

U40VE

Current spill statistics contained in every event
Now is saved into BmnEventHeader

MSC16V Total spill statistics at the end of the spill.
Contained in fictive event after last event of the spill
May be saved into:

- previous event - technically clumsy
- next event - may not exist in the run
- different tree (tree of spills (alongside with the tree of events))
- just write summary to the DigiRunHeader

U40VE_RC RAW Data Format

Data Types

Data types	
2	TAI timestamp
3	Trigword

Normal spill data

TAI Timecode

Timecode in TAI (International Atomic Time) scale is received by White Rabbit interface.

2 - TAI Timestamp																															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
2		TAI ns [27:0]																													
2		TAI seconds [23:0]																									TAI flags [29:28]		TAI ns [29:28]		
2		0										TAI seconds [39:24]																			

TAI flags: 2 - timecode is valid, otherwise invalid.

3 - Trigword																															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
3			0			trig source[7:0]										LVDS_IN [15:0]															

trig source[7] - internal periodical

trig source[6] - internal random

trig source[5-1] - 0

trig source[0] - external

4 - AUX Counters																															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
4				Trig candidates [27:0]																											
4				Trig accepted [27:0]																											
4				Before rejected [27:0]																											
4				After rejected [27:0]																											
4				Trig reject counter [27:0]																											
4				Beam trig all counter [27:0]																											
4				Beam trig available counter [27:0]																											

MSC16V RAW Data Format (for End Of Spill)

End of spill data

5 - spill hit counters																															
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
5					28-bit counter, ch #0																										
5					28-bit counter, ch #1																										
...																															
5					28-bit counter, ch #15																										

U40VE Legend

Trig candidates

- trigger candidates(without before/after protection)

Trig accepted - DAQ triggers which passed before/after protection

Before rejected - number of triggers rejected by before protection

After rejected - number of triggers rejected by after protection

Trig reject counter - unused

Beam trig all counter - all available triggers from T0 unit

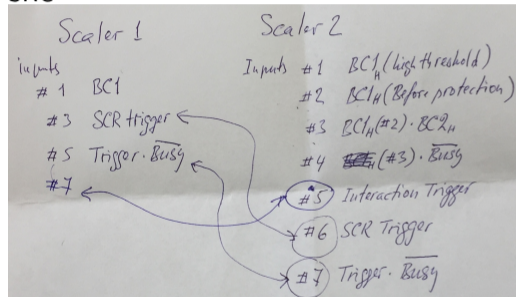
Beam trig available counter - same as prev. AND DAQ NOT BUSY

BM@N

1.2 MSC16VE, Slot 7 - ETH, Slot #10 - VME

ETH Ch#	VME Ch# in Data	Description
1	0	BC1
2	2	BC2
3	4	BC3
4	6	Beam Trigger (BT)
5	8	L0 Trigger
6	10	Trigger Protection
n/a	12	BT & Busy

SRC



DAQ Raw Data

```

7667 events in the spill
MSC16: BC1 97604, BC2 49584, BC3 7668, BeamTrigger 46937, L0 13170, TrigProtection 98491, BT&Busy 36828
U40VE: cand 13168, acc 7667, before 2166, after 365, rjct 96974, all 40419, avail 31950
100 events in the spill
MSC16: BC1 0, BC2 0, BC3 101, BeamTrigger 0, L0 100, TrigProtection 0, BT&Busy 0
U40VE: cand 100, acc 100, before 0, after 0, rjct 0, all 0, avail 0
7776 events in the spill
MSC16: BC1 99579, BC2 50042, BC3 7777, BeamTrigger 47275, L0 13132, TrigProtection 100605, BT&Busy 37175
U40VE: cand 13132, acc 7776, before 2139, after 365, rjct 98980, all 40604, avail 32191

```

Sergeev's log

```

/*
Data format since 15.03.2018
=====
Date      Time
n_BC1    gate flag  BC1 count  BC2      VC
BC3      BEAM TRIGGER L0         BD_Mult  Si_Mult
Trigger  DAQ_Trigger  L0 div N   DAQBusy  MinBias
NoInteraction BT_nBusy    BP_Rejected AP_Rejected Spill nbr
*/
04.04.2018 17:30:05 98122 0 97190 49581 23537 0 46948 46901 29948 50005 13169 13169 46901 7668 46948 0 37101 0 20824 67141089
04.04.2018 17:30:19 0 0 0 0 0 0 0 0 3 15641 100 100 0 101 0 0 0 0 0 67141090
04.04.2018 17:30:33 100120 0 99192 50032 24198 0 47286 47231 30546 50595 13132 13132 47231 7777 47286 0 37440 0 21110 67141091

```

DAQ Raw Data

```

7149 events in the spill
MSC16: BC1 188680,      BC2 109994,      BC3 0, BeamTrigger 81543,  L0 81474, TrigProtection 178668, BT&Busy 72286
U40VE: cand 294875,    acc 7149,      before 2179,      after 661,  rjct 177174, all 30343177, avail 268435455
7065 events in the spill
MSC16: BC1 186046,      BC2 107168,      BC3 0, BeamTrigger 79718,  L0 79649, TrigProtection 175994, BT&Busy 70740
U40VE: cand 290078,    acc 7065,      before 2182,      after 639,  rjct 174286, all 72286217, avail 268435455
5928 events in the spill
MSC16: BC1 145544,      BC2 83483,       BC3 0, BeamTrigger 62358,  L0 62332, TrigProtection 137846, BT&Busy 55624
U40VE: cand 229166,    acc 5928,      before 1427,      after 469,  rjct 136537, all 180289545, avail 268435455
5508 events in the spill

```

Sergeev's log

```

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=====
Date      Time
          n_BC1      gate flag  BC1 count  BC2        VC
          BC3        BEAM TRIGGER L0         BD_Mult    Si_Mult
          Trigger    DAQ_Trigger L0 div N   DAQBusy    MinBias
          NoInteraction BT_nBusy    BP_Rejected AP_Rejected Spill nbr
*/
29.03.2018 0:09:53 231666 1 180174 109805 66305 0 81557 81481 116855 93815 11302 11302 81481 7150 81557 0 72509 0 23064 67140655
29.03.2018 0:10:07 254199 1 177371 107012 65412 0 79731 79655 114915 92356 11114 11114 79655 7066 79735 0 70963 0 22718 67140656
29.03.2018 0:10:21 178501 1 138795 83381 51480 0 62372 62334 90099 77859 8783 8783 62334 5929 62372 0 55788 0 16764 67140657

```

DAQ Raw Data

```

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```

Sergeev's Log	DAQ MSC16	DAQ U40VE
$Trigger \approx DAQ_trigger$	L0	Candidates
$BT \approx L0$	BT	
$BT \wedge Busy$	$BT \wedge Busy$	
DAQ Busy	BC3 (on Krypton runs) ??	Accepted

DAQ Raw Data

```

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Sergeev's log

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```

$$\frac{BT \wedge \overline{Busy}}{BT} \approx \frac{Accepted_{[U40]} + Before_{[U40]} + After_{[U40]}}{Candidates_{[U40]}} \approx \frac{Available_{[U40]}}{All_{[U40]}}. \quad (1)$$

Where to Store Spill counters?

DATA

Event 5

Event 6

Event 6

Event 0 FVME 0x076D05A

Event 0 FVME 0x076D389



Event 0 FVME 0x07654F3

Event 7

Event 8

Raw Tree of Events

Event 5 U40 counters

Event 6 U40 counters

Event 6 U40 counters

Event 7 U40 counters

Event 8 U40 counters

Digi Tree of Spills

MSC16 from 0x076D3892