THE g-2 EXPERIMENT - THE PS OPERATIONAL ASPECTS

Several discussions have been held recently about the beam layout for the g-2 experiment (see MPS/MU-NOTE/EP 69-11 and NP 525/MK).

In this note we start to look at some PS operational aspects which may in turn have repercussions on NP and TC users. It is recalled that there has been a decision to put the g-2 experiment in the West Area and that the need is for one bunch fast ejected (FE 16) at a momentum $\gtrsim$ 20 GeV/c.

Rough estimates of time table are

a) Experiment ready to receive beam at end 1973.

b) Duration of experiment three years.

There are in principle three possibilities

1) To feed both the g-2 and BEBC with only one ejection pulse. This requires a beam splitting device requiring, amongst other things serious modifications of the present beam layout. The possibility of a series target has been envisaged but would require a much longer secondary beam and more bending.

2) To feed the g-2 beam from the RF beam (BEBC) target by using the same FE pulse as the BC. Although this is the simplest for PS operation, and economical in use of protons and shielding, it requires much more bending and would mean placing the g-2 storage ring away from the SE corner towards the centre of the South side of the West Hall.

3) To feed the g-2 target with a second fast ejection pulse from the slow primary beam section. The position of the muon-storage ring as well as secondary beam length can be optimized in this case. This solution has however the disadvantage of using additional flat top time or alternatively of lengthening the repetition rate.

Both 1) and 2) require beam crossing which puts an additional constraint on beam(s) design.

Solutions which do not allow operation of the g-2 and the omega beam within the same cycle have not been considered.

In the following we have tried to investigate some of the typical PS cycles with double pulsing of FE 16 (i.e. 1 for BEBC, 1 for g-2). The cases of single FE 16, which have also been investigated, although not shown, result in a reduction of repetition rate of typically 4-7 o/o if the same slow ejection spill length is maintained or in a lengthening of the spill out by 50 ms if the repetition rate is kept constant.

It should be noted that the beam running time of the g-2 experiment will be approximately one third to a half of the total time in which the muon storage ring is installed. In summing the various factors we therefore tentatively conclude that possibility 3 is the better solution in that it meets nearly all the boundary conditions, and also because of its overall simplicity and lower cost.

The serious disadvantage of this solution is

1) EITHER A loss of 50 ms of spill time for constant repetition time which for electronic experiments is assumed to be unacceptable.

2) OR An increase of repetition time for constant spill time which in the cases investigated is $\leq$ 7 o/o. If the running time assumptions are correct this percentage must be divided by a number between two and three. Although this is undesirable it might prove acceptable to all users.

We assume in the following (for beginning 1973) :

1) Two different kickers available (for 58-74 and 16) no polarity switch.

2) The new kickers can multi-kick with $\lesssim$ 50 ms between kicks.

3) Bumps and associated lenses in all ejections ON or OFF $<$ 50 ms.

4) Interval FE-SE $<$ 50-60 ms.

5) Interval SE - end of flat top $\lesssim$ 50 ms.

6) Interval between two 58 ejections 120 ms at 24 GeV/c (58 septum power supply as well as 2 m HBC limitation). (We used 100 ms in our cycle example).

7) FE 16 able to run all of the PS operational time.

8) New 16 septum planned for 1/3 duty cycle.

9) Momentum of ejection 16 (F or S) fixed by D.C. beam transfer channel.

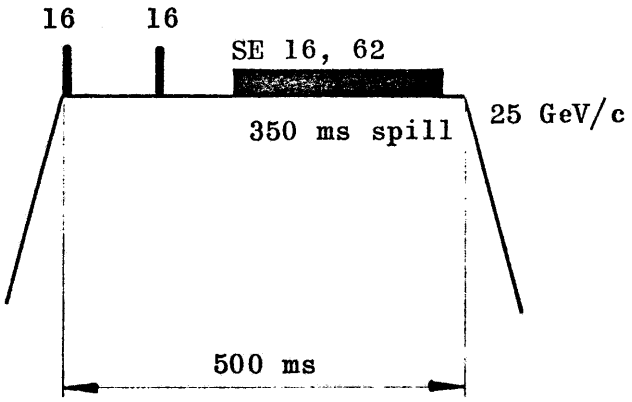
10) Final repetition times for PS magnet power supply (see MPS/Po-Note 69-10).
Note that at the higher PS energies with a flat top of 400 ms an increase of 100 ms means 0.2 or 0.3 sec increase in repetition time).

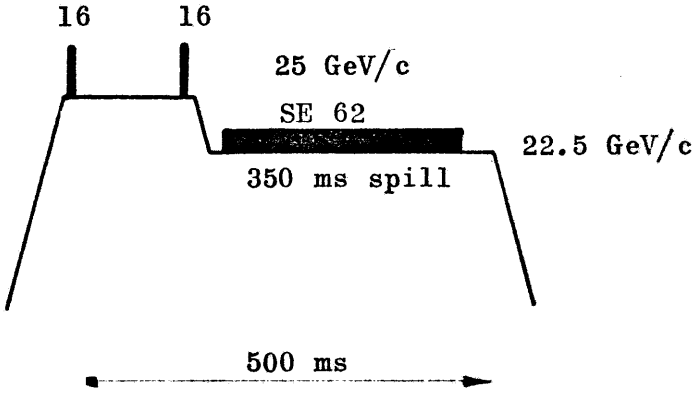
11) We assume in the following cycle examples 50 ms for points 2), 3), 4), 5) above.

12) Double pulsing of BEBC not taken into account.

The following typical cycles can be imagined :

a) Only single 58 pulsing (then FE 58 on the rising field - Not shown).



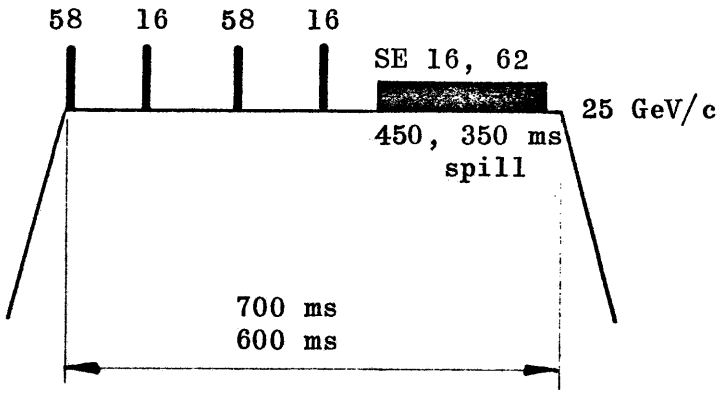


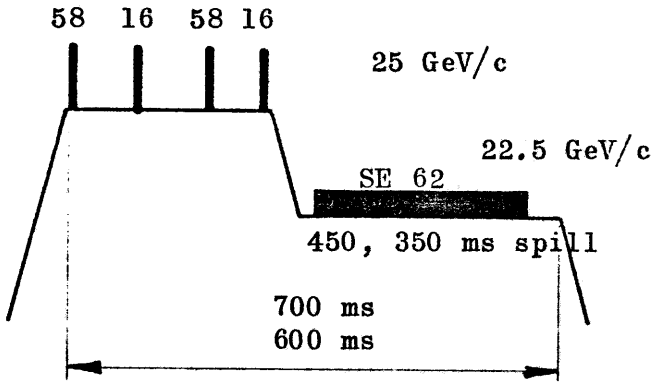
Repetition rate :

2.2 s

1.7 s

b) Double 58 pulsing

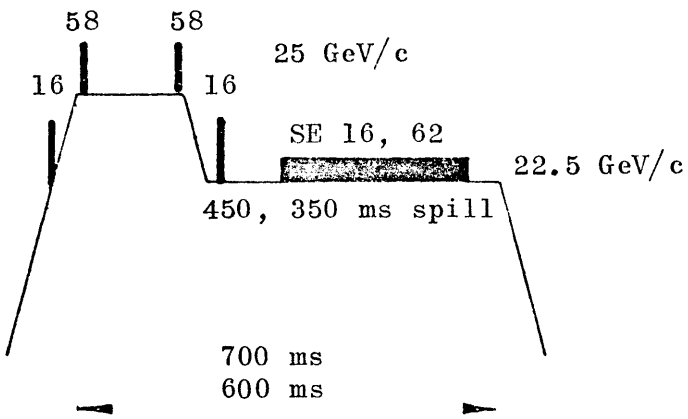


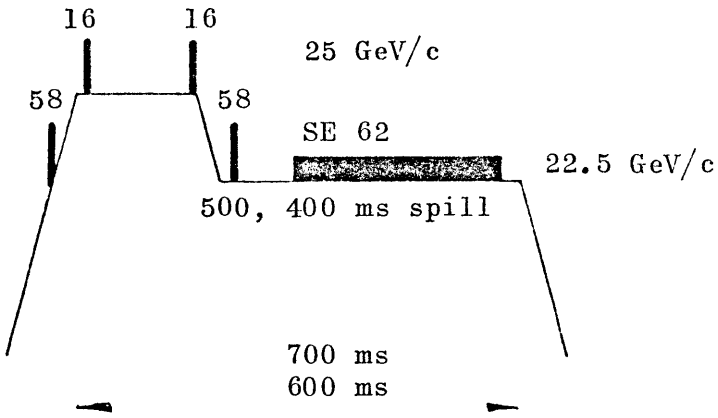


Repetition rate :

2.7 s.
2,5 s

2.3 s
2.1 s





Repetition rate :

2.2 s	2.1 s
2.0 s	1.9 s

Remarks

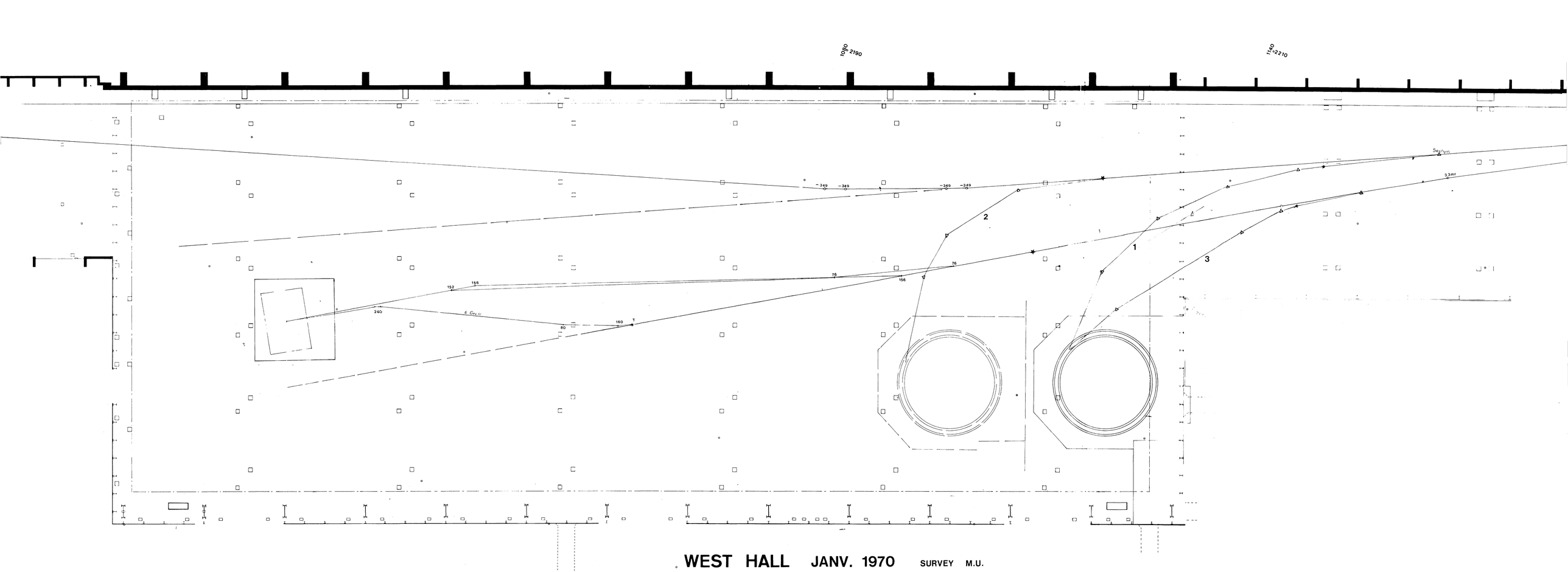
These cycles assume that FE 74 for Gargamelle is always on the rising field, i.e. at a maximum energy of 20 GeV/c or 22.5 GeV/c in our examples.

G.L. Munday
M. Reinharz

Distribution :

J. Allaby
Y. Baconnier
O. Barbalat
D. Bloess
F. Combley
D. Dekkers
J. Geibel
D. Fiander
L. Hoffmann
P. Lazeyras
G. Petrucci
E. Picasso
P.H. Standley
Ch. Steinbach

MPS Group Leaders
NP Group Leaders



WEST HALL JANV. 1970 SURVEY M.U.