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MINUTES OF MTA PROGRESS MEETING - MARCH 28, 1950

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MINUTES OF MTA PROGRESS MEETING
TUESDAY, MARCH 28,1950

PRESENT: UCRL - Baker, Brobeck, Farly, Gordon, Latimer, Lawrence, Lofgren, Longacre, Martin, McMillan, Norton, Panofsky, Powell, Reynolds, Serber, Sewell, Thornton

Cal. Development Co. - Crandall, Cope, Kent

AEC - Ball, Fidler, Thomas

Brobeck: We are investigating D.P.I. booster pumps. Steam ejector pumps are being planned for roughing but probably will not be used for backing the diffusion pumps.

The design of the building includes two levels on each side of the tank suitable for mounting the oscillators. There will be 72 oscillators which will be equally divided between any two of these four rows. The pilot model will start with 16 oscillators and two pre-exciters. These will be in two rows.

In the full scale machine the design may call for bunching the oscillators near the low voltage end.

The space occupied by the coupling loops is equivalent to one foot of diameter of the tank. This reduces the effective diameter to 58 feet.

Discussion: Thornton suggested that transmission lines into the tank be disposed radially rather than horizontally by putting a bend into one or both of the lines. There was objection to this on the basis of complications in handling such leads through the shielding. Baker suggested extending the longer transmission line farther into the tank. Brobeck stated that a two foot clear diameter hole is planned for the transmission lines.

Panofsky: The resonant frequency of the tank has been recalculated. We now obtain 12.1 mc rather than 10.8 mc. This is for a tank diameter of 59 feet with no bumps. To this figure of 12.1 mc there should be added 0.2 mc to compensate for flats in the tank. The uncertainty in the calculations is estimated at $\pm$ 0.4 mc. This gives a resultant frequency of 12.3 $\pm$ 0.4 mc.

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Baker: We are proceeding with the design of the oscillator on the basis of the RCA-5831 tube plus a grounded grid circuitry. This tube is known to operate on 1 megawatt C.W. This should insure satisfactory operation on one 1 megawatt pulses.

RCA will shortly supply us with an experimental model of a new type triode which will give the equivalent of grounded grid operation but by using a grounded cathode. This will greatly simplify the driving problems. This tube circuit will have a power gain between input and output of several hundred in contrast with about five associated with present grounded grid systems. The tube will require only one main transmission line per tube. The circuitry will be approximately one-half as complex as a typical grounded grid oscillator system. Efficiencies higher than 80% are in prospect because of advanced electron optics.

Tests on the basic system will be conducted using a modified version of the present RCA 5831 tube. If results are as expected, work can then start on a larger tube, tentatively set at 3 megawatts (pulsed) output. This power level is set by a combination of transmission line limitations plus conservative extrapolation of the present RCA tube.

We now have a 56 mc oscillator running into a resonant load. There have been no problems.

Sewell: We have been running model magnet tests and trying new designs for magnets to go within the drift tubes and studying drift tube mounting. We plan to mount the drift tubes on insulated supports, then measure the field configuration in them and determine the location of conducting supports. We will then determine the energy increase for ions going through them.

Powell: Measurements on four quadrant magnet model with 45° pole tips separated by 45° spaces show a ratio of magnetic field intensities between the gaps and spaces of 100/65.5. This will compensate for particles of 40 Mev energy. We need to compensate for particles having a $\beta = 0.5$. We will try cutting the gap to 20 inches. We will also try a design having three poles and three dees.

Norton: The pilot model will require a 1 megawatt tube. There are only two possible manufacturers of such a tube. These are Federal with their D50 and RCA with their 5831. The latter tube has been tested by RCA at 1 megawatt C.W. for 1/2 hour. This gives us assurance that the tube should serve satisfactorily under 1 megawatt pulsed operation.

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Preliminary discussions have been held with Westinghouse, G. E., Allis-Chalmers and RCA for the 30 megawatt pulsed power supply for the pilot model. According to Allis-Chalmers, their resonant power supply is no longer feasible due to our reduction in the repetition rate.

We have contacted all possible manufacturers of the huge tube for the full scale machine and requested a written feasibility report be submitted in sixty days. The companies contacted are Federal, RCA, G. E., Westinghouse, and Collins Radio.

Farly: We are specifying a useful duty cycle of 0.2, such as 25 millisecond useful pulses at a rep rate of 8 per second. The pulse is defined in terms of the useful time, neglecting buildup and letdown times. We are specifying the allowable voltage excursion as ± 2% of the r.f. voltage in the accelerator tank. This value is not critical but if the excursion is greater than this we will waste power. The power required for the pilot model will be 30 megawatt peak or an rms rating of about 9 megawatt for the rectifier output.

Lofgren: We have set up a hydrogen arc in a magnetic field and have attempted to pull ions out of the anode end in the direction of the magnetic field. We have thus far obtained 1/4 ampere total ion currents. We have not tried to determine what fraction of this may be due to molecular ions. This beam current has been obtained with a variety of geometries including a single 3/16" hole in the arc chamber or with multiple smaller holes. The present limit on ion currents is insufficient pumping speed. We expect within a week or ten days to have installed a new tank equipped with a 20" diffusion pump. Our present plans are to go from this model ion source directly to the full scale device. The debugging should be not much more difficult for the full scale model than for any intermediate size and will undoubtedly involve design problems which intermediate models wouldn't solve anyway.

Reynolds: We have had slow progress on site acquisition, but we are proceeding as though this is going through.

Fidler: We are making a news release the end of this week regarding the establishment of the California Research and Development Company and a program of classified research it will conduct for the AEC in cooperation with the Radiation Laboratory.

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Lawrence: We will hold meetings regularly at 4pm on Tuesdays. The meetings should be brief and serve the purpose of keeping the various groups properly informed and coordinated.

Russell H. Ball

W. B.Reynolds
John A. Cope
H. A. Fidler
J. Norton
W. Brobeck
A. Tammaro
K. S. Pitzer
R. H. Ball