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INTERFACE, TYPE 159

TECHNICAL SPECIFICATIONS

The interface (IF) controls the data transfer from a RMH read-out system[1] via a system encoder module[2] (SE), type 158, into CAMAC[3] In the basic system configuration[4] (Fig. 1) SE and IF are mounted together to form a triple width CAMAC plug-in module.

Read-out of data from the system can be started either via a start read-out command from CAMAC (see 3.1) or via an external signal (START, NIM level) accessible from the front panel. The NIM output signal (BUSY) indicates the status of the module and can be used for event blocking, etc. Binary coded data (Fig. 2) is received from SE via the internal output bus (IOB).

The transfer of data from the IF to CAMAC can be accomplished by means of single transfers as well as by use of one of several possible blocktransfer modes (see 4). After the last word has been transferred to CAMAC a NIM signal indicating the end of the data block (BE), on the front panel, will be active. This signal can be used to terminate the blocktransfer, or to interrupt the computer, etc. At the end of a normal read-out cycle a reset command (see 3.1) will be sent in order to reset the IF, the SE, and the data in the RMH-modules (RMH), types 4236[5] or 4248[6]. The reset command sets the BE and BUSY signal inactive, thus enabling the system to accept a new event.

Via the IF events can be re-read several times. This can be accomplished by sending a new start read-out command from CAMAC instead of the reset command as described above. It should be noted that the reset command must be sent before the system may accept a new event.

The IF can only be used in connection with a SE module.

1. INPUT

Internal Output Bus connection (IOB): 1x40 (2x20) headers (wrap pins): ECL signals (single ended driven, other end of pair statically on ground).

Connections: See Fig.3.

2. CONTROL (Front panel)

2.1 START input (start read-out): NIM signal, min. 50 nsec, internally terminated with 50 Ω.

2.2 BUSY output: NIM signal, true (- 0,8 V) if unit is busy; if used must be terminated with 50 Ω.

2.3 Block end output (BE): NIM signal, true (- 0,8 V) if no more data words in system; if used must be terminated with 50 Ω.

2.4 Select indicator (SEL): red, "ON" when addressed by CAMAC.

2.5 BUSY indicator: yellow, "ON" when busy.

3. CAMAC commands

3.1 List of commands:

FUNCTION	RESPONSE (Q)	DESCRIPTION
F(2)•A(0)	yes, if (BUSY•$\overline{BE}$)	read data
F(8)•A(0)	yes, if (BUSY•BE)	test block end (LAM)
F(9)•A(0)	yes	reset data & registers, BUSY & BE
F(25)•A(0)	yes	start read-out or start re-reading
Z•S2	no	initialise, ident. to F(9)•A(0)
C•S2	no	clear data register

$\overline{BUSY}$ = START + F(25)•A(0).....set BUSY
$\overline{BUSY}$ = Z•S2 + F(9)•A(0).....reset BUSY
BE = BUSY • EOR *.....set BE
$\overline{BE}$ = F(9)•A(0) + F(25)•A(0).....reset BE

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*) EOR.....end of read-out (signal from SE)

3.2 Sample program (shows program control operation):

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Z•S2                                  initialise CAMAC
event trigger
F(25)•A(0)                            start read-out
F(2)•A(0)                             read data word
          test   Q=1                  continue
                 Q=0                  check BE-LAM
F(8)•A(0)                             check BE-LAM
          test   Q=1                  end of event
                 Q=0                  try to read data word
end of event
F(9)•A(0)                             reset data & registers
go to new event trigger
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4. BLOCK TRANSFER MODES

4.1 UQC (repeat) mode: see refs. 7, 11, 12.

The command F(2)•A(0) must be used to read-out data. The end of a data block is indicated by the BE signal.

Nord-10 computer systems: The VIP input could be used to terminate the block transfer. See ref. 8.

HP-2000 series computer systems with the Borer branch driver (ref.9): The external BE input to the branch driver should be used: use of the UQL mode is better (see 4.2).

CAVIAR systems (see ref.10): This mode is not applicable.

4.2 UQL (pause) mode: see ref. 11, 12.

The command F(2).A(0) must be used to read-out data. The end of a data block is indicated by the positive response (Q=1) to the F(8).A(0) command which tests the block end LAM (block end look-at-me). This mode is implemented by hardware in the Borer branch driver. Note that there is no LAM signal available at the dataway connector (see 5).

This mode is not applicable to the Nord-10 computer systems and CAVIAR systems used at CERN.

4.3 UCS (stop) mode: see refs. 7, 11, 12.

This mode uses also the command F(2)•A(0) to read-out data. Contrary to the above mentioned block transfer modes (UQC, UQL) this mode tests the response (Q) and terminates the data block by absence of a positive response (Q=0).

Note that the UCS mode is not generally applicable** and that it should only be used for small RMH read-out systems up to 4.000 channels.. Nevertheless it is a very convenient method for testing and it is supported by many CAMAC-computer interfaces (f.ex.: CAVIAR systems).

5. DATAWAY CONNECTIONS

See ref. 3 for connections (Table II, p. 15; contact allocation at a normal station).

6. MECHANICS

Single width CAMAC module; in basic configuration with the SE combined to a triple width module. For use in other system configurations see refs. 1 and 4.

7. POWER SUPPLY

+ 6 V / 1,2 Amps, - 6 V / 0,6 Amps.

**) Note: In large RMH read-out systems (>4.000 channels) interfaced into CAMAC systems with a cycle time of 1 μsec/command it cannot be guaranteed that the SE supplies data for every CAMAC cycle even with the average data transfer time of <400 nsec/word from the RMH system.

REFERENCES

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10. S. Cittolin and B.G. Taylor, CAVIAR user manual, CERN, DD Division, DD/OC/GA/80-2, Version 1.6 (1980).

11. Block transfers in CAMAC systems, Supplement to the basic CAMAC specifications, ESONE-NIM Comittees(EUR 4100e suppl.), "Ad interim" copy, CERN (1976).

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LIST OF ABBREVIATIONS

BI	Branch input
BO	Branch output
BR	Branch receiver (module)
BT	Branch terminator (plug)
B0	Bit 0
B4	Bit 4
CE	Crate encoder (module)
CL.1	Clock 1 (internal)
CI	Chamber interface (module)
C0	Crate Address bit 0
DF	Device flag (handshake signal, response)
DO	Data output
ECL	Emitter coupled logic
ED	External device
EI	Enable input ("daisy" chain signal)
EIF	Enable input "first" (signal to "first" crate encoder)
ENC	Encode (handshake signal; request)
ENCSE	Encode from system encoder
ENFS	Enable fast strobe
EO	Enable output ("daisy" chain signal)
EOR	End of read-out (end of record)
ERR	Error
F	Flag bit
FF	Flip-flop (bistable)
FO	Fan out (module)
IF	Interface (module)
IIB	Internal input bus
IOB	Internal output bus
IRR	Initialise re-read
LC	Level converter (module)
LH	Lower half (of data pattern)
LSB	Least significant bit
MOR	Memory OR
MSB	Most significant bit
OP	Operational
PAR	Parallel
p.c.b.	Printed circuit board (p.c. board)
RD	Read
RMH	Receiver & memory on hybrid
RT	Reset
SE	System encoder (module)
SR	Start read system encoder (module)
S0	Station address bit 0
UH	Upper half (of data pattern)
WCI	Wire chamber interface (module)
W0	Wire number 0 (uncoded)

Signal		Return
ENC	1	Return (GND)
SR	2	" "
EOR	3	RT
DF	4	
B0	5	
B1	6	
B2	7	
B3	8	
B4	9	
B5	10	
B6	11	Return (GND)
B7	12	
B8	13	
B9	14	
B10	15	
B11	16	
B12	17	
B13	18	
B14	19	PAR
B15	20	Return (GND)

Fig. 3

Internal Output Bus Connections (IOB)
viewed from solder side