

Advance

SIGNAL GENERATOR TYPE B.4.

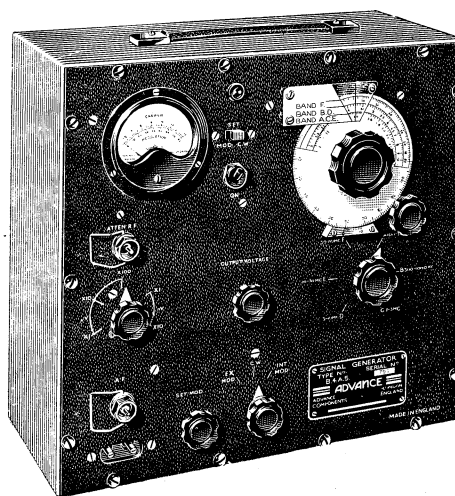
(Including B4A5 : B4B5 : B4A6)

THE Advance Type B4 Signal Generator provides instruments having a wide frequency range with accurate frequency and output voltage calibration.

The frequency ranges are 100 kc/s to 80 Mc/s on B4A and 30 kc/s to 30 Mc/s on B4B. The accuracy of frequency calibration is $\pm 1\%$. A linear scale and vernier are provided to give very close resetting accuracy. Due to the use of a crystal voltmeter followed by our type A.38 high frequency resistive attenuator, the output is measured to $\pm (1 \text{ db} + 2\% \text{ F.S.D.})$

The signal can be modulated internally at 400 c/s from 0—80%. External modulation, also 0—80% may be applied up to 30 kc/s into the B4A and up to 10 kc/s into the B4B. Both internal and external modulation depths are monitored.

The instruments are of robust construction and are simple to operate.



S P E C I F I C A T I O N

SPECIFICATION

Frequency ranges.

B4A	100 kc/s—80 Mc/s in 6 ranges.	Accuracy $\pm 1\%$.
	Range A. 100– 300 kc/s.	Range D. 3–10 Mc/s.
	Range B. 300–1000 kc/s.	Range E. 10–30 Mc/s.
	Range C. 1– 3 Mc/s.	Range F. 30–80 Mc/s.
B4B	30 kc/s–30 Mc/s in 6 ranges.	Accuracy $\pm 1\%$.
	Range A. 30– 100 kc/s.	Range D. 1– 3 Mc/s.
	Range B. 100– 300 kc/s.	Range E. 3–10 Mc/s.
	Range C. 300–1000 kc/s.	Range F. 10–30 Mc/s.

R.F. OUTPUT VOLTAGE Accuracy $\pm (1\text{db} + 2\% \text{ F.S.D.})$

The output voltage from the 75 ohm attenuator is fed into a 75 ohm transmission line which is terminated with a 75 ohm dummy aerial pad. The output into 75 ohms is continuously variable from $1 \mu\text{V}$ to 100 mV. by means of a 4-step decade attenuator and a continuously variable control. The signal is monitored after the variable control to ensure accuracy at high frequencies.

OUTPUT IMPEDANCE

The output impedance at the end of the unterminated transmission line is 75 ohms. When terminated by the Termination Pad type T.P.1A supplied with the instrument, three impedance values are available :—

- (1) 37 ohms (with full output).
- (2) 10 ohms (with one-tenth indicated output).
- (3) A standard dummy aerial (with one-tenth indicated output).

INTERNAL MODULATION

Frequency 400 c/s $\pm 10\%$.

Modulation depth 0–80% ; $\pm 1 \text{ db}$.

EXTERNAL MODULATION

B4A 10 c/s–30 kc/s, 0–80% for frequencies less than 1/30th of the carrier frequency.

B4B 10 c/s–10 kc/s, 0–80% for frequencies less than 1/30th of the carrier frequency.

Approximately 10% modulation depth per volt input into high impedance is obtained. The modulation depth is monitored. Accuracy $\pm 1 \text{ db}$.

S P E C I F I C A T I O N

A.F. OUTPUT

This is obtained from the internal modulation oscillator at 400 c/s \pm 10%. Output is approximately 0-10 volts into 600 ohms.

R.F. LEAKAGE

Good screening and filtering have reduced stray radiation to less than 1μ V.

ACCESSORIES

Each instrument is supplied with the following :—

- 1 ECC 91 Mullard Valve (6J6)
- 1 6SN7GT Valve.
- 1 6X5GT Valve.
- 1 Pilot Lamp, type M.E.S. 11 mm. 6.5 volt.
- 1 Termination and Dummy Aerial Pad, type TP1A.
- 1 Shielded R.F. Feeder, complete with plugs, type P.L.5.
- 1 Shielded A.F. Lead, complete with plug and crocodile clips, type PL.18.
- 1 Mains Lead, type P.L.24.

POWER SUPPLY

B4A5, B4B5 : 110, 210, 230, 250 volts 40-100 c/s.

B4A6 : 117 volts 25-60 c/s.

Consumption approximately 25 watts.

WEIGHT

25 lb. nett.

DIMENSIONS

13 ins. \times $12\frac{3}{8}$ ins. \times $7\frac{1}{4}$ ins.

SPECIFICATION OF TERMINATION PAD TYPE TP.1A

Input impedance 75 ohms.

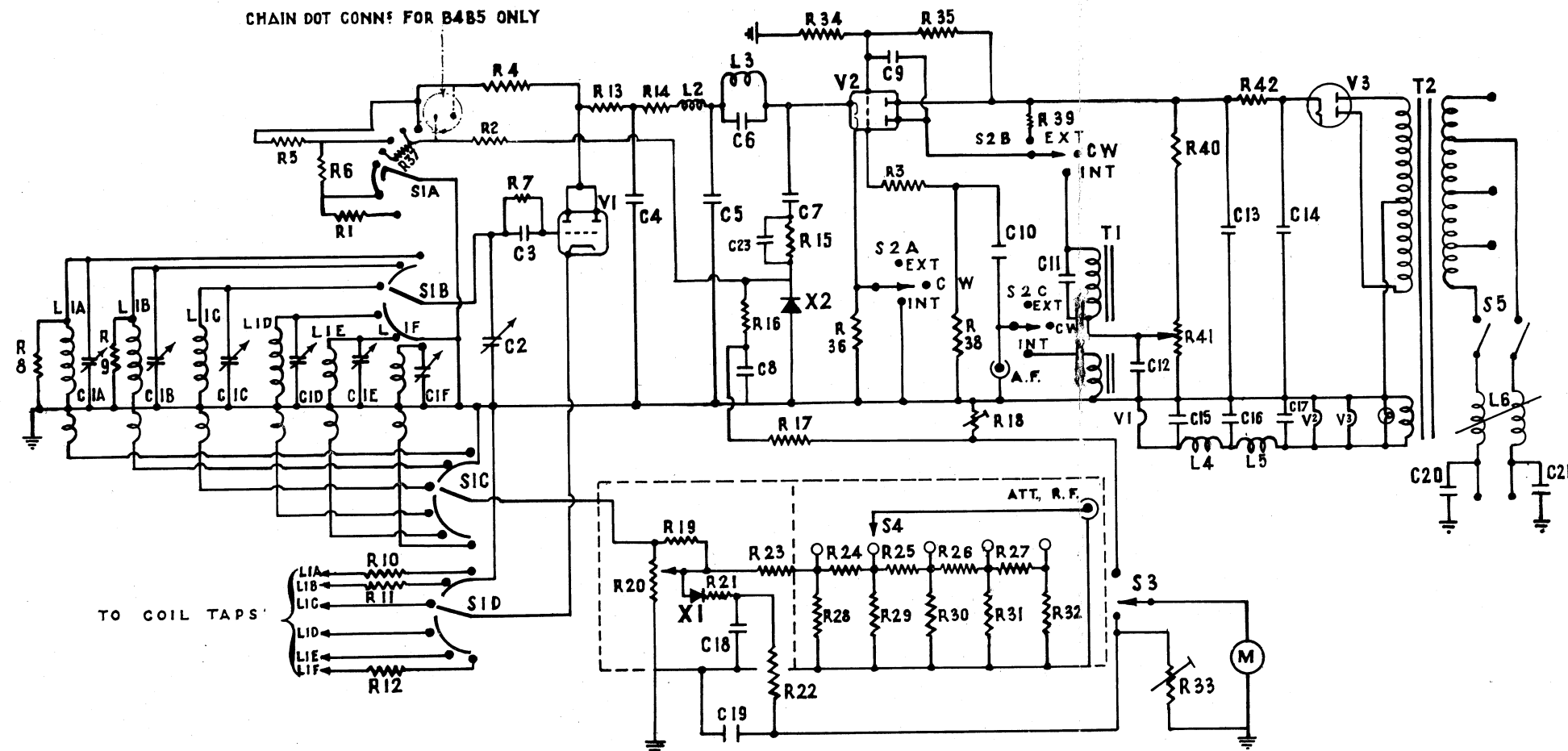
Outputs : 37 ohms at full voltage.

10 ohms giving one-tenth of input voltage.

A standard dummy aerial giving one-tenth of input voltage.

The TP1A is shown on the circuit diagram.

CHAIN DOT CONN[†] FOR B4B5 ONLY



CIRCUIT DIAGRAM
T. P. I. A.

NOTE.—The right is reserved to adjust valves or amend this circuit without notice.

RESISTORS

R.1.	15,000 ohms	±10%	¼ watt
R.2.	330,000	"	"
R.3.	10,000	"	"
R.4.	15,000	"	½ "
R.5.	5,600	"	¼ "
R.6.	10,000	"	"
R.7.	15,000	"	"
R.8.	100,000	"	"
R.9.	22,000	"	"
R.10.	1,000	"	"
R.11.	220	"	"
R.12.	2,200	"	"
On B4A connection is straight to the coil.			
R.13.	22	"	¼ watt
R.14.	1,000	"	"
R.15.	10,000	"	"

RESISTORS

R.16.	150,000 ohms	±10%	¼ watt
R.17.	100,000	"	"
R.18.	5,000	"	pre-set potentiometer
R.19.	330	"	±10% ¼ watt
R.20.	91	"	non-inductively wound potentiometer
R.21.	1,000	"	±10% ¼ watt
R.22.	2,200	"	"
R.23.	240	"	± 5% "
R.24.	743	"	± 1% ½ " high stability
R.25.	743	"	"
R.26.	743	"	"
R.27.	743	"	"
R.28.	120	"	"
R.29.	91	"	± 2% "
R.30.	91	"	"

RESISTORS

R.31.	91 ohms	± 2%	½ watt high stability
R.32.	82	"	"
R.33.	5,000	"	pre-set potentiometer
R.34.	1M.	"	±10% ¼ watt
R.35.	2.2M.	"	"
R.36.	5,100	"	"
R.37.	680,000	"	"
R.38.	1M.	"	"
R.39.	100,000	"	"
R.40.	5,100	"	"
R.41.	100,000	"	potentiometer 4 watt
R.42.	1,000	"	±10% ½ watt
R.43.	270	"	± 1% ½ "
R.44.	100	"	"
R.45.	11	"	± 2% "
R.46.	390	"	±10% ¼ "

CAPACITORS

C.1.	A-F 3-30	pF	Concentric Trimmers
C.2.	13-541	pF	Variable Condenser
C.3.	100	pF	Silvered Mica
C.4.	200	pF	±5% Silvered Mica on B4A
	750	pF	" " " B4B
C.5.	330	pF	" " " B4A
	1200	pF	" " " B4B
C.6.	220	pF	" " " B4A
	800	pF	" " " B4B
C.7.	0.5	μF	250v D.C.W. Paper Tubular
C.8.	0.5	μF	" " " "
C.9.	0.05	μF	350v " " "
C.10.	0.05	μF	" " " "
C.11.	0.05	μF	" " " "
C.12.	8	μF	Electrolytic
C.13.	16	μF	" " " on B4A5
			and B4B5
C.14.	32	μF	" " " on B4A6
	16	μF	" " " on B4A5
			and B4B5
	32	μF	" " " on B4A6
C.15.	0.04	μF	miniature metallized paper
C.16.	0.04	μF	" " " "
C.17.	0.04	μF	" " " "
C.18.	0.005	μF	moulded mica
C.19.	0.04	μF	miniature metallized paper
C.20.	0.005	μF	moulded mica
C.21.	0.005	μF	" " " "
C.22.	200	pF	" " " "
C.23.	300	pF	miniature metallized paper

COILS

L.1.	A-F	Oscillator Coils
L.2.		R.F. Filter Inductance
L.3.		R.F. " "
L.4.		L.T. R.F. Choke
L.5.		" " " "
L.6.		Mains R.F. " "
L.7.		Dummy Aerial Inductance

VALVES

V.1. ECC 91 (6J6) — V.2. 6SN7 GT — V.3. 6x5GT

RECTIFIERS

X.1.	Silicon Crystal Rectifier B.T.H. Type CS2A
X.2.	Selenium Rectifier S.T. & C. Type K2.5 or Q8/5

SWITCHES

S.1.	A-D	R.F. Switch
S.2.	A-C	Modulation Switch
S.3.		Meter Switch
S.4.		Attenuator Switch
S.5.		Mains Switch

TRANSFORMERS

T.1.	Modulation Transformer
T.2.	Main Transformer: Input 110-210-230-250v. 40-100 c/s on B4A5 and B4B5 Input 117v. 25-60 c/s on B4A6

O P E R A T I N G

MAINS VOLTAGE

The B4A6 is for use on 117V, A.C. only at 25–60 c/s. The B4A5 and B4B5 are normally despatched with the mains transformer set to operate at 220–240V. A.C. (40–100 c/s). For other supply voltages, withdraw the instrument from its case by unfastening the fixing screws round the edge of the front panel, unsolder the lead on the 230-volt tag on the mains transformer, and re-solder it to the appropriate tapping point.

With the correct mains voltage applied, the instrument may be switched on. Warming up takes only a few minutes.

FREQUENCY

Any frequency in the range of the instrument may be selected to an accuracy of $\pm 1\%$ by means of directly calibrated scales and a band selector switch. A linearly calibrated scale with vernier is also provided to enable high accuracy of re-setting to be obtained. If a given frequency is to be required on a number of occasions, the vernier scale reading should be noted, and when re-setting, the instrument should be set to the reading. Fine frequency adjustment is easily obtained using the double slow motion drive which gives a ratio of 25 : 1. When desired, however, the knob on the main dial may be used to swing from one end of the band to the other.

R.F. OUTPUT

The R.F. output, into a 75 ohm load, or available at the 37 ohm socket of the terminating pad, type TP1A, is variable between $1 \mu\text{V}$ and 100 mV by means of a continuously variable control and a 5 position 20 db per step attenuator. The output voltage is monitored at the input to the attenuator after the continuously variable control, by a crystal voltmeter with an open scale. This method avoids the frequency errors inherent in the continuously variable control.

I N S T R U C T I O N S

To read the output voltage, press the switch marked "SET MOD-CW" into the "CW" position. The output voltage available into a 75 ohm load or at the 37 ohm socket of the TP1A is the product of the reading of the meter, which is calibrated 0-15, and the setting of the step attenuator marked $X1\mu V$, $X10\mu V$, $X100\mu V$, $X1mV$, $X10mV$.

For accurate reading at the higher frequencies the output line must be correctly terminated, but up to about 5 mc/s the output voltage may be doubled with slight error by omitting the termination.

When using the "10 ohm" socket or the "dummy aerial" socket on the termination pad, the output voltage is one-tenth of the indicated output.

INTERNAL MODULATION

The signal may be internally modulated 0-80% at 400 c/s. With the modulation switch set to "INT MOD", modulation depth is varied by the "SET MOD" control. The modulation depth is monitored when the "SET MOD-CW" switch is set to "MOD". Since the modulation depth is determined by the ratio of modulating voltage to H.T. voltage, it is advisable to maintain accurately the mains input voltage to the generator.

EXTERNAL MODULATION

The signal may be modulated from an external source up to 80%, the frequencies of modulation being 10 c/s to 30 kc/s into the B4A and 10 c/s to 10 kc/s into the B4B. The upper modulation frequency is limited to 1/30th of the carrier frequency. It is desirable that the mains input voltage be accurately maintained for metering to be accurate. The external modulating signal is injected into the "A.F." socket with the modulation switch set to "EXT MOD". Input impedance is high, A.D.C. blocking condenser is incorporated.

AUDIO FREQUENCY OUTPUT

A signal is available at the A.F. socket from the internal 400 c/s modulating oscillator, when the modulating switch is on "INT MOD". Approximately 0–10 volts is available into 600 ohms varied by the "SET MOD" control. This output is taken from the secondary winding of the modulation transformer and has a low D.C. resistance to earth.

METER ADJUSTMENT

The monitoring circuits are correctly adjusted before leaving the factory. If after long use they become inaccurate, they may be corrected by means of the preset potentiometers provided. These potentiometers are situated just under the mains transformer.

The most accurate method of adjusting the R.F. metering is by the use of a calibrated crystal voltmeter with input impedance of 75 ohms, which will indicate 100 mV. With 100 mV into the calibrating meter the instrument meter reading is adjusted to read 10 (X10 mV).

An alternative is to adjust the metering at a low R.F. frequency, preferably about 1 Mc/s. The output into a valve voltmeter should be 200 mV when the instrument reads 100 mV.

The modulation depth indication may be adjusted using an oscilloscope. Care should be taken to avoid errors due to the distortion of the oscilloscope amplifiers. It may be preferred to use the cathode ray tube plates directly, obtaining the deflecting voltage by loose coupling to the tuning condenser.

62
252

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WELLINGTON

Advance

SIGNAL GENERATOR

TYPE B4

including B4A5, B4B5, and B4A6

INSTRUCTION MANUAL

With the Compliments of
TURNBULL & JONES LTD.
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