CALIBRATION CHART

CAVITY WAVEMETER

TYPE No. : WI 6100 **No 1**
SERIAL No. : J528
ROOM TEMPERATURE : 73 $^{\circ}_{F}{}^{+}_{-}{}^{2}_{2}{}^{\circ}F$
RELATIVE HUMIDITY : 66%

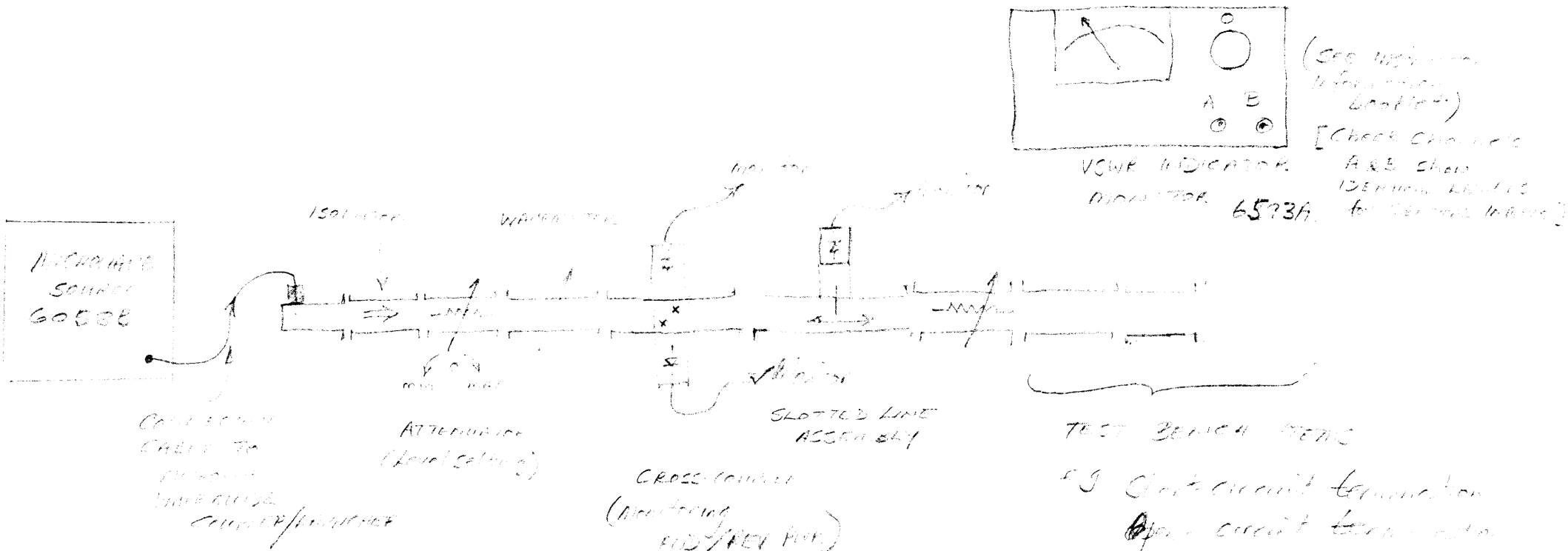
CALIBRATION POINTS

Freq.	Scale	Freq.	Scale	Scale
9240	11.912	10120	4.662	
9200	12.320	10080	4.936	
9160	12.740	10040	5.218	
9120	13.158	10000	5.498	
9080	13.593	9960	5.782	
9040	14.041	9920	6.090	
9000	14.491	9880	6.375	
8960	14.965	9840	6.670	
8920	15.440	9800	6.981	
8880	15.930	9760	7.289	
8840	16.430	9720	7.604	
8800	16.950	9680	7.930	
8760	17.447	9640	8.261	
8720	18.011	9600	8.599	
8680	18.576	9560	8.932	
8640	19.145	9520	9.282	
8600	19.731	9480	9.603	
8560	20.342	9440	10.002	
8520	20.971	9400	10.365	
8480	21.605	9360	10.732	
8440	22.264	9320	11.122	
8400	22.949	9280	11.510	

MICROWAVE INSTRUMENTS LIMITED
SHIREMOOR, NORTHUMBERLAND,
ENGLAND.

J E Thorburn
20/3/1962.

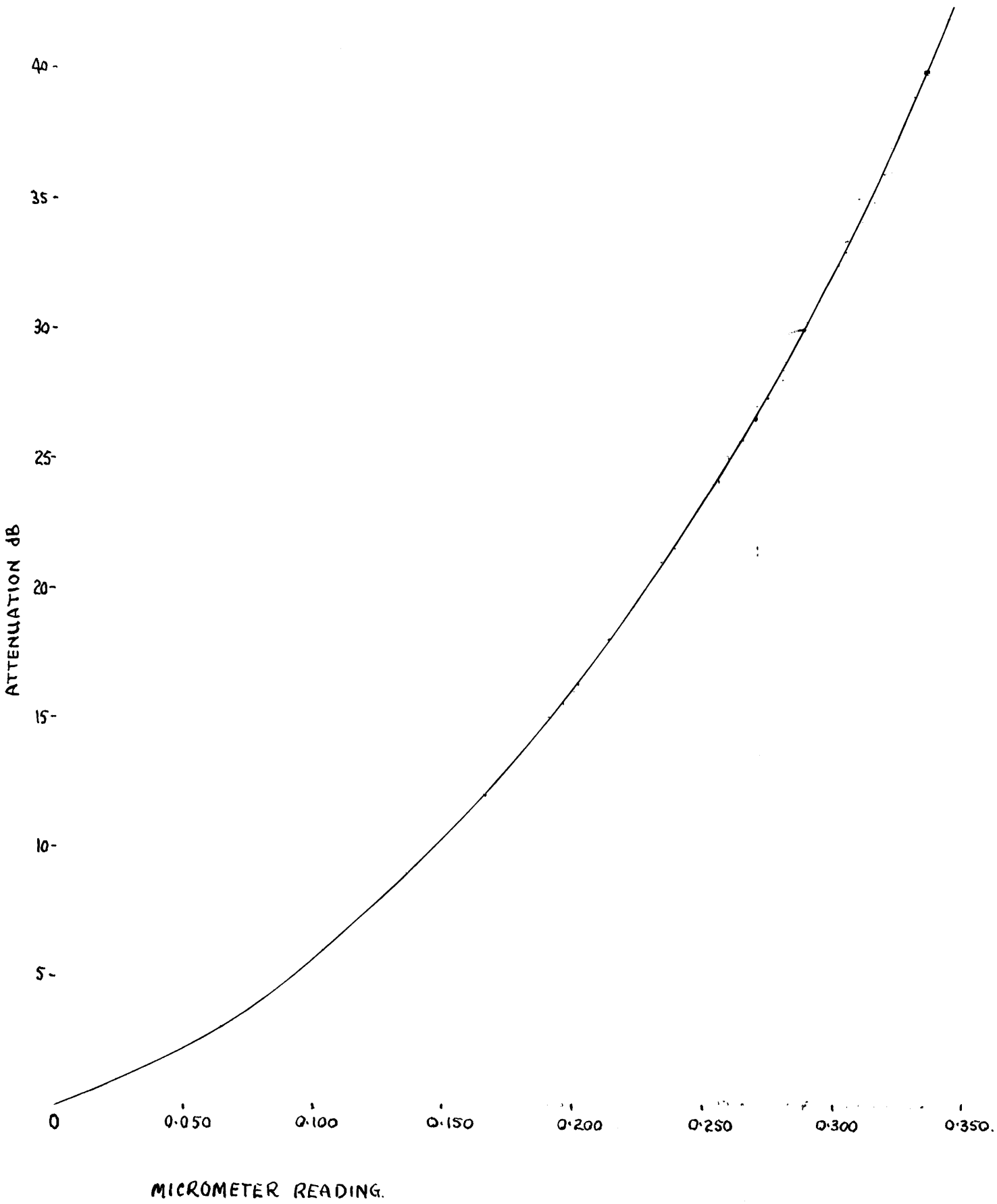
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
MICROMETER SCALE READING (m.m.)


A
B
VSWR INDICATOR
6573A
ISOLATOR
ATTENUATOR
SLOTTED LINE ASSEMBLY
TEST DEVICE PORT

SANDERS CALIBRATED ATTENUATOR SN°696 TYPE CA16/2RF

9500 ± 20MHz

CAL 4.11.66 DK.



CENTRAL INSTITUTE OF TECHNOLOGY

ELECTRONIC ENGINEERING DEPARTMENT

PROPAGATION LABORATORY

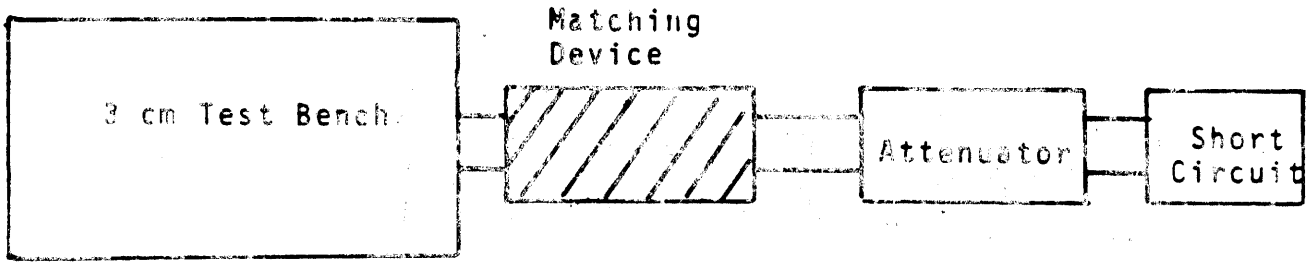
LOAD MATCHING IN WAVEGUIDES : Part V.

AIM : To investigate three methods of matching a load to a waveguide.

THEORY : A complex load may be matched to a waveguide using :

(i) A triple screw tuner
(ii) A double stub tuner
(iii) A single stub and phase shifter.

APPARATUS : Set up the apparatus as shown below but without the matching section :



In addition you will require :

1. Triple screw tuner
2. Waveguide Junction
3. Phase shifter
4. Double stub tuner
5. Precision Short circuit.

METHOD :

1. Adjust the load attenuator for an S.W.R. of about 4:1.

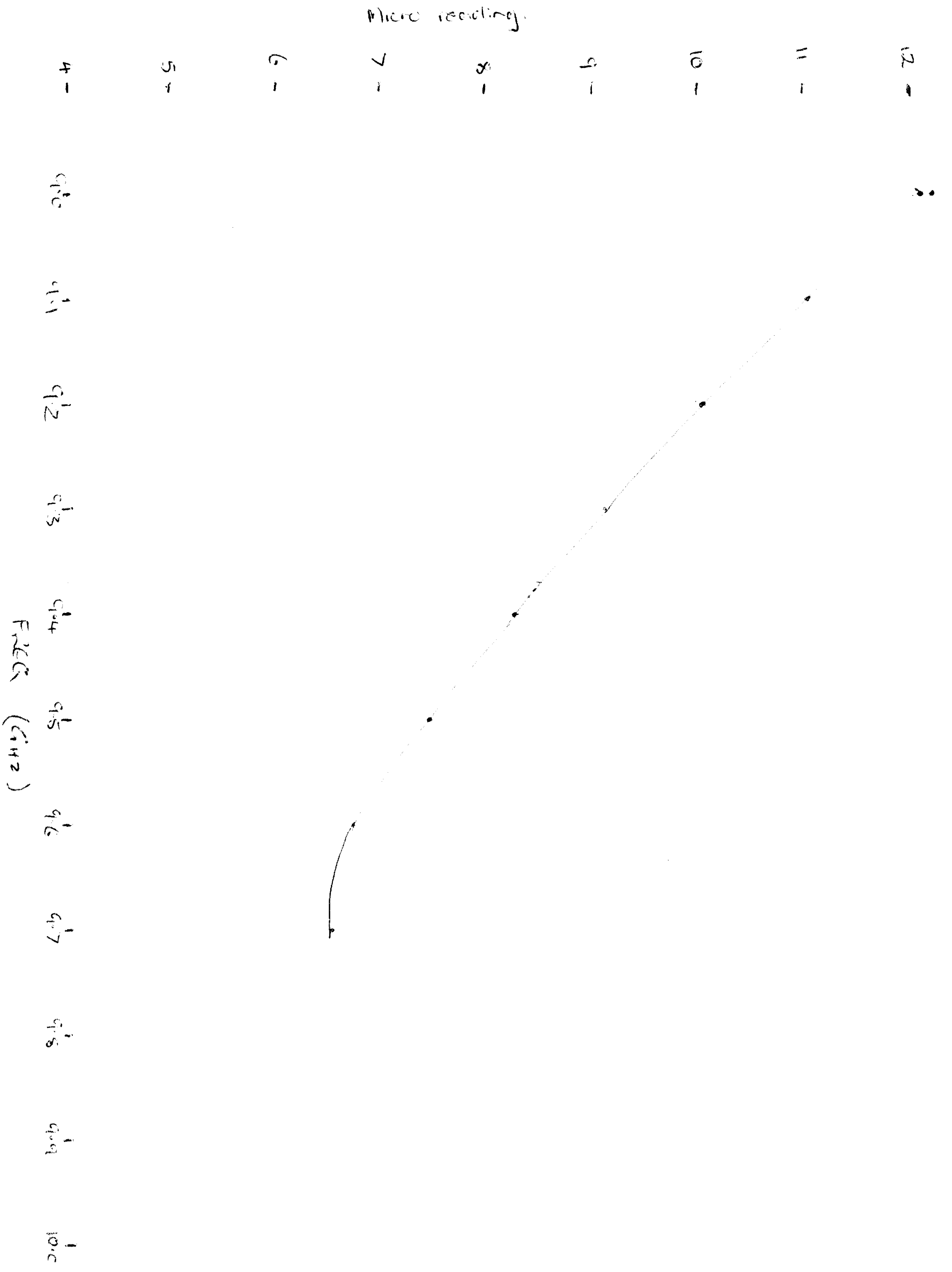
2. Insert triple screw tuner and adjust for best V.S.W.R.

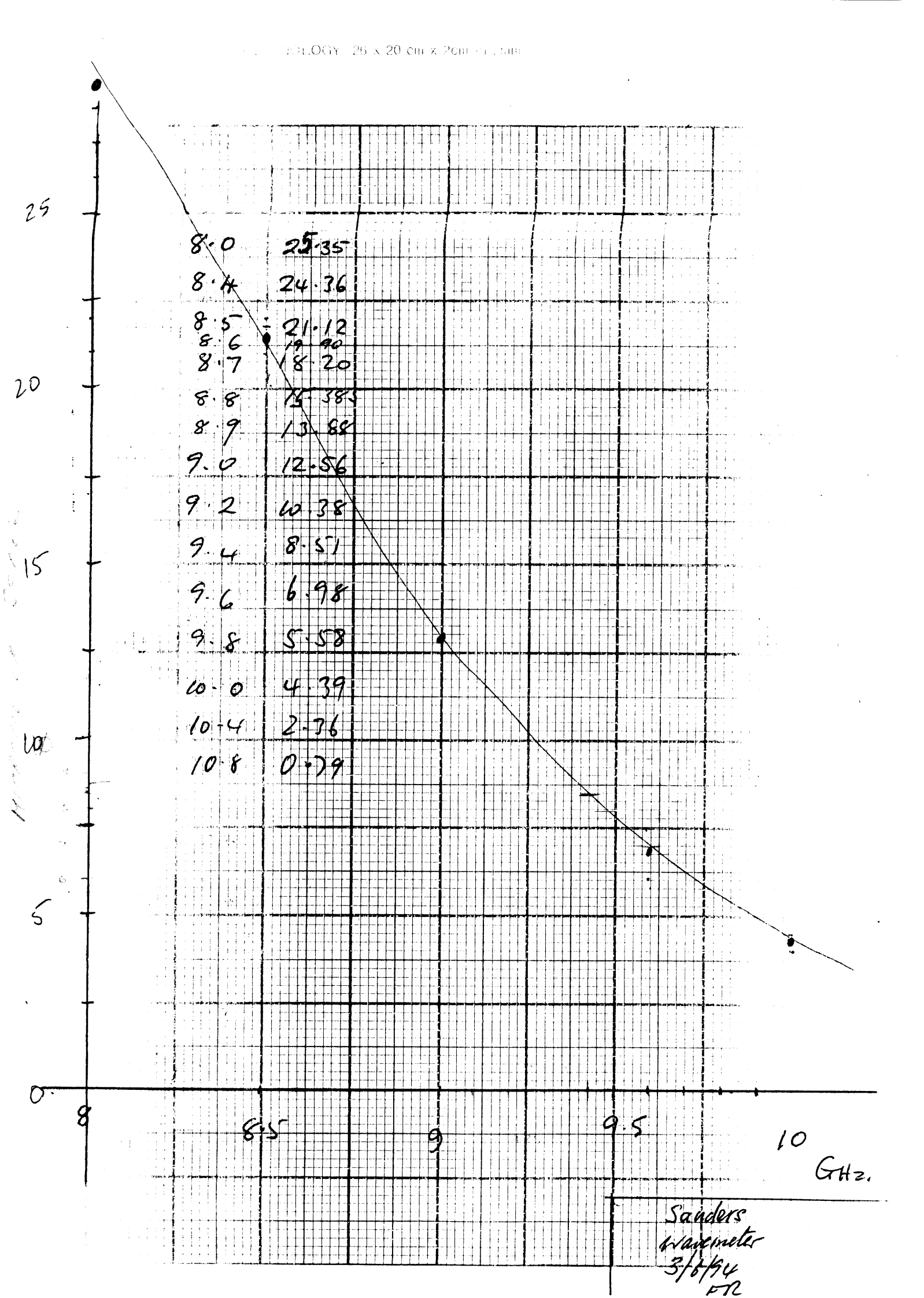
   V.S.W.R. _____

3. Replace triple screw tuner with double stub tuner and repeat.

   V.S.W.R. _____

4. Replace with the phase shifter and precision short as shown over page and repeat.


Micro reading
4
5
6
7
8
9
10
11
12
9.0
9.1
9.2
9.3
9.4
9.5
9.6
9.7
9.8
9.9
10.0
Freq (GHz)


25
20
15
10
5
0
8
8.5
9
9.5
10
GHz.
8.0 25.35
8.4 24.36
8.5 21.12
8.6 19.90
8.7 18.20
8.8 15.38
8.9 13.88
9.0 12.56
9.2 10.38
9.4 8.51
9.6 6.98
9.8 5.58
10.0 4.39
10.4 2.76
10.8 0.79
Saunders
wavemeter
3/6/54
FR

9.00

8.00

(mm)

7.0

6.0

5.0

$\frac{S}{b}$

4.0

3.0

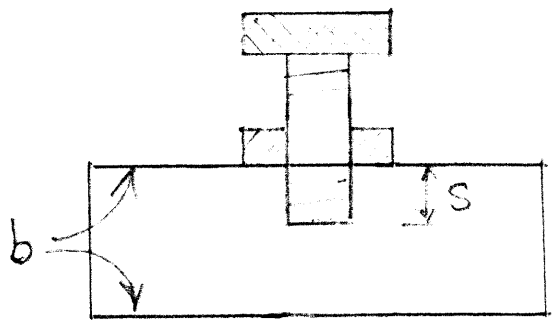
2.0

1.0

0.0 1 2 3 4 5

Normalised susceptance

JB/Y_0



Example:

$\frac{S}{b} = 1.5$ normalised

$\therefore S \cong 4.7$ mm

SET THE MICROMETER TO THIS VALUE

In the LAB B503 the waveguide internal dimension is 10mm

Thus S can be read directly from the chart

LR '96

TABLE IV (g)

FREQUENCY (Gc/s) TO GUIDE WAVELENGTH (cm) FOR TE_{10} MODE IN RECTANGULAR WAVEGUIDE 0.622 × 0.311 inches I/D. (WG18)

f_0	0	1	2	3	4	5	6	7	8	9	*Subtract* 1 2 3	4 5 6	7 8 9
12.4	3.755	3.748	3.740	3.733	3.726	3.719	3.712	3.705	3.698	3.691	0 1 2	2 3 4	5 5 6
12.5	3.684	3.677	3.670	3.663	3.656	3.649	3.643	3.636	3.629	3.623	0 1 2	2 3 4	4 5 6
12.6	3.616	3.609	3.603	3.596	3.590	3.583	3.577	3.570	3.564	3.557	0 1 1	2 3 3	4 5 5
12.7	3.551	3.545	3.539	3.532	3.526	3.520	3.514	3.508	3.501	3.495	0 1 1	2 3 3	4 4 5
12.8	3.489	3.483	3.477	3.471	3.465	3.459	3.453	3.448	3.442	3.436	0 1 1	2 2 3	4 4 5
12.9	3.430	3.424	3.419	3.413	3.407	3.401	3.396	3.390	3.384	3.379	0 1 1	2 2 3	3 4 5
13.0	3.373	3.368	3.362	3.357	3.351	3.346	3.340	3.335	3.330	3.324	0 1 1	2 2 3	3 4 4
13.1	3.319	3.314	3.308	3.303	3.298	3.293	3.287	3.282	3.277	3.272	0 1 1	2 2 3	3 4 4
13.2	3.267	3.262	3.257	3.251	3.246	3.241	3.236	3.231	3.226	3.221	0 1 1	2 2 3	3 4 4
13.3	3.217	3.212	3.207	3.202	3.197	3.192	3.187	3.182	3.178	3.173	0 0 1	1 2 2	3 3 4
13.4	3.168	3.163	3.159	3.154	3.149	3.145	3.140	3.135	3.131	3.126	0 0 1	1 2 2	3 3 4
13.5	3.122	3.117	3.113	3.108	3.103	3.099	3.095	3.090	3.086	3.081	0 0 1	1 2 2	3 3 4
13.6	3.077	3.072	3.068	3.064	3.059	3.055	3.051	3.046	3.042	3.038	0 0 1	1 2 2	3 3 3
13.7	3.033	3.029	3.025	3.021	3.017	3.012	3.008	3.004	3.000	2.996	0 0 1	1 2 2	2 3 3
13.8	2.992	2.988	2.983	2.979	2.975	2.971	2.967	2.963	2.959	2.955	0 0 1	1 2 2	2 3 3
13.9	2.951	2.947	2.943	2.939	2.935	2.932	2.928	2.924	2.920	2.916	0 0 1	1 1 2	2 3 3
14.0	2.912	2.908	2.904	2.901	2.897	2.893	2.889	2.885	2.882	2.878	0 0 1	1 1 2	2 3 3
14.1	2.874	2.871	2.867	2.863	2.859	2.856	2.852	2.848	2.845	2.841	0 0 1	1 1 2	2 2 3
14.2	2.838	2.834	2.830	2.827	2.823	2.820	2.816	2.813	2.809	2.806	0 0 1	1 1 2	2 2 3
14.3	2.802	2.799	2.795	2.792	2.788	2.785	2.781	2.778	2.774	2.771	0 0 1	1 1 2	2 2 3
14.4	2.768	2.764	2.761	2.757	2.754	2.751	2.747	2.744	2.741	2.737	0 0 1	1 1 2	2 2 3
14.5	2.734	2.731	2.728	2.724	2.721	2.718	2.714	2.711	2.708	2.705	0 0 0	1 1 1	2 2 2
14.6	2.702	2.698	2.695	2.692	2.689	2.686	2.683	2.679	2.676	2.673	0 0 0	1 1 1	2 2 2
14.7	2.670	2.667	2.664	2.661	2.658	2.655	2.651	2.648	2.645	2.642	0 0 0	1 1 1	2 2 2
14.8	2.639	2.636	2.633	2.630	2.627	2.624	2.621	2.618	2.615	2.612	0 0 0	1 1 1	2 2 2
14.9	2.609	2.607	2.604	2.601	2.598	2.595	2.592	2.589	2.586	2.583	0 0 0	1 1 1	2 2 2
15.0	2.580	2.578	2.575	2.572	2.569	2.566	2.563	2.561	2.558	2.555	0 0 0	1 1 1	1 2 2
15.1	2.552	2.549	2.547	2.544	2.541	2.538	2.535	2.533	2.530	2.527	0 0 0	1 1 1	1 2 2
15.2	2.525	2.522	2.519	2.516	2.514	2.511	2.508	2.506	2.503	2.500	0 0 0	1 1 1	1 2 2
15.3	2.498	2.495	2.492	2.490	2.487	2.484	2.482	2.479	2.477	2.474	0 0 0	1 1 1	1 2 2
15.4	2.471	2.469	2.466	2.464	2.461	2.459	2.456	2.454	2.451	2.448	0 0 0	1 1 1	1 2 2
15.5	2.446	2.443	2.441	2.438	2.436	2.433	2.431	2.428	2.426	2.423	0 0 0	0 1 1	1 1 2
15.6	2.421	2.419	2.416	2.414	2.411	2.409	2.406	2.404	2.401	2.399	0 0 0	0 1 1	1 1 2
15.7	2.397	2.394	2.392	2.389	2.387	2.385	2.382	2.380	2.378	2.375	0 0 0	0 1 1	1 1 2
15.8	2.373	2.371	2.368	2.366	2.364	2.361	2.359	2.357	2.354	2.352	0 0 0	0 1 1	1 1 2
15.9	2.350	2.347	2.345	2.343	2.341	2.338	2.336	2.334	2.331	2.329	0 0 0	0 1 1	1 1 2
16.0	2.327	2.325	2.323	2.320	2.318	2.316	2.314	2.311	2.309	2.307	0 0 0	0 1 1	1 1 1
16.1	2.305	2.303	2.300	2.298	2.296	2.294	2.292	2.290	2.287	2.285	0 0 0	0 1 1	1 1 1
16.2	2.283	2.281	2.279	2.277	2.275	2.272	2.270	2.268	2.266	2.264	0 0 0	0 1 1	1 1 1
16.3	2.262	2.260	2.258	2.256	2.254	2.251	2.249	2.247	2.245	2.243	0 0 0	0 1 1	1 1 1
16.4	2.241	2.239	2.237	2.235	2.233	2.231	2.229	2.227	2.225	2.223	0 0 0	0 1 1	1 1 1
16.5	2.221	2.219	2.217	2.215	2.213	2.211	2.209	2.207	2.205	2.203	0 0 0	0 0 1	1 1 1
16.6	2.201	2.199	2.197	2.195	2.193	2.191	2.189	2.187	2.185	2.183	0 0 0	0 0 1	1 1 1
16.7	2.181	2.179	2.178	2.176	2.174	2.172	2.170	2.168	2.166	2.164	0 0 0	0 0 1	1 1 1
16.8	2.162	2.160	2.159	2.157	2.155	2.153	2.151	2.149	2.147	2.145	0 0 0	0 0 1	1 1 1
16.9	2.144	2.142	2.140	2.138	2.136	2.134	2.133	2.131	2.129	2.127	0 0 0	0 0 1	1 1 1
17.0	2.125	2.123	2.122	2.120	2.118	2.116	2.114	2.113	2.111	2.109	0 0 0	0 0 1	1 1 1
17.1	2.107	2.106	2.104	2.102	2.100	2.098	2.097	2.095	2.093	2.091	0 0 0	0 0 1	1 1 1
17.2	2.090	2.088	2.086	2.084	2.083	2.081	2.079	2.078	2.076	2.074	0 0 0	0 0 1	1 1 1
17.3	2.072	2.071	2.069	2.067	2.066	2.064	2.062	2.060	2.059	2.057	0 0 0	0 0 1	1 1 1
17.4	2.055	2.054	2.052	2.050	2.049	2.047	2.045	2.044	2.042	2.040	0 0 0	0 0 1	1 1 1
17.5	2.039	2.037	2.035	2.034	2.032	2.031	2.029	2.027	2.026	2.024	0 0 0	0 0 0	1 1 1
17.6	2.022	2.021	2.019	2.018	2.016	2.014	2.013	2.011	2.010	2.008	0 0 0	0 0 0	1 1 1
17.7	2.006	2.005	2.003	2.002	2.000	1.998	1.997	1.995	1.994	1.992	0 0 0	0 0 0	1 1 1
17.8	1.991	1.989	1.987	1.986	1.984	1.983	1.981	1.980	1.978	1.977	0 0 0	0 0 0	1 1 1
17.9	1.975	1.974	1.972	1.971	1.969	1.967	1.966	1.964	1.963	1.961	0 0 0	0 0 0	1 1 1

CENTRAL INSTITUTE OF TECHNOLOGY

ELECTRONIC ENGINEERING DEPARTMENT

PROPAGATION LABORATORY

MEASUREMENT OF MICROWAVE COMPONENTS

THEORY : Determining the operating characteristics of microwave components involves the measurement of :

(i) The effects of inserting the device into a microwave system.
(ii) The performance of the device itself.

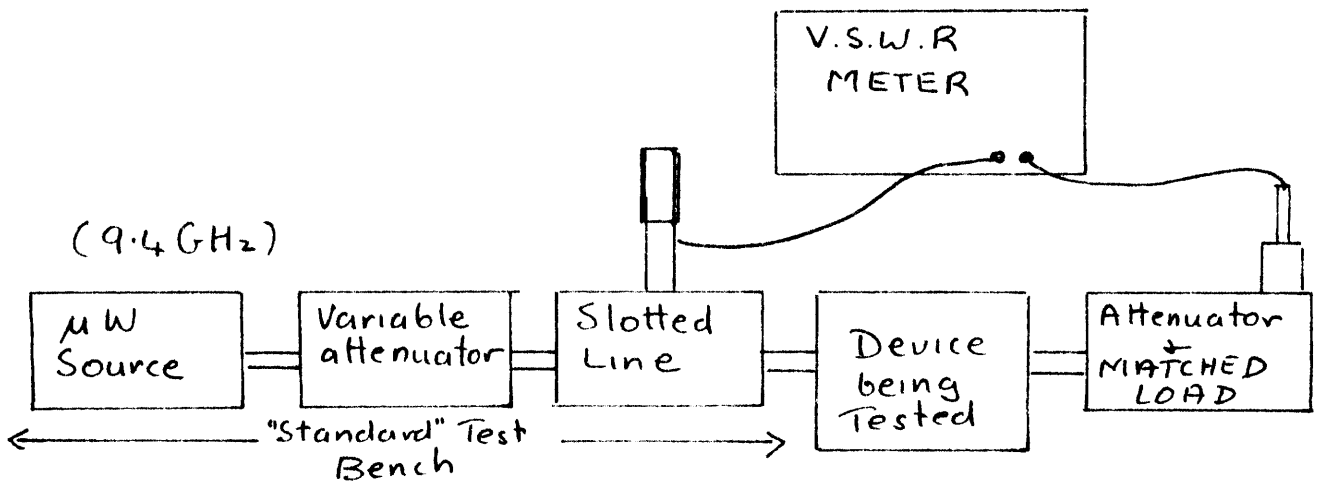
The following may be measured :

(a) Insertion loss : The drop in output power in dB when the device is inserted between a microwave bench and a matched detector. Note : the Insertion loss caused by the device is when it is operated in its minimum loss mode.

(b) V.S.W.R. : The effect on the V.S.W.R. seen by the generator when the device is set up as for (a) above.

(c) Component Measurements : Examination of the operation of the device itself using a matched detector to determine the levels involved.

APPARATUS : Standard Test bench set at f = 9.4 GHz unless otherwise specified.
Matched detector consisting of :
(a) Wideband coaxial detector
(b) Wideband coaxial/waveguide transformer
(c) Calibrated attenuator.



Note : a wavemeter is not needed using the Marconi solid state source.

3. Magic Tee

(a) Connect the "Magic Tee" to the source via a twin stub tuner. Terminate both side arms with matched loads and adjust the twin stub tuner till V.S.W.R. is better than 1.1:1.

(b) Replace one matched load by the matched detector and determine the loss from the source to the side arm.

Loss _____ dB.

(c) Note level from the detector, replace the matched load on the side arm and measure the level in the unused input arm.

Isolation _____ dB.

(d) Isolation between input arms

_____ dB.

4. Bethe (45°) coupler

(a) Set up with matched detector terminating the main arm and matched loads at both side arms.

(b) Set the output for "0" dB on the meter with at least 40 dB of attenuation held in the meter amplifier and the load attenuator.

(c) Reverse the matched detector and the load on the forward power sampling arm and determine the Coupling Factor.

Coupling Factor _____ dB.

(d) Reset levels for at least 30 dB of held attenuation and reverse load and detector on the coupled arm to determine the reverse power level.

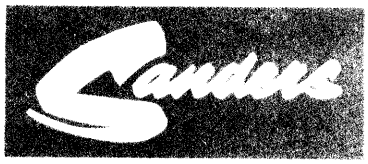
Reverse power loss _____ dB.

(e) Directivity factor is now the sum of (c) and (d).

Directivity factor _____ dB.

CALIBRATION CERTIFICATE TEST DIVISION

WAVEMETER



Type WM.16/1 R Serial No, 93 Cert No. 10334

Customer & Order No. SOUTHERN CROSS ENGINEERING 10059

Freq:	M/Reading	T.	H.
8.4	22.810	20.5	52.
8.5	20.345	"	"
8.6	18.250	"	"
8.7	16.461	"	"
8.8	14.877	"	"
8.9	13.470	"	"
9.0	12.221	"	"
9.1	11.085	"	"
9.2	10.061	"	"
9.3	9.120	"	"
9.4	8.259	16	50
9.5	7.456	"	"
9.6	6.724	"	"
9.7	6.032	"	"
9.8	5.390	"	"
9.9	4.797	"	"
10.0	4.235	"	"
10.1	3.637	18	51
10.2	3.211	"	"
10.3	2.740	"	"
10.4	2.286	"	"
10.5	1.865	"	"
10.6	21.697	"	"
10.7	20.935	19	52
10.8	20.201	"	"
10.9	19.514	"	"
11.0	18.820	"	"
11.1	18.185	"	"
11.2	17.570	"	"
11.3	16.985	"	"
11.4	16.415	"	"
11.5	15.912	"	"
11.6	15.342	20	53
11.7	14.834	"	"
11.8	14.350	"	"
11.9	13.875	"	"
12.0	13.408	"	"
12.1	12.975	"	"
12.2	12.536	"	"
12.3	12.131	"	"
12.4	11.721	"	"

Originated by K.C Langdon.

Date 18th September 1962

Approved [signature]

Date 20th September 1962

DR.

Serial No. of Standard used 1

Recommended re-calibration date 12TH FEB 1965

CALIBRATION CERTIFICATE TEST DIVISION

CALIBRATED ATTENUATORS

Serial No. 696

Cert. No. 10093

Attenuator Type C.A. 16/2RF.

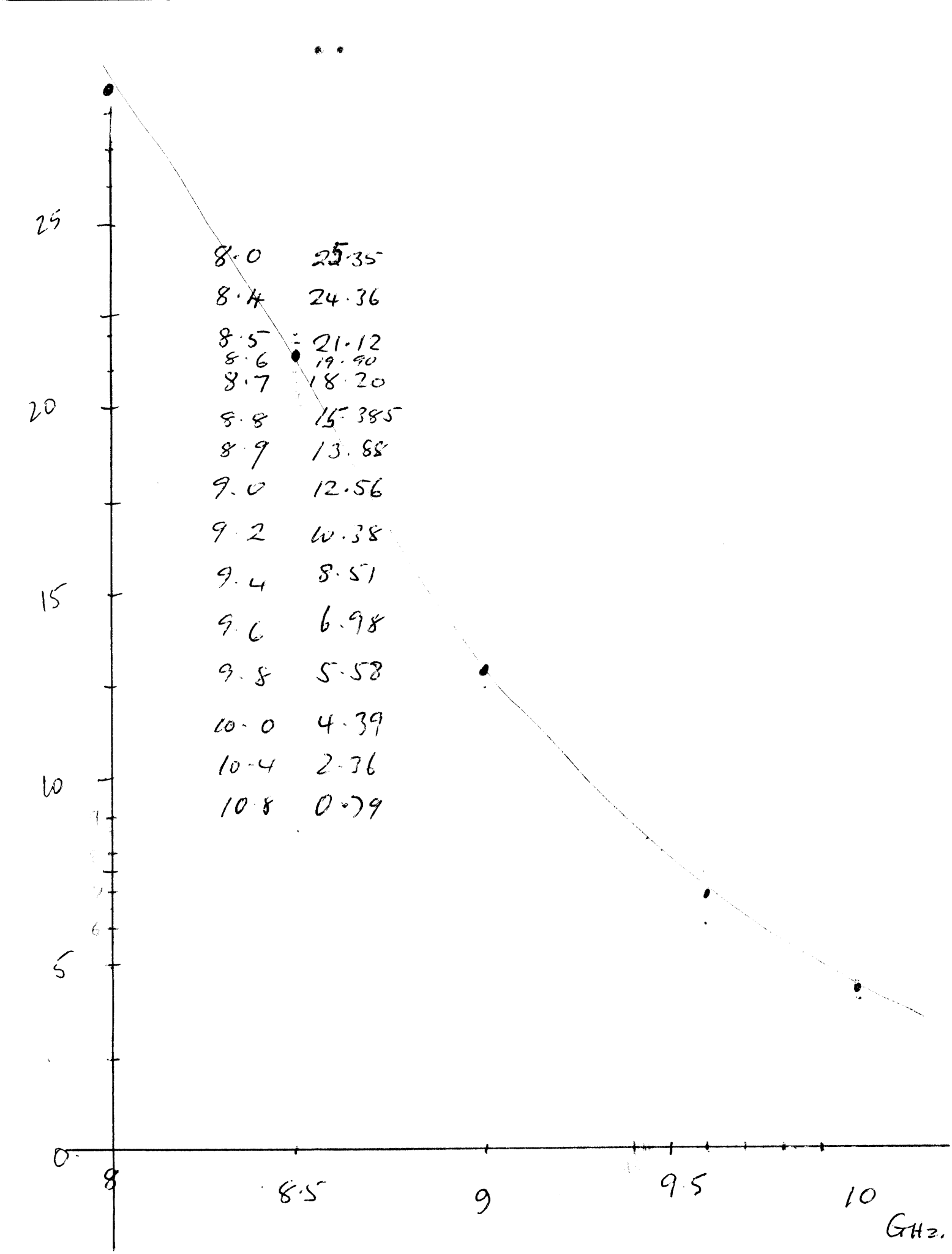
Customer & Order No. SOUTHERN CROSS ENGINEERING 10059

ATTENUATION	FREQUENCY Gc/s				
	8,500 ± 20Mc/s	9000 ± 20Mc/s	9500 ± 20Mc/s	10,000 ± 20Mc/s	± 20Mc/s
	MICROMETER READINGS				
2db	0955	0970	0960	0970	
4 "	1340	1340	1330	1330	
6 "	1625	1620	1610	1600	
8 "	1860	1850	1835	1835	
10 "	2070	2060	2040	2040	
12 "	2250	2240	2240	2220	
14 "	2430	2420	2410	2400	
16 "	2590	2580	2580	2565	
18 "	2740	2740	2730	2720	
20 "	2900	2885	2870	2870	
22 "					
24 "	3190	3165	3150	3140	
26 "					
28 "	3450	3430	3405	3385	
30 "					
32 "	3710	3680	3640	3620	
34 "					
36 "	3970	3920	3850	3830	
38 "					
40 "	4230	4150	4055	4020	
INSERTION LOSS	0·03db	0·04 db	0·04 db	0·06db	0· db
V.S.W.R. @ 40db	1·025 :1	1·03 :1	1·04 :1	1·025 :1	1· :1

Temperature of calibration 20°C. ± 1°C.
Power handling capacity - 1 watt at maximum attentuation
Leakage - Less than a level of 60db. down on the input level.

Standard used Serial No. 210
Recommended re-calibration date 12th FEB 1964

Originated by B. LAMBERT
Date 10th AUG 1962
Approved
Date 11th FEB 1963



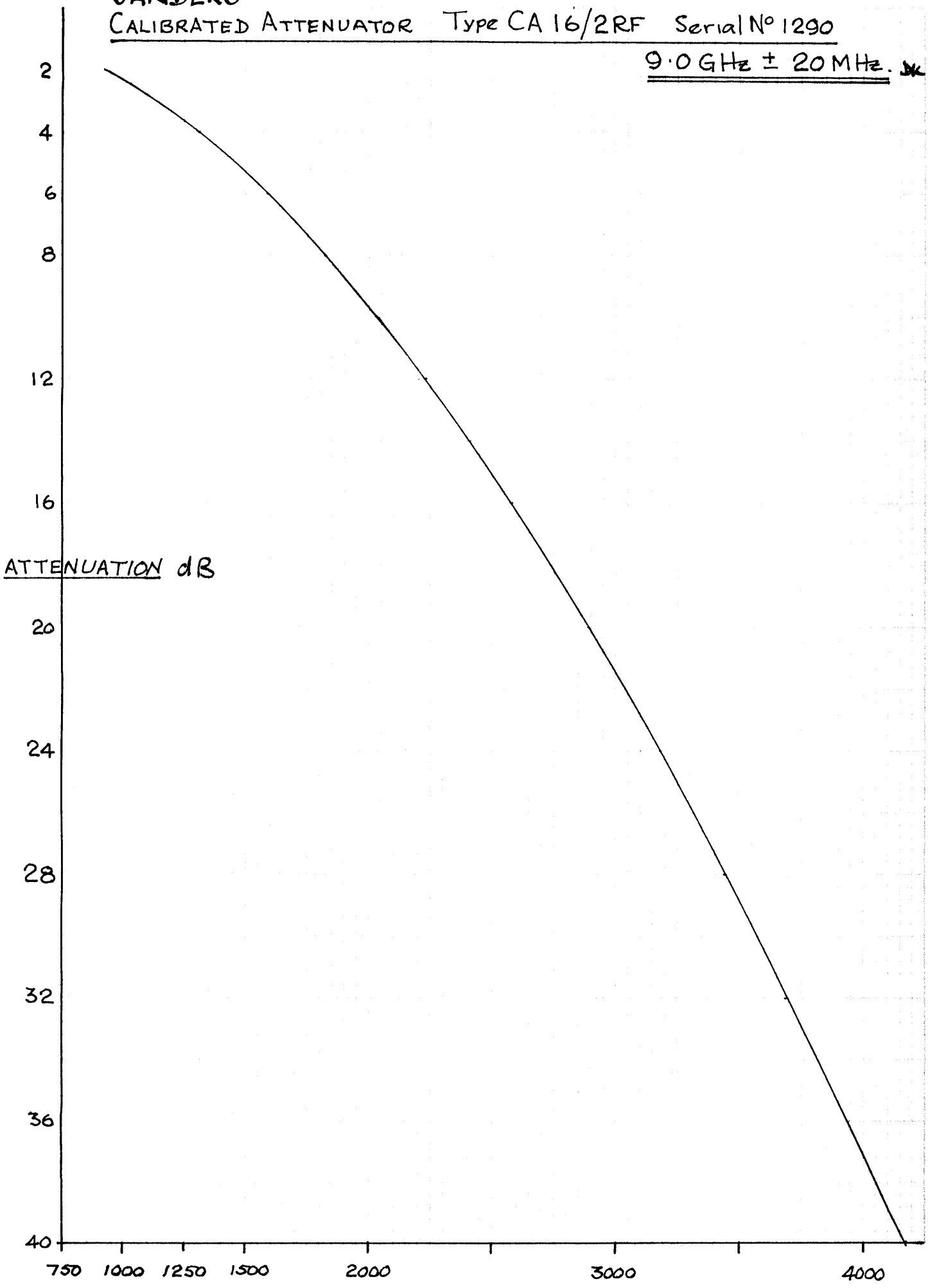
8.0	25.35
8.4	24.36
8.5	21.12
8.6	19.90
8.7	18.20
8.8	15.385
8.9	13.88
9.0	12.56
9.2	10.38
9.4	8.51
9.6	6.98
9.8	5.58
10.0	4.39
10.4	2.36
10.8	0.79

Sanders
wavemeter
3/6/54
ETR

SANDERS

CALIBRATED ATTENUATOR Type CA 16/2RF Serial No 1290

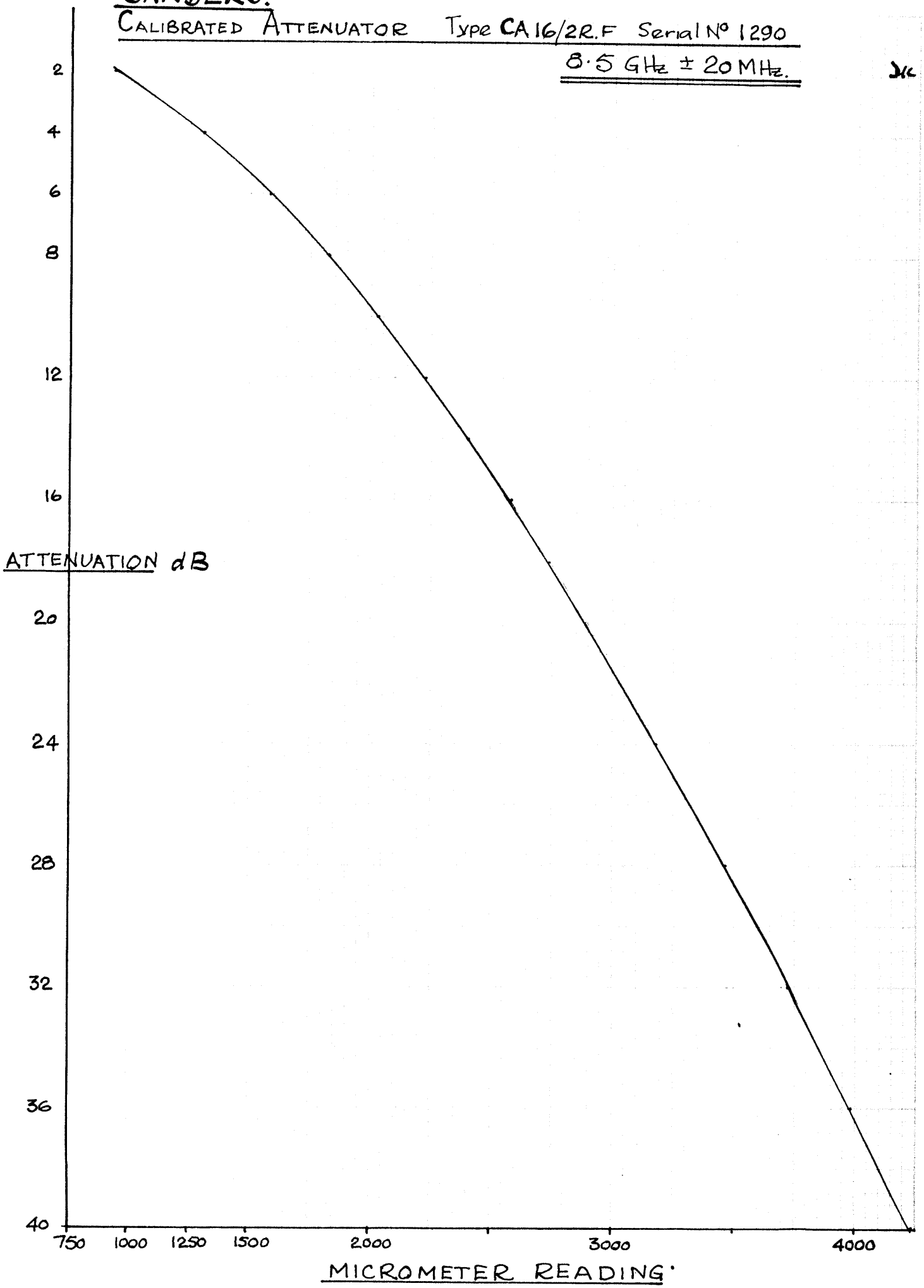
9·0 GHz ± 20 MHz. JK



SANDERS.

CALIBRATED ATTENUATOR Type CA 16/2R.F Serial No 1290

8·5 GHz ± 20 MHz.

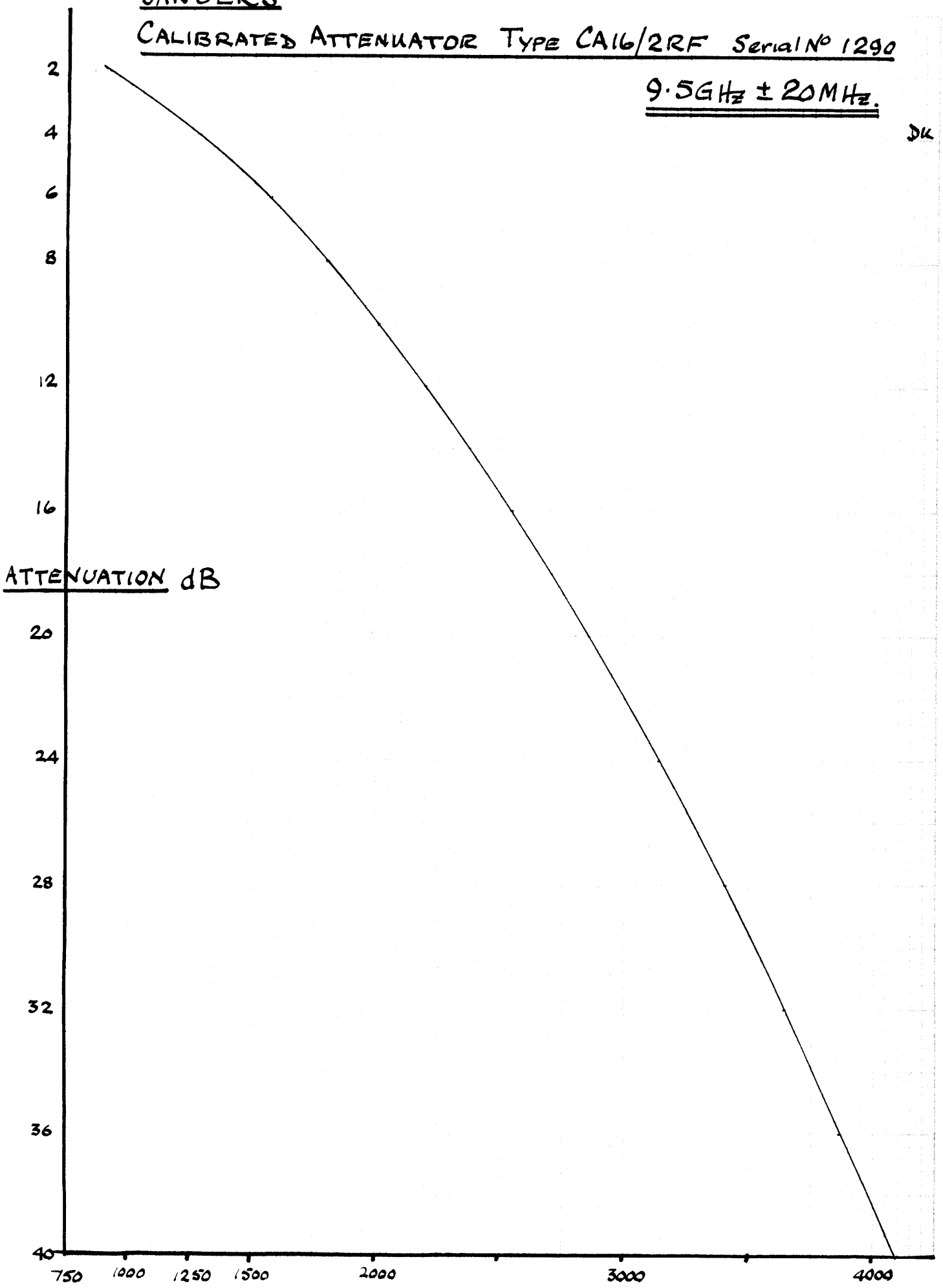


SANDERS

CALIBRATED ATTENUATOR TYPE CA16/2RF Serial No 1290

9·5GHz ± 20MHz.

DK

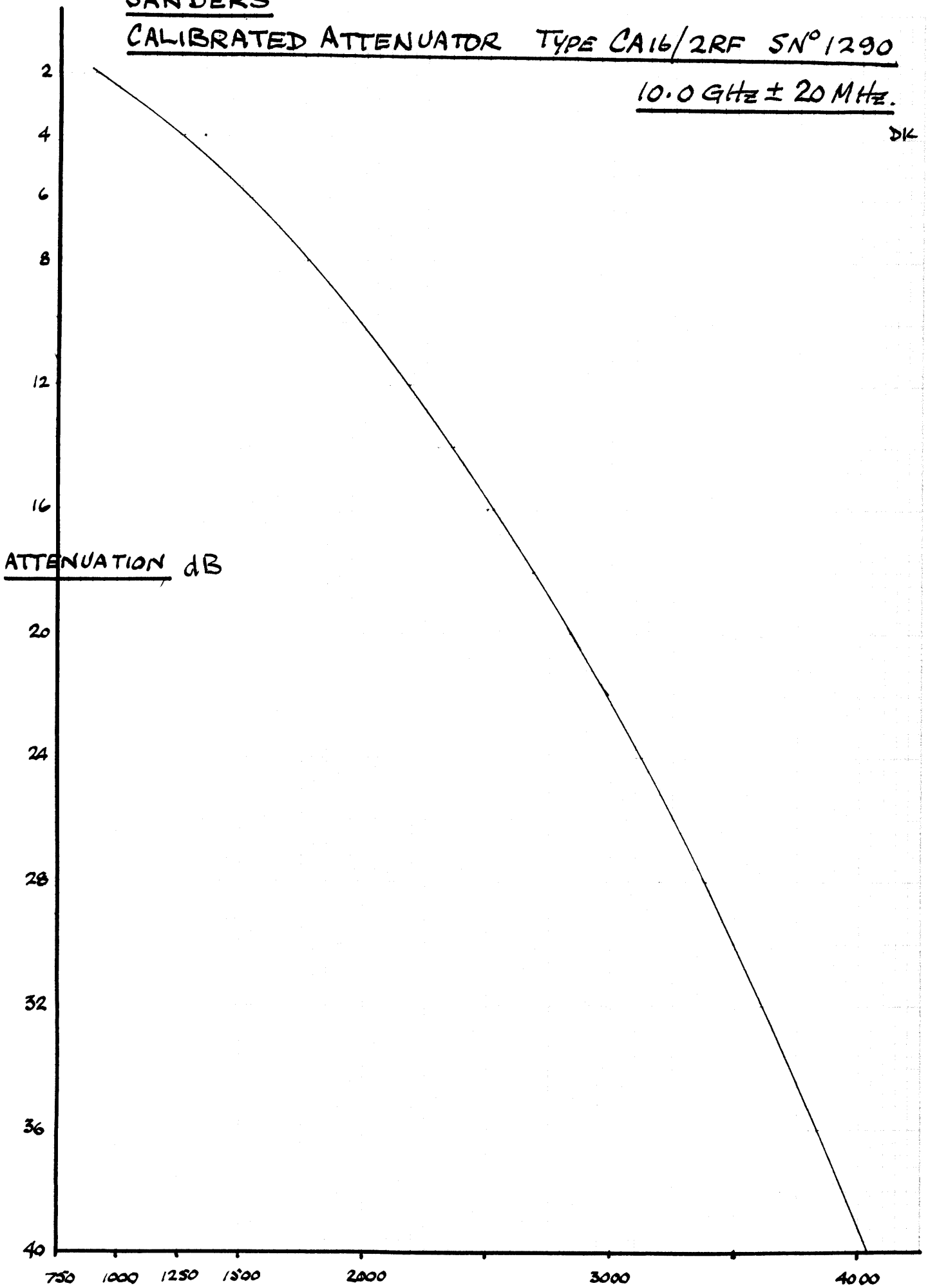


SANDERS

CALIBRATED ATTENUATOR TYPE CA16/2RF SN° 1290

10.0 GHz ± 20 MHz.

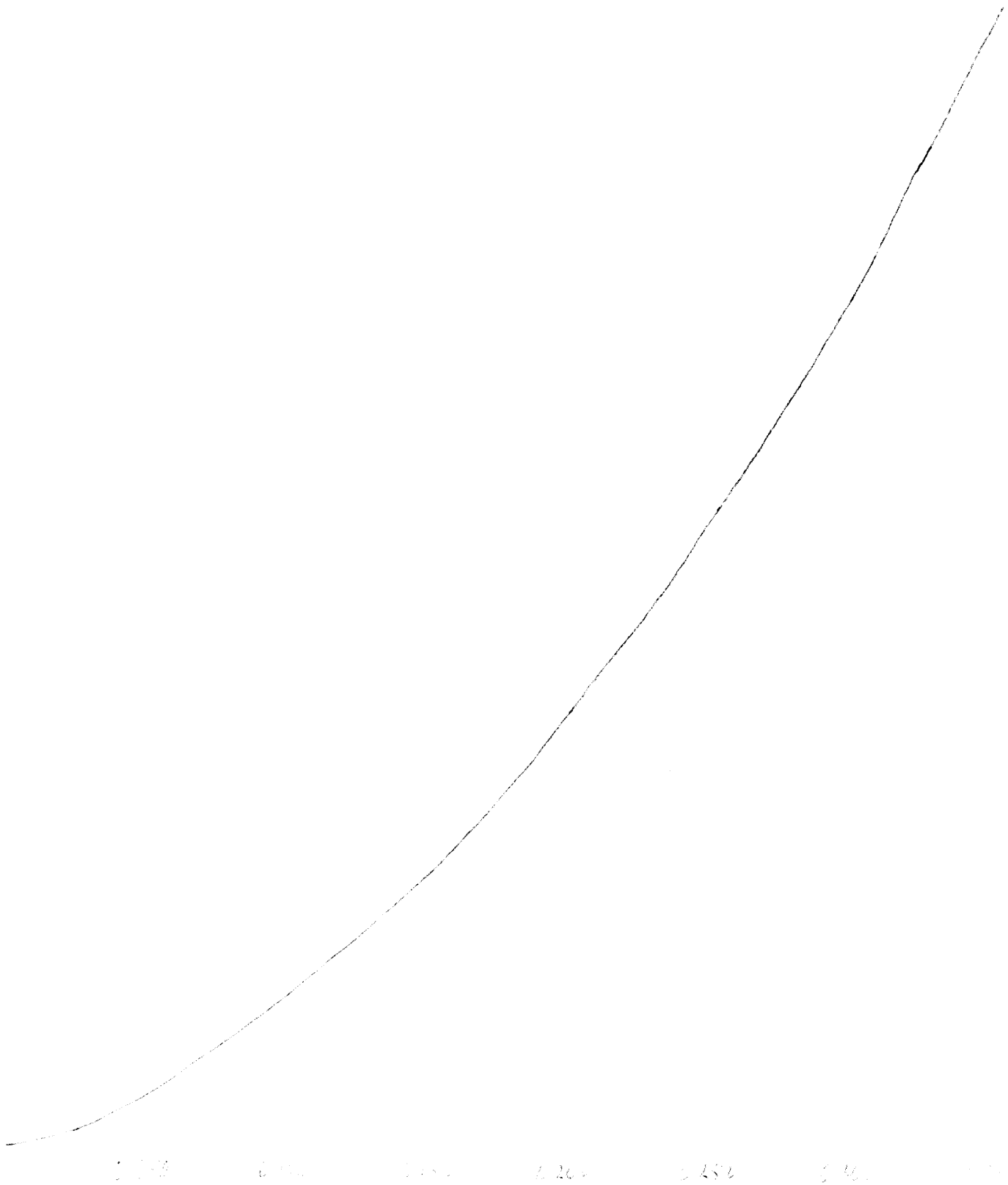
DK



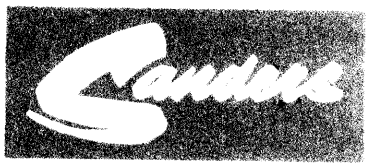
MICROMETER READING.

Saunders Calibrated Attenuator

9.2 GHz Calibrated 12-10-77



CALIBRATION CERTIFICATE TEST DIVISION



PHASE SHIFTERS

Phase Shifter Type PS. 16 /. R F Serial No. 293 Cert No. 10810

Customer & Order No. SOUTHERN CROSS ENGINEERING 10059

Phase Angle	MICROMETER READINGS Frequency Gc/s				
	...8.5± 20Mc/s	..9.5 .± 20Mc/s	...10.0± 20Mc/s	..... ± 20Mc/s	..... ± 20Mc/s
18°	0985	0990	0975		
36°	1695	1680	1640		
108°	4210	4040	3875		
144°	5625	5455	5045		
180°	7625	7660	6460		
72 °	2950	2860	2790		
V.S.W.R.	0: 1.05	0: 1.18	0: 1.24	0:	0:

Temperature of calibration .....°C
Accuracy of calibration ± 0· %

Originated by M.Taylor

Date 10.12.62

Approved

Date 11.12.62

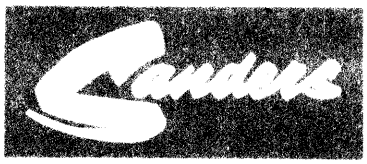
Recommended re-calibration
date 12th FEB 1964

W. H. SANDERS (ELECTRONICS) LIMITED DRI

A Member of the Sanders Group of Companies

Gunnels Wood Road, Stevenage, Herts. Tel.: Stevenage 981. *Grams and Cables: Sandelect, Stevenage. Telex:* 82159 *Sanders Stev.*
London Office: 49 *Conduit Street, London, W.* 1. *Telephone: Regent* 3534. *Telegrams and Cables: Santronic, London*
German Associate Company: Sanders Electronics G.M.B.H., Vogtstrasse 52, Frankfurt-am-Main. Telephone: Frankfurt 593368
Telegrams: Santron. Telex: Frankfurt 4—12970

CALIBRATION CERTIFICATE TEST DIVISION



STANDING WAVE METERS

Standing Wave Meter Type SWM 10/18 F Serial No. 211 Cert. No. 10999

(frequency 9.5 mc/s λg = 4.361 cm.)

Customer & Order No. SOUTHERN CROSS ENGINEERING 10059

1. Coupling of Travelling detector 22.184db

Variation of coupling & impedance measurement

Position of probe(CM)	Variation of output(db)	Variation of coupling(db)	Position of probe (CM)	Variation of output(db)	Variation of coupling(db)
7.0	0.007	0.002	13	0.028	0.015
7.5	0.002	0.002			
8.0	0.01	0.003			
8.5	0.026	0.006			
9.0	0.0265	0.013			
9.5	0.016	0.014			
10.0	0.0135	0.012			
10.5	0.0275	0.01			
11.0	0.03	0.0115			
11.5	0.023	0.0105			
12.0	0.018	0.018			
12.5	0.028	0.18			
13.0					

V.S.W.R. 0.02 db.

The above table gives the output as a function of position of the travelling detector. In this test the instrument is terminated with a Standard Waveguide containing a matched termination. The reflection from the termination has been eliminated by the measurement technique so that the second column of figures represents the variation of output which would be observed when measuring a standard perfectly terminated guide. The VSWR is extracted by graphical analysis from this result and the figure stated is a measure of the error in impedance measurement in the instrument. The third column represents the variation of coupling of the travelling detector to a pure travelling wave. This information can be used to improve the accuracy of measurement if desired.

Short circuit test:

a.) Scale bar set up at 6.6. cm.)

b.) V.S.W.R. Nearest S/C 36.693 db

V.S.W.R. furthest from S/C 36.139 db

c.) Attenuation constant 0.0002902 nepers/cm.

d.) $\frac{\lambda g \text{ in slotted section}}{\lambda g \text{ in unslotted section}}$ = @ 9.5 mc/s.

Originated by D.L.B. Jones

Date 23.1.63

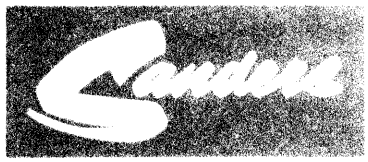
Approved

Standard used Serial No. 205

Recommended re-calibration

12th FEB 1964

CALIBRATION CERTIFICATE TEST DIVISION



COAXIAL LINE OSCILLATORS

C.L.C. Type 7-12

Serial No. 318

Klystron serial No. 6981 Cert. No. 11205

Customer & Order No. Southern Cross Engineering Ltd, 10059. WHS. 21911

Frequency Gc/s	Micrometer Reading	Reflector Voltage	Frequency Gc/s	Micrometer Reading	Reflector Voltage	
7000	12.100	– 200 V	9000	5.912	– 310 V	
7100	11.652	– 200 V	9100	5.718	– 310 V	
7200	11.248	– 200 V	9200	5.502	– 350 V	
7300	10.934	– 200 V	9300	5.290	– 350 V	
7400	10.520	– 200 V	9400	5.088	– 350 V	
7500	10.142	– 200 V	9500	4.888	– 350 V	
7600	9.790	– 200 V	9600	4.700	– 160 V	
7700	9.462	– 200 V	9700	4.520	– 160 V	
7800	9.118	– 200 V	9800	4.327	– 160 V	
7900	8.824	– 200 V	9900	4.156	– 160 V	
8000	8.482	– 200 V	10000	3.980	– 160 V	
8100	8.206	– 270 V	10100	3.796	– 160 V	
8200	7.916	– 270 V	10200	3.632	– 160 V	
8300	7.643	– 270 V	10300	3.464	– 200 V	
8400	7.376	– 270 V	10400	3.300	– 200 V	
8500	7.110	– 270 V	10500	3.120	– 200 V	
8600	6.853	– 270 V	10600	2.980	– 200 V	
8700	6.613	– 310 V	10700	2.814	– 200 V	
8800	6.384	– 310 V	10800	2.642	– 200 V	
8900	6.142	– 310 V	10900	2.494	– 200 V	

Cathode Voltage - 300 Volts ± 0.25% Resonator Voltage:- Earth

Note:- All Voltages given are with respect to "Earth". Accuracy of calibration ±0.1% when piston attenuator is loosely coupled & reflector voltage to stated value within ± 0.25%.

Reset accuracy - better than 0.1 Mc/s.

Temperature of calibration 22 °C.

Important:- The accuracy of this calibration is only applicable when used with the Klystron given above, which must not be removed or rotated.

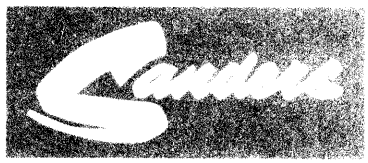
Recommended recalibration Date 26.2.64 and/or when Klystron is changed or removed.

Originated by B.Lambert

Date 21.2.63

Approved

CALIBRATION CERTIFICATE TEST DIVISION



COAXIAL LINE OSCILLATORS

C.L.C. Type 7-12

Serial No. 318 .....

Klystron serial No. ..... Cert. No. 102 05 sht.1

Customer & Order No. .....

Frequency Gc/s	Micrometer Reading	Reflector Voltage	Frequency Gc/s	Micrometer Reading	Reflector Voltage	
11000	2.344	– 200 V			– V	
11100	2.176	– 200 V			– V	
11200	2,010	– 160 V			– V	
11300	1,862	– 160 V			– V	
11400	1.688	– 160 V			– V	
11500	1.534	– 160 V			– V	
11600	1.330	– 160 V			– V	
11700	1.176	– 160 V			– V	
11800	1.014	– 160 V			– V	
11900	0.818	– 160 V			– V	
12000	0.666	– 160 V			– V	
		– V			– V	
		– V			– V	
		– V			– V	
		– V			– V	
		– V			– V	
		– V			– V	
		– V			– V	
		– V			– V	
		– V			– V	

Cathode Voltage – 300 ..... Volts ± 0.25% Resonator Voltage:- Earth

Note:- All Voltages given are with respect to "Earth". Accuracy of calibration ±0.1% when piston attenuator is loosely coupled & reflector voltage to stated value within ± 0.25%.

Reset accuracy - better than 0·.1 ....Mc/s.

Temperature of calibration ..22.. °C.

Important:- The accuracy of this calibration is only applicable when used with the Klystron given above, which must not be removed or rotated.

Recommended recalibration Date .....26.2.64.....
and/or when Klystron is changed or removed.

Originated by B.Lambert .....

Date .....21.2.63.....

Approved .....

PROCEDURE : Microwave Devices

The following devices are available for measurement :

1. Ferrite Isolator
2. Ferrite Circulator
3. Magic Tee
4. Bethe Coupler (Cross coupler)
5. P.i.N. diode switch
6. Waveguide Switch

At least four of these devices should be measured.

1. Ferrite Isolator (Rank)

Insert the device between the bench and the matched load. Determine :

(a) Insertion loss _____ dB) Device
VSWR _____) connected
) for maximum
) forward
) power

(b) Remove the matched load and replace it with a short circuit and re-measure V.S.W.R.

V.S.W.R. _____

(c) Reverse the isolator, terminate with matched load and measure.

V.S.W.R. _____

Loss _____ dB

(d) From the Return Loss (sum of the two losses above) determine the theoretical V.S.W.R. (use the radial scale of a Smith Chart).

Theoretical VSWR _____

Compare this to the measured VSWR in (a).

2. Ferrite Circulator

Set up with input to port 1, matched detector at port 2. Port 3 open.

(a) V.S.W.R. _____

(b) Terminate port 3 in matched load.

V.S.W.R. _____

Insertion loss of circulator _____ dB

(c) Reverse the positions of the matched detector and the load and determine the isolation between Port 1 and Port 3.

Isolation _____ dB.

SANDERS CALIBRATED ATTENUATOR S/N 696 TYPE CA16/2RF
9500 ± 20 MHz CAL 4.11.66 DK.

Sanders Calibrated Attenuator
9.2 GHz Calibrated 12-10-77