TRIMAX TRANSFORMERS

(CLIFF & BUNTING PTY. LTD.)

CHARLES STREET, NORTH COBURG, VICTORIA

OUTSIDE BROADCAST AMPLIFIER TYPE A. 32.
and
POWER CONVERTER P. 31.

1.0. DESCRIPTION :

1.1. Application : The Trimax outside broadcast Amplifier Type A.32 has been designed to give studio control facilities at outside locations. It has four individually controlled, high gain, low noise, pre-amplifiers which are fed into a common amplifying channel. Facilities are provided for monitoring the programme, and metering valve currents; switching is also provided to allow a telephone to be connected to the programme line for cueing purposes.

In addition, the gain and frequency response of the amplifier together with the extremely low noise level, make the amplifier useful for laboratory tests and measurements.

1.2. Characteristics: The circuit design and construction is such that the amplifier will perform with the utmost efficiency and dependability under all normal operating conditions, and, in addition is capable of withstanding considerable mechanical and electrical abuse. All components are conservatively rated and mechanically stable. The low level amplifying stages are shock mounted on a high-mass platform, to reduce microphonic effects and guard against possibility of mechanical damage. The power supply, which is carried in the same case, is designed on similar lines. The carrying case provided is of Bond wood, covered with plasticised fabric, with metal angles and corners to resist abrasion.

1.3. Attenuators : The amplifier is fitted with the new Trimax attenuators. These have solid stainless silver alloy contacts and collector ring. This alloy has the property to resist practically all chemicals both organic and inorganic. Compounds of sulphur and chlorine, which usually cause the most damage in electrical circuits, have virtually no effect on this special alloy. Tests have shown that only commercial nitric acid will stain the metal, but without causing serious noise.

Abrasive particles are quickly removed from the contact surfaces by the design adopted, with the result that noise due to this source is minimised. In addition, when the dust covers are in place, it is unlikely that any significant quantity of dust will reach the contacts.

The moving contacts are mounted on a specially heat treated silver plated beryllium copper spring of special design. This is mounted in a clutch assembly. In conjunction with the stops located on the knob and dust cover, this clutch mechanism gives very great ease in affixing the knob to the spindle. It is only necessary to set the knob on the spindle in any position and turn it (if necessary against the clutch) until "Zero" and "Infinity" register correctly. This ensures, automatically, correct lining up of the contact arm and attenuator calibration.

1.4. Specification :

1.4.1 Frequency response	:	30 - 15,000 cycles ± 1db
1.4.2 Input impedance	:	to suit 50 ohm microphone (or pick-up)
1.4.3 Source impedance	:	50 ohms.

1.4.4	Output impedance	:	600 ohms ± 10%
1.4.5	Load impedance	:	600 ohms
1.4.6	Overall gain	:	Approximately 105 db
1.4.7	Maximum output level	:	+ 21 db.
1.4.8	Distortion	:	Less than 4% at + 21 dbm.
1.4.9	Noise	:	40 db below 21 dbm out (gain 100 db) (in production, many amplifiers have absolute input noise levels of - 134 db or better)
1.4.10	Controls - front panel	:	4 Channel attenuators having 28 steps of 1.66 db and 3 steps to Infinity, with common master gain control having similar characteristics.
1.4.11	Metering circuits	:	All tube cathodes and a monitoring position are selected by the metering switch S.2 and are read on the V.U. meter. The characteristics of this meter are such that with the metering switch in the + 8 V.U. position, the meter will read 0.V.U. when the level in the programme line is + 8 dbm. Valve currents are indicated by meter readings which should not be outside 50% - 90% on the lower V.U. meter scale.
1.4.12	Control Switch	:	Four positions are provided :- Off, On, Dial lamp (DL) and Telephone (TEL.). This switch disconnects both plate and filament supplies in the off position. In the DL position the panel lamp is switched on illuminating the meter and controls. In the position TEL. the line is connected to the telephone jacks at the rear of the amplifier and the amplifier is terminated at 600 ohms internally.
1.4.13	Rear circuits	:	At the rear of the case are located the input sockets for each of the preamplifiers, power connection socket and three pairs of jacks. These are for (a) Telephone (b) Line (c) Bridging The last pair of jacks are connected directly across the

output transformer secondary circuit. A location plate which shows the position of the various connections, is fitted on the back of the amplifier case.

1.4.14 Tube Complement : V1) V2) V3) 6AU6 V4) V5) V6) 6SJ7GT V7) 6SN7GT

1.4.15 Dimensions : Amplifier 14½" x 9¼" x 8½"

Power Unit - 9½" x 9" x 4½"

Carrying Case - 21" x 10½" x 16" high.

2.0. PRINCIPLES OF OPERATION :

2.1. Circuit Details : The circuit consists essentially of four stages. For the preamplifier stage four valves Type 6AU6 are operated as individual amplifiers, but have a common screen supply resistor and condenser. These are each preceded by a multi-shielded, unterminated, input transformer suitable for use with a 50 ohm source. The output of each tube is applied to an individual fader (R1, R2, R3, and R4) and mixing is accomplished at the output of these faders.

The common amplifier channel consists of three stages with a master gain control following the first stage (V5). Negative feedback is applied over V6 and V7. A simple phase-splitting arrangement is used to give push-pull output from the 6SN7. This allows a smaller output transformer to be used, for the same output power.

3.0. OPERATION : The Trimax amplifier Type A.32 has been designed for use with power converter Type S.31. It may also be used with battery supply of 6 volts, 2.4 A. and 200 volts, 20 MA approximately.

3.1. Maintenance : Access to the amplifier is obtained by unscrewing two captive screws at the rear of the amplifier. Care should be exercised when the case is being removed from or returned to the amplifier. The panel fitting has been made as neat as possible in order to exclude dust. In addition, as a V.U. meter is being used, the front panel must be made in a non-magnetic material, in this case brass. It is, therefore, necessary to see that no undue force is applied to the panel when the amplifier is out of the case. When in the case the panel is rigidly supported. Once the amplifier has been removed, access to the tubes, switches and jacks may be obtained from the top while faders and minor components are accessible from below. For ease of access in the small available space, the panel carrying the major portion of the components has been pivoted, and provided with two captive screws. When these are undone, the panel may be lifted giving access to the interior components. Owing to the fact that the amplifier is by nature unavoidably slightly

cramped, it is apparent that capacative or other effects could be produced should certain leads be placed in proximity to each other. The layout has actually been made so that such leads are kept well apart and under normal conditions, the amplifier is perfectly stable. Should repairs be necessary, it would be advisable to see that leads which may have been removed are returned to their former position - although considerable latitude is allowable.

Should any condensers require replacement, it is essential that correct connections be used and that outer foils be replaced with the same polarity.

3.2. Attenuators : The attenuators as provided have been lubricated and should not require attention for a considerable period. As explained earlier, it is extremely difficult to cause noise with the special alloy silver contacts used, and since they are individually protected by dust covers, it is unlikely that maintenance will be required except at widely spaced intervals.

4.0. POWER SUPPLY :

4.1. General : The power converter Trimax Type S.31 which accompanies the amplifier fits into the main carrying case and provides one location for the main amplifier during transport. This unit enables the amplifier to be operated on either 6 volts D.C. or 200-250 volts A.C. 40-60 cycles.

4.2. Operation : Non-synchronous vibrators are used together with a thermionic rectifier which gives good regulation. The control switch has five positions, namely A.C., Off, Vibrator 1, Off and Vibrator 2. The unit is fitted with Trimax tap-changing fuse-holder which enables correct A.C. operating voltage to be chosen while also giving fuse protection. Fuses used should be rated at 0.5 to 1.A. The vibrators and rectifier are mounted on a high mass shock insulated sub-chassis which enables mechanical noise produced by the vibrators to be minimised. It should be noted that the vibrator cases are 6 volts positive to earth and, therefore, the utmost care should be taken to ensure that they do not short to the chassis. When replacing components, it is necessary to make sure that polarities are observed.

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COMPONENTS LIST TRIMAX TYPE A32 O.B.

DATE NOV. '50.

RESISTORS

R62/63 = 1000Ω

R40/43 — 3MEG, R44/45 — 10K, R46 — 5K, R47 — 1.5K
R49/50 — 60K, R50 — 20K, R51/55 — 15K, R60/61 — 10K.

	R1	Attenuator Type A.26 P.	Trimax
	R2	Attenuator Type A.26 P.	Trimax
	R3	Attenuator Type A.26 P.	Trimax
	R4	Attenuator Type A.26 P.	Trimax
	~~R5~~	~~25 K. 1/2 Watt 10%~~	~~I.R.C.~~
	R6	100 K.1/2 Watt 10%	I.R.C.
	~~R7~~	100 K.1/2 Watt 10%	I.R.C.
	R8	100 K.1/2 Watt 10%	I.R.C.
	R9	100 K.1/2 Watt 10%	I.R.C.
	R10	2.5 K.1/2 Watt 5%	I.R.C.
	R11	2.5 K.1/2 Watt 5%	I.R.C.
	R12	2.5 K.1/2 Watt 5%	I.R.C.
	R13	2.5 K.1/2 Watt 5%	I.R.C.
	~~R14~~	~~25 K. 1/2 Watt 10%~~	~~I.R.C.~~
	R15	1 K. 1/2 Watt 5%	I.R.C.
	~~R16~~	~~250 K.1/2 Watt 10%~~	~~I.R.C.~~
	R17	100 K.1/2 Watt 10%	I.R.C.
	R18	Attenuator Type A.3 P.	Trimax
	~~R19~~	~~2 K. 1/2 Watt 5%~~	~~I.R.C.~~
	R20	500 K.1/2 Watt 10%	I.R.C.
	R21	100 K.1/2 Watt 10%	I.R.C.
	~~R22~~	~~25 K. 1/2 Watt 10%~~	~~I.R.C.~~
	R23	500 K.1/2 Watt 10%	I.R.C.
	R24	750 Ohm 1/2 Watt 5%	I.R.C.
	R25	500 K. 1/2 Watt 10%	I.R.C.
	R26	200 K. 1/2 Watt 5%	I.R.C.
	R27	20 K. 1/2 Watt 5%	I.R.C.
X	R28	500 K. 1/2 Watt 5%	I.R.C.
	R29	7 K. 1/2 Watt 5%	I.R.C.
	R30	9 K. 1/2 Watt 5%	I.R.C.
	~~R31~~	~~25 K.1/2 Watt 10%~~	~~I.R.C.~~
	R32	100 Ohm 1/2 Watt 5%	I.R.C.
	R33	3.5 K. 1/2 Watt 5%	I.R.C.
	R34	100 Ohm 1/2 Watt 5%	I.R.C.
	R35	3.5 K. 1/2 Watt 5%	I.R.C.
	R36	600 Ohm 1/2 Watt 10%	I.R.C.
	~~R37~~	~~5 K. 1/2 Watt 10%~~	~~I.R.C.~~
	~~R38~~	~~15 K. 1/2 Watt 10%~~	~~I.R.C.~~
	~~R39~~	~~70 K. 1/2 Watt 10%~~	~~I.R.C.~~

CONDENSERS :

	C1	25 u.f. 40 V.W. Electrolytic	Ducon ET10769
	C2	25 u.f. 40 V.W. Electrolytic	Ducon ET10769
	C3	25 u.f. 40 V.W. Electrolytic	Ducon ET10769
	C4	25 u.f. 40 V.W. Electrolytic	Ducon ET10769
	~~C5~~	~~.5 u.f. 200 V.W. Paper~~	~~Technico~~
	~~C6~~	~~24 u.f. 350 V.W. Electrolytic~~	~~Ducon ET1049~~
	C7	.25 u.f. 200 V.W. Paper	Technico
	C8	.25 u.f. 200 V.W. Paper	Technico
	C9	.25 u.f. 200 V.W. Paper	Technico
	C10	.25 u.f. 200 V.W. Paper	Technico
X	C11	~~.008 u.f. 400 V.W. Mica~~	~~Simplex S.M.~~

CONDENSERS.

C11 - 25μf 40P.V, C20/23 — .01μf, C24 - ~~8~~ 16μf
C25 - 8μf. C26 - 16μf.

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COMPONENTS LIST TRIMAX TYPE A32 O.B. AMPLIFIER.

DATE NOV.'50.

PART NO.	DESCRIPTION	MANUFACTURE.
	CONDENSERS CONTD. :	
~~C12~~	~~.25 u.f. 200 V.W. Paper~~	~~Technico~~
C13	.25 u.f. 200 V.W. Paper	Technico
X C14	.008 u.f. 400 V.W. Mica	Simplex S.M.
C15	.25 u.f. 200 V.W. Paper	Technico
~~C16~~	~~24 u.f. 350 V.W. Electrolytic~~	~~Ducon ET1049~~
C17	.05 u.f. 200 V.W. Paper	Technico
C18	.25 u.f. 400 V.W. Paper	Technico
X C19	.015 u.f. 400 V.W. Mica	Technico
	VALVES :	
V1	6AU6)	Radiotron
V2	6AU6)	Radiotron
V3	6AU6) Selected for Low Noise	Radiotron
V4	6AU6) Level	Radiotron
V5	6AU6)	Radiotron
V6	6 SJ7GT	Radiotron
V7	6 SN7GT	Radiotron
	MISCELLANEOUS :	
T1	Transformer Type MS 977	Trimax
T2	Transformer Type MS 977	Trimax
T3	Transformer Type MS 977	Trimax
T4	Transformer Type MS 977	Trimax
T5	Transformer Type TA 1015	Trimax
P1	Socket Type S.3F	Trimax
P2	Socket Type S.3F	Trimax
P3	Socket Type S.3F	Trimax
P4	Socket Type S.3F	Trimax
P5	Socket Type S.6M	Trimax
J1	Twin-Single Circuit Jacks	
J2	Twin-Single Circuit Jacks	
J3	Twin-Single Circuit Jacks	
J4	Twin-Single Circuit Jacks	
J5	Side Contact Lamp Jack	
M1	V.U. Meter	Weston Type 732
S1	Switch 6 Pole 4 Position	M.S.P.
S2	Switch 2 Pole 9 Position	M.S.P.

NOTE : COMPONENTS MARKED " X " ARE SUBJECT TO VARIATION FROM NOMINAL VALUES GIVEN.

TRADE MARK

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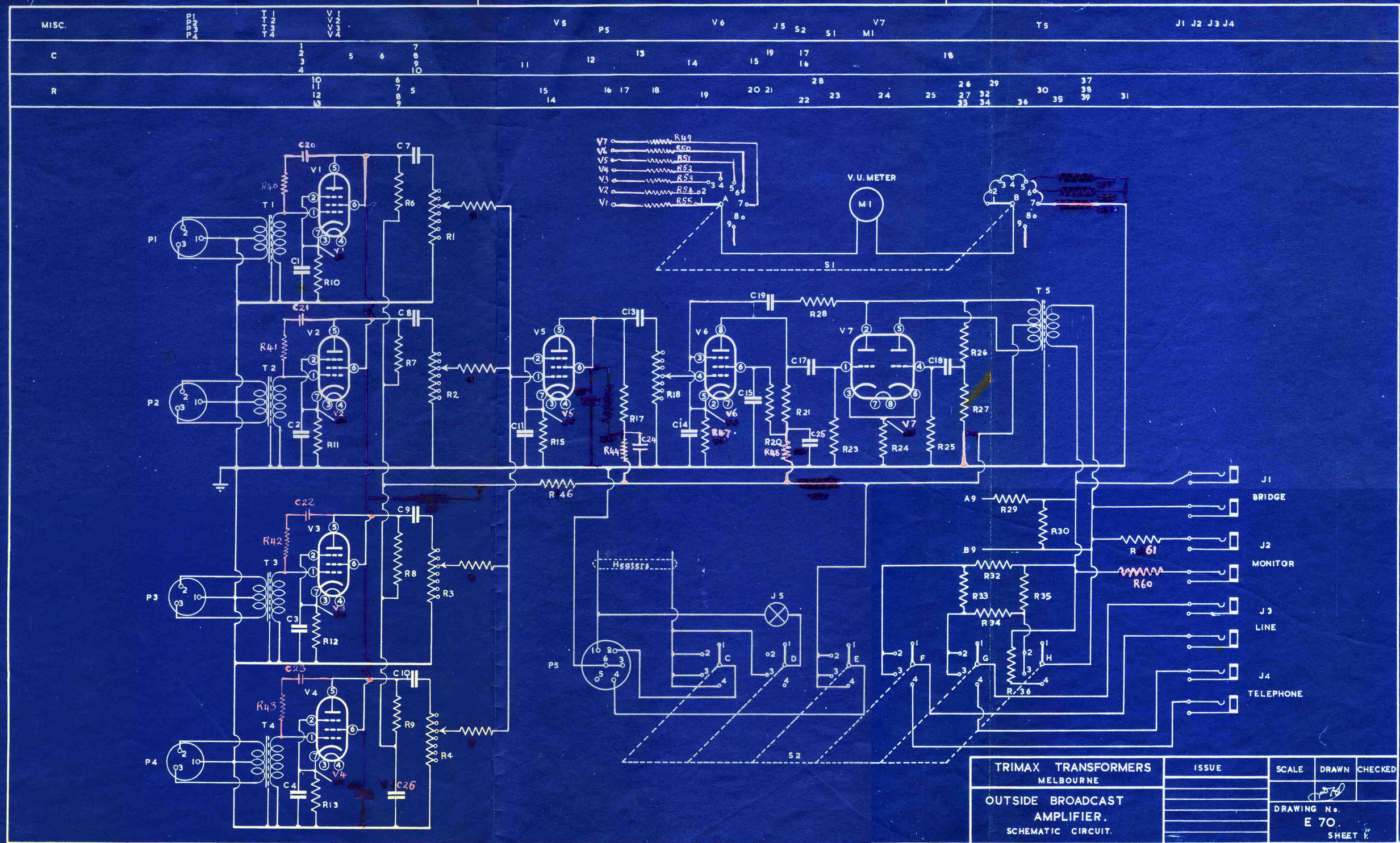
COMPENENT LIST TRIMAX POWER CONVERTER TYPE S.31.

DATE Nov.1950.

PART NO.	DESCRIPTION	MANUFACTURE
C.1	Condenser 500 u.f. 12 V.W. Electrolytic	Ducon EE0823
C.2	Condenser 24 u.f. 350 V.W. Electrolytic	Ducon EE0889
C.3	Condenser 24 u.f. 350 V.W. Electrolytic	Ducon EE0889
C.4	Condenser .004 u.f. 2 K.V. Test Mica	Simplex S.M.
C.5	Condenser .004 u.f. 2 K.V. Test Mica	Simplex S.M.
C.6	Condenser .5 u.f. 200 V.W. Paper	Ducon PC205
T.1	Transformer Type TP1772 A	Trimax
T.2	Choke Type TZ54	Trimax
T.3	Choke Type TZ.277	Trimax
V.1	Valve type 6X5GT	Radiotron
V1B1	Vibrator type V5105	M.S.P.
V1B2	Vibrator type V5105	M.S.P.
S.1	3 Bank 2 Pole 5 Position Switch	M.S.P.
TCFH	Tap Changing Fuse Holder	Trimax
P.1	Socket Type S3M	Trimax
P.2	Socket Type S6F	Trimax
P.3	3 Pin A.C. Plug Base	Ring-Grip

TRADE MARK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V5
P5
V6
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T5
J1 J2 J3 J4
C
R
V.U. METER
M1
S1
S2
Heaters
J1
BRIDGE
J2
MONITOR
J3
LINE
J4
TELEPHONE
R46
R61
R60
TRIMAX TRANSFORMERS
MELBOURNE
OUTSIDE BROADCAST
AMPLIFIER.
SCHEMATIC CIRCUIT.
ISSUE
SCALE
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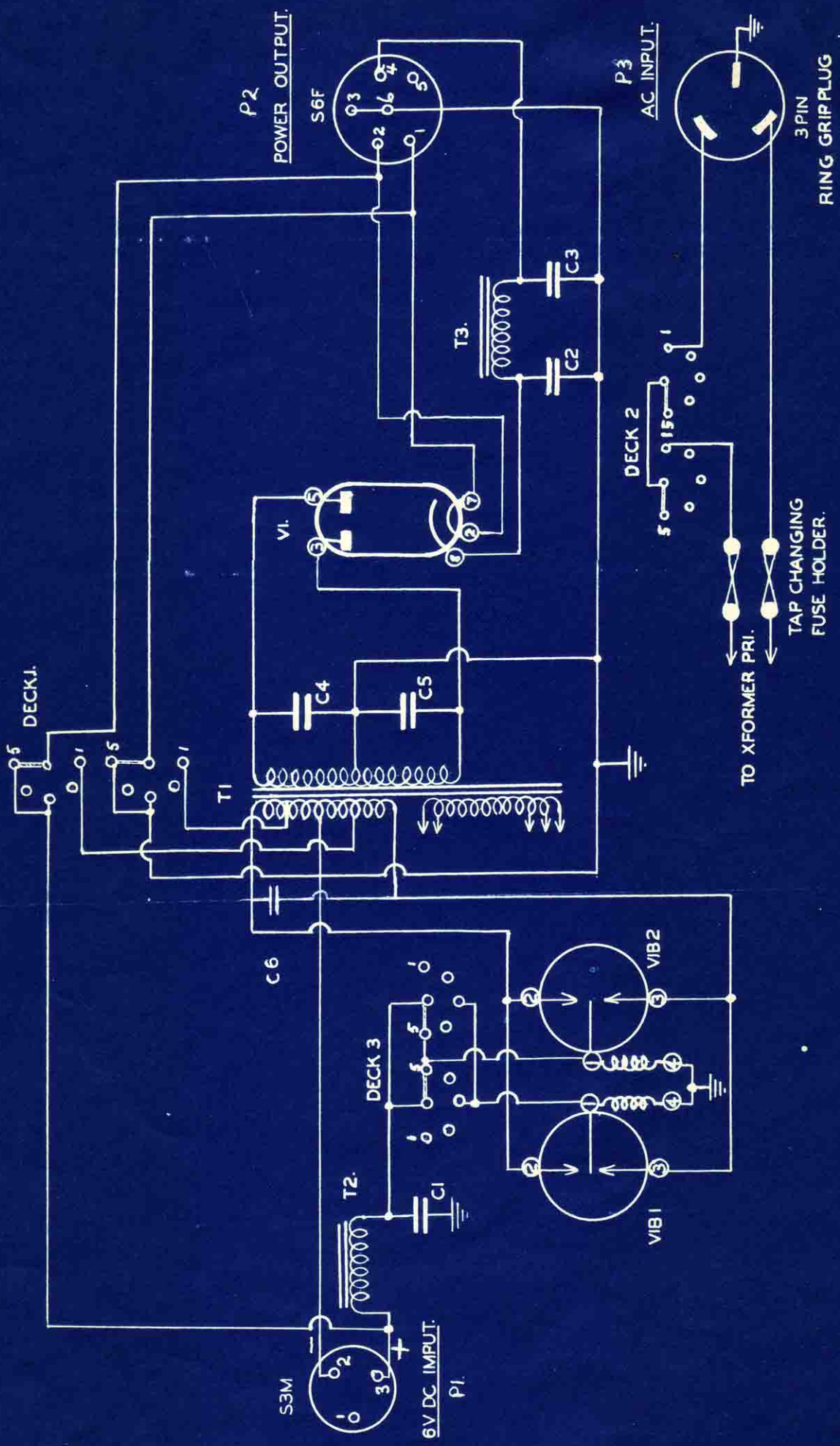
SHEET 1.



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