Transcript of the T.R.E. (TRE) report T. 1858

THE GERMAN MAGNETRON TYPE LMS10(G)

1. Summary

This report summarises the results of an examination of several samples of the LMS10(G) magnetron which is used in German equivalent of H2S Mark II. The valve is an almost exact copy equivalent of the British CV64 in so far as external dimensions, operating conditions and power output are concerned. The operating wavelength is however very near to 9.0 cms. with a spread up to 9.14 cms. approximately.

2. NOTES ON MECHANICAL CONSTRUCTION

The material of the block appears to be pure copper, being very soft and difficult to machine. The whole assembly is brazed or soldered by an euctectic process (?, AOB)*, whereas CV64 has gold-sealed end plates. Small particles of solder were found attached to the straps and to the ends of the block, which was in some places pitted by the actions of the flux.*

In general the internal finish is not outstanding. The segment holes show machining marks from boring operation, and the slots in one sample examined by microscope showed a pronounced taper in the radial direction. There is quite a wide variation in the dimension of the slots in any one block. These inaccuracies are probably a result of the choice of block material. The straps are a mirror image of the straps in CV64 and are set slightly farther away from the ends of the block. It would appear that no attempt has been made to tune the block by distortion of the straps.

The coupling loop assembly is very similar to that in CV64 but the method of insertion into the block is extremely rough. About ½ mm of the outer of the concentric protrudes into the circuit hole and excess of solder has been used.
The cathode assembly is carried by twin seals but no anti-corona terminals are fitted. The cathode assembly is again much the same as in CV64; the heater, coated with refractory material, appears to be made from a notably ductile material.

The valve differs from CV64 in having a getter assembly fitted in a small reservoir attached to one of the heater stems.

In general the block dimensions are not significantly different from CV64 (see table 1). The anode diameter - cathode diameter ratio is slightly less and the cathode diameter is slightly greater. The segment holes are very slightly larger and the slots narrower. The block is longer, the end spaces being slightly longer but the same diameter. The overall length is the same for both valve (types, AOB)*.*

PERFORMANCE

Eight samples were operated under similar conditions to CV64, viz-
Field 1350 gauss
V peak 13 kV approximately
I peak 12 Amp approximately
Pulse length 0.84 microseconds

Five samples behaved in a similar fashion to CV64, giving about the same power output and exhibiting a similar mode change as the applied HT was increased from zero to the operating level. The operating wavelength was in all cases very nearly 9.0 cms. The other three samples gave poor efficiency (approximately 10 %) and had a wavelength scatter up to 9.14 cms the mode change change being much less violent than in the good samples.
It was noticed that these valves operated at a lower impedance than the good samples but increasing the field had little effect. It was possible to operate the good valves at 400 - 500 kW input by increasing the field, the power output being of the order 100 - 150 kW.

It would appear that some from the coding is applied after initial test to classify samples according to wavelength (see column 2, Table 2). The centring of samples near 9.0 cms is compatible with the theory that a Chinese copy of CV64 has been attempted. Before setting of the straps CV64 has wavelength between 8.9 and 9.0 cms. and the setting operation consists of increasing the capacity to bring the wavelength to 9.1 cms.
This may be to some extent confirmed by the presence of some low efficiency samples badly off tune, possibly due to poor jigging and distortion during machining and assembly, no pretuning been attempted.

The diode emission was measured and found to be about 20 A at approximately 6 kV, further increase in applied HT producing negligible increase of current (due to saturation, AOB).
The heater dissipation is approximately 15 watts at 6.3 volts. compared with 8 watts for CV64.

L.M.S.10 9cm German Magnetron

Table 1

Dimension of Block

		LMS10 (a)	LMS10 (859)	CV64

Segment slot Width	(l1 (mean varn. (l2 (mean varn.	.191 cm) .007) .174) .009)	.196 cm. .004 .191 .004	.200 cm .001
Segment hole dia.	d	.707	.705	.701
Anode hole dia.	D	1.603	1.600	1.598
	Length of Block	1.53	-	1.42
	Thickness of end plate	.109	-	.235
	Cathode dia.	.6	.61	.59
	Overall Length	3.62	3.61	3.61

Table 2

Performance of Valves with CV64. Operating conditions

Serial No.	Marking	KV in.	A. in.	Field Gauss	Power out watts	Efficiency %	Wave-length cm
853	12	12.6	14	1350	25	14	9.104
854	23	11.8	14.0	1350	11.4	9.7	9.142
855	00	11.3	10.3	1350	35.1	30	9.000
856	00	13.5	10.5	1350	35.5	25	9.02
858	00	13.0	14.0	1359	41.0	22.5	8.991
859	00	13.0	13.8	1350	38.0	21	8.994
860	02	13.7	14.0	1350	39.4	20.5	9.022
862	08	11.5	14.0	1350	10.9	7	9.094
CV64 1746		13.4	14.0	1350	46	24.5	9.104

To be continued on the next page

Variation of Field with Low Efficiency Sample (862)

Field Gauss	KV in.	A in.	Efficiency %
800	7.4	14.0	0
1000	9.5	14.0	0
1200	10.5	14.0	2
1400	11.8	14.0	7
1600	13.7	14.0	12.3
1800	14.8	14.0	15
1600	12.7	10.0	13.2
1600	11.9	7	12.8

Authors: *E.B. Callick*
Miss J.E. Modonald

Approved by: *W.B. Lewis*

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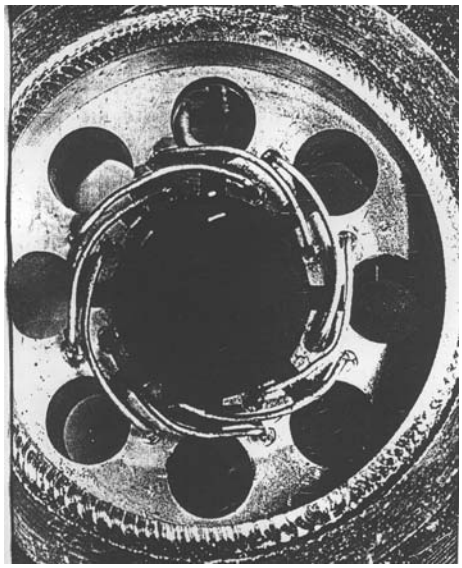
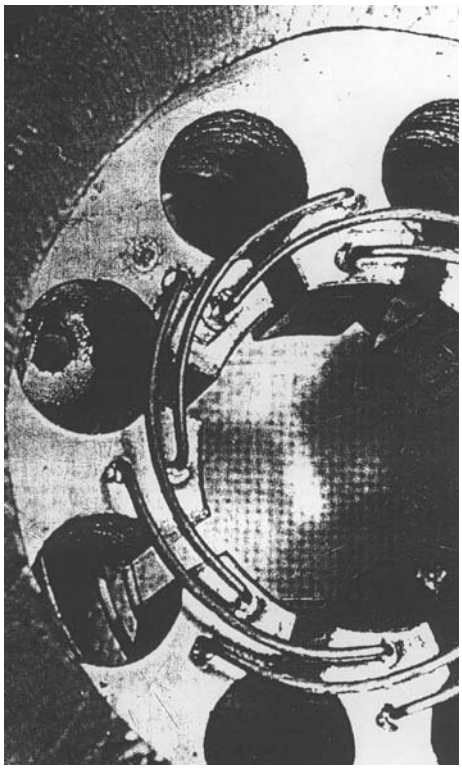
Brian Callick became very well known after the war (AOB).



Typical strapping of CV64

Consider also the next page



Typical strapping of LMS10