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PROGRESS REPORT ON PSB EQUIPMENT MODIFICATIONS, SPECIFIC INTERFACES, AND OTHER BR WORK ASSOCIATED WITH THE CONTROLS IMPROVEMENT PROGRAMME*

THE BR STAFF
(Reported by K.H. Reich)

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*) Presented (partly) at MAC meeting No. 82.

CHART 1 : ACTIVITIES

BR	BR + CCI	CCI
- Conception of adaptation of equipment	- Compositions of CAMAC subsystems*	- Development of modules
- Realization of adaptation	- Lay-out of CAMAC network*	- Prototyping
- Installation of adaptors	- Planning of installation phases **	- Tendering and contract, follow-up
- Contribution to module development*, if any	- Tests of interface together with equipment	- Reception of material
	- Composition of experimental CAMAC subsystems, if any	- Tests of standard interface
		- Provision of hw + sw diagnostic (for standard interface) including local access facilities
		- Installation of CAMAC standard interface and in situ tests
		- Provision of microprocessor programming and testing facilities
		- Provision of micro equipment drivers

* CCI responsibility

** Responsibility according to general division of work : CCI standard interfaces, BR specific interfaces (adaptors which may however use standard modules and cables delivered by CCI)

I. INTRODUCTION

The first package[1] of the Controls Improvement Programme[2] includes the Programme Line Sequencer*(PLS) and the PS Booster (PSB), besides a major contribution to the (initially stand-alone) computer controls of the Antiproton Accumulator (AA) as well as to the $\overline{p}$ production and acceleration.

For the PSB part the division of work between BR and CCI as regards the hardware aspects is shown in Chart 1[3]. For the software, BR group has mainly the task of furnishing input data. We contribute also to the definition and design of operational and machine study facilities, as well as of local tests and stand-alone operation, including the specialized mobile consoles in the equipment rooms.

Progress with the PSB equipment modifications (section II), the specific interface activities (section III) and the other work (section IV) is reported below.

What would be more difficult to describe is our general contribution to the overall optimization, viz. *maximizing* the usefulness of the control system for the operation staff and the accelerator systems specialists while *minimizing* the controls hardware (numbers, number of different types, complexity, cost) and software (volume, number of different modules, complexity, man x months required) as well as the equipment modifications. This contribution benefited notably from our intimate knowledge of PSB hardware and operation, and a long-standing experience as users of computer controls[4].

As regards all BR activities, yet another optimization/balancing is going on continuously: how to do in parallel the work described here, that for the SPS intensity increase[5] and the Antiproton Production and Acceleration (APA)[6] besides keeping the PSB running. As the three major enterprises are interrelated and all scheduled to be operational by end 1980, some of the controls conversion has to be left for later in view of the limited resources available.

• An overview of the entire PSB conversion, i.e. including the equipment not under BR responsibility, is given in Appendix 1 (see also point IV.5).

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*) Now called Cycle Program Generator (CPG).

II. EQUIPMENT MODIFICATIONS

1. General

In order of decreasing numbers these modifications are required because of

i) extended control and acquisition (for instance resetting from MCR)
ii) the new standard interface[7]
iii) change-over from manual to computer controls (RF, Q-measurement, etc.)
iv) pulse-to-pulse modulation via the PLS (fast kicker magnets, "sieve")
v) the resulting simplification of the software (stand-by for all power supplies)
vi) conversion to the NORD system in two stages (nearly all equipment now, some items of the 800 MeV transfer line later).

For a given equipment several of these reasons may come into play, as well as the requirements of SPS[5] and APA[6]. As the related argumentation is sometimes rather involved only the result is reported here in these cases. There is no claim to completeness; the emphasis is rather on the volume and diversity of this work. A more detailed description is given in some of the documents shown in the list of references.

2. Power supplies and assimilated equipment

The *global control structure* for all PS power supplies was elaborated by an inter-group working party[8]. As regards MCR operation, only three global control commands will exist in the future: SET UP, PAUSE and FULL STOP. For us this means notably that it should be possible to start up any power supply (e.g. after a power failure) from the MCR by remote control, and idem to reset and to stop it completely (e.g. at the end of the run), as well as having available in the MCR the corresponding status indications. The power supply specialists obviously need more detailed controls (and status indications): OFF, STAND-BY, ON, RESET. For many of the existing power supplies this new approach translates itself into additions and modifications, in particular a replacement of manual circuit-breakers by remotely-controlled ones. A detailed study of these modifications (together with some others notably required to improve the precision of the current acquisition) was made for the twenty-seven power supplies in the Booster High Power Room (BHP)[9].

An *implimentation by stages* is unfortunately the only solution possible, given our resources and the other comitments[5,6]. In the first stage only the 73 + 12 new power supplies*[5,6] will conform fully to the new standard. Modifications of the other 290 power supplies wil be restricted to what is required for SPS and APA (notably faster pulsing and introduction of pulse-to-pulse modulation), and what has been asked for with priority by OP as regards the transfer line supplies (see below).

The high-power *transfer line power supplies* are notably being equipped with remotely controlled circuit-breakers and better ADCs. Where required[6] these supplies will be fitted with reference sources suitable for pulse-to-pulse modulation (ppm). Some low-power supplies (and the TIS supply) will be rearranged so as to allow continued control of the PS injection from the present 800 MeV injection console after the transfer of all the other transfer line power supply controls to the NORD system.

The adaptation of the (large) *rest of the existing power supplies* will at this stage be done in the interface (see section III).

The *positioning of the various septum magnets* is at present made by means of seventeen manually controlled motors. From the computer controls point of view, these can be considered as power supplies, i.e. the same standard interface modules will be used. Their number could be reduced strongly by using single actuations and local demultiplexing. Such a solution was developed and agreed; the equipment modifications (and construction of the specific interface) are under way.

The *RF acceleration* and *kicker magnet* systems are also considered as power supplies from the point of view of computer controls. As in this context it was more convenient to group together all aspects of these systems (including interface items), they are here dealt with separately from the power supplies (see subsections 3. and 4. below).

3. Accelerating system

While all of the high power RF system and a few items of the beam control system are at present not computer controlled, full control by the

*) Thirty-one (+four spares) for the injection line dipoles, twenty-six (plus five spares) for the ejection and transfer line dipoles, twelve (plus two spares) for the $\int Bdl$ and ΔQ supplies and four (plus one spare) for the injection line and injection septum magnets.

NORD system is planned from the start.

3.1 High power system

Here it is essentially a matter of controlling, and acquiring the status of, some twenty low and high voltage switches.

3.2 Beam control system

As regards *control and acquisition* of the variables not yet computer controlled (such as the switches closing and opening the various loops), it is necessary to replace the manual control modules (equipped with relays) by computer control modules designed for ppm (solid state switches). This implies some changes of signal levels and impedances, which in turn may require modifications to the element controlled.

The *specific timing pulses* of the beam control system (which are not part of the general timing system) are now generated in a set of counters, and mixed when required in special purpose diode matrices. The new CAMAC counters will require new mixers because the existing ones will not be compatible (mechanically, electrically and geographically).

The *analog multiplexer* for the beam control signals will be replaced by the signal observation system (SOS). This implies collecting the signals at a different location and on different connectors from the ones used at present, and in some cases signal level adaptation may be required.

The *injection and ejection frequency* of the four rings are acquired in the existing system via STAR, in a special format and in BCD code. Both the code and the format not being accepted by the new computer systems, one has to change the frequency measurement system. In the future, the new hardware for the Q-measurement will be used in time-sharing during the cycle. This requires a specific interface consisting essentially of an eight-channel multiplexer controlled by the timing system.

4. Kicker magnet system

The detailed *description of the conversion to full computer control* is presented in reference 10; here only a summary is given.

New *high voltage reference supplies* are required for the kickers and ejection bumpers (ED) (eleven units now plus four for IKF later).

Interlocks and control data transmission will have to be rewired and regrouped.

As to *special timing,* the drift stabilizers will not be modified in the first package (i.e. before 1980) but the timing logic must be rebuilt to make use of the new standard preset counters. Before this conversion there will be an interim stage requiring added patch panels and level converters.

Regarding *signal acquisition,* the digitization of the IKS and ED waveforms requires complete replacement of the existing equipment while the EK and TK acquisition hardware must be extensively modified to use the standard binary counters. Buffers and amplifiers are also required to make existing signals compatible with the SOS.

Digital acquisition of the *high voltage signal* will also be added.

5. Timing and sequencing system

As these modifications are not yet fully frozen, and will be reported separately in detail, again only a summary is given here.

The entire system must be rebuilt, partly to meet new present and future needs, partly on account of the new standard preset counters.

The new equipment will include various logic boxes specific to the PSB timing system, modifications to the programme line equipment for scope triggering (TCU), provisional modification of the B-train and a rearrangement of the pulse distribution network to allow the physical displacement of the system to the BCER.

It should be noted that the nature of the system, built around a set of counters, makes the distinction between the system itself and its interfaces a rather artificial one.

6. Beam diagnostics equipment

In this area the most successful approach appears to be via a joint proposal by the users together with hardware and software specialists[11]. There is good progress with this, for the Q-measurement[12], and talks on the targets have started[13]. It should also be noted that some diagnostics equipment is already controlled via the T-BMC NORD computer[14] after the recent transfer from the PDP 11/45[15]. The aim is to have all essential equipment fully controlled by the NORD system from the start, though perhaps not the full "four channel" facilities.

The present manual controls of the *Q-measurement*[12] (selection of ring/plane, preset counters, kick commands) will be replaced by standard computer controls. The existing HP 5360 computing counters are being replaced by CAMAC-compatible HP 5345 reciprocal counters with HP-IB bus facility. These counters will also be used for the frequency measurement, see 3.2 above. (The real time and data reduction problems are being solved by means of a local ACC. This device will also take care of multi-user requests from the various consoles.)

The *orbit observation (R-U)* system will be completely redesigned at a later date. The present objective is a temporary, minimum work, interface. This will possibly include changes to the R-U timing to allow more than two closed orbit measurements per cycle to satisfy the demands from the four consoles. Four HF SOS channels will be provided for MEs.

7. Status and planning

Nearly all first priority modifications have been looked at in detail and agreed upon. As already said, they concern mainly those equipments which have to be modified or replaced anyway because of (i) the SPS intensity increase[5], (ii) the APA[6] and (iii) obsolescence. The general planning is shown in Appendix 2.

Major modifications left for later concern various power supplies(complete actuation facilities and full status acquisition), the orbit observation system (see subsection 6. above), the four channels for other beam diagnostic equipment, and the main power supply (change-over to computer control).

III. SPECIFIC INTERFACES

1. General

Nearly all of the present PSB computer control commands and acquired data are transmitted via the standard STAR interface, a small fraction via a STAR/CAMAC or (in case of the T-BMC[14,15]) a pure CAMAC interface. Whenever practical STAR will be replaced by CAMAC in the first package. As the CAMAC interface is not STAR compatible, at least not on the level of cable connectors, there is not infrequently the need for a specific tailor-made interface between CAMAC and existing accelerator equipment. In some cases STAR/CAMAC converter modules will be used; in other cases the accelerator equipment is being modified as described in section II.

In a number of instances the distinction between equipment and interface is artificial (like in the case of timing equipment), in others (notably the accelerating system including beam control, the kicker system and the Q-measurement, as well as the T-BMC items) it was more convenient to deal with the two subjects together in section II. The examples given below again concentrate on some of the main specific interface activities as distinct from a complete listing.

In most cases, connecting anything to the new control system implies changing cables and connectors, building patch-panels, rerouting cables, etc. The implications both in terms of material and of manpower are substantial.

Thirty-five racks are being added in the Booster Central Electronics Room (BCER) to house the new interface hardware (standard and specific).

2. Power supplies and assimilated equipment

The pertinent new *standard control modules*[7,8] are the CAMAC Quad Transceiver (QT) and the CIM Single Transceivers(ST). The latter is designed to be housed in the power supply itself. Where possible this will be implemented in the future; at present all STs are planned to be housed separately. Seventeen of these crates complete with the appropriate sockets and internal connections are on order for the seventy-three new supplies.

As regards the *specific interface for the existing STAR-controlled supplies*, the present version of the ST enables one to use passive hardware only. Twenty-six complete interface crates are on order for the bulk of these supplies. Three crates will be fitted temporarily with active components for providing the non-existing STAND-BY actuation of the respective power supplies so as to reduce by one the number of different software modules/simplify the general module.

The *controls of the new multipole supplies* are already in CAMAC[16]. For the first package they will be adapted to the NORD systems by means of ACCs. A specific interface is required to connect the current signals to the SOS.

3. Beam diagnostic equipment

The *injection line beam current transformer (I-TR)* system is being remade to improve the accuracy. The additional equipment required to supply signals to the CAAS and the SOS involves patch panels and a few buffer amplifiers.

The *injection line position monitors (I-U)* are a new system. The work to interface it with the computer is similar to that required for the I-TRs.

4. Status and planning

Nearly all specific interfaces have been designed and agreed upon. Those less dependent on the last details of the standard interface have been ordered. The others will be fabricated as soon as the prototypes have been tested with the standard modules.

The planning (see Appendix 2) essentially calls for installing all hardware (standard and specific) in 1979, and testing (and debugging) in the first half of 1980. This implies that both the standard and the specific interfaces will be delivered exactly as specified, so as to match/mesh without modifications. Several months of tests are indispensible because (i) it is essential to have tested thouroughly the various subsystems before the beginning of the switch-over IBM to NORD and (ii) most BR staff doing these tests have other work to do in parallel.

IV. OTHER WORK

1. Interface layout

According to the *division of work* (see Chart 1) this is a CCI responsibility but obviously calling for close collaboration with BR.

The *geographical distribution* of the *interface hardware*[17)] is by now largely frozen. In reference 17 the location of the thirty-three CAMAC and the associated CIM crates is shown in detail; some refinement continues.

Because of lack of space, and the wish to keep open the possibility to return to the present interface until, say, mid 1981, not all desiderata of CCI, OP and PSB (hardware) people could be fulfilled. To make room for the thirty-five new interface racks (plus sixteen racks with new accelerator equipment), a number of existing installations will be moved or modified.

2. Input data for software design

This activity started in mid 1978 [18)] and is almost terminated. In the course of numerous meetings the PSB systems were reviewed one by one (with the beam control system just done) and an agreement reached. In some cases this has meant an addition to the specific interface (I-Q, I-DIS), in other cases modification of the standard interface (kickers) in order to simplify the software, notably for the pulse-to-pulse modulation of machine parameters (ppm).

3. Operational and machine study facilities

Aspects considered more closely are the PSB parasite cycles and associated facilities, ppm of machine parameters, detailed used of the PLS, and the Beam measurement computer facilities[14,15] and their successors. As far as can be judged at present, it should be possible to meet our requirements. The data flow rates and the alarm tree still need further study.

4. Hardware tests and stand-alone operation

The ad-hoc working group arrived at the following recommendations[19]

i) before summer 1979 provision of about five mobile consoles ("trottinettes") for access to the accelerator equipment either via the specific interface (= single transceiver for the power supplies) or via the standard (CAMAC) interface; these consoles are notably to have a storage facility for both programs and (input or output) data.

ii) in summer 1980 provision of two mobile consoles ("Mercedes") giving access via the NORD computer.

iii) implimentation of a minimum hardware specialist tree, notably for power supplies.

5. Stock taking and particular co-ordination tasks

A first stock-taking exercice was made in January 1978 [20], and is still being refined(see Appendix 1). An example of a particular co-ordination concerns the TV system[21], another one the complete list of the new names for the PSB process elements[22], and a last but not least the SPS work[23].

6. General communication and education

These essential aims were notably met via information meetings and seminars[18,24] as well as direct discussions, notably of the trees.

V. CONLCUSIONS

One year after its launching, work in the areas reviewed here is nearly all defined, and implementation has started. The planning contains no slack, and we have no reserve resources. Considering also our other engagements, it still seems possible to meet the target dates provided we receive the building blocks (mainly standard modules) and tools (like the mobile consoles and appropriate documentation) in time[25] and in working condition as specified.

ACKNOWLEDGEMENTS

Much of the work described was done in close collaboration with the AE, CCI, LI, OP & SM staff engaged in the Controls Improvement Programme, and should be seen in that frame[26]. Separate reporting was mainly motivated by the backlog in the areas covered here.

Distribution : BR Group
BOC
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and as requested to Miss M. Innocenti.

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ALIMENTATIONS - 1

Nº	EQUIPEMT	RESA	Nomb	P.P.M.	SOS	GFA	256 INPUT GATE	DUAL O. REG	QUAD	STH	STD	RESET COUNTER	UP/DOWN COUNTER	PLS RECEIVER	PLS DECODER	SCHIL. ADC	ANALOG MUX	256W. MEMORY	SAMPLING ADC + 256 W	C/STAR A	C/STAR C	A.C.C	AUTRES	REMARQUES	PRIORITE
A1	R. DIPOLES	FV	116	oui	116	10 POOL			29	116		1													1
	P. MULT. (OLD)	"	44	oui	44	POOL			11	44		1													1
	T. DIPOLES	"	3	oui	–	–			4	13		–												Sons les 3 alim. à changer /sur ces 13, 9 en aval de TBH	1
A2	I.Q.	F.V	12	oui	12	–			3	12		–												Ni "stand-by" ni "off" sur l'alimentation à résoudre provisoirement dans int. spécif.	1
	DSDV	"	1		–	–			1	1		–												Alim idem I.Q	1
A3																									1
	E. SEPTA	F.V	1	non	–	–			1		1													Interface spécifique à refaire	1
	T. D,B,S,Q	"	12		–	–			3		12													cf PS BR No2 77 31 de P BURLA	1
	TP. Q (LISS)	"	6	oui	2*	–			2		6													*TS01 et TS.02 sur SOS	1
	TM. Q, 3	"	3		–	–			1 }		3														1
	TJS 42	"	1		–	–					1														1
A4	I DIS	FV	[illegible]	non	14 2HE	–			2	5		–												SYNCHRO IDIS cf CADENCEMENT; idem A2	1
	TS/3	"	[illegible]	oui	1	–			cf A3 }	1		2			1									START/STOP PAR PC en PPM (ligne 10 Parc'y)	1
	T. BH	"	1	oui	1	–					1	–													1
	IF ID	"	2	oui	2	2			1 }	2		1													1
	[illegible] OVAL	"	2	oui	2	2				2		1													1
A5	R. MULT (NEW)	FV + JD	60	oui	60	12 POOL						4*										2		*2 modules, un / crate	1
A6	I DIPOLES	FV	31	oui	31	–			8	31		–												Y compris DSDH	1
	E_DIPOLES	"	16	oui	16	–			4	16		–													1
	T DIPOLES	"	(1)	oui	8*	–			3	10		–												Pas SOS pour ligne BTM (2)	1
	L SH, V	"	4	non	4	–			1		4	–													1
	Σ		341		302	26			74	253	28	10			1							*		*Nombre ACC pour [illegible]	

-- ALIMENTATIONS-2 / AIMANTS

No	EQUIPEMt	RESA	Nomb	P.P.M.	SOS	GFA	256b INPUT GATE	DUAL O. REG	QUAD	STH	STD	PRESET COUNTER	UP/DOWN COUNTER	PLS RECEIVER	PLS DECODER	SCAL. ADC	ANALOG MUX	256W. MEMORY	SAMPLING ADC + 256W	C/STAR A	C/STAR C	A.C.C	AUTRES	REMARQUES	PRIORITÉ
A7	C Strips	F V*	9	oui	8	8 Pool			2	8		1													1
	∫ Bdl	F V	4	oui	4	4			1	4		1												OU DEUX GFA EN SERIE AVEC ADAPTATION	1
A8	SCRAPERS	CC	3	STABILITE AMPLITUDE	8	–			2	8		4			1									[illegible] SCRAPER à dem TSV3 (Ax) COMMANDE SENSIBILITE [illegible]	1
	BEAMSCOPE	CC	3		3	–			1	3		2			1									2 LIGNES SPECIALES SCRAPERS (H et V).	1
A9	A. PRINCIPALE	F V	1	oui 11,12	3	1			1		3	1											1 ADC 14 bits	SIMULATION STRI REQUISE POUR FEM. CONTROLE MANUEL, CONVERSION REMISE A + TARD, MANQUE DE TEMPS ET D'EFFECTIFS	3
	Σ		24		26	13			7	23	3	9			2							*		cf page 1	
AIMANTS-M																									
M1	POS. SEPTA	P.B.	3	NON	–	–			1		3	–												SYSTEME DE COMMANDE MANUEL DE MOTEURS A ADAPTER EN CONSERVANT MULTIPLEXAGE D'ADRESSES.	1
M2	SECURITE AIMANTS SEPTUM	PB		NON	–	–	1 ?	1 ?																INTERFACE A FAIRE, DOIT RENTRER DANS LE CADRE DE L'ETUDE DES ALARMES	3
M3	RM (ALIMENT)	PB		NON	–	–	1 ?	1 ?																"	3
M4	AIM. PRINCIPAL	PB		NON	–	–	1 ?	1 ?																"	3
M5	AIM. INJECTR	PB		NON	–	–	1 ?	1 ?																"	3
	Σ						4 ?	4 ?	1		3				0							*		cf page 1	

HAUTE FREQUENCE

N°	EQUIPEMT	RESP	Nomb	P.P.M.	305	GFA	256b INPUT GATE	DUAL O. REG	QUAD	STH	STD	PRESET COUNTER	UP/DOWN COUNTER	PLS RECEIVER	PLS DECODER	SCAIL. ADC	ANALOG MUX	256W. MEMORY	SAMPLING ADC + 256 W	C/STAR A	C/STAR C	A.C.C	AUTRES	REMARQUES	Priorité
HF1	SYSTEME ACCELERAT.	G.N*	1	TENSION HF st/stop mités	fHF2	—	1*		1		4													* A ETUDIER POUR EQUIP. MONITORING FIABILISATION [illegible]	1
HF2	ASSERVISS. FAISCEAU	GG		12 par	88+* 12HF	5	1	5	5	19					2	1	1	1						*48 SIGNAUX ANALOGIQUES SUR PARTIE NON BANALISEE D'UNE CONSOLE. COMMANDES MANUELLES A METTRE SUR ORDINATEUR	1
HF3	CABENSEMENT FAISCEAU	GG		8 PC	fHF2							28								1				RATIONALISATION POUR RECONSTRUCTION	1
HF4	GENERATEUR FONCTION HF	GG.		OUI (GFA)		4																		ELECTRONIQUE PARTICULIERE POUR PARTIE RAPIDE DU GENERATEUR HF.	1
HF5	MES. FREQ. HF	GG.																						VOIR I-10	1
HF6	LONGITUD. FEEDBACK	GG			fHF2																			Compatible ordinateur mais non encore installé	3
HF7	BUCKET SHAKING	GG				4									1										3
HF?	TRANSVERSE FEEDBACK	GG			16HF																			ENCORE EN DISCUSSION	[illegible]
Σ					88+ 10HF	13	2	5	6	19	4	28			3	1	1	1		1		*		*cf page 1	

KIKERS (cf PS. BR 78-12)

N°	EQUIPEMᵀ	RESA	Nomb	P.P.M.	SOS	GFA	256 b INPUT GATE	DUAL O. REG	QUAD	STH	STD	RESET COUNTER	UP/DOWN COUNTER	PLS RECEIVER	PLS DECODER	SCHMI. ADC	ANALOG MUX	256W. MEMORY	SAMPLING ADC + 256 W	C/STAR A	C/STAR C	A.C.C	AUTRES	REMARQUES	PRIORITÉ
K1	I.KS	GN/GG	1	4 PC + AMPLITUDE **	17*	—			1	1						1	2	1						* 16 SOS + 1 POUR SPÉCIALISTE, ADAPTER SYSTÈME ACTUEL À NOUVELLE INTERFACE; ** À L'ÉTUDE	1
	FORME IMP.***	GN.	6				1	3																*** FORME P3	P3
K2	EK, JK	GG/GN	7	MODE EJECTION START/STOP	8* + 7HF				2	7		7*	7		1									14 SOS + 1 POUR SPÉCIALISTE ADAPTER SYSTÈME ACTUEL À NOUVELLE INTERFACE * IDEM TSV3 VOIR A4	1
K3	ED	GG/GN	1		7*				1	1		1*				1	1	1						6 SOS + 1 POUR SPÉCIALISTE. ADAPTER SYSTÈME ACTUEL À NOUVELLE INTERFACE * IDEM TSV3 VOIR A4	1
K4	I.KF	GG/GN	4		4 HF							4												PRÉVOIR CEPENDANT CONTRÔLE MANUEL LOCAL EN ATTENDANT TRANSFERT SUR NORD UNE FOIS DÉCONNECTÉ DE L'IBM.	3
K5	DRIFT STABILIZER	GA/GN	7																						3
	Σ				32 + 11HF		1	3	4	9		12	7		1	2	3	2				*		* cf page 1	

CADENCEMENT / DIVERS

N°	EQUIPEMT	RESA	Nomb	P.P.M.	SOS	GFA	256 b INPUT GATE	DUAL O. REG	QUAD	STH	STD	PRESET COUNTER	UPDOWN COUNTER	PLS RECEIVER	PLS DECODER	SCAIL. ADC	ANALOG MUX	256W. MEMORY	SAMPLING ADC + 256 W	C/STAR A	C/STAR C	A.C.C	AUTRES	REMARQUES	PRIORITÉ
C1	CAD. GENERAL	GG *	1	oui 20 par	/	/						56*			4							(2)		* ENCORE A L'ETUDE, LE NOMBRE DE PC EST PROBABLEMENT TROP ÉLEVÉ, IL EST ENCORE TROP TÔT POUR LE DEFINIR	1
C2	MONITORING	GG	1	/																				SYSTEME DE SURVEILLENCE DU CADENCEMENT ACTUELLEMENT A L'ETUDE, L'OPERATION AIMERAIT MODIFIER P3	3
C3	A. TRAIN	GG		oui 1 par											1									SYSTEME A L'ETUDE	1
DIVERS																									
D1	ACQ. VIDE	[illegible] CCI	57 par	non			2									1	4						DAC (TEST)		1
	Cde Pompes	"	"	non					2		6												12 SCU (LINAC)		3
D2	ELAM STOPPER	J. ROBERT																						RESTE SUR PUPITRE MCR, ACQ cf D6	
D3	PASSOIRE	CC	1	oui			1* }	1							1									* EN REMPLACEMENT DU STAR	1
	R. ELAM STOP	CC	4																						
D4	STATION EAU DEMIN	P.B	1	/																				ETUDES A FAIRE	2
D5	CLIMAT.	P.B	1	/																					2
D6	SECURITE ELAM STOPPER + PORTES	J. ROBERT (FREEMAN)	1	/			5																	ACQUISITION DE BITS	1
D7	[illegible] SYST.	(BOSSER?)	1	/																					1
D8	GFA	CCI	60	oui	60																			RAPPEL POUR REMPLACEMENT [illegible]	1
	Σ				60		8	1	2		6	56			6	1	4							cf page 1	

INSTRUMENTATION. - 1

No	EQUIPEMT	RESA	Nomb	P.P.M.	SOS	GFA	256 b INPUT GATE	DUAL O. REG	QUAD	STH	STD	RESET COUNTER	UP/DOWN COUNTER	PLS RECEIVER	PLS DECODER	SCAL. ADC	ANALOG MUX	256W. MEMORY	SAMPLING ADC + 256 W	C/STAR A	C/STAR C	A.C.C	AUTRES	REMARQUES	PRIORITÉ
I1	I-TR	GG*	2	oui	8 HF	–										1	1					1		CALIBRATION A FAIRE PAR ACC.	2 / 1
I2	R.TR T.TR	BATT.	4 2		4 + 10 HF	– –						2				2	2	1				1		SYNCHRO TTR A PARTIR EK.	1 1
I3	I.U	GG	1	oui	24 HF	–										3	3	3							2 / [illegible]
I4	R U	GG	1	oui	4 HF	–	1	1				8*								1				*NOMBRE EN COURS DE DISCUSSION	1
I5	T. U	SCHULTE			42 HF*		1	1								1	3	1						* RESPONSABILITE BR	1
I6	W-U,L	GG	1		4*																			4 SIGNAUX DETECTES (BC SB)	3
I7	ECRANS	ROBERT P.B	21					3															3 INP/OUT R	MULTIPLEXAGE VIDEO SUR SOS	1
I8	CIBLES	C M.	16'	oui	2				4		16	32''			2									*MOUVEMENTS ; A L'ETUDE. + NOUVELLES CIBLES.	1
I9	[illegible] SOM.	TETU	1	–	1																			CONSOLE REUNIE SYST. LINAC	1
I10	MLS Q	GPB	1	oui		5						4			1							1	1 HPIB	4 CANAUX A L'ETUDE.	1
I11	CAL Q.	CM	1	oui								3				2	2	2						ACTUELLEMENT SUR T BMC	1
I12	LMIT 200 MHz	JPD	1	oui				1												3	1				1
I13	F.G.B.	HS	1	oui	1							2			1		1'				1'		5 SAD* 3 ATTENUAT.*	*EN OPERATION ACTUELLEMENT EN RODAGE SUR T.BMC	
	Σ				12 + 84 HF	5	2	6	4		16	51			4	9	12	7		4	2	3			

INSTRUMENTATION. 2

No	EQUIPEMt	RESA	Nomb	P.P.M.	SOS	GFA	256b INPUT GATE	DUAL O. REG	QUAD	STH	STD	PRESET COUNTER	UP/DOWN COUNTER	PLS RECEIVER	PLS DECODER	SCAN. ADC	ANALOG MUX	256W. MEMORY	SAMPLING ADC + 256W	C/STAR A	C/STAR C	A.C.C	AUTRES	REMARQUES	PRIORITÉ
114	EMIT. LONG	G.G.	1	oui			1	1				2	2										1 HPIB	A METTRE EN ŒUVRE SUR T.BMC	2
115	[illegible] BLM	CC																						DEPEND DE 116	
116	New BLM	[illegible]	160		104 + 14HF	–		1				1				1	7	1					HT DRIVER (LC 2132)		
117	[illegible]	JD	30		30							4				1	2	1						A ETUDIER COMPLETEMENT	2
Σ					134 + 14HF		1	2				7	2			2	9	2							
~ TOTAL ~																									
1	ALIM		365		328	8			81	276	31	19			3										
2	AIMANTS					–	4	4	1		3														
3	HF				88 128HF	13	2	5	6	19	4	28			3	1	1	1		1					
4	KICKERS		9		32 + 11HF	–	1	3	4	9		12	7		1	2	3	2							
5	CAD/DIVERS				60	–	8	1	2		6	56			6	1	4								
6	INSTRUM.				146 + 36HF	5	3	8	4		16	58	2		4	11	21	9		4	2	3			
	POOL GFA					32																			
					754 + 30 (784)	58	18	21	98	304	60	173	9		17	15	23	12		5	2	*	20	Le nombre d'ACC sera défini par ces au niveau Interface [illegible]	

Appendix 2
CERN/PS/BR 78-28

DRAFT PLANNING FOR SPECIFIC INTERFACE AND NEW / MODIFIED PSB EQUIPMENT . SHUT-DOWN '80: 1st 8 to 31st 10 29.9.78