

MACHINES AND AREAS COMMITTEE

Summary of meeting No 17 - November 28, 1973

Present : O. Barbalat (Secretary), D. Bloess, D. Dekkers, M. Georgijevic, C. Germain, W. Hardt, L. Hoffmann, J.H.B. Madsen, G.L. Munday (Chairman), G. Plass, K.H. Reich, C.E. Rufer.

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The purpose of the meeting was to survey the pending problems and pick out the topics which will require attention in the coming months.

1. Operation at intermediate intensity in 1974/75

Most of the anticipated problems (MAC No 10 and 13) have been solved.

A first successful run at intermediate intensity has already taken place (November 14 to 17). A second one is foreseen for December. Other runs using the PSB will be scheduled in 1974/75 every time that Gargamelle* is on the programme and during 1975 for the East Hall.

- In view of this, the problem of operating staff for the Booster is acute and is being dealt with.
- Scraping the PSB beam by orbit bumps to reduce its emittance down to what can be accepted without losses by the PS, works. It is therefore not necessary to develop scraping targets.
- The problem of controlling the losses in the PSB and the PS must be looked at. One must find what is the acceptable loss level. The policy is to reduce the intensity somewhat if this significantly reduces the losses.

* The first 1974 Gargamelle run is scheduled for week 14 (early April).

2. Beam Dump

This subject was already extensively discussed at a previous meeting (MAC No 11) and rules for a general discipline with high intensity beams are proposed by D. Dekkers (MPS/CO/Note 73-65). The committee supports these principles and expects that they can be progressively put in action.

Studies have progressed (MPS/CO/Note 73-76); this allows the organization of a meeting in January to take decisions on the internal dump together with establishing work priorities for the target section which is responsible for this activity.

It is clear that one plans devices not just for the intermediate intensity but for 10^{13} p/p.

3. Machine Studies

- G.L. Munday stated the aim to obtain 10^{13} p/p with acceptable beam quality by the end of 1974, or at least identify the bottlenecks and start solving them.
- PS studies will follow each successive Booster improvement.
- As to the Linac studies, they are part of the new Linac project and have been previously discussed (MAC No 12); they are described in the report CERN/MPS/LINP 73-1.
- It was felt that the theoretical work performed in the division should be better known. O. Barbalat was asked to gather this information for the second half of December.

4. Linac

The policy followed in 1973 with the old Linac, to match the operating requirements to the machine capability has proved successful. The problem of deciding what can be offered for PSB machine studies as well as the hardware status will be discussed in January 1974.

5. Booster

The BR group is preparing a document listing its programme for 1974/76. It will be available for discussion in January 1974.

Although a high priority is given to operation at the intermediate intensity, for the moment, the same people have also in addition to cater for machine studies and hardware development. Because less people will be on standby duty than in 1973, some temporary increase in PSB unscheduled off-time could result. The target will nevertheless be to keep the fault rate of the whole

3 machine complex below 10 %. A projet which will require a significant effort is the provision of pulse to pulse intensity modulation.

One should also mention that it has been decided to extend the present system of multipole corrections (MPS/BR/Mi.73-43).

6. PS Magnet

The magnet working party has concluded that the survival of the PS magnet itself is assured for the next few years with the present poleface windings.

The strengthening of the end blocks which is progressively implemented should allow practically their indefinite survival.

The main coils must still be further investigated. The insulation is no longer watertight but one could replace the surface layer or add another one. It is not an urgent problem, provided that water is not sprayed in large quantity over the coils; this programme can be postponed for a few years.

The poleface windings must be replaced but the available usable spare coils allow us to work until 1977/78 and give time to examine various improvement schemes (see MAC No 14). But in view of the remaining problems still to be studied (cooling, coupling between power supplies and dynamic system response, cable layout, required shut-down time, combined use of PFW and lenses to relax PFW specifications), it will not be possible to have the elements for a decision before mid' 1974.

7. Power supplies for auxiliary magnets

- Several new sets of programmable power supplies have been recently approved (see MAC No 8 and 14). Other ones will be needed for the PFW and for powering fast bumps (see below). The South Hall extension upper floor is nearly filled up. One can not avoid the construction of a new building to house these supplies. The principle of this construction in the vicinity of the East ejection building was approved. Details can be discussed outside MAC but they must be fixed soon, so that the connection tunnel work can still take place during the coming shut-down.
- The principle of capacitive discharge supplies for powering the various fast ejection auxiliary magnets has since long been recognized. Five supplies of this type are expected to be needed (Bumps 16, 58, 74 kick enhancement quadrupoles and one spare unit). It is obviously very desirable to standardize them and therefore prepare carefully the specifications to group them in a single order. This means a 15 month delay before delivery of the first unit.

On the other hand, the situation for the bump 16 is very critical for the operation as has been mentioned several times (see MAC No 6 and 15 and the Operation reports by D. Dekkers). Ordering on a "crash" basis a single "prototype" supply would still require many months (and it would not be available before August 1974) with the risk of being different from the 4 other ones.

It was therefore decided to place a single order for 5 identical supplies. It was agreed that in order to speed up their preparation, the work on the PFW could if necessary be somewhat delayed. However, to ease up the present operation, one will scout around to see if a suitable supply exists somewhere at CERN which could be used in the meantime for the bumps 16.

8. Ejection equipment

Extraction magnets

- The situation with EM 16 will remain difficult until mid'1975 (end of 25 GeV/c physics in West Hall). Besides the magnet in the machine which has already been repaired twice, there is only one complete spare (but with rubber joints) and only 1 of the 3 modules of a 3rd magnet.
- Afterwards, a new magnet performing only fast ejection and continuous transfer will be installed in s.s. 16. This magnet and its power supply are scheduled for mid'1975*.
- For fast ejection 58/74, the first large aperture unit is under test and will be installed during the coming shut-down in s.s. 74, if the power supply arrives in time.
A second large aperture magnet is scheduled for s.s. 58 in June 1974.
- The problem of large aperture slow ejection type extraction magnets for s.s. 61/62 is more difficult ; specifications are still under discussion with W. Kubischta. If no major difficulty occurs, it is hoped that something could be ready by 1976.

Fast kickers

- The first tests of the FAK have successfully started; difficulties remain for ejection from s.s. 58 and 74 (3rd turn ejection) maybe because of the 3 $\lambda/2$ bumps.
One must point out that the operation from March 1974 onwards relies on its availability.
FAK still uses the "straight flush" type of timing system which is not computer controllable. A decision on a new timing should be taken soon.
- It was confirmed that during 1974 both partial aperture kickers will remain operational. Later FK13 will be moved into s.s. 97 and always be kept operational as a spare unit in case of FAK failure.
- Radiation measurements taken after the intermediate intensity run have shown a substantial increase of the induced activity on FK97, although nothing abnormal was noticed during the run. This activation on machine elements (also TIS and TIK) might well be one of the factors which will set what is the reasonable intermediate intensity limit for the moment.

* In the meantime, the "Bertolotto" fast extraction magnet used in s.s. 16 from 1970 to 1972 is still available as spare.

Time lacked to discuss other extraction elements. Groups responsible for this equipment are invited to list the present equipment status and the available spare parts. This would help to achieve a coherent policy for all the elements of the CPS complex (such a survey has already been done for the PSB - see MAC No 9).

9. Miscellaneous PS ring elements

- The responsibility for TIS (800 MeV injection septum magnet in s.s. 42) has been transferred, about one year ago, to F. Rohner who was associated to its installation and running-in.
A spare unit must still be provided and tested by the constructor (MAE group).
- TIK (800 MeV injection kicker magnet in s.s. 45) is now with the group of D. Bloess.
A discussion on the status of this device took place recently and a programme for improvement was agreed (see MPS/DL/Min. 73-31).
- Time lacked to discuss this further but the same remarks concerning equipment status, spare parts made in the previous section should apply.

10. Continuous transfer

Since the last MAC meeting devoted to this subject (meeting No 9), an updated report by A. Krusche has appeared (MPS/SR/Note 73-33). It is hoped that experimented studies using the intermediate intensity beam can take place before the end of 1973. One could then take early in 1974 a decision on the adopted scheme (Electrostatic Septum in s.s. 81 or in s.s. 31).

11. Timing System

G. Gelato having wished to be discharged, after taking on M. Rabany's team in addition to his own, J.P. Riunaud has accepted to take the responsibility of the timing committee to survey the PS complex timing system and to implement the modifications necessary for operation with the SPS. A preliminary discussion has already taken place (MPS/DL/Note 73-20) and in spite of the short notice, a first survey of the situation will be presented at the December 12 MAC meeting by J.P. Riunaud.

12. Experimental Areas

- Starting in 1974, 25 GeV/c physics in the South Hall will be progressively phased out and replaced more and more by test facilities for new equipment. The use of a portion of the South Hall for the new Linac control room and for access to the old Linac has been approved by the Board of Directors.

The civil engineering work for the new Linac utilities (water drain) might create some temporary problems in this area.

- Physics has stopped in the North Hall and it will be progressively used for other activities (Hot lab., telemanipulator, storage, etc.; see MAC No 14).
- The transformation of the East Area was discussed recently (MAC No 16) and there is no need to come back to this subject.

13. Controls

There was only a rather brief discussion on some aspects of the PS controls problems. Many issues have been treated by the Controls Committee and were reported in the meetings minutes. Other ones will be discussed in the near future such as the advisability to use CAMAC for all new control equipment.

The structure of the PS computer control system was shortly debated. In particular, should one order now a PDP-11/45 for the PSB ? Does one need a spare computer which could also be used for programme development ? What other satellite or front-end computers should one consider ? (A proposal for the auxiliary magnet power supplies has been prepared by J. Gruber and H. Kugler). The subject obviously needs a further discussion in 1974.

The need of more computers for the PS controls should not be confused with the other requirements of minicomputers for laboratory developments. Several needs appear in connection with the new Linac project and for magnet measurements, for instance.

14. Miscellaneous

- O. Barbatat was asked to make again, during the coming shut-down as in 1971 (CERN/MPS/DL 71-10), an analysis of the reliability performance of the various components of the PS in the past two years.
- For several projects (PFW, extraction magnets), the knowledge of the duty cycle of the PS when operating with the SPS is a key design parameter. New elements should be matched not to the peak PS duty cycle for 25 GeV/c physics alone but rather to the likely cycles when injecting in the SPS. Although there is a wide variety of possible cycles, M. Georgijevic was asked to prepare figures for a few probable situations.
- Intensity modulation from cycle to cycle has been mentioned several times. The question was dealt with in October (MAC No 15) but should be taken up again in 1974.

15. Next Meeting

Wednesday, December 12 at 14.30 p.m.

Small PS Conference Room

- Agenda :
- CPS Timing System and implications of operation as injector for the SPS
 - Review of pending problems (continuation) :
 - . Instrumentation
 - . Operation
 - . Vacuum PS and PSB

O. Barbalat

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