MPS/CO Note 68-21
25 June, 1968

A TENTATIVE PS START-UP PROGRAMME

FOR SEPTEMBER 1968

J.H.B. Madsen

1. Assumptions made in drafting the programme

   - By the 1st September the shut-down work will be sufficiently advanced to allow injection of the Linac beam into the PS and acceleration of the beam up to 600 to 800 MeV.

   - During September the PS can be operated during evenings and nights only, (say from 1800 hrs to 0600 hrs) with perhaps the exception of weekends and thus the PS ring will be open during the day.

   - Installation of additional equipment, such as septum lens, targets, in the ring vacuum will be done from 16 - 20 September, whilst leaving the vacuum system untouched during other periods (during the period 16 - 20 September, the start-up programme will probably be interrupted.

2. Main aims of the programme

   - to verify the status of the various machine systems
   - to optimize the machine parameters for good future running for the PS users (start-up for physics on 2nd October)
   - to study beam behaviour and control at injection
   - to study acceleration at reduced B
   - to offer some MD time to the people interested
   - to obtain more experience in operating the PS.

   Remark. One would like to accelerate up to full energy during the last week of September.

3. Verifications, preceding injection trials, on the various machine systems (list to be completed)

(To be finished and reported before the 1st September)

- Linac; beam quality
- new main magnet power supply system
- magnetic measurements in magnets touched during the shut-down
- timing system (including peaking-strips)
- BLW connections (old system)
- electrical insulation vacuum chambers
- PS vacuum (the pressure read-out system in MCR hopefully ready)
- RF system (also PU station system)
- IBM 1800 facility
- TV and flags
- dump and measuring targets
- radiation security system

Reminder: as usual, all PS modifications are reported before starting with injection trials.

4. Injection trials to test PS status

* with "old 90%" $\dot{B}$ value

* with BLW supplies as used in the past

- trials on spiralling beam, with all injection corrections off, until 100 μs or more spiralling time is obtained; if necessary the 6th harmonic correction is added
- if spiralling > 100 μs: accelerate and improve trapping by adjusting PFW, quadrupoles, skew and 6th harmonics (care has to be taken to dump beam on target at about 600 MeV)
- find the closed orbit at injection with scope observation (no film)
- test and adjust RF system
- further injection adjustments and if closed orbit at injection looks sufficiently correct, a film of the orbits taken
- observation of 200 M/c structure in beam, comparison with previous data, optimization.

After injection has been sufficiently stabilized, all technical problems cured:

- calibration of PU stations
- effective chamber aperture measurements, radial and vertical
- radial closed orbit at injection, without corrections: a proper measurement including Q_R
- radial closed orbit, with 6th harmonic correction
- as above but with another repartition of the 6th harmonics
- as above but with 7th harmonic corrections added
- vertical closed orbit at injection, without corrections: a proper measurement including Q_V.

- An analysis of the orbits may result in requests for magnetic verifications and some local corrections may be added; repetition of closed orbit measurements
- optimization for maximum trapping.

5. MD programme

Some main items for the programme are given below. (It is intended to reserve at least one day or rather evening/night per week for MD work not scheduled in advance.)

- RF studies on new frequency programme, the reduction of accelerating voltage, etc.
- injection at 25% $\dot{B}$ with 10% RF voltage (voltage increase in 100 to 1000 μs to 80 kV then in a few ms to the final 150 kV), acceleration during 20 to 100 ms after which B is changed to a higher value, say 115%
- injection at constant field to study coupling through space charge between horizontal and vertical betatron oscillations
- study on trapping as a function of form closed orbit at injection
- study on beam loss during first turn as a function of Linac emittance
- trials on effect of programmed 6th harmonic corrections
- influence of vacuum on beam dimension during acceleration (measurements with the IBS: ionic beam scanner).

6. Finalising the programmes

The programmes can be finalised after having received your comments, suggestions.

For the people involved, a meeting is scheduled for the second half of July.

NOTE This tentative programme is drawn up after discussions with Messrs Baconnier, Barbalat, Bigliani, Lefèvre, Hereward, Rosset and the E.i.C.'s.

Time for constant field measurements has been requested by Messrs Lapostolle and Thorndahl.

J.H.B. Madsen

Distribution

Lists MD/1 and SI/1
P. Lapostolle, ISR
L. Thorndahl, ISR