PS/FES/TN-4
IK/mj

15 March, 1968

# SOME PRELIMINARY REFLECTIONS AND QUESTIONS ON THE ELECTRONICS FOR THE SERPUKHOV EJECTION

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## 1. INTRODUCTION

The proposed electronic equipment is divided into 6 main parts. They are more or less independent functional blocks as follows :

2. Timing
3. Interlocks
4. Beam diagnostics
5. Monitoring
6. Automatic charging circuits for power supplies
7. Servo-electronics for hydraulic actuators.

The functional blocks 5, 6 and 7 are linked in a very weak way to the accelerator electronics. Therefore no questions are yet existing.

The functional block "Timing" contains the "Master Clock" "Pre- and Post-Counters", the "Radio Frequency" "Pre- and Post-Counters", the "Master Clock" "Master Counter", the "Radio Frequency" "Master Counter", the "Kick and Bunch Selector" which is combined with the "Program Sequencer" and the "Radio Frequency" and "B" synchronization. All the above-mentioned technical terms are explained in extenso in the Draft design study and in "Operation Straight Flush", NPA/Int. 67-11.

It is foreseen to use in Serpukhov a timing system similar to the one used in the ejection system at CERN. The M-train used in the CERN system is replaced in the Serpukhov system by the master clock pulse-train combined with the pre-selection counters. The RF and B-train synchronization shall be realized in the same way as in the CERN fast ejection system.

Some questions about the program sequencer are :

2.a Is there already a general beam sharing system foreseen in Serpukhov (sequencer, program generators, etc.) ?

2.b Has it been foreseen to program in a centralized manner the internal and external targets ?

2.c What about the common beam sharing for the ejection channels A and B which should probably be synchronized with one another and with the internal targets ?

The functional block "Interlocks" contains all transducers for pressure voltage, current, air- and water-flow, temperature and mechanical position controls. The external, for instance the radiation safety interlocks, are handled in the same way as the transducer signals. The main question for the functional block "Interlocks" is :

3.a What is the radiation safety philosophy (closed zones, interlocked doors, starting delays, etc.) ?

The functional block "Beam diagnostic" contains the internal beam position measurement devices located near the deflection magnets (static or electromagnetic pick-ups), the beam intensity measurement equipments (beam current transformers), mechanical magnet position measurement equipments (magnet to central orbit position), television (fluorescence picture-frame screen up- and down-stream the deflection magnets and full screens in the extracted beam) and the radiation measurement device for measuring beam losses in and around the deflection magnets. Some questions for the functional block "Beam diagnostic" are :

4.a Detailed drawings of the interior of the electrostatic pick-ups ? Places in which they are mounted ?

4.b Is there a data collecting system foreseen for the different accelerator parameters ?

The functional block "Monitoring" contains all the fast pulse observation circuits around the magnets and the pulse generators. No circuits of the monitoring system are connected to the ejection external equipment. Accordingly, the question of the monitoring system will not have to be treated in Serpukhov.

The automatic charging circuits for power supplies possibly include servo-amplifiers for voltage and current regulations and the power electronics (ignitrons, SCR, etc.). From the point of view of the accelerator electronics the charging circuits and the power electronics may be handled as black boxes.

The same is valid for the electronics for the hydraulic system. This electronics is forming - with electrical and mechanical parts - a closed system and is connected to the control electronics.

In the following chapters the more detailed questions about the functional blocks 2, 3 and 4 are formulated.

## 2. TIMING

2.1 Master crystal clock output characteristics (impedance, voltage, pulse shape).

2.2 Master crystal clock pre-counters output and input characteristics (impedance, voltage, pulse shape).

2.3 Master crystal clock standard pulse distribution and loading capability.

2.4 B-train generator output characteristics (impedance, voltage, pulse shape).

2.5 B-train generator precision.

2.6 B-train distribution and loading capability.

2.7 Time-jitter B-train to Master, clock, statistical and systematical jitter.

2.8 What about the B-pulse train on the flat top and after the flat top when no up and down B-counters are existing ?

2.9 From which part of the radio-frequency system are the RF-pulses derived and what is the precision of the zero crossing detection ? What happens around the phase jump (transition, flat top) ?

2.10 Are significant machine pulses available and when, how are they generated (MW, MT, M30) and distributed ? What is the loading capability ?

## 3. INTERLOCKS

3.1 Of what type are the interlock signals and how are they distributed ? What is the loading capability ?

## 4. BEAM DIAGNOSTIC

4.1 Of what kind are the output signals of the static pick-ups ?

4.2 How are the output signals displayed ?

4.3 Loading possibility of the displayed pick-up signals ?

4.4 How is the beam intensity measured ?

4.5 How are the output signals of the beam measurement dispayed ?

4.6 What is the loading capability of the beam intensity measurement installation ?

4.7 Is an average position measurement device available or not ?

4.8 What about the local directive radiation control in the ring ?

For chapters 5, 6 and 7 there are no detailed questions.

## 8. INSTRUMENTATION RACKS

8.a Are there standard racks existing of width between fixation holes of 19" ?