The pages that follow are scans of the notes I have about the G3MHB transmitter built into a 6-foot rack.

The transmitter was built in 1956 following a donation of equipment by the late Mr Harry Clegg G3FX, an old boy of the school, who happened to hear us on his car radio as he passed the school. The equipment included the T.1131 modulator, T.1131 power supply, the 6-foot rack and an exciter unit comprising three 6AG7s and an 807.

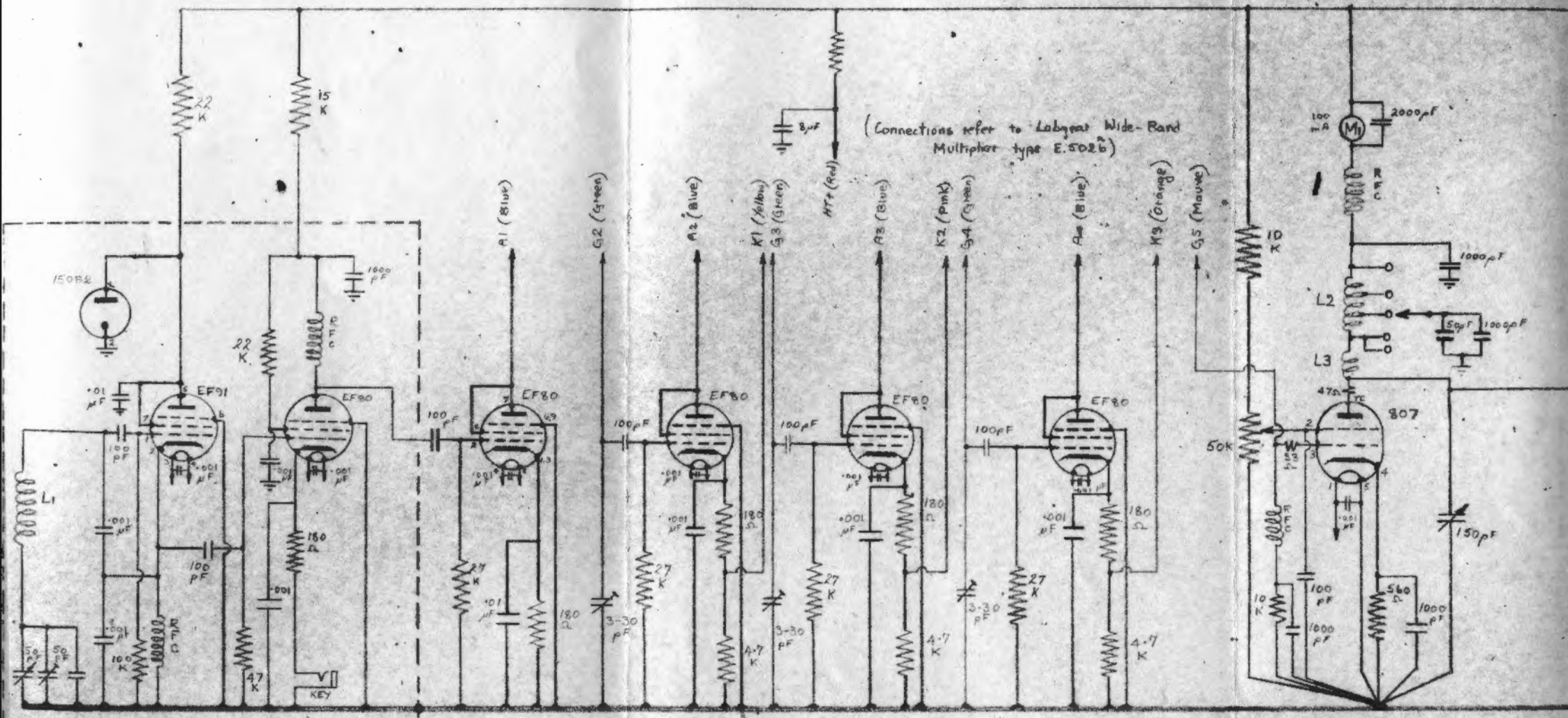
The exciter unit was fitted into the rack initially, but as it was found to drift rather badly a new one was built. The new exciter incorporated the Labgear Multiplier Unit, very popular in multi-band transmitters of the day.

The following pages include circuit diagrams of the exciter, 813 PA stage, modulator pre-amp and rough layouts of the various units. Did we really use a carbon microphone energised by a 4½V battery in those days?!!!

Also included are antenna plans. Our first antenna system comprised three dipoles, end to end, for the 7, 14 and 28 MHz bands. This was later replaced with a G5RV multiband antenna. Steps were taken towards constructing a 21 MHz rotary beam to be located on the roof above the Delius Room. A wooden boom was made, thanks to Mr George Ashton, the woodwork master at the time. Aluminium tubing was cut to size but it is not known what happened to it. It is possible the partly constructed beam is still on the roof!. The following document includes the calculations for the beam and the matching stub to be used.

The information from my notes is very rough and is far from professional. I was very young and inexperienced at the time! However, I hope you find it of some interest.

David M Pratt
G3KEP/G4DMP 20 April 2015



L1:- 44 turns of 24 s.w.g. enam. Cu close-wound on 5/8" dia. former.

L2a :- 16 turns 26 swg.
L2b :- 12 turns 18 swg.
L2c :- 6 turns 18 swg.
close wound on with 1/4" gap each coil

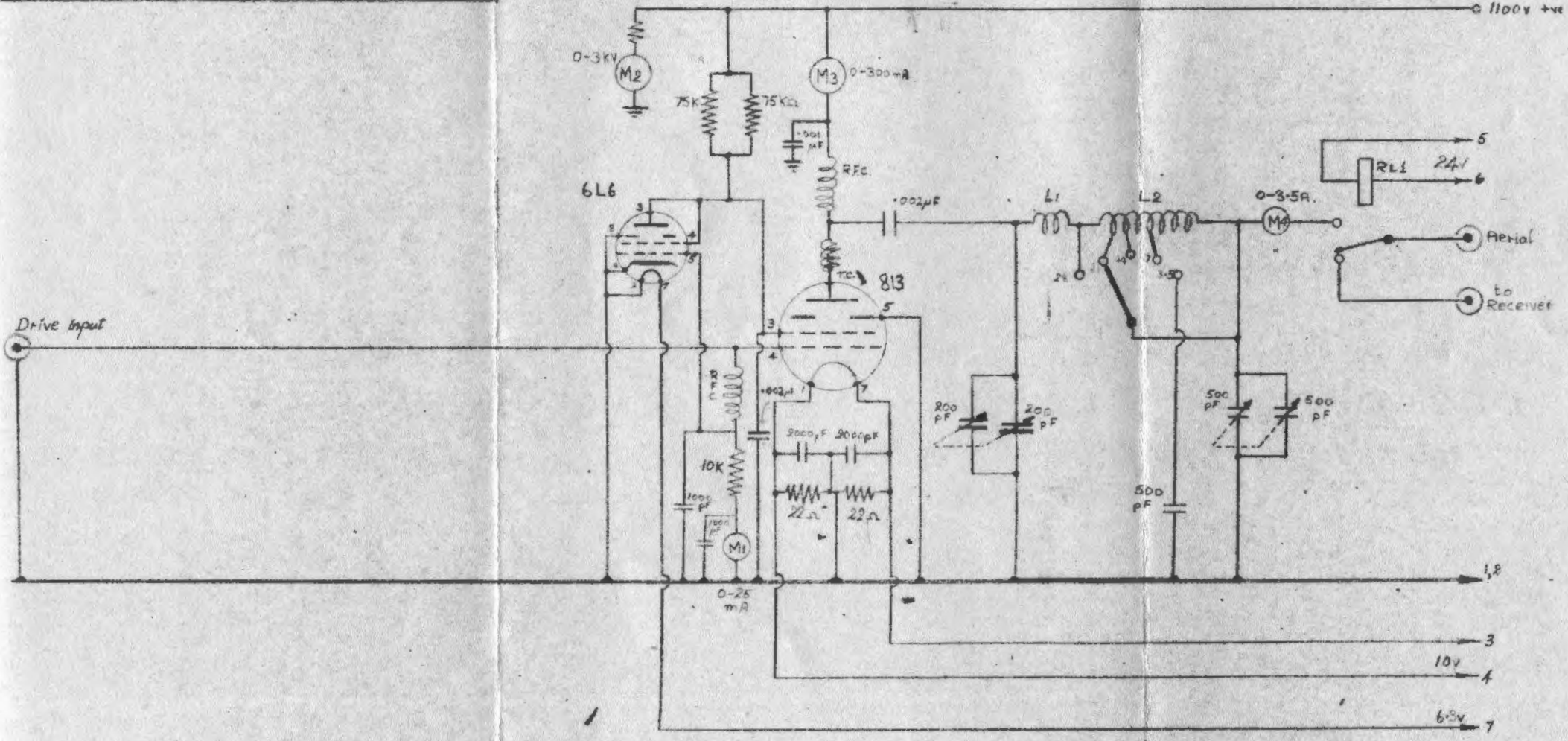
L3 :- 4 turns 14 swg 6 t.p.i. self-sup

CIRCUIT DIAGRAM OF THE G3MHB EXCITER

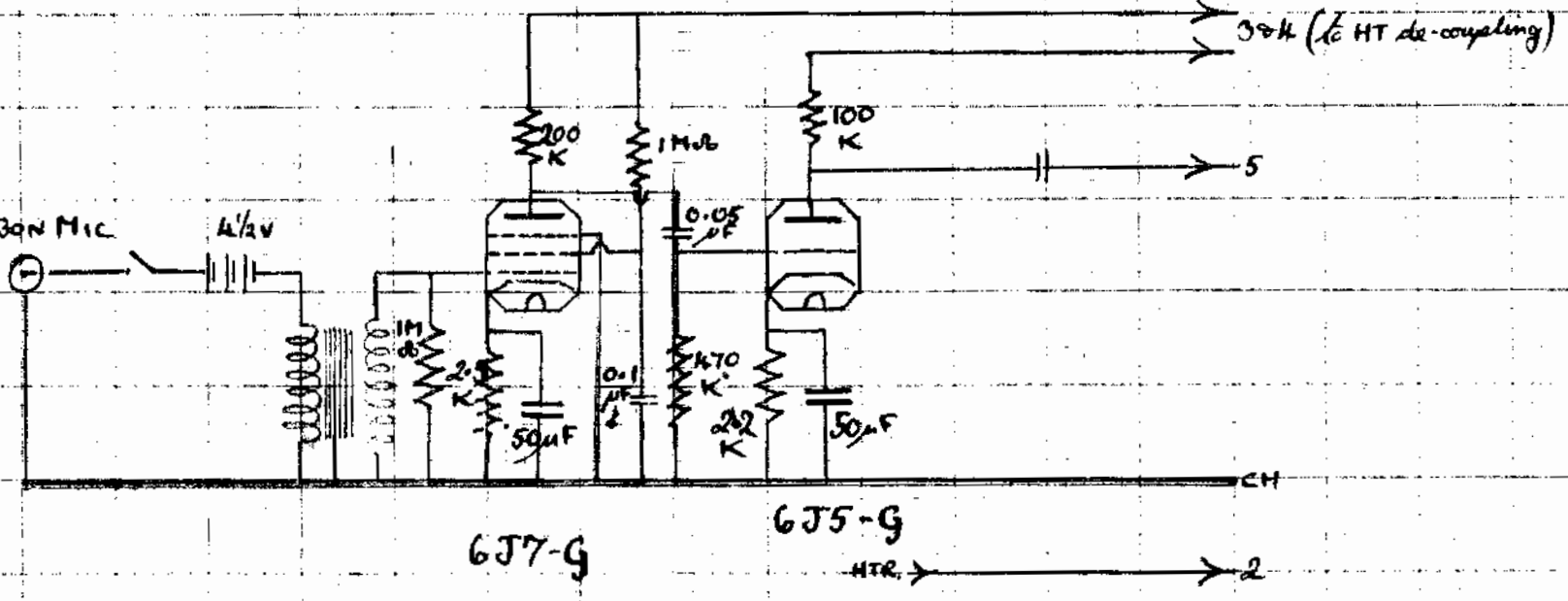
CIRCUIT DIAGRAM OF THE G3MHB P.A. CHASSIS

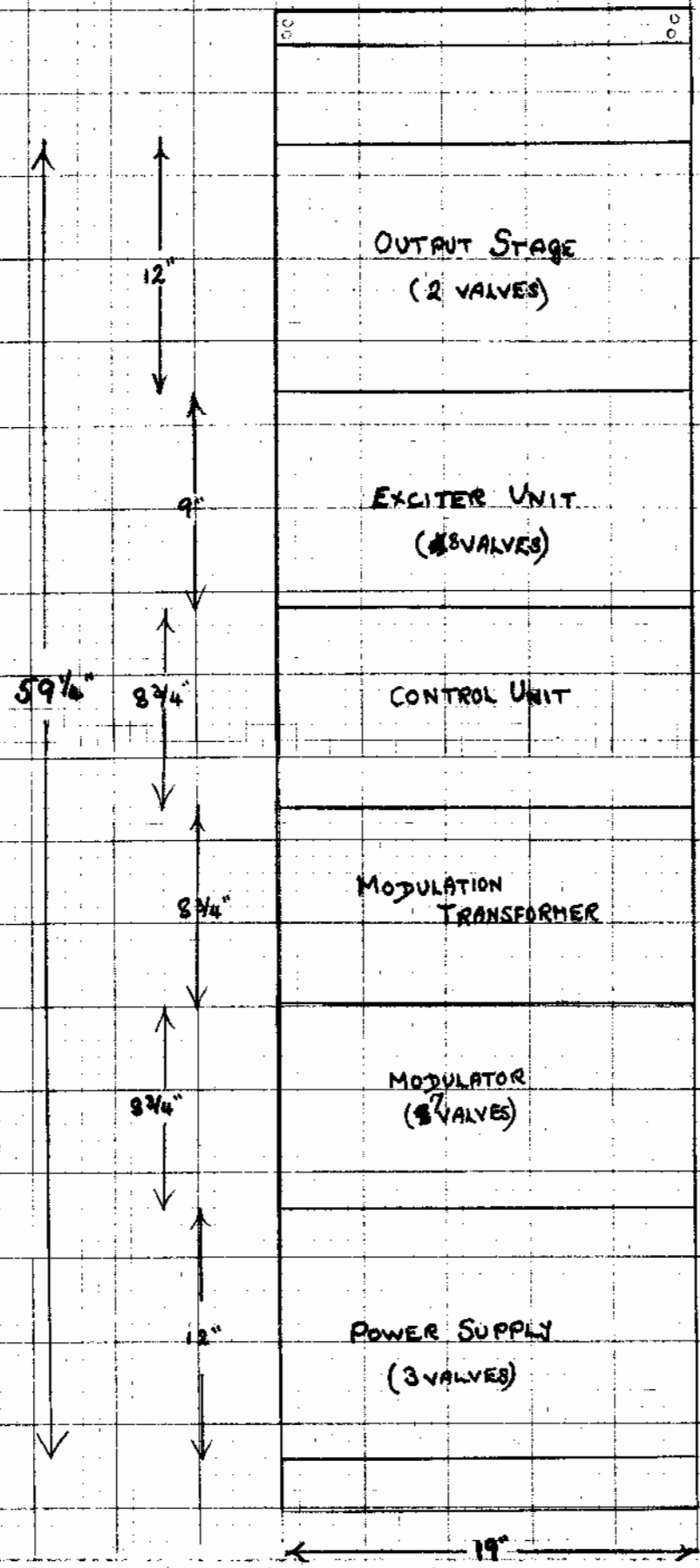
L1 : 5t. 14 swg. enam. 1" inside diam. self-supporting 1½" long.

L2 : 10t. 14 swg. enam. 2½" Edistone Former 8 tpi. tapped at 2, 4 and 6 turns from anode end.



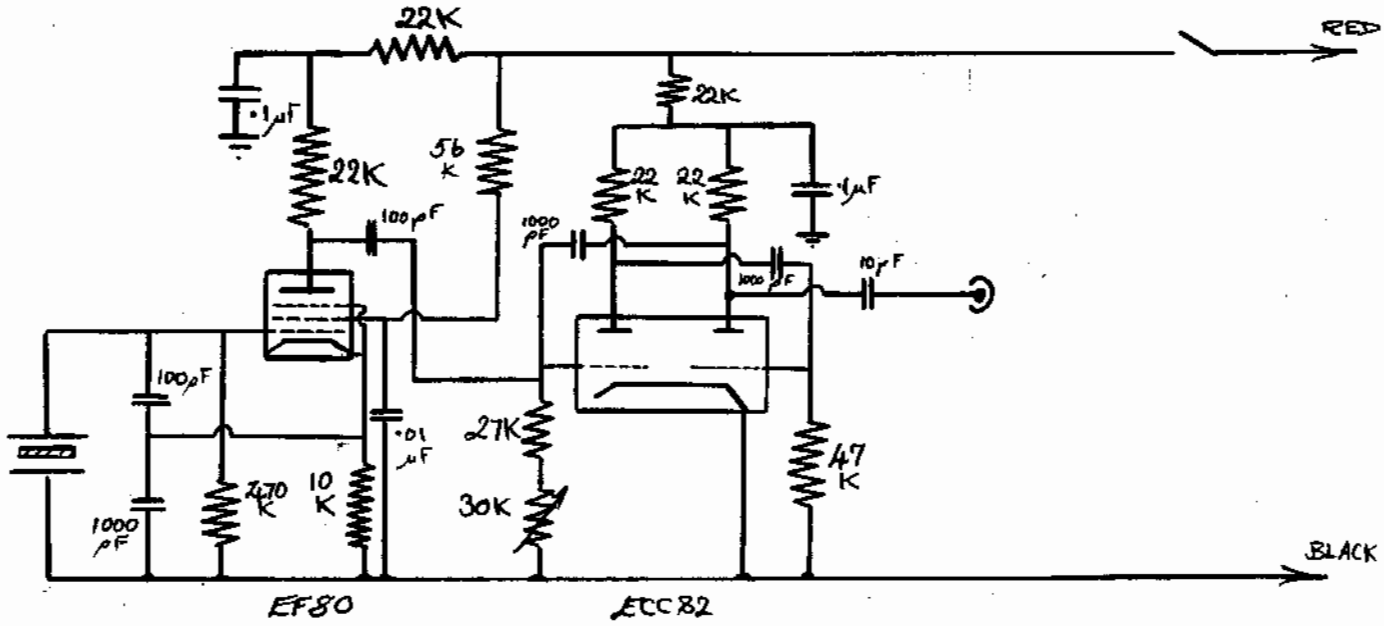
First Two Stages of Modlator of B.G.S. Transmitter.



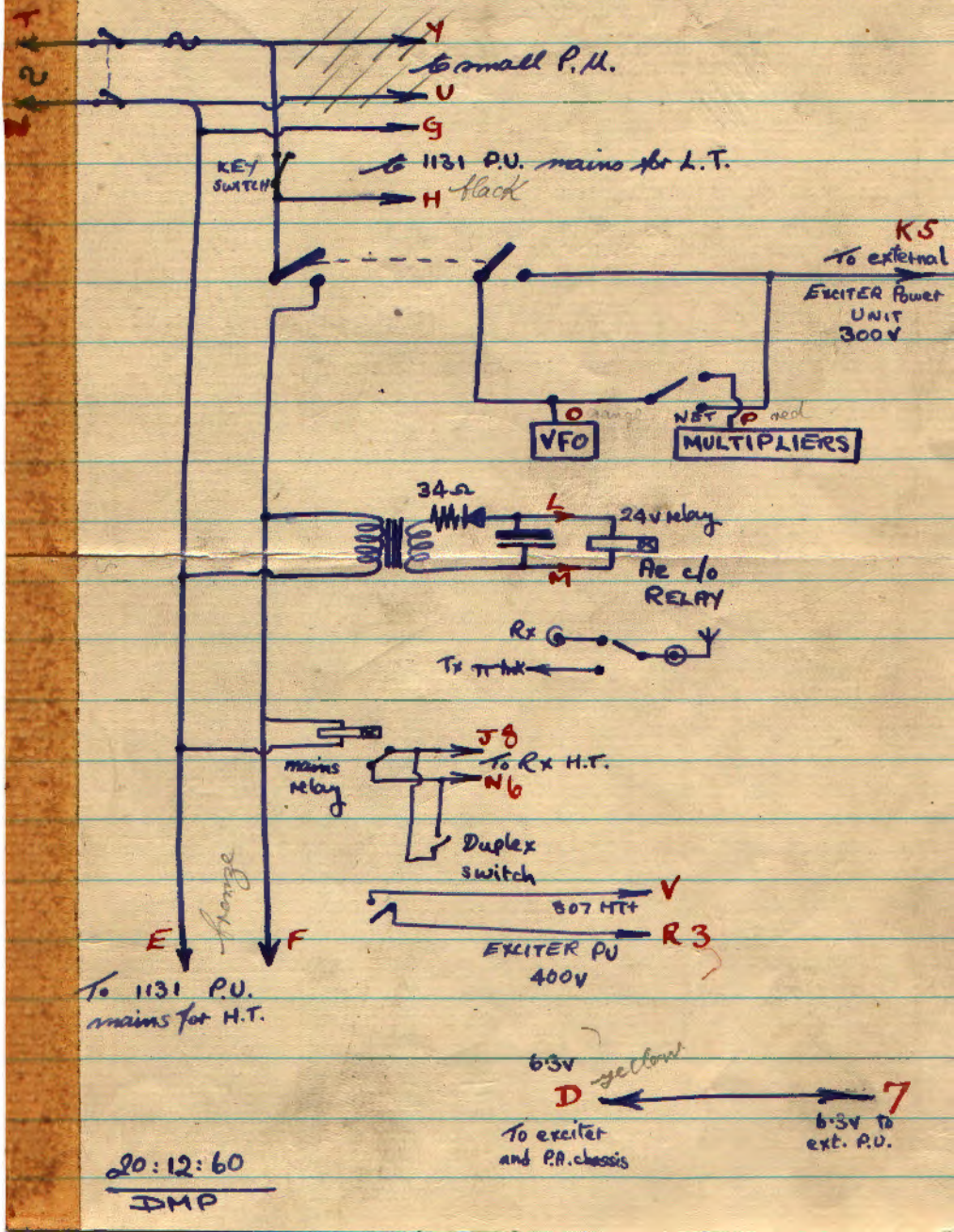


TOTAL OF
20 ~~27~~ VALVES

G3KEK



100 Kc/s CRYSTAL OSCILLATOR & 25 Kc/s MULTIVIBRATOR


T
2
Y
to small P.U.
U
G
KEY SWITCH
1131 P.U. mains for L.T.
H black
K5
To external
EXCITER Power UNIT 300V
O orange
NET
P red
VFO
MULTIPLIERS
34Ω
L
24V relay
M
Ae c/o RELAY
Rx
Tx
J8
To Rx H.T.
mains relay
N6
Duplex switch
V
807 HT+
R3
EXCITER PU 400V
E
F
To 1131 P.U. mains for H.T.
6.3V
yellow
D
7
6.3V to ext. P.U.
To exciter and P.A. chassis
20:12:60
DMP

Bottom Panel - 1131 Power Supply

Connections:

1	E	Earth	all connected to chassis.	17	V_1	0	
2	Q_1	330v −		18	V_2	4v	
3	R_1	6·3v −		19	−	−	
4	R_2	−		20	W_1	~	mains for HT: 330v + 1000v and tags 17 & 18.
5	R_3	6·3v		21	W_2	~	
6	S_1	4v		22	X_1		mains for all other low tension windings.
7	S_2	0	8v	23	X_2		
8	S_3	4v					
9	T_1	4v					
10	T_2	0	8v				
11	T_3	4v					
12	U_1	0	4½v				
13	U_2	4½v					
14	Q_2	330v +					
15	−	−					
16	−	−					

N.B. Switch on mains on tags 22 and 23 for at least three minutes before applying mains on tags 20 and 21.

1131 Modulator

Connections

1	E	Earth
2	Q1	chassis HT−
3	R1	6·3v −
4	R2	—
5	R3	6·3v −
6	S1	4·0v
7	S2	earth 8·0v (TZ40 htrs)
8	S3	4·0v
9	T1	—
10	T2	—
11	T3	—
12	Q2	330v +
13	Z1	—
14	Z2	—
15	-	—
16	-	—
17	N1	—
18	N2	—
19	V1	—
20	V2	—

Valve Data

TZ40

Maximum Plate Dissipation : 40 watts
Filament Voltage : 7.5 v
Filament Current : 2.5 A
Maximum Plate Voltage : 1500 v
Maximum Plate Current : 150 Ma
Maximum D.C. Grid Current : 45 Ma
Amplification Factor : 62

Class-B Amp. Audio

Plate voltage = 1500 v
Grid voltage : -9 v
Max. Plate current : 250 Ma
Max. D.C. grid current : 285 Ma
Approx. Grid Driving Power = 6 watts
P-to-P load Resistance : 12,000 Ω
Approx. output Power : 250 watts

811 Maximum Plate Dissipation : 55 watts
Cathode Voltage : 6.3 V
Cathode current = 4 A
Max. Plate Voltage = 1500 V
Max. Plate current = 150 Ma
Max. D.C. Grid Current = 50 Ma
Amplification Factor = 160

Class-B Amp. audio
Plate Voltage = 1500 V
Grid Voltage = -9 V
Plate current = 20/200 Ma
Max. d.c. Grid Current = 150 Ma
Approx. Grid driving power = 3 watts
P-to-P load Resistance = 17,600 Ω
Approx. Power Output = 220 watts.

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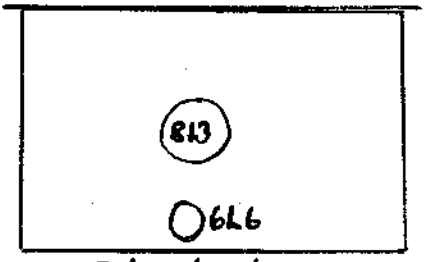
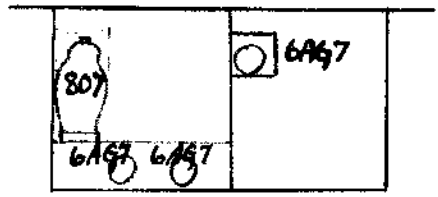
813 Heater Voltage = 10 V
Heater current = 5 amps.

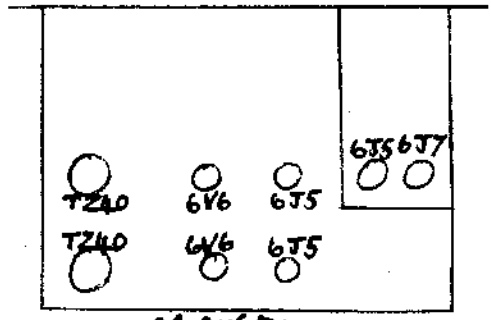
VALVE LAYOUT



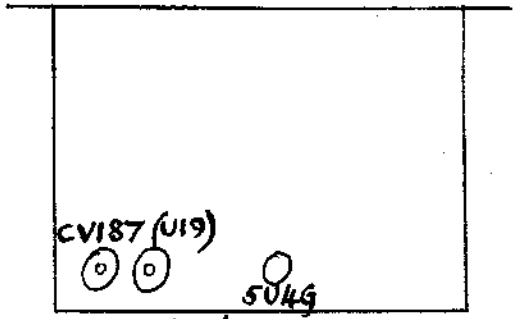
P.A. Chassis



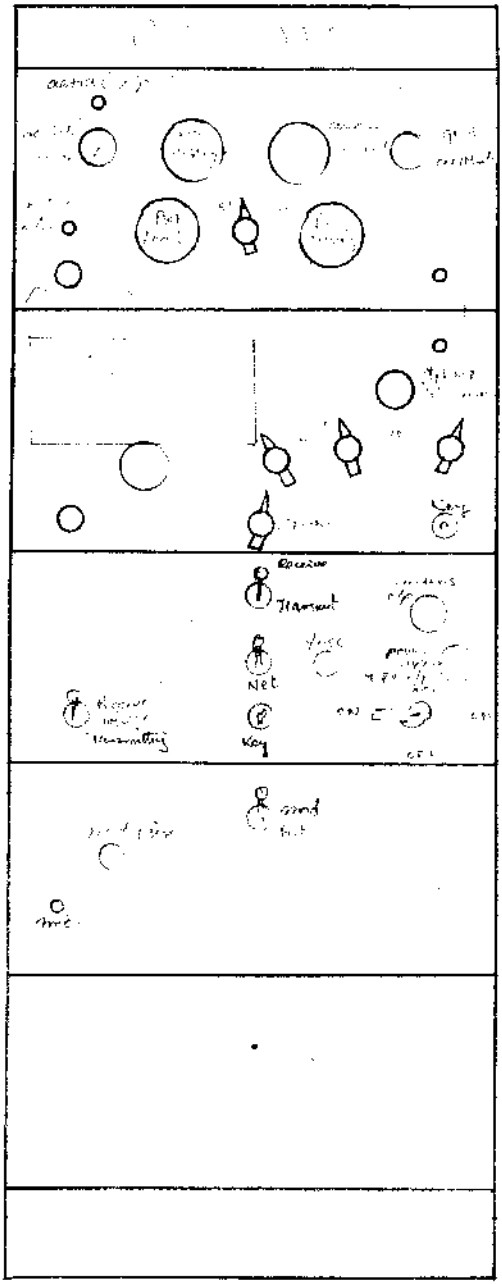
Exciter chassis



Modulator

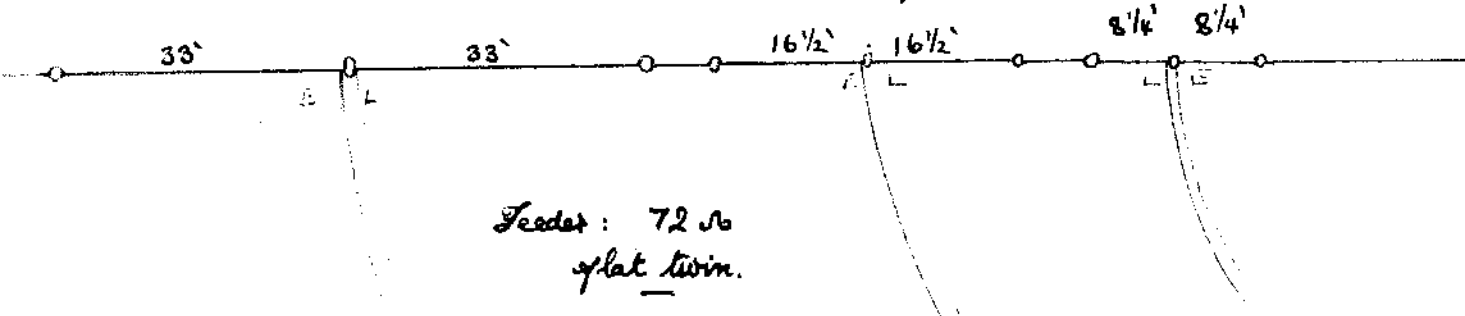


Mod/Trans. Power Supply


Net
Net

40m. ½ λ dipole (66')

20m. ½ λ dipole (33') 10m. ½ λ dipole (16½)

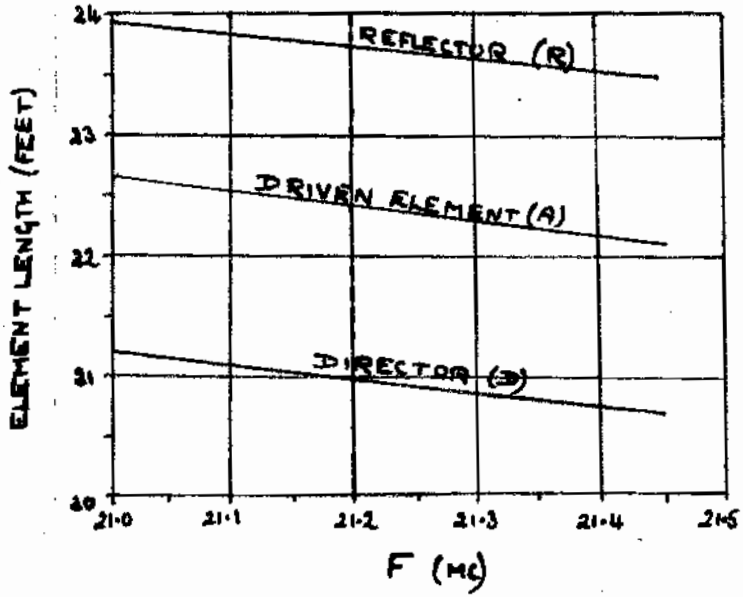


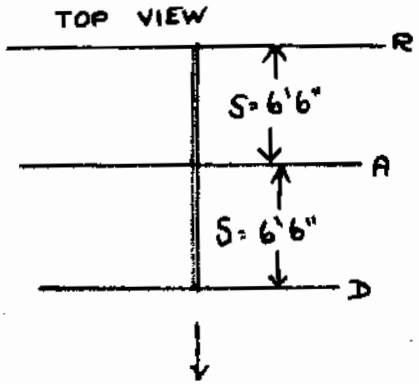
Feeder: 72 Ω
flat twin.

Approximate Positions of P.A. controls using GSRV aerial :-

Band	aerial loading	P.A. Tuning
3·5 - 3·6	30	0
3·5 - 3·8	100	0
7 - 7·1	8	33
14 - 14·35	10	80
21 - 21·45	45	86
28 - 29·7	60	88

p84) # 21 MC - 3EL. ROTARY BEAM DATA

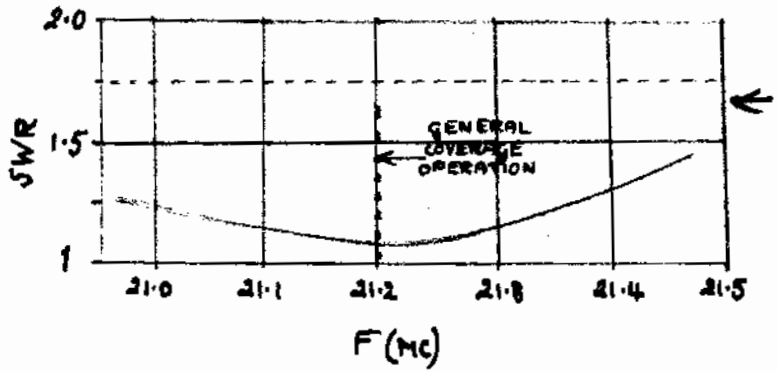




ELEMENT DIAMETER = 1"

ELEMENT LENGTHS for 21mc 3-element Parasitic Beam for General Coverage.

A = 22'5" D = 21'0" R = 23'8" S = 6'6"



SWR vs FREQUENCY FOR 3-EL. BEAM RESONANT AT 21·2 MC/S

3 ELEMENT PARASITIC BEAM FOR 11, 15, OR 20 METRE

Power Gain : 8.0 - 8.5 DB

F/B Ratio : 25 DB

Radiation Resistance : 20 Ω

Driven Element length (~~feet~~) : $\frac{473}{F(MC)}$

Director length (~~feet~~) : $\frac{445}{F(MC)}$

Reflector length (~~feet~~) : $\frac{501}{F(MC)}$

Element spacing (~~feet~~) : $\frac{140}{F(MC)}$

Bandwidth for 1.75 / 1 SWR =

1070 Kc at 11 metres

840 Kc at 15 metres

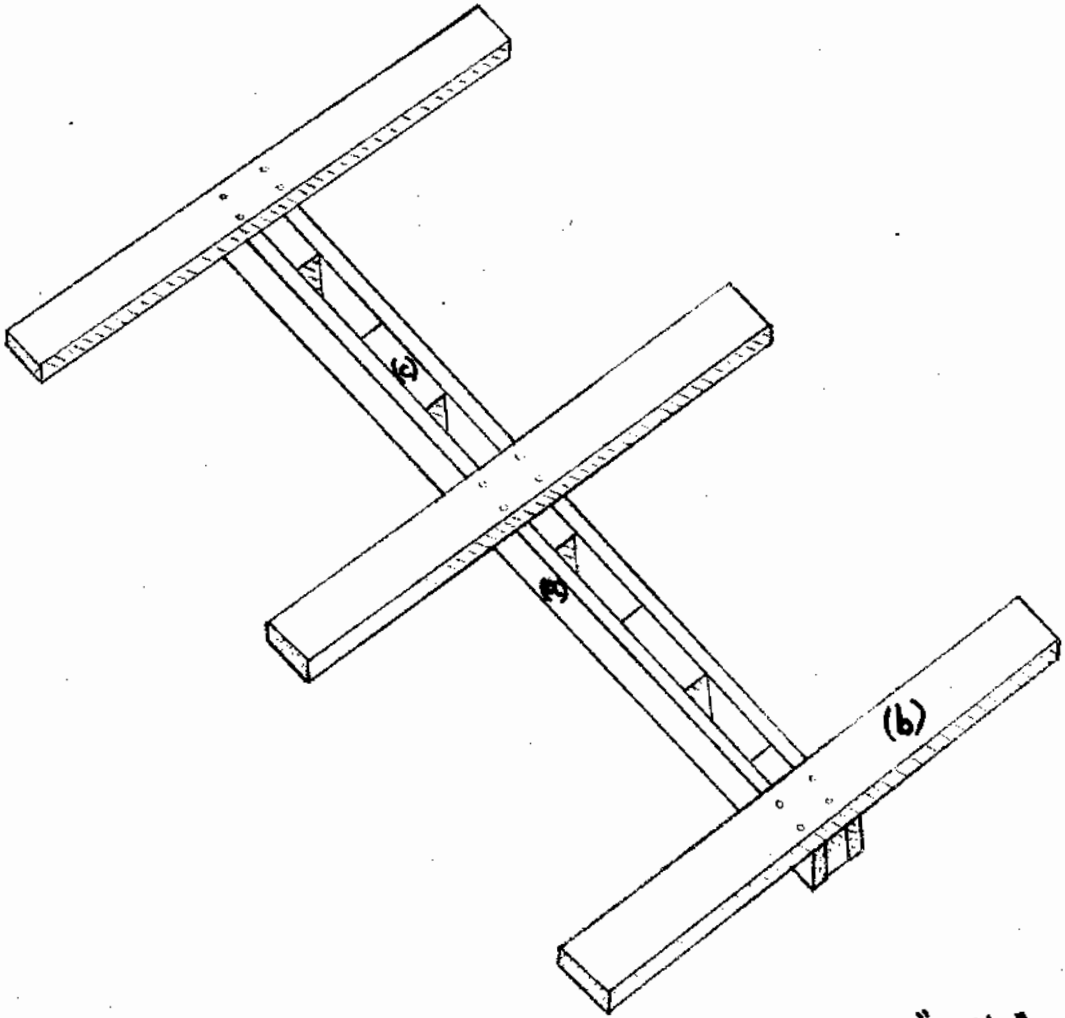
450 Kc at 20 metres

Diameter of elements =

20 metres : 1½"

15 metres : 1"

11 metres : 1"

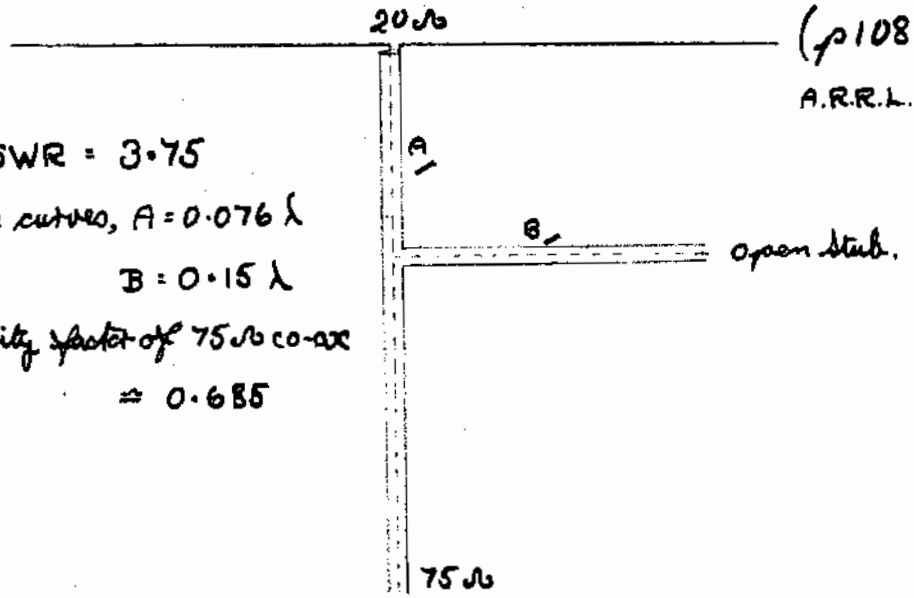


(a) 13'3" × 3" × 1½"

(b) 36" × 3" × 1½"

(c) 3" × 3" × 9"

BOOM FOR
21 MC. ROTARY BEAM



(p 108-110 A.R.R.L. ANT. BOOK)

SWR = 3·75

from curves, A = 0·076 λ

B = 0·15 λ

velocity factor of 75 Ω co-ax ≈ 0·685

$$\text{Length (feet)} = \frac{985 \times 0.685}{21.2 \text{ Mc/s}} \times \text{length (wavelengths)}$$

$$\underline{A} = \frac{985 \times 0.685 \times 0.076}{21.2} = \underline{2 \text{ ft } 5 \text{ in.}}$$

$$\underline{B} = \frac{985 \times 0.685 \times 0.15}{21.2} = \underline{4 \text{ ft } 9 \text{ in.}}$$

Matching Stub for 20 Ω impedance ant. to 75 Ω. (3 el. beam for 21 Mc/s).