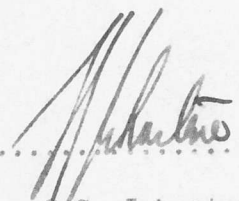


DESIGNS DEPARTMENT SPECIFICATION

NO.5.187(70)

Wide Band Amplifier Type AM14/12



.....  
G.G. Johnstone  
for Head of Designs Department

Written by: M.T. Ellen

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CJC

D.D.Spec.No.5.187(70)  
Title Sheet

DESIGNS DEPARTMENT SPECIFICATION NO.5.187(70)

Wide Band Amplifier Type AM14/12

C O N T E N T S

General

Mechanical

PRODUCTION TEST SCHEDULE

D R A W I N G S

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Assembly and wiring	D 27917 A2
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PB Wiring Board 1	D 27919 A2
PB Wiring Comp side Board 1	D 27920 A2
PB Component Section Board 1	D 27921 A4
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PB Wiring Board 2	D 27923 A4
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PB Wiring Board 3	D 27925 A4
PB Drilling Board 3	D 27926 A4
Transformer	D 27927 A3
Modification of Penultimate stage of Marconi H1100 to accept AM14/12	DSK 13150 A2

CJC

D.D. Spec. No. 5.187(70)  
Contents Sheet

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**BBC**

DS/SPA4

DESIGNS DEPARTMENT SPECIFICATION NO.5.187(70)

Wide Band Amplifier Type AM14/12

GENERAL

This unit is a wide band amplifier covering 4-27MHz. It has a constant output of 2 watts for any input power between 1mW and 100mW.

It is intended that the amplifier should be mounted inside a Marconi H1100 penultimate stage (see drawing DSK 13150 A2).

MECHANICAL

The amplifier is housed in a standard Eddystone diecast box, with a small heat sink attached to one side. In order to dissipate the large amount of heat produced in the output transistor, the heat sink must be cooled by having air forced over it. The overall dimensions of the amplifier are 8 " x 4 " x 2 ".

Input impedance	75 $\Omega$ unbalanced
Output impedance	75 $\Omega$ unbalanced
Input level	1mW - 100mW
Output level	2W
D.C. supply voltage	18 volts (-ve earthy) (N.B. The supply must be current limited to 2.5A)
Current Consumption	1.8 $\pm$ 0.2 Amps.
Frequency response with AGC in operation	$\pm$ 0.5dB. from 4 - 27MHz
Harmonic distortion	All harmonics better than -25dB relative to the fundamental
AGC range	20dB (for an output change $< \frac{1}{2}$ W)
Cooling	Forced air.
Input socket	BNC
Output socket	BNC
Power input	Painton 4 Pole fixed plug.

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**BBC**

DS/SPA4

D.D.Spec.No.5.187(70)  
Sheet 1 of 1 Sheets

DESIGNS DEPARTMENT SPECIFICATION NO.5.187(70)

Wide Band Amplifier Type AM14/12

PRODUCTION TEST SCHEDULE

Apparatus required

- |                          |  |
|--------------------------|--|
| 1) Power supply          | International Electronics type DS50/50/2 or equivalent (N.B. Set current limiting to 2.5 Amps) |
| 2) Signal generator (a)  | Marconi 4kHz - 50MHz oscillator type TF1246 or equivalent.                                     |
| 3) Signal generator (b)  | Marconi AM signal generator type TF801D/1 or equivalent.                                       |
| 4) Oscilloscope          | Tekronix type 581 (plug-in unit type 82)   |
| 5) Oscilloscope probe    | Tekronix X10 probe.  |
| 6) Power meter*          | Marconi RF Power Meter type TF1152A/1 (50A) or equivalent.                                     |
| 7) Avo model 8           |  |
| 8) Polyskop              |  |
| 9) Attenuator (variable) | Rohde and Schwarz type DPU or equivalent.  |
| 10) Attenuator (fixed)   | Rohde and Schwarz (20dB 20W) type RDB or equivalent.   |
| 11) Spectrum Analyser    | Polarad Electronic Instruments Wide Dispersion Spectrum Analyser Model 2892A or equivalent.    |

Procedure

Check that the amplifier has been satisfactorily manufactured in accordance with the relevant drawings. Check the following points in particular:-

- 1) That the base and collector of TR8 are connected to the correct parts of the printed board.
- 2) That the nuts securing TR8 are tight, and that only one is in electrical contact with the printed board.
- 3) That the resistance between the case of TR8 and the box is 3.3Ω.
- 4) That the brackets of T5 are securely connected to the correct parts of the printed board.
- 5) That the blue (AGC) wire from PB3 to PB1 is in place.
- 6) That R1 is in circuit.

Remove the wire from PB3 to SKB and replace it with a 25ohm 1W non inductive resistor. (Several resistors in parallel may be used).

Connect the variable voltage power supply to PL11 (+ve) and PL12, and connect the power meter to SKB. Gradually increase the supply voltage to about 18 volts; the current will rise to about 1.5A at 10V and then remain almost constant up to 18V. Check that the power meter reading is zero.

Connect signal generator 'b' (as specified) to the input of the amplifier via the variable attenuator (set to maximum attenuation). Adjust the signal generator to produce an output at 15MHz and gradually decrease the attenuation until the output power either ceases to rise or reaches 2 watts (N.B. The reading on the power meter will be  $\frac{2}{3}$  of the true output power). If the AGC circuit does not limit the output power to 2 watts, replace R1 with a 25K variable resistor, and adjust it until the output power is limited to 2 watts. Measure the value of the resistance and replace it with a fixed resistor of the nearest preferred value. Check that the output power is limited to 2 watts.

In place of the power meter connect the 20dB attenuator. Using the Polyskop, measure the frequency response of the amplifier from the amplifier input to the attenuator output. It is important that the above measurement is made with an input level which is sufficiently low that the AGC circuit does not operate. A suitable level may be obtained by setting the Polyskop attenuator to -40dB. (If the input level is too high the peak of the Polyskop trace will be flattened). The total gain of the amplifier without the attenuator should be between 40dB and 50dB. If the amplification between 4 and 27MHz varies by more than 4dB, then adjust R29 and C15 until it is within the above limit. Now increase the input level and check that the AGC circuit effectively flattens the response.

Connect signal generator 'a' (as specified) to the input of the amplifier via the variable attenuator, and reconnect the power meter. Check that the output power stays constant ( $\pm 0.5W$ ) for input powers between 1mW and 100mW at several spot frequencies over the band. The input power can be calculated by measuring the peak to peak input voltage with the oscilloscope (1mW into 75ohm is approximately 0.77 v PK-PK).

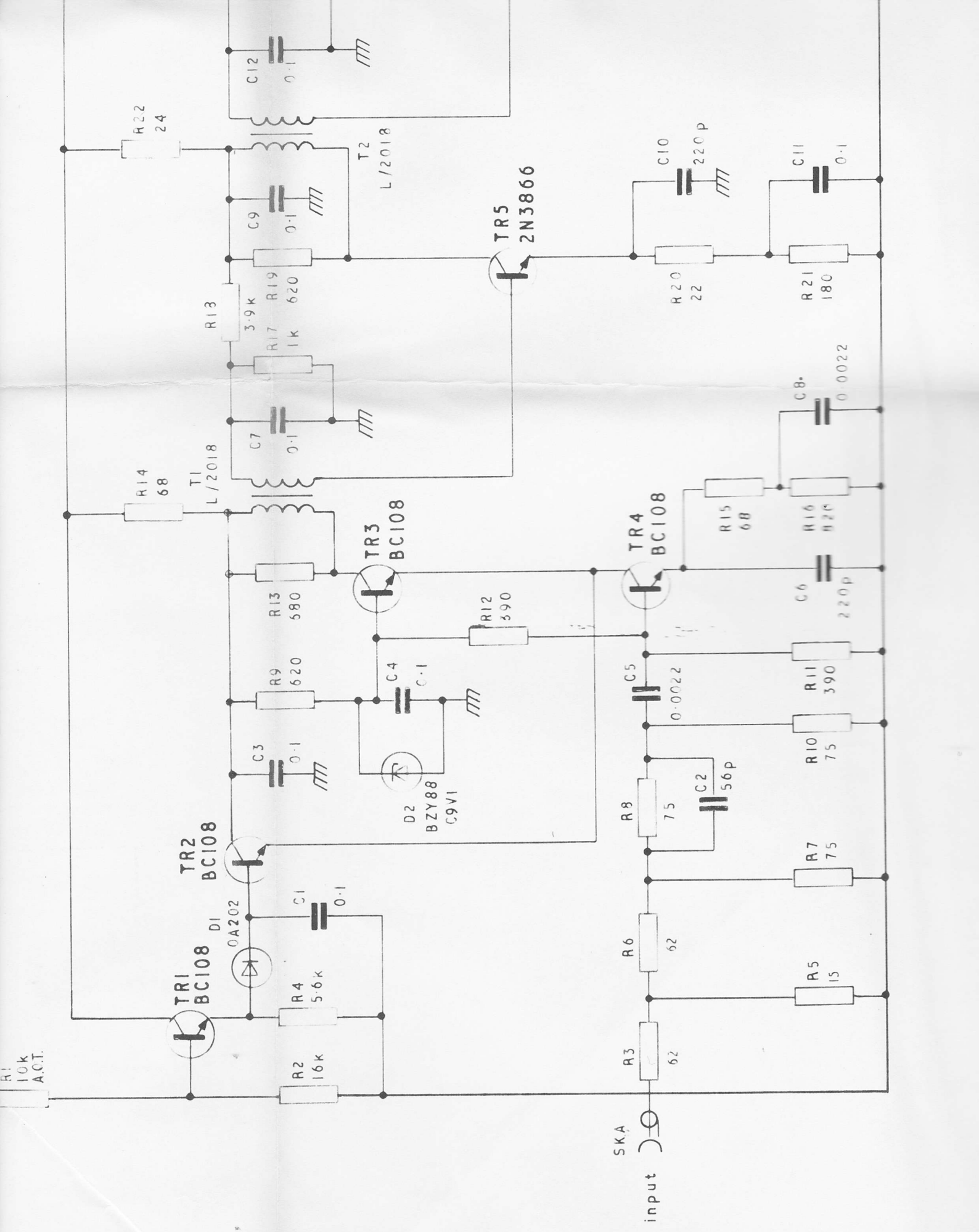
Now connect the Spectrum Analyser (via the 20dB attenuator) to the output of the amplifier, and drive the amplifier with signal generator 'b' (as specified) set to produce an output power between 1mW and 100mW. Check that for all frequencies between 4 and 27MHz, each harmonic of the output signal is at least 25dB below the fundamental.

With normal drive applied to the input, check that the amplifier functions correctly after the output has been open, and short circuited.

Replace the wire to SKB.

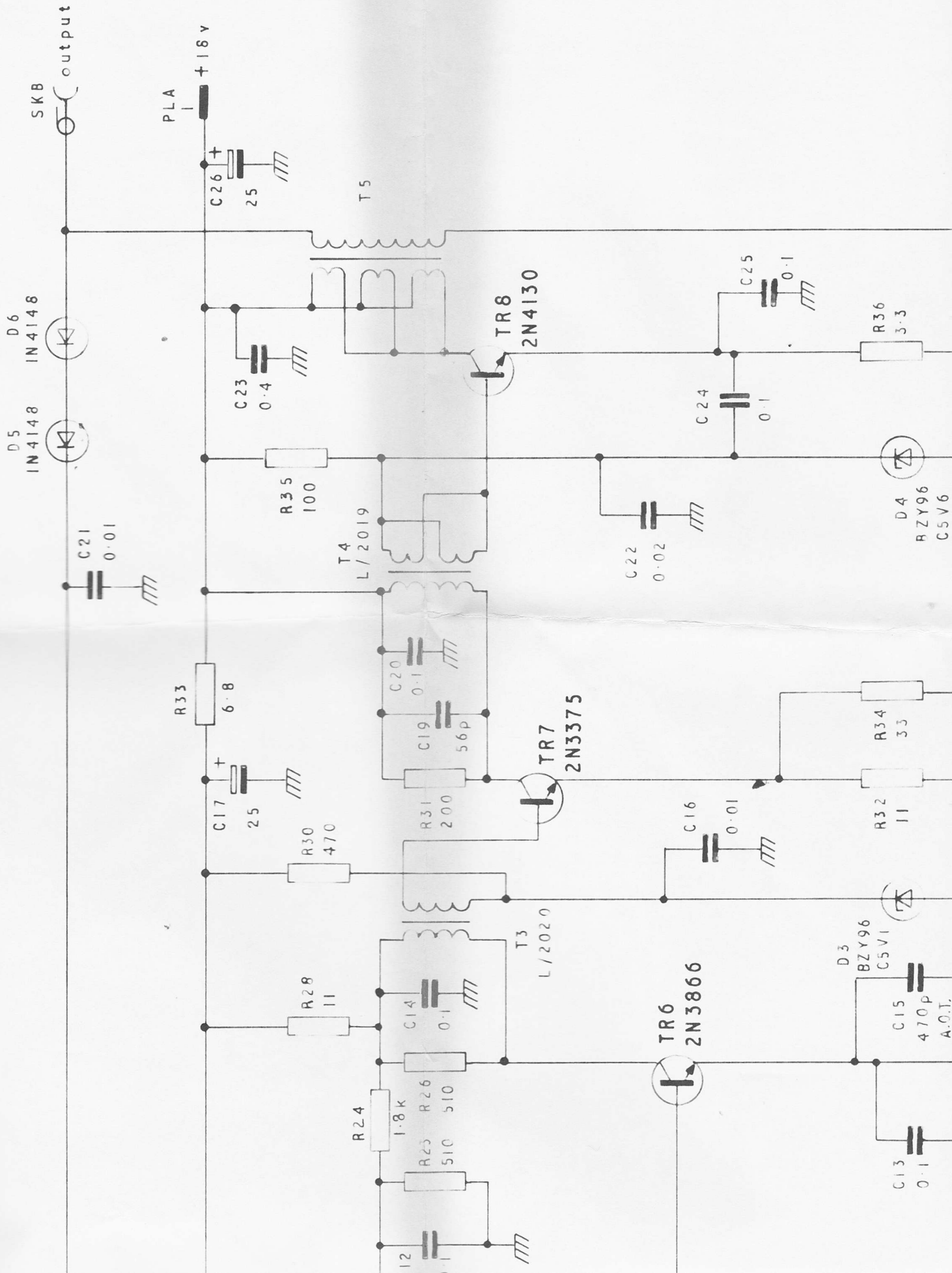
D27915A2

WIDE BAND AMPLIFIER) CIRCUIT



R1  
10k  
A.C.T.

input SKA



SKB output

PLA +18V

D5 IN4148  
D6 IN4148

D4 RZY96  
C5V6

D3 BZY96  
C5V1

C15 470p  
A.O.T.

C13 0.1

R32 11

R34 33

R36 3.3

C25 0.1

C24 0.1

C23 0.4

C26 25

C22 0.02

C21 0.01

C17 25

C19 56p

C14 0.1

C15 470p  
A.O.T.

TR8 2N4130

TR7 2N3375

TR6 2N3866

T4 L/2019

T3 L/2020

T5

R33 6.8

R35 100

R36 3.3

R32 11

R34 33

R30 470

R31 2.00

R28 11

R25 510

R26 510

R23 510

R24 1.8k

R12

R13

R14

R15

R16

R17

R18

R19

R20

R21

R22

R27

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R30

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R308

R309

R310

R311

R312

R313

R314

R315

R316

R317

R318

R319

R320

R321

R322

R323

D27916A4

sheet 1 of 5 sheets

CHANGE 9/9/70 ISS. 1

AM14/12 - AMPLIFIER, R.F. WIDE BAND

PARTS LIST

ITEM No.	No. OFF	DESCRIPTION	C/C'T REF.	BBC REF. OR DRG. No.
<u>DRAWING NUMBERS</u>				
		Circuit		D27915A2
		Parts List		D27916A4
		Assembly & Wiring		D27917A2
		Details		D27918A1
		P.B. Wiring Board 1		D27919A2
		P.B. Wiring Comp. Side Board 1		D27920A2
		P.B. Comp. Loc Board 1		D27921A4
		P.B. Drilling Board 1		D27922A4
		P.B. Wiring Board 2		D27923A4
		P.B. Drilling Board 2		D27924A4
		P.B. Wiring Board 3		D27925A4
		P.B. Drilling Board 3		D27926A4
		Transformer		D27927A3
<u>FURTHER INFORMATION REQUIRED FOR MANUFACTURE</u>				
		Unit Assy. Information		EA10484
7		Unit Wiring Information		EA10137
		Unit Wiring Information		EA10139
		Inductor		L/2018, L/2019, L/2020
1	1	Box comprising items 2 & 3		
2		1 - diecast box eddystone radio Type 6827P Modified to		D27918A1 Det.1
3		4 - Bush, Hank Rivet, 4BA, Brass		
4				
5				
6	1	Heatsink		D27918A1 Det.2
7				
8				
9	1	Label BBC DRG EPA 5311 Engraved to		D27918A1 Det.3
10	1	" " " EPA 5312 Det.3	" "	" " 4
11	1	" " " " " "	" "	" " 5
12	1	" " " " " "	" "	" " 6
14				
15				
16	1	Printed Board No.1		D27919A2, D27920A2 D27921A4, D27822A4
17				
18				
19	2	Socket, R.F. Coaxial Greenpar GE37507H	SKA & B	
20	1	Plug Fixed, 4 Pole Painton Type 311604	PLA	
21				
22				
23	1	Heatsink Redpoint Type 5F		
24				
25				

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BBC  
DS/PLA4

AM14/12  
AMPLIFIER R.F. WIDE BAND  
PARTS LIST

DRN. *FMW*  
TPD. AG  
CKD. M.T.E  
APPD. A.H.G.

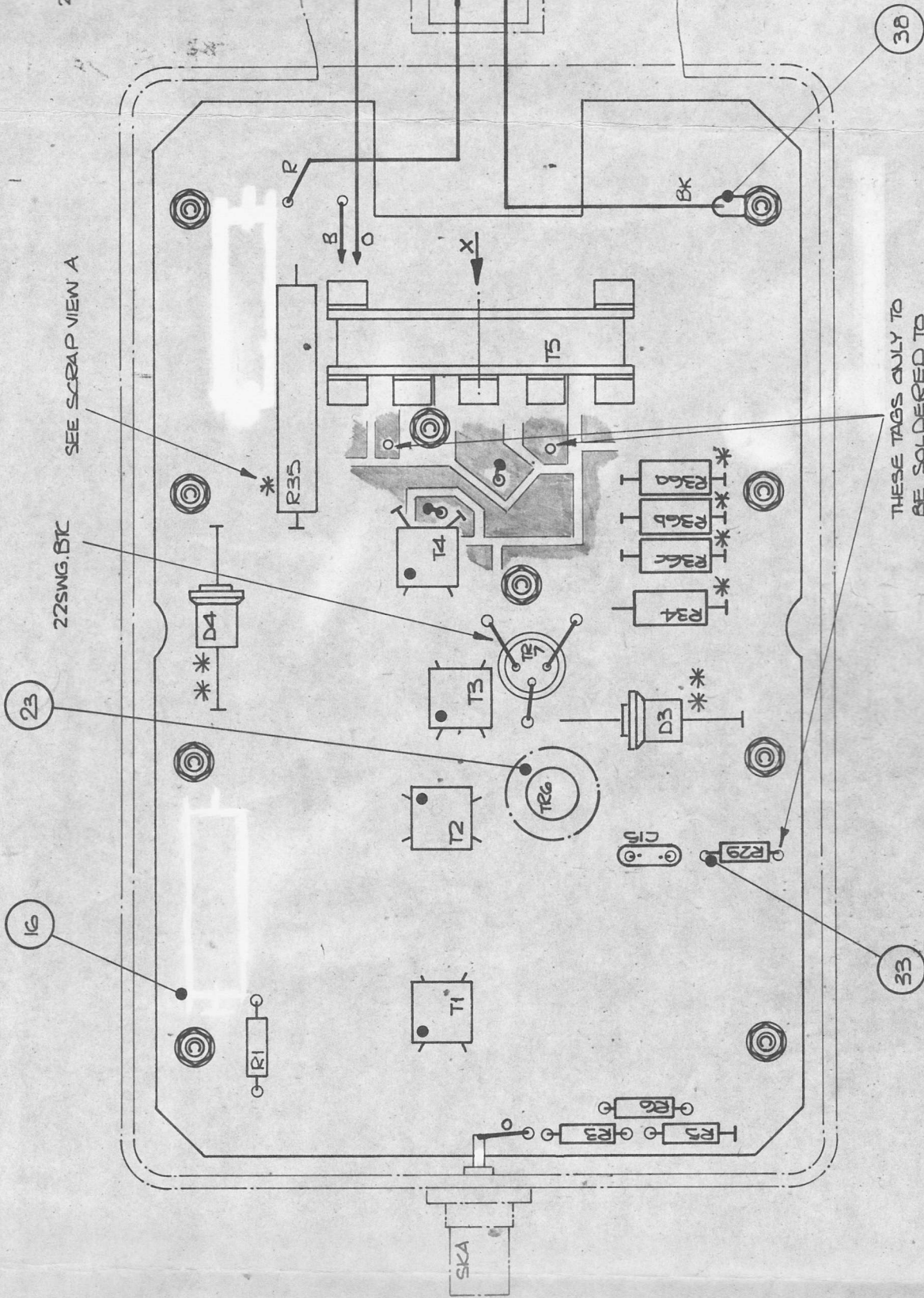
DESIGNS DEPARTMENT  
**D27916 A4**  
sheet 1 of 5 sheets.



VIEW ON TOP OF BOX WITH LID REMOVED

22SW3 STRA

THIS S  
ROTA

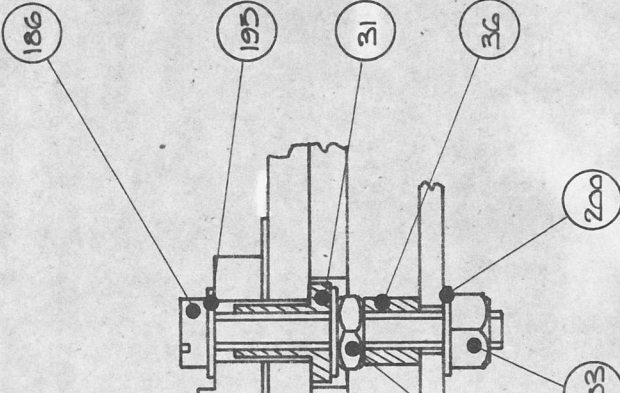


SEE SCRAP VIEW A

22SW3, BTK

THESE TAGS ONLY TO BE SOLDERED TO COPPER TRACK ON BOTH SIDES OF BOARD

33 IN 1/3 POSITIONS

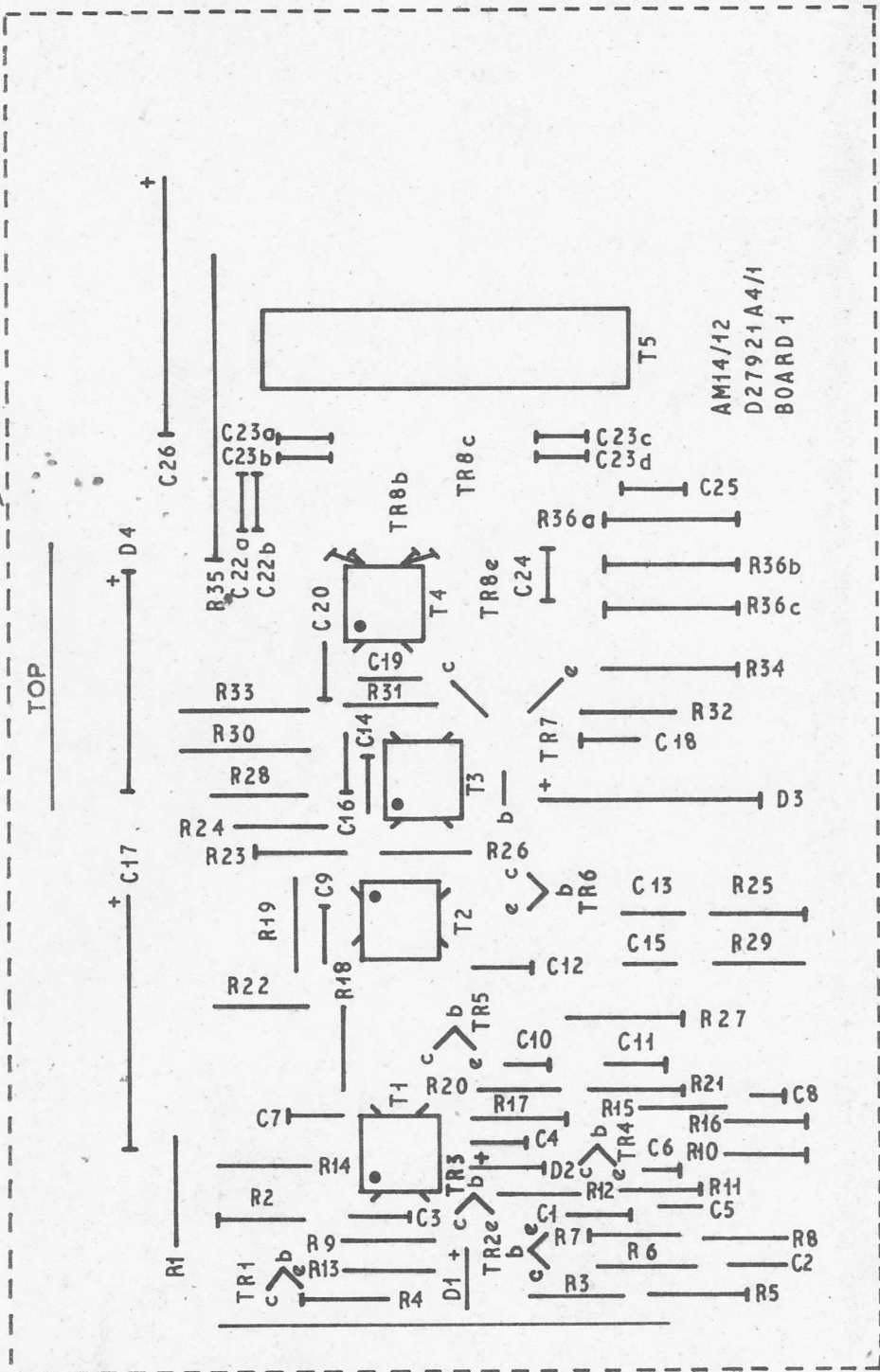


# AM14/12 ASSEMBLY & WIRING

ISS	1
CHANGE	9/9/70

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MINIMUM SIZE TO CUT NEGATIVE



CHARACTERS AND LINES TO BE PRINTED IN BLACK  
 PRINTED WIRING ON REVERSE SIDE OF BOARD IS D27919 A2  
 PRINTED WIRING ON COMPONENT SIDE OF BOARD IS D27920 A2

SCALE 1:1

DRN	
TCD	M. C.
CKD	A.T.C.F.
APPD	A.T.P.B.

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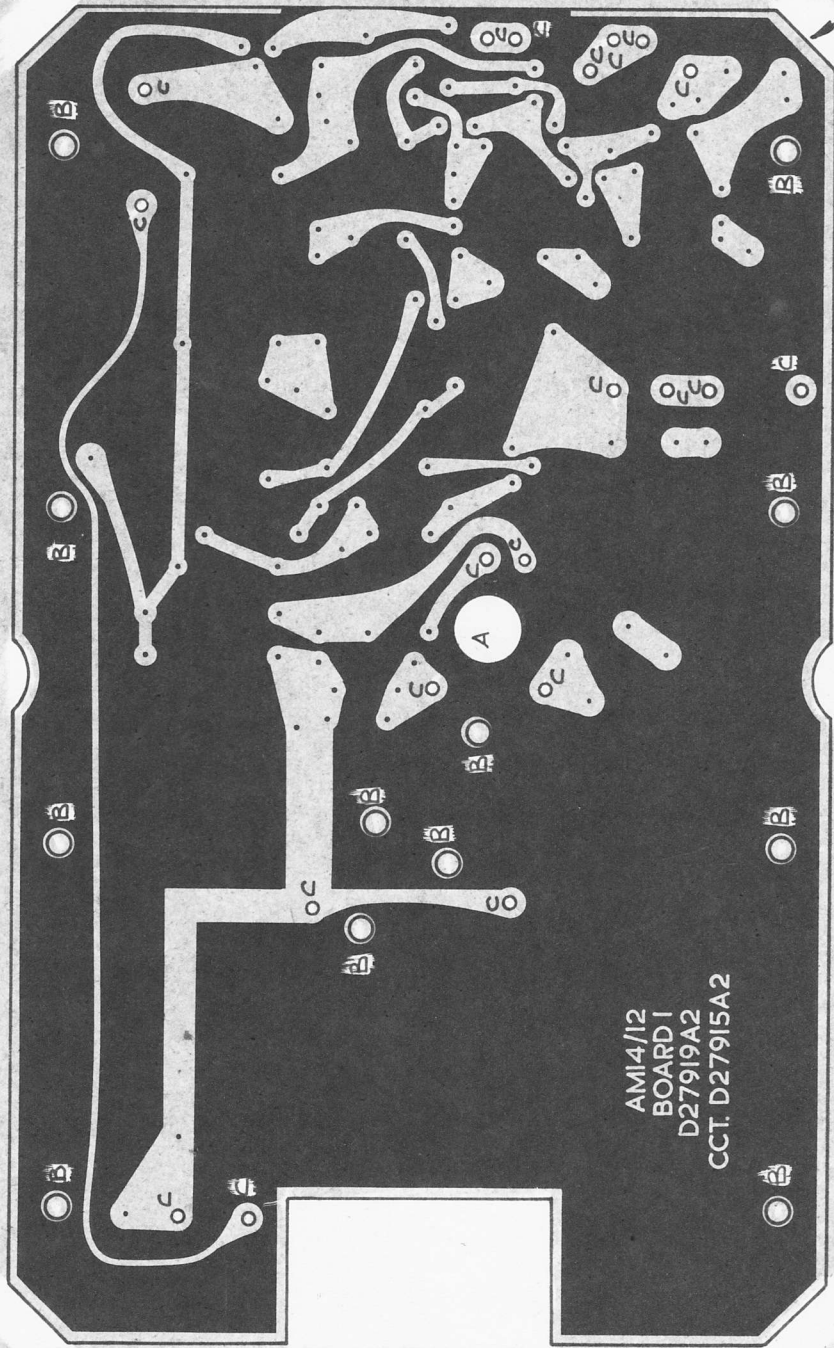
BBC  
DS/A4

AMI4/I2 BOARD I  
P. B. DRILLING

D27922A4

AMI4/I2 P.B. DRILLING BOARD I

CHANGE	ISS
9/9/70	1
25/10/76	2



AMI4/I2  
BOARD I  
D27919A2  
CCT. D27915A2

CUT BOARD TO OUTER  
EDGE OF COPPER.

MATERIAL 1/16" THICK BAKELITE XYLONITE LTD.  
SHEET TYPE H76/1/1 CLAD ON BOTH  
SIDES WITH 1OZ /SQ.FT COPPER.

MANUFACTURED TO D27919A2 D27922A2 & D27921A4  
FINISH TINNED

HOLE REF	DRILL SIZE	DIAMETER INCHES	DIAMETER M.M.
A	7/16"	.437	11.1
B	27	.144	3.7
C	51	.067	1.7
D			
E			
UNCODED	60	.040	1.0

DRN [Signature]  
TCD  
CKD [Signature]  
APPD [Signature]

DESIGNS DEPARTMENT  
**D27922 A4**

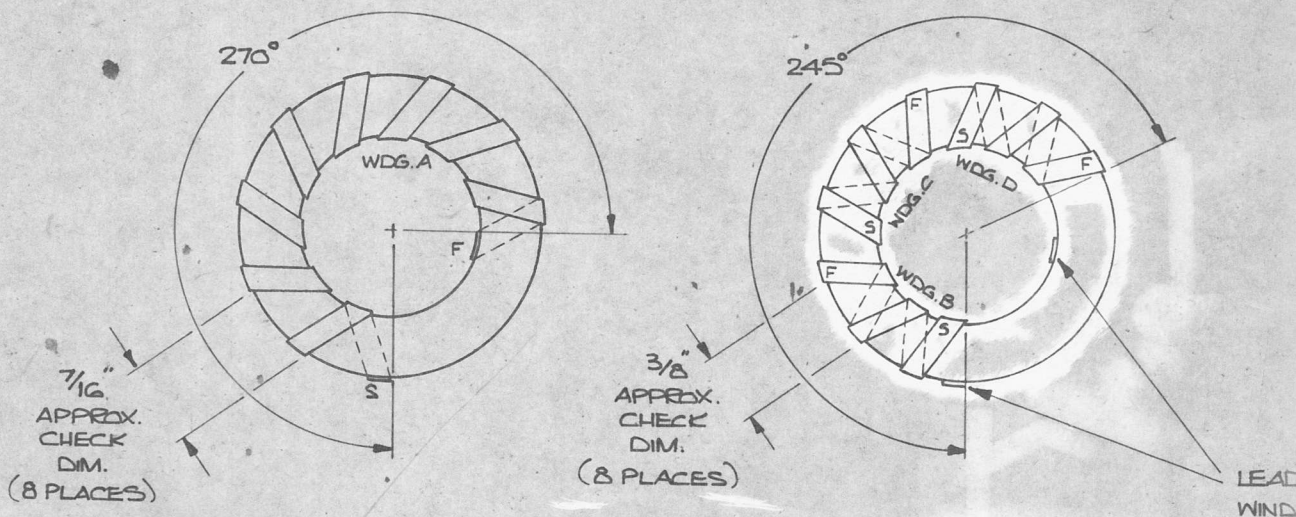
SCALE 1:1

D21927A3

WINDING INFORMATION

VIEW OF SECONDARY WINDING

VIEW OF PRIMARY WINDINGS



WINDING AND INSULATION

USING FORMER ITEM 48

1. WDG A :  
 $2\frac{1}{2}$ T OF ITEM 50 EQUISPACED AROUND  $270^\circ$  OF THE FORMER AS SHOWN. ENDS OF THE WINDING TO BE LEFT APPROX  $\frac{3}{4}$ " LONG.
2. AFTER COMPLETION OF WINDING A TAPE ITEM 52 TO BE WOUND IN SAME MANNER AS WDG.A, TURNS TO OVERLAP EACH OTHER FOR ONE REVOLUTION, TO COMPLETELY ENCLOSE ALL BUT THE LEAD-OUTS OF WDG.A
3. WDGs B,C & D :  
 EACH  $2\frac{1}{2}$ T OF ITEM 50 EQUISPACED AROUND  $245^\circ$  OF THE FORMER AS SHOWN. ENDS OF EACH WINDING TO BE LEFT APPROX  $\frac{3}{4}$ " LONG.

FINISH

1.  $\frac{1}{4}$ T OF TAPE ITEM 52 TO BE WOUND AROUND THE CIRCUMFERENCE OF THE WOUND FORMER THE EDGES TO BE NEATLY WRAPPED AROUND THE SIDES OF THE FORMER.
2. ADHESIVE TO BE REMOVED FROM THE LEADOUTS

NOTE : 'LIR-KIT' TAPE ITEM 50 TO HAVE PROTECTIVE BACKING REMOVED PRIOR TO WINDING

ASSEMBLY NOTE

1. LEAD-OUTS OF WINDINGS TO BE SOLDERED TO HOLES IN PCB TOGETHER WITH BRACKET BOARDS IN PLACE OF BOTH AREAS
2. BRACKETS TO BE SOLDERED TO BOARDS IN PLACE OF BOTH AREAS

TEST INFORM.

WDG A (SECONDARY)  
WDG B+C+D (PRIMARY)  
MEASURED ESR  
(BRACKETS) C

42 IN 7 SEE

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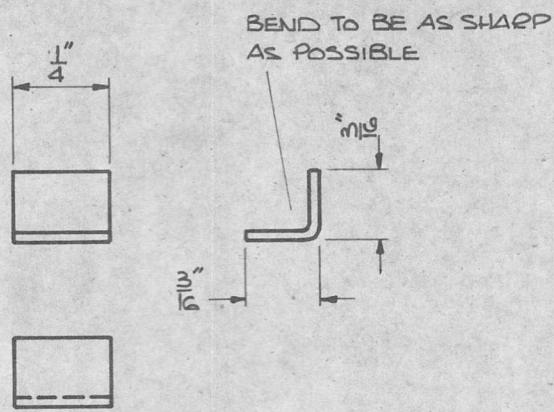
AM14/12 TRANSFORMER

BBC

DS/A3

AM14/12 TRANSFO

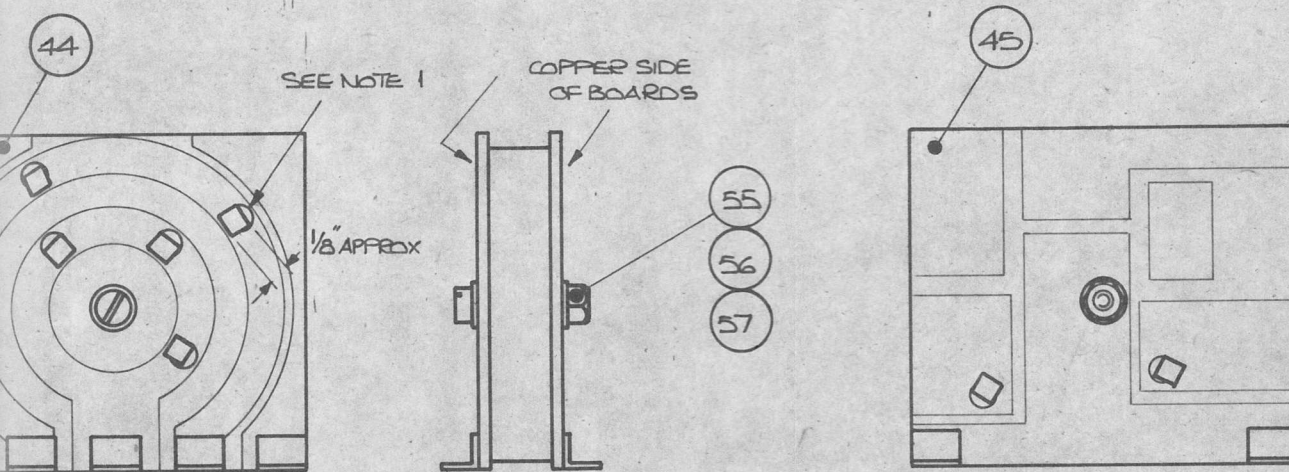
THIRD ANGLE PROJECTION



DETAIL 1 . MOUNTING BRACKET  
 MATERIAL . 24 SWG (.022") COPPER 1/2H  
 FINISH . HOT DIP TINNED  
 SCALE . 2:1

D27927A2

THIRD ANGLE PROJECTION



POSITIONS  
 NOTE 2

TRANSFORMER TO BE LOCATED THRO' MOUNTED BOARDS, BOARDS TO BE CLAMPED SQUARELY & LEAD-OUTS THEN TO BE SOLDERED TO COPPER TRACK ON BOARDS TO BE SOLDERED TO COPPER TRACK ON POSITIONS SHOWN ENSURING BOTTOM EDGES BE FLUSH.

TRANSFORMATION  
 (SECONDARY) APPROX 4.5μH  
 (PRIMARY) APPROX 0.6μH  
 BETWEEN RELEVANT LEADOUTS OF TRANSFORMER.

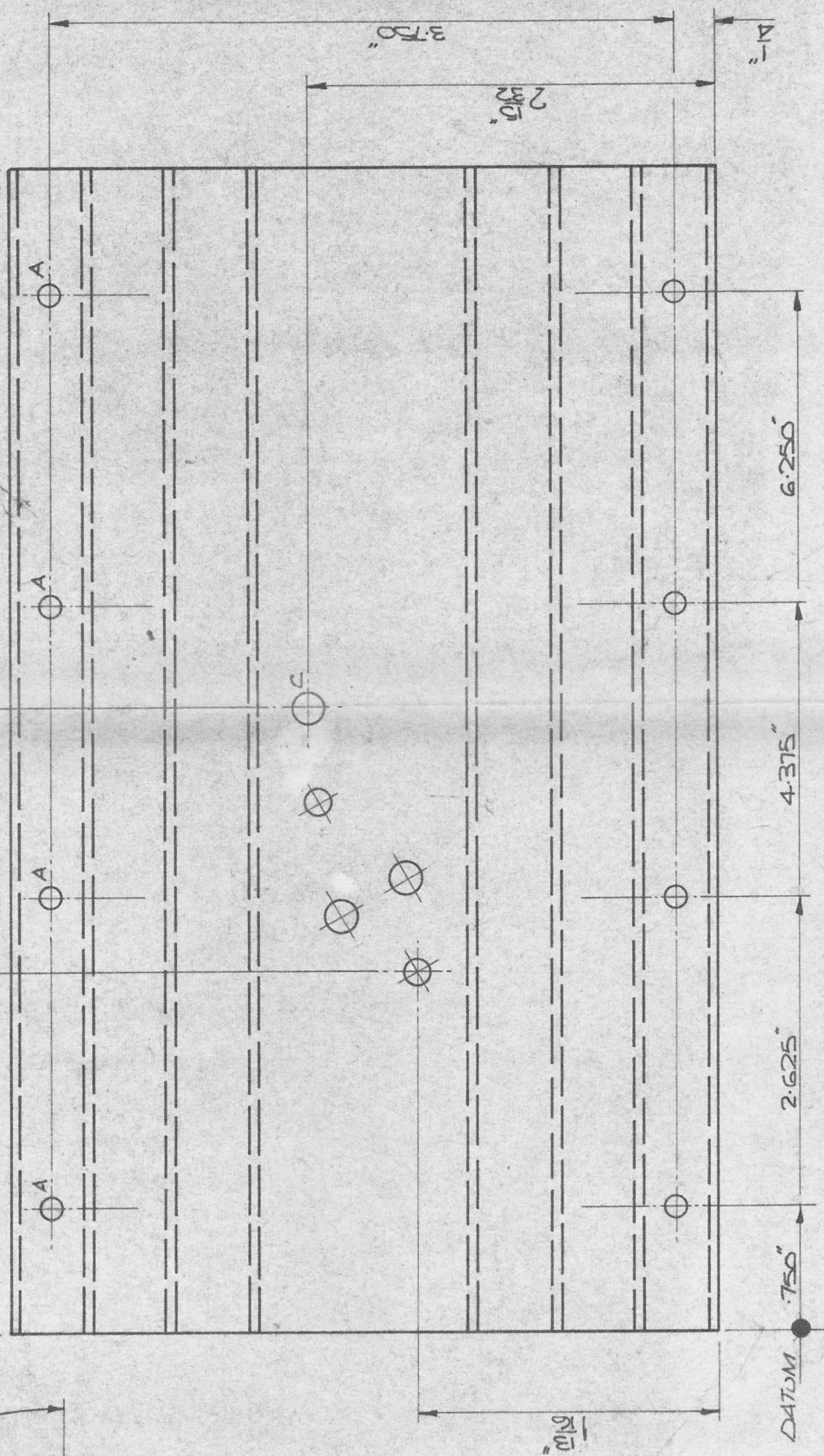
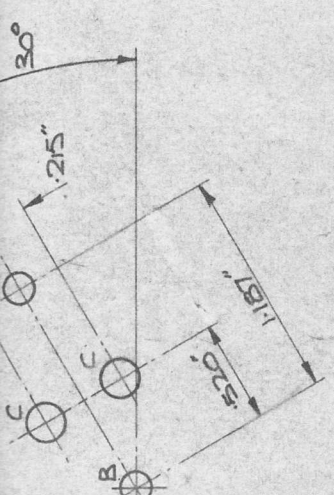
NORMAL TOLERANCES  
 FRACTIONS ±0.010"  
 DECIMALS ±0.005"

PARTS LIST : D27916A4  
 SCALE : 1:1 EXCEPT WHERE OTHERWISE STATED

FORMER

DRN	SWW	DESIGNS DEPARTMENT
TCD		
CKD	M.T.F.	D27927 A3
APPD	CHB	





DRILLING DATA  
 A DR. 1/8" DIA  
 B DR. 5/32" DIA  
 C DR. 13/64" DIA

DETAIL 2 HEATSINK  
 MATERIAL MARSTON EXCELSIOR LTD. MAREX  
 TYPE 65DN/0700/A/1/00  
 FINISH CLEAN