EDOC302

EUROBALL DATA ACQUISITION SYSTEM

Group and Item Number Allocation

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This document defines the allocation of group and item numbers used by the Euroball VXI electronics. For a description of the raw data format which uses these numbers see the document ***EDOC300***.

Group number allocation for Euroball

The allocation of groups for Euroball is an extension of that used for Eurogam.

detector type	group numbers
ReadOut Controllers (STR 8080)	248 - 255
MasterTrigger	247
Tapered (Eurogam I)	51 - 80
Clover (Eurogam II)	21 - 50
Cluster (Euroball III)	1 - 20

Note - Eurogam uses group 255 (only) for all readout controllers and for the master trigger module.
The group number space between 100 and 240 is available for use by readout systems for ancillary detectors within Euroball.

Item number allocation for the Euroball Master Trigger VXI card

The Master Trigger card generates a number of data items.

data item	item number
Event type	0
Raw Ge Sumbus	1
Clean Ge Sumbus	2
BGO Sumbus	3
User Sumbus	4
Timing (TAC)	5

Item number allocation for the Euroball Ge/BGO VXI cards

The Ge card provides 6 electronics channels each of which instrument one Euroball Ge tapered detector. Each channel has 4 ADCs.

ADC	item number
20Mev	0
4Mev	1
Timing (FT)	2
Timing (CO)	3

The BGO card provides 6 electronics channels each of which instrument one BGO shield for a Euroball Ge tapered detector. Each channel has 3 ADCs.

ADC	item number
total energy (Energy)	4
timing (TAC)	5
hit pattern (Pattern)	6

Item number allocation for the Euroball Clover VXI card

The Clover card instruments the 4 element Euroball Ge Clover detector and its associated BGO shield. For the purposes of this note the Ge elements will be labelled as Ge-element# which takes the values 1 => 4. Each element has 4 ADCs which will be labelled as adc# which takes the values 0 => 3.

ADC	adc#
20Mev	0
4Mev	1
Timing (FT)	2
Timing (CO)	3

The item number is given by **(Ge-element# - 1) * 4 + adc# + 8**
which has the values 8 => 20.

The Euroball data acquisition control system identifies the elements as GeA to GeD where A is element number 1 and D is element number 4. Thus

GeA.20Mev	is item	8	
GeA.4Mev	is item	9	through to
GeD.CO	which is item	23	

The Ge electronics includes one spare element which can be switched in to replace any one of the normal 4 elements in the event of a failure. This spare element will be assigned the item numbers allocated to the element it has replaced.

The Clover BGO electronics instruments the Clover detector BGO shield and provides 3 sum data items.

data item	item number
total energy (Energy)	4
timing (TAC)	5
hit pattern (Pattern)	6

Item number allocation for the Euroball Cluster VXI cards

The Cluster Ge card instruments the 7 element Euroball Ge Cluster detector. For the purposes of this note the elements will be labelled as Ge-element# which takes the values 1 => 7. Each element has 3 ADCs which will be labelled as adc# which takes the values 0 => 2.

ADC	adc#
20Mev	0
4Mev	1
Timing (FT)	2

The item number is given by **(Ge-element# - 1) * 3 + adc#** which has the values 0 => 20.

The Euroball data acquisition control system identifies the elements as GeA to GeG where A is element number 1 and G is element number 7. Thus

GeA.20Mev	is item	0	
GeA.4Mev	is item	1	through to
GeG.FT	which is item	20	

The Cluster BGO card instruments the 18 element Euroball BGO shield and back-catcher. For the purposes of this note the elements will be labelled as BGO-element# which takes the values 1 => 18. Each element has 2 ADCs which will be labelled as adc# which takes the values 0 => 1. Additionally the BGO electronics provides 3 sum data items.

data item		item number
sum	(BGOSum.Energy)	21
sum	(BGOSum.TAC)	22
hit pattern	(BGOPattern.High)	23
hit pattern	(BGOPattern.Low)	24

and

ADC	adc#
Energy	0
Timing (TAC)	1

The item number is given by **(BGO-element# - 1) * 2 + adc# + 25**
which has the values 25 => 60.

The Euroball data acquisition control system identifies the elements as BGOA to BGOR where A is element number 1 and R is element number 18. Thus

BGOA.Energy	is item	25	
BGOA.TAC	is item	26	through to
BGOR.TAC	which is item	60	

Both the Ge and BGO electronics include one spare element which can be switched in to replace any one of the normal 7 or 18 elements in the event of a failure. This spare element will be assigned the item numbers allocated to the element it has replaced.

Item number allocation for the GIR

item	item #
error report	63
event number (EvNum)	62 (61 - see note)

All VXI cards which use the GIR for VXI interfacing have a number of common data item generated within the GIR.
The **error report** item is used by the GIR to report various internally detected errors. The error cause is reported as a code in the data part of the 32 bit data word.
The **event number** item is the reconstructed event number generated by the GIR using the algorithm defined in the document ***EDOC301***.

Note - In the case of the Cluster electronics which is in fact 2 VXI cards the Ge card GIR is allocated item number 62 and the BGO card GIR is allocated item number 61.

Group and Item allocation for the ReadOut Controllers (VRE)

The ReadOut Controllers use groups 248 - 255. Each group corresponds to a physical DT32 readout bus and can accomodate 15 ReadOut Controllers. For VRE module **n** (i.e. VRE**n**) the group number used is given by **248 + (n/16)**. Hence the first DT32 bus (with **n=0**) has VRE modules VRE1 => VRE15; and the second DT32 bus (with **n=1**) has VRE modules VRE17 => VRE31 etc.

For a specific DT32 bus each VRE has a number **i** given by **n modulo 16** or **n - ((n/16) * 16)**. The first VRE on the DT32 bus has **i=1** and the last has **i=15**. If there is only one VRE on the DT32 bus then it has **i=15**. For further details see the document ***EDOC300***.

The use of item numbers by the ReadOut Controllers is thus

data item	**item number**	**item number range**
start sub event token	i	1-15
event number LSW	i+16	17-31
event number MSW	i+32	33-47
end sub event token	i+48	49-63

No VRE uses the value **i=0** and hence the items 0,16,32 & 48 are not allocated.