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# TEST PROCEDURES OF THE H.V. PULSE FORMING NETWORK AND KICKER MAGNET

It is proposed to commence with the major adjustments and regulation of the system in general on 21/6. Prior to this date it has been agreed with S. Milner that the points listed below will be attended to. These are :

i) Preparation of the terminal inductance of each delay line. The value should be 1.8 μH, and at this setting the pulse from the delay line should be controlled.

ii) The system for tightening down the front and tail spark gaps has to be decided, and its correct function controlled.

iii) To prepare 8 (plus some spare) rings which will enable the total interelectrode spacings in the front and tail gaps to be reduced, the thickness of the ring should be 0.0920 cm, and should be incorporated into the spark gaps at the earliest opportunity.

iv) Pressure test from the point of view of security.

v) Identification by part number of the component parts of the system of spark gaps.

vi) The replacement of the actual resistive divider chains by the ones which have been especially prepared to achieve an accurate ratio of division of one half.

## Test procedure for spark gaps

a) Control on mechanical stability of the front and tail gaps under the influence of pressure. Pressure range to be investigated 1 - 4 atmos. absol., and the maximum displacement of the top of the body of each spark gap should be at the most 0.002 cm.

b) With each front and tail gap in turn:

i) to measure the total spacing between H.V. electrode and output electrode with the system under force using the tool developed by A. King.

ii) to measure the total height of the centre electrode, and

iii) to set the centre electrode to achieve equal spacing between centre and output electrodes. (In view of the fact that the resistive dividers have been prepared so as to achieve a division of one half, both sides of the spark gaps should have equal breakdown voltages).

c) With each front and tail gap connected to the appropriate source of H.V. and to the appropriate resistive divider, to continue, in turn, to measure the static breakdown voltage as a function of pressure. Pressure range 1-4 atmos absol. in steps of 0.5 atmos. In principle each spark gap should give identical results, however, if the situation is not so it may be necessary to resort to

   i) a recheck of the adaption of the spark gap to the divider, or

   ii) a modification to the total interelectrode spacing in the spark gap (already there will exist measurements of the total inter-electrode spacing from b above).

d) For each front and tail gap to investigate rise time, time jitter and time delay (perhaps), as a function of high voltage, with the gaps maintained 10 o/o below breakdown. Range of high voltage 30 - 63 kV in steps of about 10 kV. This range of high voltage will correspond to a pressure range of about 2 to 4 atmos. absol.

e) For each SCSG (short circuit spark gap) to fix zero settings of distance scales for $d_1$ and d. ($d_1$ - lower gap spacing, d - total interelectrode spacing.

f) To optimize settings of $d_1$ and d with each SCSG so as to obtain the most favourable characteristics of fall time and time jitter of the high voltage pulse.

At this stage in the test programme underway with the experimental system, it is clear that the distance settings to be employed are not these deduced solely from measurements of spontaneous breakdown. A probable reason is that under these conditions the lower gap is too undercritical and the influence of this condition is amplified because of the strong feedthrough of the trigger pulse (coupled directly from a 50$\Omega$ impedance source, in comparison with the line impedance of 10$\Omega$). This situation could be most quickly offset by the use of resistive or capacitative decoupling for the trigger pulse. As a rule of thumb, however, it appears that the total distance d should be made large enough to enable a ratio $d_1 / d \sim 1/3$ whilst avoiding spontaneous breakdown - effectively making the lower gap more competitive during the trigger action. The tests will be made essentiall with a high voltage applied to the delay time corresponding to p = 4 atmos-pheres in the system, later to reduce the high voltage and pressure and to control the characteristics of fall time and time jitter as a function of high voltage. Range of high voltage to be investigated 64 - 30 kV

It is foreseen that this work will extend from 21/6 to 14/7. At the same time, the termination resistors (10$\Omega$) of the output channels of the pulse forming system will be controlled as a function of temperature and time. Also, as regard to the automatic pressure system, the characteristics of the electric amplifiers regarded as one unit and the assembly comprising E.P.C. and Booster regarded as another separate unit should be set to standard values. (Dijkhuizen, Milner). Further, the work of surface formation with the kicker magnet will be started, so as to arrive ($\sim$ 17/7) at the required working condition.

Direct test of operation of sparkgaps plus lines

This work is more directed toward the operation of the whole system, and is scheduled to begin 14/7. Atthis point, the work will involve :

a) More personnel (Dijkhuizen, Milner, Kamber). In general the aims should be to :
   i) control the simultaneous operation of the front, clipping and tail gap.
   ii) check the accuracy, speed and stability of charging the lines with the modified Früngel power supply and of the automatic pressure adjustment.

Following on from the 17/7, the kicker magnet is scheduled to be ready for coupling with the new pulse forming network. At this point the work will be centred around the magnetic field profile, and its possible improvement.

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