AUSTRALIAN NATIONAL UNIVERSITY

DEPARTMENT OF NUCLEAR PHYSICS

14UD TANK OPENING REPORT No. 55

15th to 26th September 1986.
(12 days open, 10 working days.)

REFERENCES: Earlier Tank Opening Reports are referred to by the notation (38/4) etc, meaning Report No. 38, page 4. A glossary of terms and abbreviations is given at the end of the report.

REASON FOR TANK OPENING

Low demand for machine time, because of a mass exodus to attend conferences, led us to take the opportunity to investigate sparking problems, also fit our new N.E.C. conducting, self-lubricating tyres, (54/4), check all the chain stabilizing idlers which have been largely neglected during recent openings and perform a complete chain inspection.

PREAMBLE

The 14UD was last closed on 8th August. Though it went easily to 12 MV there were sparks at higher voltages. Intermittent bouts of sparking continued to plague operations until the present opening, just before which we carried out a series of diagnostics with shorting rods, concluding that something was wrong in the vicinity of Units 24 and 25.

We took out the gas on Friday, 12th September and opened the tank on Monday 15th.

OPERATIONAL TIME.

During the 35 days since the last closure, the 14UD operated for 444 hours. This was 58% of elapsed time, excluding the days for gas transfer (42/2).

THE TANK OPENING.

Exploratory tour.

The bottom two rings in Unit 25 were loose; this could have resulted from the sparking or been the cause of it. Nothing else was found to explain the sparking of the previous month, though particular attention was paid to units 24, 25 and their neighbours.

When new points are put in we are always interested to note the rate of buildup of deposits on them, also the colours which are most distinctive when the buildup is new and thin. A full set of tube and column points had been put in at the last opening; we found no discolouration on the tube points and only a slight brown stain on the column ones; certainly there was no buildup on them. To our pleasure, we found that only one point assembly had drooped since the installation

had been modified to test a new idea for ring location. We fitted new ring screws, machined to 0.407 inches, so that they bottomed tightly through the screw stub onto the ring surface with the screw slot at the correct angle. In about 10% of cases, the combination of thread starts and screw slot depths, result in loose rings; screws 0.443 inch long are put in these rings. The fluctuation in ring major dimension using this technique is about one half that observed in unmodified units. The slots located snugly in the recesses on the post electrodes. We believe that this expedient will not only lead to fewer loose rings, but avoidance of loose screws, with consequent poor contact, will cause less spark erosion at the post electrodes.

Procedure for reconditioning posts:

Most N.E.C. column posts are stamped with an indelible serial number on the ceramic at one end. Before removing end flanges we code them and use the marked ceramic to make sure the flanges are returned to their correct ends. Next we take off the end flanges and degrease the posts. Slots are simultaneously milled 2.085 inches from the centre line in all the electrode lips. The average depth is 0.04 inches. Failed spot welds are redone and additional welds placed near the notch. Post end flanges are then shot blasted in preparation for conductive bonding. The contact areas of the end electrodes and flanges are coated with a layer of conducting epoxy, assembled, compressed and clamped in the post press (52/5). They are baked to a temperature of 120 degrees C for approximately 15 minutes. One end of a post is machined square to its axis and the other end machined similarly so that the overall length is 19.25 inches, less 0.016 inches. This gap is filled by a beryllium copper shim 0.4 mm thick.

Accelerating tube.

We reported earlier, (53/5; 54/2), some measurements carried out on tube ceramics and corona points with a 10 kV resistance tester. These tests revived our occasional bursts of interest in finding out what, in reality, the voltage gradient along the tube is like.

Every tube gap in the H.E. end of the machine was tested, with corona assembly in position at 5 kV and the resulting currents noted. At positions where currents were unusually high or low, the corona assemblies were adjusted to bring them more into line with the average currents, which were in the 65 to 80 microamp range. In five cases, high currents were not due to the corona assembly, but to low resistance of the ceramic itself. The worst instance of these was one which passed 140 microamps with the corona assembly removed. Ceramics in this condition obviously shunt the corona assembly, affecting the gradient.

Shafts.

No bearings were held to be bad enough to warrant changing.

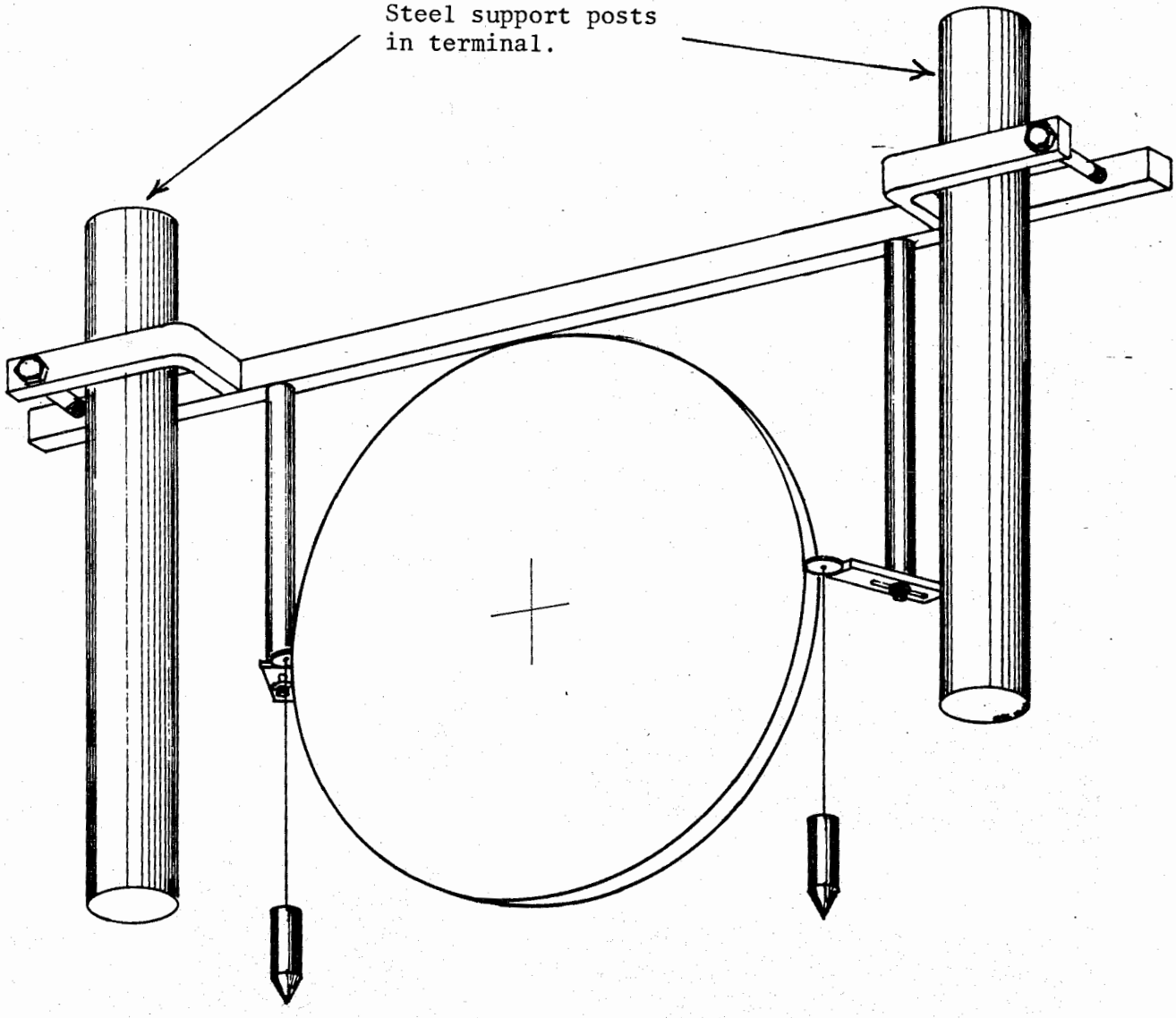
STRIPPERS

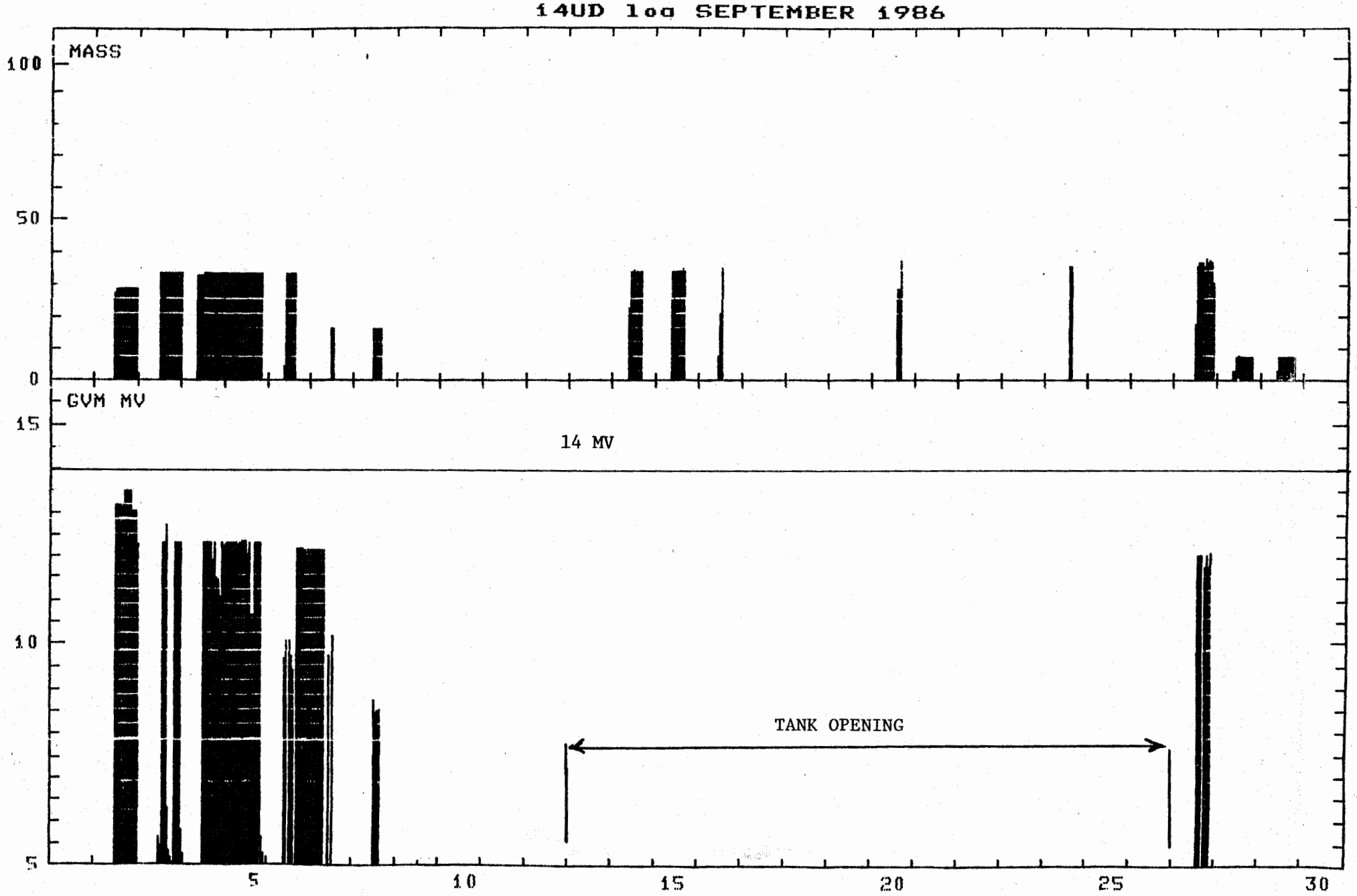
No foils were changed.

Sketch of the upper of the two A.N.U. jigs used for precise alignment of 14UD chain pulleys.

Discs of the same diameter as chain pellets are set in the chain groove on the pulley. Plumb-bobs suspended from the centres of the discs determine the centres of corresponding discs on a similar jig in the bottom of the tank; the lower pulleys are set to these discs.

The pulleys can be lifted out from the fixed discs and lowered back between them.




14UD 1oa SEPTEMBER 1986
MASS
100
50
0
GVM MV
15
14 MV
10
5
TANK OPENING
5
10
15
20
25
30