Amalgamated Wireless (Australasia) Ltd.

INSTRUCTION BOOK NO. 1070R

OPERATION AND MAINTENANCE

MODULATED OSCILLATOR

A.W.A. TYPE C1070

47 York Street, Sydney

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A.M.A. MODULATED OSCILLATOR

TYPE C1070

THE PURPOSE OF THE INSTRUMENT

This instrument has been designed for use in servicing all kinds of radio receivers. Modulated or unmodulated signals of any frequency between 100 Kilocycles and 20 Megacycles are available.

THE FOLLOWING TESTS MAY BE CARRIED OUT RAPIDLY AND WITH AMPLE SERVICE ACCURACY:

1. Alignment of I.F. and R.F. circuits at any desired frequency.

2. Adjustment of receivers provided with wavelength or kilocycle scales to correct dial calibration by setting trimmers and padding condenser.

3. Examination of ganged T.R.F. circuits for errors in tracking.

4. Measurement of overall sensitivity of all types of receivers at any frequency, and gain of I.F. amplifiers.

5. Estimation of noise level at higher sensitivities by comparison of audio outputs between modulated and unmodulated carrier of equal strength.

6. Determination of stage gain in I.F. or R.F. amplifiers.

7. Testing of valves for performance under

working conditions by insertion of several in succession in a given socket in a receiver and noting the change in stage gain or overall sensitivity.

8. Checking the performance of A.V.C. in receivers.

9. Measurement of selectivity of I.F. or R.F. amplifiers in terms of band width in kilocycles, for input signals one hundred or one thousand times larger than the signal on tune required to give some chosen value of audio output.

10. Determination of image ratio, or the ratio of the micro-volts input at the image or second spot frequency to the micro-volts at the wanted signal frequency, both giving equal audio output.

This comprehensive list of tests covers more than is usually required in receiver servicing. None of these tests requires an instrument with capabilities of accuracy available in a signal generator. Consequently the controls and methods of calibration can be modified in the direction of speeding up and generally simplifying operation. This object has been the aim in the design of the Type C1070 modulated oscillator, and has been achieved with but small reduction in accuracy below average signal generator performance.

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DESIGN AND PERFORMANCE

FREQUENCY RANGE

100 Kc to 20,000 Kc in six ranges, selected by a switch.

Range A, 96 Kc to 250 Kc.
Range B, 240 Kc to 600 Kc.
Range C, 560 Kc to 1420 Kc.
Range D, 90 metres to 220 metres (1,360 Kc to 3,330 Kc.).
Range E, 37 metres to 96 metres (3,120 Kc. to 8,100 Kc.).
Range F, 15 metres to 38 metres (7,900 Kc. to 20,000 Kc.).

All ranges are directly calibrated on a rotovisor type dial; A, B and C are marked in kilocycles and D, E and F in metres.

Calibration accuracy is better than 1 per cent on range C, and within 2 per cent on the other ranges.

OUTPUT

The attenuator calibration indicates directly the approximate microvolts output on Ranges B and C. It is calibrated 1, 3, 10, 30, etc. up to 100 M (100,000) with two extra markings not carrying accompanying figures. The one adjacent to the 100,000 mark is 300,000 and the last one is the extreme position for the pointer when turned clockwise.

The approximate output signal on the other ranges may be estimated from the following table:

Range	Multiplying Factor for Attenuator Calibration
A	1.4
B	1
C	1
D	0.5
E	0.2
F	0.08

The average maximum R.F. output on each band is therefore:

A	400 Millivolts
B	300 Millivolts
C	300 Millivolts
D	150 Millivolts
E	60 Millivolts
F	25 Millivolts

The attenuator reacts noticeably upon the carrier only at the higher outputs. The frequency change caused through advancing the attenuator control from low outputs up to the position marked 100 M is approximately as follows:

High frequency end of band 0.3 per cent.
Middle of band 0.1 per cent.
Low frequency end of band 0.05 per cent.

On position 300 M the shift of carrier

frequency will be three times greater, as the change of frequency is directly proportional to the indication of the attenuator control.

It is important that the special shielded cable supplied should be used with the oscillator always, otherwise the above figures for R.F. output on each band will not hold. This cable has the correct characteristics to suit the attenuator, and to behave as a dummy aerial on the broadcast and the short wave ranges (for alignment purposes only).

Leakage signal through the attenuator cannot be detected except at about 20 Mc. where it is of the order of less than one microvolt. The relative ratios of attenuation as marked on the attenuator scale are almost unaffected by the value of the operating radio frequency.

MODULATION

The modulator oscillator is adjusted to approximately 400 C.P.S. by adjusting the air gap of the TA1060 Transformer. The modulation depth is set at about 30 per cent on the low frequency bands by means of a resistance in parallel with the "tank" circuit of the audio oscillator. The only serious departure from the figure of 30 per cent for the modulation depth occurs on band F where it rises to about 45 per cent. The battery switch has 3 positions, OFF, MOD. OFF, and MOD. ON, allowing the

radio frequency output to be obtained free from modulation in the middle position.

CONSTRUCTION

The coils and wave change switch together with the wiring and the oscillator valve socket are individually screened, and form together a complete assembly. This assembly, the variable condenser and modulator oscillator system are mounted to a rear panel. In this way radio frequency currents in this panel cannot give rise to external stray fields due to the shielding effect of the front panel and outside metal case.

The variable condenser is operated by a smooth eight to one reduction drive situated between the two panels. The piston or variable capacitance attenuator also lies between the two panels and is of special design. It contains no fragile electrical parts, as in the resistance type attenuators, that may require replacement.

At one end of the brass tube is placed an insulated metal disc that is connected to the tank circuit of the R.F. Oscillator. A second and similar disc is carried on the face of an insulated piston, and is connected to the output terminal on the front panel.

The batteries are strapped in the rear of the case, and are wired to a terminal panel at the side where clearance holes (insulated) are provided for insertion of the prods of a voltmeter to check voltages without opening the case.

EQUIPMENT

Valves. Two type 30 Radiotrons are used - one as R.F. oscillator and one as 400 cycle Audio oscillator.

Batteries. Four 4.5 Volt Bias Batteries (drain 60 mA) and one 60 Volt Light Duty Battery (drain 3 to 5 mA) are required. The Bias Batteries are connected in parallel to operate the filaments in series.

The condition of the batteries may be checked with a volt-meter through the holes in the side of the case.

Satisfactory Voltage Limits are as follows:

"A" Battery	3.5 to 4.5 Volts.
"B" Battery	50 to 60 Volts.

It is not desirable to continue to use batteries of voltages below these limits.

To instal or change batteries or valves proceed as follows:

1. Turn the tuning control (the knob second from the right) so that pointer indicates 100 Kc. on range A, otherwise the tuning condenser may be damaged.

2. Lay the oscillator on the bench face up, and take out the screws round the edge of the front panel.

3. Lift the oscillator out of the case by taking hold of the edge of the front panel.

4. See that a good 30 valve is held firmly in each socket.

5. Assemble the batteries in the back of the case. See that they are held firmly with the straps provided. See diagram 1070D4.

6. See that the battery switch is turned to OFF.

7. Connect the batteries according to Drg. No. 1070D4.

8. Re-assemble the oscillator in the case.

OUTPUT METER

To make satisfactory use of the modulated oscillator it is necessary to connect an output meter to the receiver under test.

A standard rectifier type of output meter is most convenient, or a conventional design of valve voltmeter may be used.

An economical substitute is suggested as follows:

A standard D.C. voltmeter of 1000 ohms per volt may be used in conjunction with a valve operating as a diode rectifier. The valve may be a filament type or indirectly heated type. The plate and all grids are

connected together to form a diode plate.

An output meter may be constructed according to Drg. No. CD379. Using a D.C. voltmeter on ranges 0-3, 0-30 and 0-300 volts and resistance 1000 ohms per volt the following A.C. voltage ranges were obtained using a type 76 and a type 30 valve:

D.C. RANGE	R.M.S. AC RANGES	
	76	30
0-300	0-250	0-290V
0-30	0-33	0-35V
0-3	0-6.5	0-9.0V

CONTROLS

The oscillator has four controls (from left to right).

No. 1 Range Switch. This control selects the coil for use on any desired range.

No. 2 Battery Switch. The battery switch has three positions.

(i) The first position, OFF; both the A Battery and B Battery circuits are open.

(ii) In the second position, MOD. OFF, the A Battery is connected to both valves but the B Battery is connected to the R.F. oscillator only.

(iii) In the third position, MOD. ON,

the B Battery is connected to the Modulator valve also; thus modulated and unmodulated carrier are available.

No. 3. Frequency Selector. By turning this knob any desired frequency throughout the range corresponding to the setting of the range switch may be obtained. Use the scale corresponding to the setting of the Range Switch.

No. 4. Attenuator. By turning this knob the amount of the output signal may be adjusted to any desired level. The approximate value of this signal may be estimated from the data given on page 3.

OPERATION

1. Set the modulated oscillator about one foot to the left of the receiver under test.

2. Connect the output cable to the terminals of the oscillator. Connect the braided lead with coloured tracer in the braiding to the insulated terminal of the oscillator by means of the spade terminal. Connect the plain lead to the earthed terminal.

3. Connect the other end of the cable to the receiver under test. The plain lead is to be connected to the earth terminal and the other lead (tracer) to the aerial terminal or grid cap of

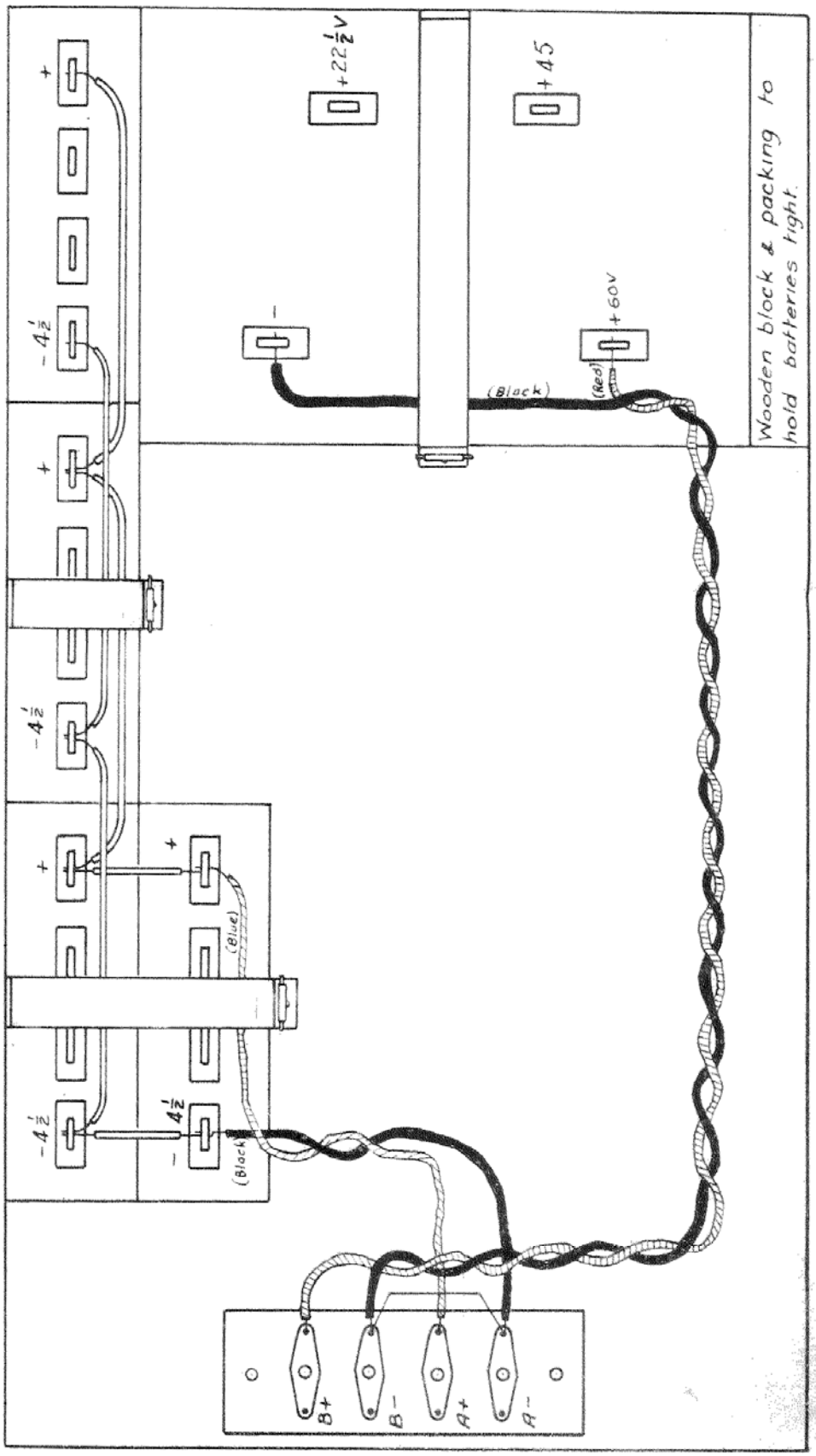
a valve as required. When connected to the grid cap it is necessary to connect a resistor between the grid cap and earth to complete the bias circuit (about 250,000 ohms or larger is suitable).

4. Connect an output meter in the plate circuit of the last valve. See Drg. No. CD379.

5. Turn the battery switch to the MOD. ON position and select the desired test frequency by means of the range switch and the frequency control.

6. Tune the receiver to the frequency of the oscillator and adjust the attenuator to give a convenient deflection on the meter. Any tests listed on page 1 may now be carried out.

CAUTION - Be sure that the Battery Switch is turned OFF when the oscillator is not in use.



AMALGAMATED WIRELESS (AUSTRALASIA) LTD., SYDNEY	SK No.		SPEC. R.S.
	DRAWN		TYPE 1C1070
INSTALLATION & CONNECTION OF BATTERIES FOR MODULATED OSCILLATOR	TRACED	J.E.S.	
	CHECK		DRG. No. 1070D
	DATE	20/11/36	

AMALGAMATED WIRELESS (AUSTRALASIA) LTD SYDNEY

CIRCUIT DIAGRAM

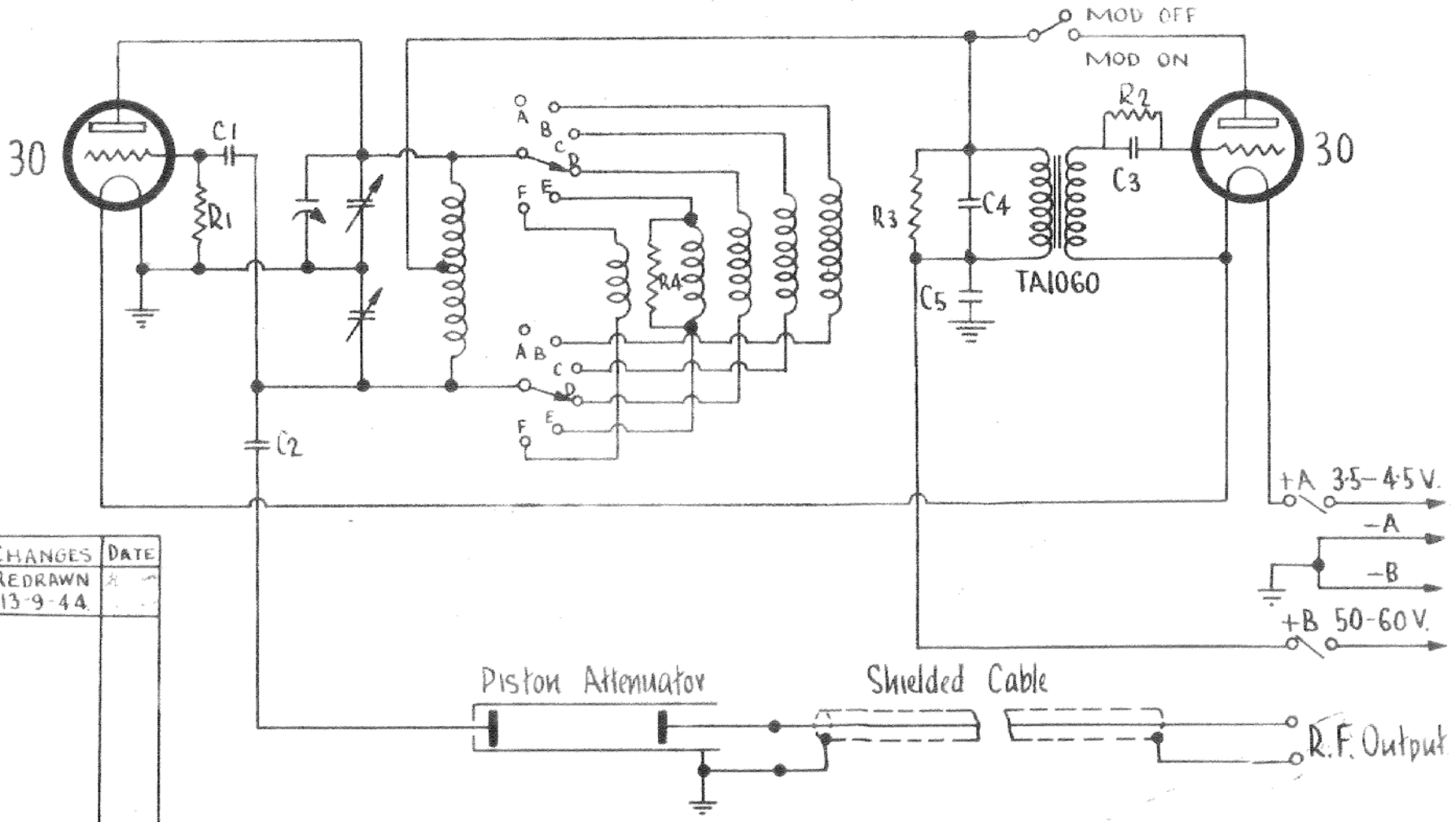
MODULATED OSCILLATOR.

DRAWN	SK No.	
TRACED		
CHECKED	SPEC	
DATE		R.S.

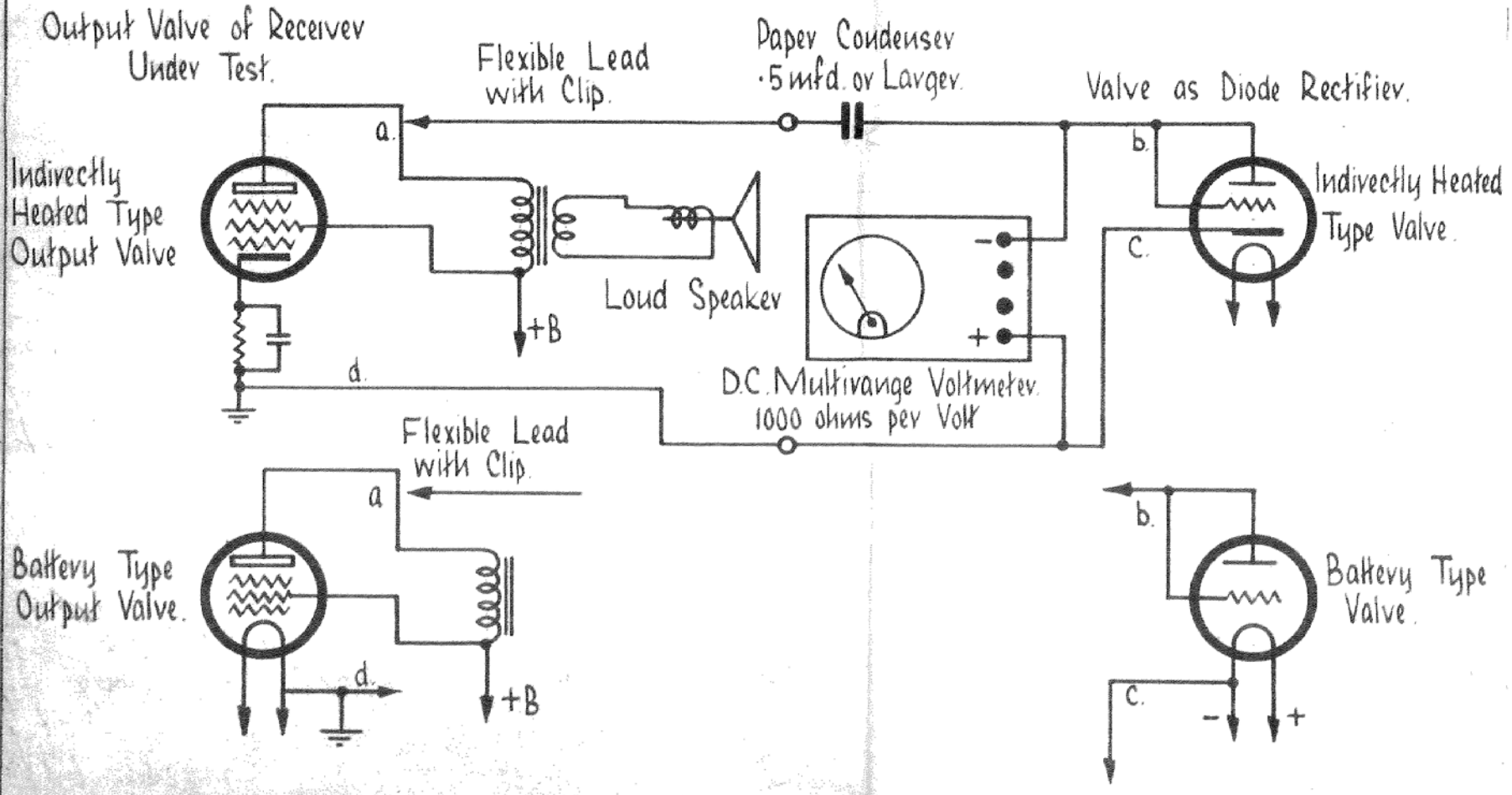
TYPE C1070

DRG. No. CD377.

CHANGES	DATE
REDRAWN 13-9-44.	



OUTPUT METER.



AMALGAMATED WIRELESS (AUSTRALASIA) LTD. SYDNEY

VALVE RECTIFIER OUTPUT METER WITH CONNECTIONS TO RECEIVER.

SK No.	DRAWN	TRACED	CHECK	SPEC.	R.S.

DATE 17-9-35

TYPE

DRG. No. CD379.