 600 and 5,000 Ω. The impedance of the Multiplier must be set to the same value as that of the Meter, and the power readings multiplied by 2 (add 3 dB)

Direct Current

A small amount of direct current may be passed through the Meter. The maximum permissible current has the following values.

Standard Model 2.5 to 2,000Ω		Wide Range Model 0.5 to 40,000Ω		10 Watt Model with Multiplier Ω	
Impedance Multiplier Setting	Max. D.C. (mA)	Impedance Multiplier Setting	Max. D.C. (mA)	Multiplier Impedance Ω	Max. D.C. (mA)
0.1	500	0.1	1000	100	200
1.0	160	1.0	300	600	80
10	50	10	100	5000	30
100	16	100	30		
		1,000	10		

SERVICING OF INSTRUMENTS

Should it become necessary to return this instrument for service at any time, our Service Department will be assisted by the following procedure:-

(1) Write to: Service Department,
Works & Engineering Division,
Marconi Instruments, Ltd.,
Ridgmont Road, St. Albans.
giving the fullest possible details of the fault or of the service required.

(2) Send the instrument to the above address, complete with accessories and instruction book, and pack a copy of the above letter with the instrument.

This procedure will facilitate the work of our Service Department and expedite the return of the instrument.

4. SPECIFICATION

Standard Model Type TF 340

Power

Range — 0.1 milliwatt to 5 watts.

The instrument is scaled from 1.0 to 50 milliwatts, with multiplier steps of 0.1 1, 10 and 100.

Accuracy — The maximum accuracy is limited to that of the copper oxide rectifier.

150 to 2,500 c/s ± 5% of full scale.
50 to 5,000 c/s mean error less than 7%
30 to 10,000 c/s mean error less than 15%

Impedance

Range — 2.5 to 20,000 ohms as follows:-
25, 30, 40, 50, 60, 80, 100, 125, 150 and 200 ohms with multiplier steps of 0.1, 1, 10 and 100

Accuracy — In the region of 1,000 c/s nearly all impedance values are within ± 2%
200 to 4,000 c/s ± 7%
30 to 10,000 c/s, the mean error is less than 20%
the max.error is less than 50%

Wide Range Model Type TF 340/1

Power

Range — As standard model.

Accuracy — 150 to 2,500 c/s ± 7% of full scale reading
50 to 5,000 c/s max. error approx. 15%
30 to 8,000 c/s mean error less than 15%

Impedance

Range — 0.5 to 40,000 ohms, as follows:-
5, 6, 8, 10, 12.5, 15, 20, 25, 30 and 40 ohms, with multiplier steps of 0.1, 1, 10, 100 and 1000.

Accuracy — 200 to 3,000 c/s ± 7%
30 to 8,000 c/s mean error approx.20%
max. error less than 50%

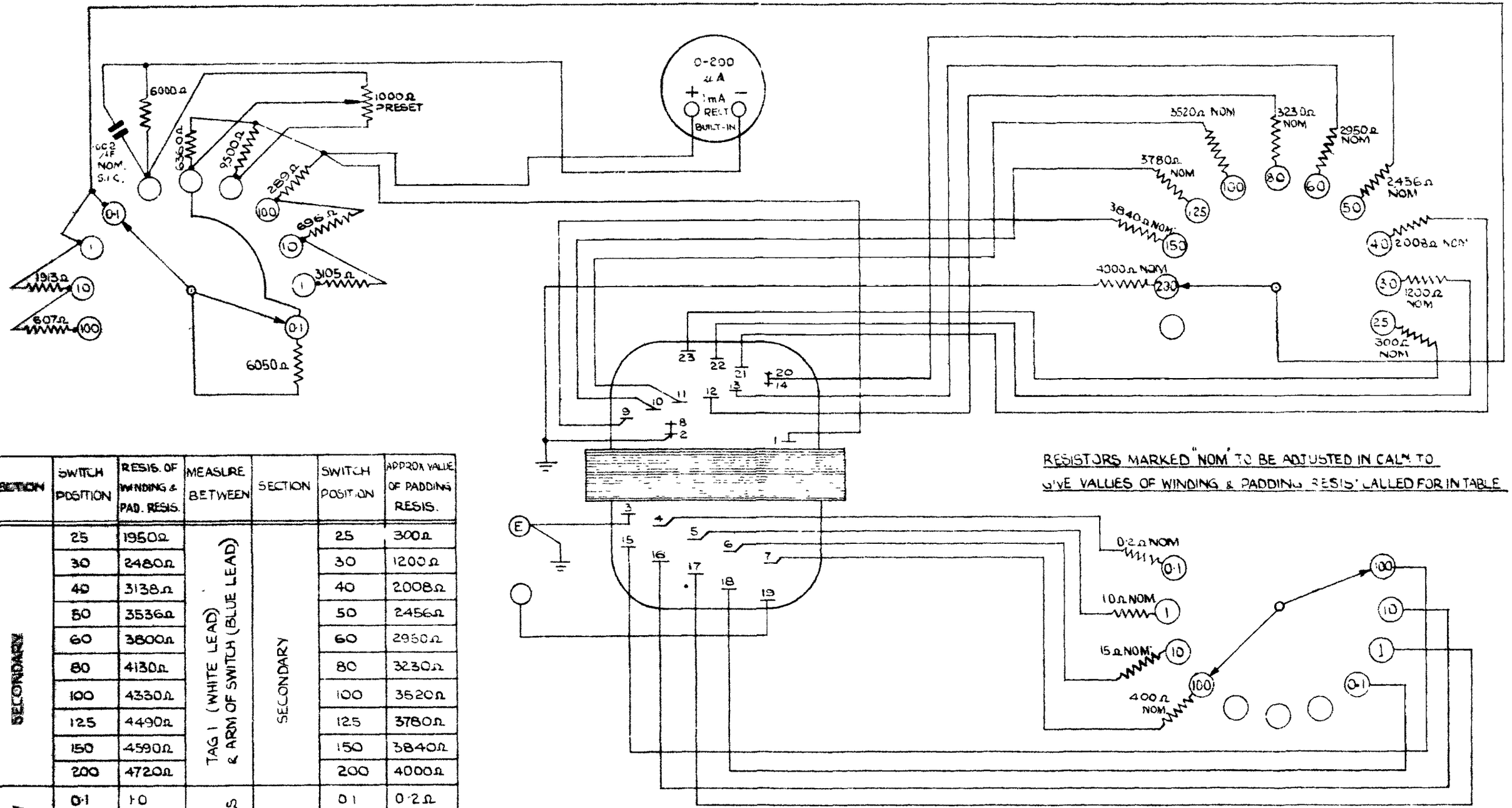
10-watt Model Type TF 340/2

As standard model, but fitted with an additional multiplier extending the power range to 10 watts at impedances of 100, 600 and 5,000 Ω

All Models

Equivalent Circuit — At low frequency the Meter input impedance is equivalent to a resistance shunted by an inductance. The above specifications are therefore based on equivalent shunt resistance and input voltage at low frequencies, and on equivalent series resistance and input current at high frequencies.

Calibration; — The calibration is made in terms of input voltage at a mean frequency, with a source of good waveform.



RESISTORS MARKED "NOM" TO BE ADJUSTED IN CALN TO GIVE VALUES OF WINDING & PADDING RESIS' CALLED FOR IN TABLE

SECTION	SWITCH POSITION	RESIS. OF WINDING & PAD. RESIS.	MEASURE BETWEEN	SECTION	SWITCH POSITION	APPROX VALUE OF PADDING RESIS.
SECONDARY	25	1950Ω	TAG 1 (WHITE LEAD) & ARM OF SWITCH (BLUE LEAD)	SECONDARY	25	300Ω
	30	2480Ω			30	1200Ω
	40	3138Ω			40	2008Ω
	50	3536Ω			50	2456Ω
	60	3800Ω			60	2950Ω
	80	4130Ω			80	3230Ω
	100	4330Ω			100	3520Ω
	125	4490Ω			125	3780Ω
	150	4590Ω			150	3840Ω
	200	4720Ω			200	4000Ω
PRIMARY	0·1	1·0	INPUT TERMINALS	PRIMARY	0·1	0·2Ω
	1	10·0			1·0	1·0Ω
	10	100			10	15Ω
	100	1000			100	400Ω

UNDERSIDE VIEW

MARCONI INSTRUMENTS LTD	
TITLE:- WIRING FOR POWER OUTPUT METER	
DRAWN. M.W.	ASSY T.E.3474.
DATE. 23-4-42	S.LIST. T.F.340.
CHKD. T.	SCALE
APPVD.	DRG Nº T.C.3475
TRACED W.M.M.	