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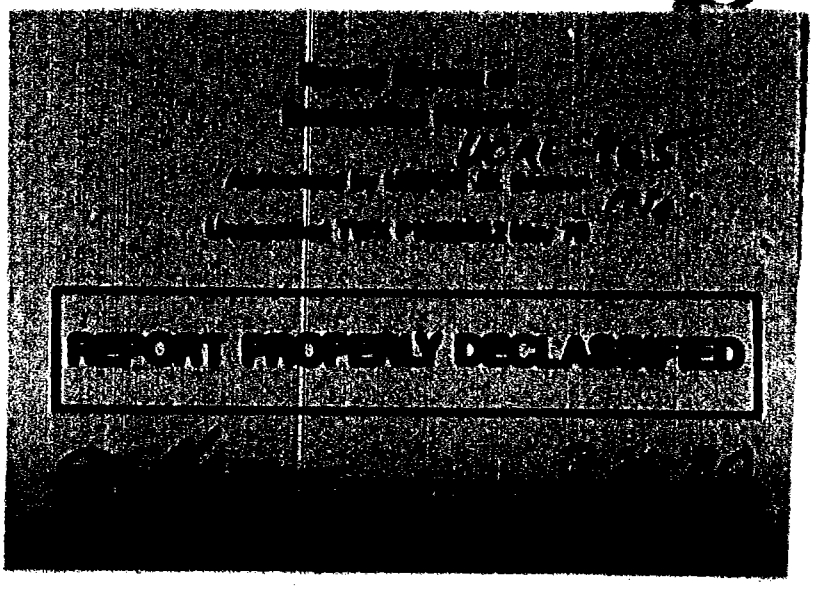

BERKELEY, CALIFORNIA

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ENGINEERING NOTES

JOB NUMBER	FILE NO.	PAGE
203-11	M20	1

Q and Z_s for 1/10 Scale Cavity

NAME: D. Sewell

DATE: October 23, 1950

THIS DOCUMENT CONSISTS OF 3 PAGES
NO. 14 OF 14 COPIES, SERIES A

1. Conditions for measurements

a. Drift Tube Position

The D.T.'s were aligned to their prescribed positions as given on Layout #26475B. Longitudinal alignment was made with a Cenco cathetometer with a one meter base length. Analysis shows repeatability of ±.01" and D.T.'s were set to ±.01". Total accuracy is then ±.02" from theoretical value listed below.

DT#	Theoretical ℄ Position from entrance wall (In)
0 (wall)	0
1	1.688
2	5.168
3	10.388
4	17.348
5	26.099
6	36.740
7	49.374
8	64.098

6-26-58
see Crash Log #12
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DATE 4-13-56
For The Atomic Energy Commission
H. R. Carroll
Chief, Declassification Branch

b. The entrance and exit ends were flat ± 1/16 except as noted.

c. The cavity is 72.25 in. long. (This is .25" longer than design figures for the 8 1/2 D.T. model because it was made for the 7 1/2 D.T. model originally.

d. The transverse alignment was made with a dumpy level sighting along the cavity axis. In each D.T. there is a set of crosshairs in each end to define the ℄. Total accuracy of crosshair alignment and positioning is ± 1/16".

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e. There were two 1/2 in. wide slots - one 90° from the drift tube stems and one 180° from the stems - in this cavity. They extended from the center of the entrance around the side to the center of the exit end. They were shorted across approximately every 1/8 wave length.

2. Frequency

Frequency was measured with Signal Corps frequency meter TS-175/U Serial #833.

a. Drift tubes were aligned at values in table of (1.) The accuracy is ±.02 as mentioned above.

End walls flat to ± 1/16 in.

Frequency = 122.6 m.c. ± .1

b. End wall perturbation measurements. Given in terms of megacycles shift per inch of movement of end diaphraghm measured at center. (Outer extremity does not change its position).

Entrance End	.93 mc/inch
Exit End	.80 mc/inch

c. Drift tube perturbation measurement. Data taken on #1 D.T. because this is the most sensitive and therefore represents the worst case.

#1 D.T.	.16 mc/inch (longitudinal)

3. Shunt Impedance, Z_s

Average of three indpendent integrations for $\int B.ds$

	Megohms
a. Plane 90° from stems using areas between successive ℄ between D.T.'s.	35.65
b. Plane 180° from stems using same areas as above	36.39
c. Plane 180° from stems using cell divisions between successive D.T. transverse ℄	37.19
Average Z_s =	36.4

$$Z_s = 23.3 \sqrt{\lambda} \pm 3\%$$

λ in meters

4. Q

a. Calculated Q from field plots ⟶ 83,900 ± 2500

$$Q = 53{,}600\sqrt{\lambda} \quad (\lambda \text{ in meters})$$

b. Experimental Q. Made by bandwidth measurements.

(1) Original value ⟶ 71,000 ± 2000

(2) After opening tank and cleaning shell and D.T.'s with Brilliantshine ⟶ 68,000 ± 2000

The difference between measured and calculated values is 15 - 20%. A program is now underway to account for this difference. It is planned to replate the D.T.'s in accordance with L. Cook's experience in obtaining high conductivity plating.

Measurements by:
M. Dazey
M. Harris
W. Lawton
D. Nielsen
R. Robertson
J. Waddell

DS:FP