Bits to 32-bit Scalers - 2015, 200 GeV

Six 32-bit boards will be online for run-14; board 1 will serve local-polarimetry with the ZDC-SMD, and boards 2 and 3 will count hits in BBC individual tiles. Boards 4 and 5 will serve relative luminosity measurements. The bit-mapping may be found at the trigger subsystem page, http://www.star.bnl.gov/public/trg/, under Run2015 as the ScalerRouterMap link.

The 7-bit bunch-crossing counter will occupy inputs/bits 25-31 in each 32-bit board:

```
BX202IN          0            SCA2BDXHI     1
BX202IN          1            SCA2BDXHI     2
BX202IN          2            SCA2BDXHI     3
BX202IN          3            SCA2BDXHI     4
BX202IN          4            SCA2BDXHI     5
BX202IN          5            SCA2BDXHI     6
BX202IN          6            SCA2BDXHI     7
```

Local polarimetry board 1 is mapped as follows:

```
QTSMDIN          0            SCA2BD1LO     0   ) Horizontal SMD strips ZDC-W
QTSMDIN          1            SCA2BD1LO     1   ) .
QTSMDIN          2            SCA2BD1LO     2   ) .
QTSMDIN          3            SCA2BD1LO     3   ) Vertical SMD strips ZDC-W
QTSMDIN          4            SCA2BD1LO     4   ) .
QTSMDIN          5            SCA2BD1LO     5   ) .
ZD101IN          3            SCA2BD1LO     6   ) Truncated ADC-sum ZDC-W
ZD101IN          4            SCA2BD1LO     7   ) .
ZD101IN          5            SCA2BD1LO     8   ) .
ZD101IN          14           SCA2BD1LO     9   ) Front ADC ZDC-W > th0
ZD101IN          15           SCA2BD1LO     10  ) Back ADC ZDC-W > th0
ZD101IN          7            SCA2BD1LO     11  ) Good TAC ZDC-W
QTSMDIN          6            SCA2BD1LO     12  ) Same as above for ZDC-East
QTSMDIN          7            SCA2BD1LO     13  ) .
QTSMDIN          8            SCA2BD1LO     14  ) .
QTSMDIN          9            SCA2BD1LO     15  ) .
QTSMDIN          10           SCA2BD1LO     16
QTSMDIN          11           SCA2BD1LO     17
ZD101IN          0            SCA2BD1LO     18
ZD101IN          1            SCA2BD1LO     19
ZD101IN          2            SCA2BD1LO     20
ZD101IN          12           SCA2BD1LO     21
ZD101IN          13           SCA2BD1LO     22
ZD101IN          6            SCA2BD1LO     23  ) .
```

BBC board 2 will count (primarily) hits in the individual tiles of the East BBC as follows:

```
BBCEIN       0          SCA2BD2LO     0   ) PMT 1, tile 1 (top)
BBCEIN       1          SCA2BD2LO     1   ) PMT 7, tile 7 and 9
BBCEIN       2          SCA2BD2LO     2   ) PMT 8, tile 8
```

```
BBCEIN      3          SCA2BD2LO     3    ) PMT 2, tile 2
BBCEIN      4          SCA2BD2LO     4    ) PMT 3, tile 3
BBCEIN      5          SCA2BD2LO     5    ) PMT 9, tile 10
BBCEIN      6          SCA2BD2LO     6    ) PMT 10, tile 11
BBCEIN      7          SCA2BD2LO     7    ) PMT 11, tile 12
BBCEIN      8          SCA2BD2LO     8    ) PMT 4, tile 4 (bottom)
BBCEIN      9          SCA2BD2LO     9    ) PMT 12, tile 13 and 15
BBCEIN      10         SCA2BD2LO     10   ) PMT 13, tile 14
BBCEIN      11         SCA2BD2LO     11   ) PMT 5, tile 5
BBCEIN      12         SCA2BD2LO     12   ) PMT 6, tile 6
BBCEIN      13         SCA2BD2LO     13   ) PMT 14, tile 16
BBCEIN      14         SCA2BD2LO     14   ) PMT 15, tile 17
BBCEIN      15         SCA2BD2LO     15   ) PMT 16, tile 18
BBCWIN      0          SCA2BD2LO     16   ) 6 inner West small tiles
BBCWIN      3          SCA2BD2LO     17   ) .       as defined below
BBCWIN      4          SCA2BD2LO     18   ) .
BBCWIN      8          SCA2BD2LO     19   ) .
BBCWIN      11         SCA2BD2LO     20   ) .
BBCWIN      12         SCA2BD2LO     21   ) .
BB101IN     14         SCA2BD2LO     22   ) BBC East hit
BB101IN     15         SCA2BD2LO     23   ) BBC West hit
VT201IN     0          SCA2BD2HI     0    ) BBC East & West in TAC
```

where six of the ‘free’ bits have been used to count hits in the six innermost small tiles of the West BBC so as to allow various combinations of 1-arm and 2-arm luminosity measurements. The remaining inputs count BBC East and West, and the (needed) VT201/0 coincidence.

BBC board 3 will count (primarily) hits in the individual tiles of the West BBC as follows:

```
BBCWIN      0          SCA2BD3LO     0    ) As above for BBC West
BBCWIN      1          SCA2BD3LO     1    ) .
BBCWIN      2          SCA2BD3LO     2    ) .
BBCWIN      3          SCA2BD3LO     3
BBCWIN      4          SCA2BD3LO     4
BBCWIN      5          SCA2BD3LO     5
BBCWIN      6          SCA2BD3LO     6
BBCWIN      7          SCA2BD3LO     7
BBCWIN      8          SCA2BD3LO     8
BBCWIN      9          SCA2BD3LO     9
BBCWIN      10         SCA2BD3LO     10
BBCWIN      11         SCA2BD3LO     11
BBCWIN      12         SCA2BD3LO     12
BBCWIN      13         SCA2BD3LO     13
BBCWIN      14         SCA2BD3LO     14
BBCWIN      15         SCA2BD3LO     15   ) .
BBCEIN      2          SCA2BD3LO     16   ) 6 selected outer East small tiles
BBCEIN      5          SCA2BD3LO     17   )            LR and TB symmetric,
BBCEIN      7          SCA2BD3LO     18   )            as defined above
BBCEIN      10         SCA2BD3LO     19   ) .
BBCEIN      13         SCA2BD3LO     20   ) .
```

```
BBCEIN      15          SCA2BD3LO     21   ) .
BB101IN     14          SCA2BD3LO     22   ) BBC East hit
BB101IN     15          SCA2BD3LO     23   ) BBC West hit
VT201IN     0           SCA2BD3HI     0    ) BBC East & West in TAC
```

which thus allow further combinations of 1-arm and 2-arm luminosity measurements. The remaining inputs count BBC East and West, and the (needed) VT201/0 coincidence.

Board 4 will serve luminosity measurements:

```
BB101IN     14          SCA2BD4LO     0    ) ADC-sum BBC East > th0
BB101IN     15          SCA2BD4LO     1    ) ADC-sum BBC West > th0
BB102IN     14          SCA2BD4LO     2    ) hit in large tiles BBC East
BB102IN     15          SCA2BD4LO     3    ) hit in large tiles BBC West
VP101IN     14          SCA2BD4LO     4    ) ADC-sum VPD East > th0
VP101IN     15          SCA2BD4LO     5    ) ADC-sum VPD West > th0
ZD101IN     12          SCA2BD4LO     6    ) ADC-sum Front ZDC East > th0
ZD101IN     14          SCA2BD4LO     7    ) ADC-sum Front ZDC West > th0
ZD101IN     13          SCA2BD4LO     8    ) ADC-sum Back ZDC East > th0
ZD101IN     15          SCA2BD4LO     9    ) ADC-sum Back ZDC West > th0
ZD101IN     10          SCA2BD4LO     10   ) ADC-sum ZDC East > th0
ZD101IN     11          SCA2BD4LO     11   ) ADC-sum ZDC West > th0
VT201IN     6           SCA2BD4LO     12   ) ZDC East & West in TAC
VT201IN     0           SCA2BD4LO     13   ) BBC East & West in TAC
VT201IN     11          SCA2BD4LO     14   ) VPD East & West in TAC
VT201IN     0           SCA2BD4LO     16   ) BBC East & West in TAC
VT201IN     0           SCA2BD4LO     17   ) .
VT201IN     0           SCA2BD4LO     18   ) .
VT201IN     0           SCA2BD4LO     19   ) .
VT201IN     0           SCA2BD4LO     20   ) .
VT201IN     0           SCA2BD4LO     21   ) .
VT201IN     0           SCA2BD4LO     22   ) .
VT201IN     0           SCA2BD4LO     23   ) .
VT201IN     0           SCA2BD4HI     0    ) BBC East & West in TAC
```

where the duplicative VT201/0 inputs will be updated with inputs counting detector live.

Board 5 will serve luminosity measurements:

```
BBCWIN      5           SCA2BD5LO     0    ) BBC West PMT 9, tile 10
BBCWIN      7           SCA2BD5LO     1    ) BBC West PMT 11, tile 12
BBCWIN      13          SCA2BD5LO     2    ) BBC West PMT 14, tile 16
BBCWIN      15          SCA2BD5LO     3    ) BBC West PMT 16, tile 18
BBCEIN      5           SCA2BD5LO     4    ) As immediately above for BBC East
BBCEIN      7           SCA2BD5LO     5    ) .
BBCEIN      13          SCA2BD5LO     6    ) .
BBCEIN      15          SCA2BD5LO     7    ) .
VPDWIN      0           SCA2BD5LO     8    ) VPD West PMT 1
VPDWIN      3           SCA2BD5LO     9    ) VPD West PMT 4
```

```
VPDWIN      4          SCA2BD5LO     10   ) VPD West PMT 7
VPDWIN      14         SCA2BD5LO     11   ) VPD West PMT 10
VPDEIN      0          SCA2BD5LO     12   ) As immediately above for VPD East
VPDEIN      3          SCA2BD5LO     13   ) .
VPDEIN      4          SCA2BD5LO     14   ) .
VPDEIN      14         SCA2BD5LO     15   ) .
ZD101IN     12         SCA2BD5LO     16   ) ZDC-sum Front ZDC East > th0
ZD101IN     14         SCA2BD5LO     17   ) ZDC-sum Front ZDC West > th0
ZD101IN     13         SCA2BD5LO     18   ) ZDC-sum Back ZDC East > th0
ZD101IN     15         SCA2BD5LO     19   ) ZDC-sum Back ZDC West > th0
VT201IN     0          SCA2BD5LO     20   ) BBC East & West in TAC
VT201IN     0          SCA2BD5LO     21   ) .
VT201IN     0          SCA2BD5LO     22   ) .
VT201IN     0          SCA2BD5LO     23   ) .
VT201IN     0          SCA2BD5HI     0    ) BBC East & West in TAC
```

where the duplicative VT201/0 inputs will be updated with inputs counting detector live. This board thus allows 1-arm and 2-arm luminosity measurements with the BBC and VPD. The BBC tiles are purposely chosen so as to allow direct cross-comparison with board 3.