PS/OP/Note 86-30
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10-July-86

Controls Layout for the Antiproton Collector

ITEMS : Stochastic Cooling Movements

Note: This document will help form part of the Controls layout 'bible' for the AC and has been put together from the information provided by the system specialists concerned and, in collaboration with G. Benincasa(CO) and S. Gustar(AA).

Please pass on your comments as soon as possible to V.Chohan/PS . tel:2719

STOCHASTIC COOLING SYSTEM MOVEMENTS

Preliminary details of this microprocessor-based system were given in PS/BT/note 85-5 by J.Boucheron & R. Maccaferri. A system of 12 pickup or kicker movements are required, leading to 12 controllable devices that need to be linked to the AA control system of Nord-100 and Camac. Each of these 12 movements would follow a given controllable function per device.

Control & Acquisition Parameters

Besides controlling the ON/OFF/RESET for each of the devices, a means to send a table of 450+1 values for each device is provided. These values are the time-domain points (spacing:5 msec ; total displacement 450 x 5 = 2250 msec) constituting the function that the device must follow. The table filling and sending would only be done as part of the initialisation and the microprocessor system follows this function autonomously till the next requirement for initialisation.

The hardware layout consists of a Quad Trans. driving a G64 crate Single Trans.(STE) used for device selection and code-attribute for type of action (control action) on registers A & B respectively and some Status bits on Register C. The time-domain function dispatch and readback would be done directly from Camac using dual Output Register(DOR) for sending values to hardware and a Borer 1031A IOR Register for readback.

For both output and input registers, the data format is word(0) for address (i.e., one time-domain function point out of 451) and word(1) for value(value at the addressed point). The value sent out is an 8 bit number between 0 and 255 indicating an angle which is translated into displacement by the local hardware. To maintain the simplicity, the Equip. Module would send this angular value without any conversion.

The handshake between DOR and the microprocessor system for data validation will be hardwired using the 4 strobe lines per word available on the DOR. The acceptance of a "correct" function will be indicated by a status bit in Reg. C of STE.

The movement control hardware permits upto 3 so called "modes" of usage and 3 bits are provided in Register A lower-byte for this. 2 additional bits associated with the "mode" chosen are also in the same register byte. The sychronous-mode is the most commonly used whereby the device responds to external timing trigger, follows the prescribed function and returns to starting position in 150 msec to wait for the next trigger. The mixed-mode is the case where the device responds to timing trigger but, at the end of the 2250 msecs, it stays at that position without returning to the starting position as in the synchronous-mode. The manual-mode implies that the device needs to be asked specifically to go to its final position as well as return to starting position. The 2 addditional bits are for the actions of going out to final position and returning to home position respectively. (fig. SC2)

Timing for synchronous operation will be provided via the standard GPPC module and this can be set according to the requirement and the machine mode of operation. Timing control will be via the standard TIM Equip. Module.

The Camac Crate Layout is shown in Fig. SC1 together with a GPPC module as an example. Fig. SC2 shows the STE registers contents in general.

Software Equipment Module(EM) : "SCMT" (Stochastic Cooling Movement)

Eq. No.	Device no.= value to put in upper byte Reg.A 0 <= v <=12	Name	Freq. Band
1	7	Pickup V UVM2907	1.65-2.40 GHz
2	10	" V UVM3207	1.00-1.65 GHz
3	12	" V UVM4307	2.40-3.00 GHz
4	1	Kicker V KVM0107	1.65-2.40 GHz
5	4	" V KVM0407	1.00-1.65 GHz
6	6	" V KVM1507	2.40-3.00 GHz
7	8	Pickup H UHM3007	1.65-2.40 GHz
8	9	" H UHM3107	1.00-1.65 GHz
9	11	" H UHM4207	2.40-3.00 GHz
10	2	Kicker H KHM0207	1.65-2.40 GHz
11	3	" H KHM0307	1.00-1.65 GHz
12	5	" H KHM1407	2.40-3.00 GHz
13	0	Master:Applies to all	

Device Selection & Use

Device Number is put in the upper-byte of Reg. A of STE via QT. Allowable values are 0 to 12.

The ON/OFF/RESET is set accordingly in the Lower-byte of Reg. A of STE with:

bit 0 =OFF in REG A LOWER BYTE
" 1 =ON "
" 2 =RESET "

The Code-attribute for ON/OFF/RESET actions is same as the Device number so that the Register B of STE must have the Device Number written into it at the same time.

The property used for ON/OFF is ONOF1
" " " " RESET " RSET

Mode Selection (example for device 1)

The property MODE choses the device mode-of-usage on Reg. A as follows:

```
>SE C=0; SE SCMT(1,MODE,0,C)=0 ; % sets  bit 4=1 & gives synchronous mode
>SE C=0; SE SCMT(1,MODE,0,C)=1 ; % sets  bit 5=1     "     mixed      "
>SE C=0; SE SCMT(1,MODE,0,C)=2 ; % sets  bit 6=1     "     manual     "
```

The property LDPOS can be used to permit the device to go out to final position (Reg.A bit7 =1) or to return to home position (Reg.A bit8 =1) i.e.,

```
>SE C=0; SE SCMT(1,LDPOS,0,C)=1 ; % GOTO FINAL POSITION OF FUNCTION
>SE C=0; SE SCMT(1,LDPOS,0,C)=0 ; % GOTO HOME POSITION OF FUNCTION
```

The property LDPOS can only be used if the device is in mixed or manual mode.

Acquisition of Status

Property STAQ : Acquires the full 16 bits of REG C including special status & intlk bits in upper byte.(e.g.,"correct" function accept)
Property ONOF1 : 1 =ON ; 0= OFF
" RSET : Acquires RESET bit ; 1=ON ; 0=OFF

Function Table Properties as applicable to one or more Devices

The Array access of the Equip. Module is ASCMT.

PR=SYMBOL(CCV) with an array A of 451+1 elements sends the table to hardware via DOR. The element no. j (1 <= j <= 451) is written in word(0) of DOR at the same time as value A(j) in word(1) of DOR.

PR=SYMBOL(AQN1) acquires the function values(451 points) stored in the memory of the local hardware via the I/O Register.

PR=SYMBOL(AQN2) acquires the physical position values(451 points) that the device achieved according to the prescribed function.

For both AQN1 and AQN2 , the appropriate Code-attributes for the type of action must be inserted in Register B of STE.

All three properties ensure correct handshake with local hardware via LAM checks on Data Validation.

Example: of "ON" and sending array of 451 values V to eq. no. 1 and acquiring the function back in array X and the actual function positions in array P .

```
> DIM-INT V(452); DIM-INT X(452); DIM-INT P(452); DIM-INT EQ(2); DIM-INT CC(2)
>
> SE V(1) =451; SE C=0; SE EQ(1)=1; SE EQ(2)=1
>
> SE SCMT(1,ONOF1,0,C)=1                    ;% DEVICE "ON"
> SE F=-1; ASCMT(V,F,EQ,SYMBOL(CCV),0,CC)   ;% SENDING FUNCTION TABLE
> SE F=+1; ASCMT(X,F,EQ,SYMBOL(AQN1),0,C)   ;% ACQUIRE    "          " FROM MEMORY
> SE F=+1; ASCMT(P,F,EQ,SYMBOL(AQN2),0,C)   ;%    "     ACTUAL POSITIONS REALISED
```

For Global commands applicable to several devices at the same time (e.g, all the Horizontal movement pickups & kickers) the EQ array could be appropriately defined with the correct Eq. nos. as contents.

INDEX TO FIGURES

Distribution:

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ACOL - CAMAC No. [redacted] Eq.R-RA-K-223

SYSTEM: Stochastic Cooling P-U Movement.

OWNER : R.Maccaferri. 3587, *3094 PS/BT 18/3-048

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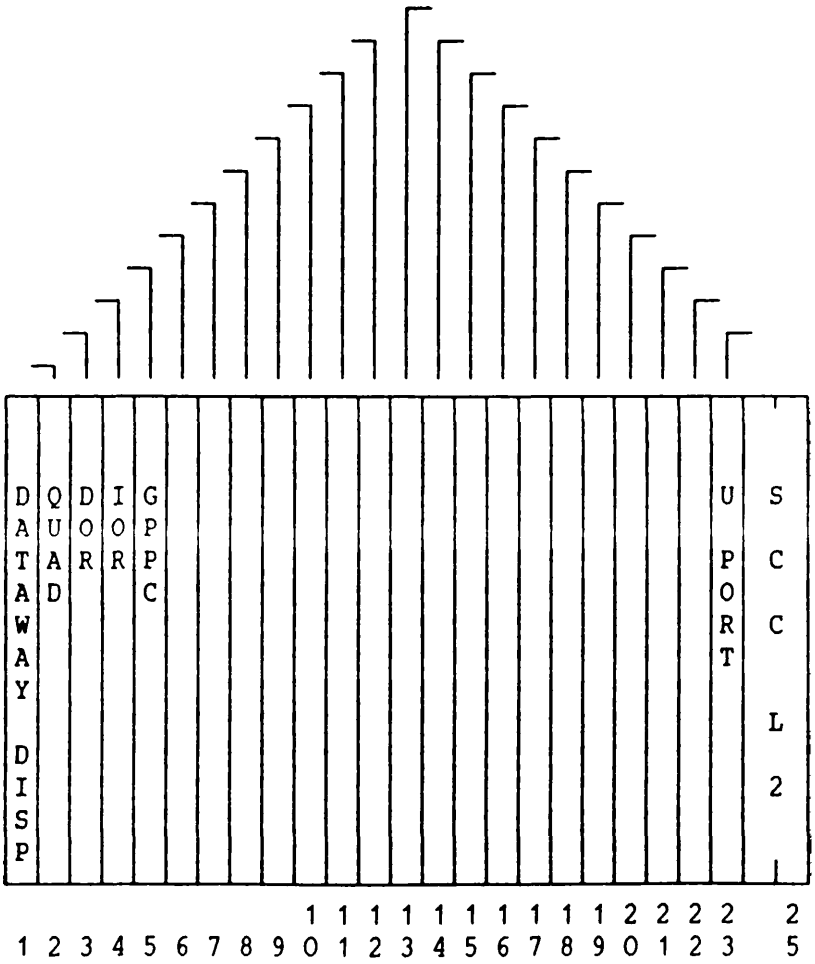

FIG. SC1

S-G. July 1986.

STOCHASTIC COOLING MOVEMENTS

SINGLE TRANSCEIVER EUROPE. **REGISTER ASSIGNATIONS.**

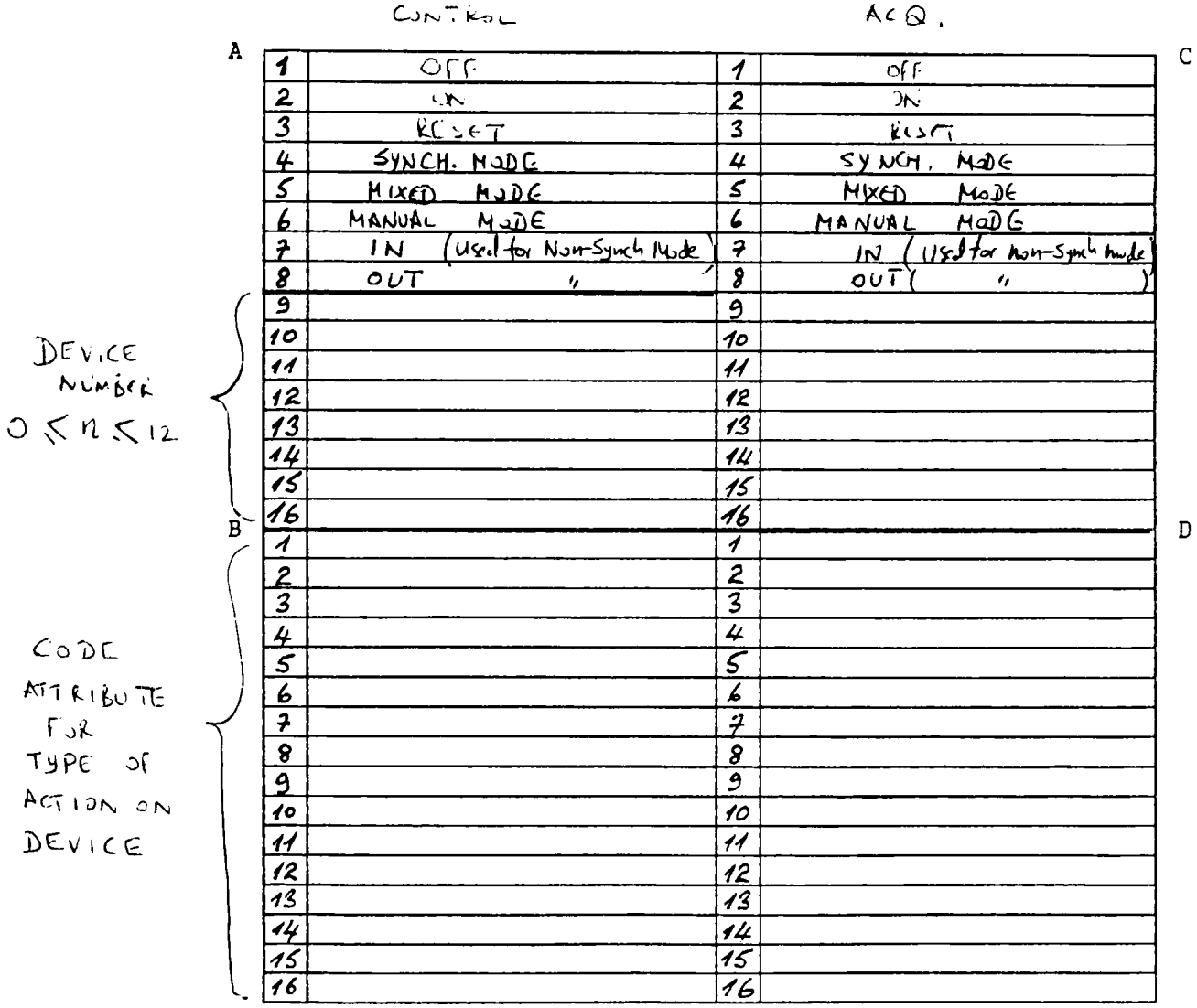

FIG. 5C2