

PROGRESS REPORT ON MULTIPULSING PROJECT D020

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1. ASPECTS CONCERNING FASTER CYCLING

1.1. Booster

Main Power Supply - All hardware has been installed. Operation is very satisfactory with the present 1,2s A cycle. Testing with faster cycling has started and results are encouraging. More tests, with cycle times down to 0.65s are planned for ME sessions in December. Since the putting into operation of the new compensator the PSB 18 kV bus bar ripple due to the PSB main supply is < 0,15 %, which should satisfy other CERN users.

Auxiliary Power Supplies - The septum supplies are being installed in the BCER. The injection and ejection dipole supplies are delivered and are undergoing testing and checking in laboratory. The ΔQ and $\int B dl$ supplies, ordered with a French firm and scheduled for delivery this month, will be delivered in January 1980.

Kickers and Timing - The kicker performance changes for faster pulsing have been completed. The new kicker timing, consisting essentially of a number of preset counters, is being done as part of the controls conversion project. The hardware for the general timing system is being made and should be installed in mid 1980. It will not be possible to use it until six weeks after the long shut-down because of the transfer of the existing timing equipment from the MCR to the BCER. The new B-train will be tackled in 1980.

Instrumentation and Controls - These two aspects, like the timing, are very much interwoven with the controls conversion and hence the antiproton projects AA and APA, the latter in particular defining the overall time scale (for instance, no long shut-down in January 1980). The consequences will show in that we shall not be able to carry out faster cycling tests on the PSB as soon as we would like. Although the required new auxiliary power supplies (designed to be controlled by the NORD system) will be available early in 1980, their temporary installation and provisional NORD control for such tests are incompatible with the overall programme. These tests will be done after November 1980. For earlier, faster cycling tests on the PS with a high intensity PSB beam a special supercycle arrangement is being studied using a PSB cycle time of 1,3 sec.

Buildings and Cooling - Most of the work foreseen under this heading has been satisfactorily completed, except for some improvement of the ventilation.

1.2. PS Machine

Main Power Supply - Hardware modifications have been completed and tests of the 0,65s cycle with the new B-train should be possible in January 1980. The minimum field of the main magnet and the precise form of the field rise from C_0 to C_{100}

will be fixed between the interested parties before the end of December. The length of the 1 GeV flat top (if any) and the 10 GeV flat top for ejection remain to be fixed. Discussions will be held this month. Provided the ejection flat top does not exceed 30-40 ms it should be possible to obtain a 650 ms cycle. Longer ejection flat tops might require us to jump to 830 ms because of the SIG restrictions.

New B-train - The system consists of three chains in parallel which are compared. One chain will be finished this month and the remaining two before the end of the year.

2. ASPECTS CONCERNING NEW EJECTION EQUIPMENT

Fast Bumpers 21 and 79 - All major items of equipment are manufactured and installed. Commissioning tests have started on the 3 two-step pulse generators in the new PS Central Ejection Hall B.367. It is expected that the generators will become operational in December (their first use will be to test AA injection kicker magnets). Completion of the magnet and transmission cable installation in the PS Ring will be made in early January 1980 so that ejection tests with the new Fast Bumpers under manual control should be possible for February 1980.

Some work has been done, but much still remains to be done, on the computer controls for the new FB system. On the hardware side interfaces are awaited from CO Group. If delivered on schedule a start in the commissioning of the computer controls from January 1980 onwards should be possible. On the software side some of the application programs are written but nothing is yet debugged - debugging will be a long process because of the complicated interfaces. The overall position is that completion of the FB system with full computer control should be possible for June 1980.

Integration of the FAK with the FB system control is not included in the above estimate - the FAK is undergoing a complete restructuring to render it compatible with future PS operation and its use in the CT process for "mixed" ejections is but one small part of its future operation.

Septum magnets and supplies - Good progress has been made on the new power supply for SM16. Installation of this new supply in B367 will start in December, and it should be available for exciting SM16 from January-February 1980.

The new septum magnet for SS16 is behind schedule because the steel is still not delivered. Completion of this magnet is not likely before end 1980 on account of the steel delivery and pressure of other work. This is not serious as the present SM16 can meet the needs for 0,65s cycling, albeit with some reduction in its life expectancy, until the new reinforced SM16 becomes available.

The reserve power supply for SM16 (which is the actual supply in B359) will be brought up specification and installed in B367 as soon as the new supply mentioned above is operational.

The components for the spare electrostatic septum have been delivered and assembly has started.

Auxiliary magnets and power supplies - The GTS 501 power supply is completed. The movement of the transition elements has been made and quadrupole QKE 73 is installed. New quadrupoles have been built to replace existing spares installed in the machine for the project. The quadrupole selection by thyristor switching for changing over from 2 and 3 Turn extraction to 4 and 5 Turn extraction has been installed.

3. FINANCIAL SITUATION

This situation, as of end Oct. 1979, is outlined in the attached table. From this it can be seen that about 75 % of the total project materials budget has been committed. Also 75 % of the 1979 estimate of 2,33 MF had been committed at the end of October. It is doubtful if the total 1979 commitment will rise above 80 % of the year's estimate - the high spending codes 8501, 8502 and 8506 have reached the commissioning phases where the rate of expenditure falls off considerably.

The underspend for 1979 can be attributed mainly to codes 8503, 8504 and 8507. The underspends on 8503 and 8507 are mainly due to the parallel work load, arising from AA commitments. The underspend in code 8504 is due to a saving in the conversion of some of the instrumentation. It will probably be compensated by some overspend in code 8505 in 1980.

The overall financial situation of the project looks healthy and reasonably well balanced between the separate code numbers. It is felt that there is sufficient reserve to deal with unforeseen difficulties which might arise during the commissioning phase. However, there will be no large surplus.

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MULTIPULSING CODES - MATERIAL COSTS, END OCTOBER 1979.

(KF throughout)

Code No.	October 1979 commitment	1979 balance - end Oct.	Total commitment - end Oct. 1979	Total estimate
7500 - 8500	4,0	44,2	74,9	195
7501 - 8501	6,1	- 13,0	916,4	950
7502 - 8502	15,2	- 10,4	931,3	1100
7503 - 8503	2,9	58,4	79,9	255
7504 - 8504	9,2	169,2	273,0	600
7505 - 8505	1,2	13,6	648,0	720
7506 - 8506	9,9	55,2	2067,7	2600
7507 - 8507	7,5	192,4	391,7	645
7508 - 8508	0	57,8	255,9	405
7509 - 8509	- 0,1	19,4	0,6	30
Totals	55,9	586,8	5639,4	7500

% of 1979 budget committed at end Oct. = 75 %.