H1-Tracking Note #26
D.P.C.Sankey
January 4th 1991
Revised April 21st 1992
Revised April 20th 1994

Format of the Raw Data Banks for the Radial Drift Chambers

FRRE bank

The contents and meaning of the various parts of the FRRE bank are described. The bank structure is tabular, sorted by 'off-line channel number'. There is no difference between the on-line and the Monte Carlo versions.

The description in the DDL is:

```
 !       BANKname BANKtype       !Comments
 !
  TABLE  FRRE     B16            ! Forward_Response_Radial_Event bank
                                 ! (digitisations)
 !   ATTributes:
 !   -----------
 !COL ATT-name FMT Min    Max    !Comments
 !
   1  CELLNUM  I   0      863    ! Cell Number
   2  DRIFT    I   0     +INF    ! Drift time/length (0.2 ns)
   3  QPLUS    I   0     +INF    ! charge at + wire end (eV)
   4  QMINUS   I   0     +INF    ! charge at - wire end (eV)
                                 ! Q+ + Q- = integral (dE/dx)*dx
                                 !           over path in cell
   5  IFLAG1   I                 ! FADC pulse information (MC = 0)
   6  IFLAG2   I                 ! FADC pulse information
*
  END TABLE
```

Note that in the H1SIM detector simulation the drift time is calculated assuming a default drift velocity of 50 μm/nS; in real data the drift velocity may vary between 30 μm/nS and 50 μm/nS and the single time is calculated by averaging the times from each end of the read-out (eqn 1).

$$T = \frac{1}{(Q_+ + Q_-)} (Q_+ . T_+ + Q_- . T_-) \qquad [1]$$

The pulse integrals are given in eV; this is within an order of magnitude of the on-line bank where the integrals are given in FADC counts. These differences will in any case be taken out by proper reference to the pertinent calibration data in any reconstruction.

Flags

The long word of 'flag' data, IFLAG1 and IFLAG2, contains information from the pulse shape analysis, which may be used to enhance the multi-hit analysis. This information is also present where appropriate for simulated data.

IFLAG1 *Currently set to zero in simulated data.*

Bits 0-4 ΔI charge integration interval in FADC bins;

Bits 5-7 `IHIT` (index–1) of hit within the cluster;

Bits 8-15 ΔT signed difference between the drift times measured at each end of the wire, in units of 200 pS. In the worst case scenario where the charge division measurement is very poor this may be used to identify which of the two cells actually contained the hit.

IFLAG2 *Currently specified in simulated data. Note changes to low byte.*

Bits 0-3 `MAXR` most significant nibble of maximum non-linear data sample;

Bits 4-7 `SEPL` separation in FADC bins from preceding digitisation on the wire;

Bits 8-11 `LHIT` length of the leading edge of the hit in FADC bins. This is nominally 2 or 3. Greater than this suggests unresolved structure, such as overlapping hits;

Bits 12-14 `NHIT` (number–1) of resolved hits in the original QT block (cluster). For an isolated pulse this is obviously 0! The maximum number of hits allowed in the on-line QT algorithm is presently 8;

Bit 15 `RAW` flag which is set to 1 when the raw data for the parent QT block has been kept in the `FRRD` bank.

For IFLAG2 these numbers are positive with a maximum value of 15. The first digitisation in a cluster has SEPL set to 15, the last digitisation has SEPR set to 15. With this ordering one can quickly determine whether the hit is problematic by testing whether IFLAG2 is greater than 1023, corresponding to NHIT = 1, LHIT = 3, SEPL = 15, MAXR = 15. An example from previous test beam data is given below. Care must however be taken when referencing the bank as Integer*2, in order to avoid falling foul of the sign bit.

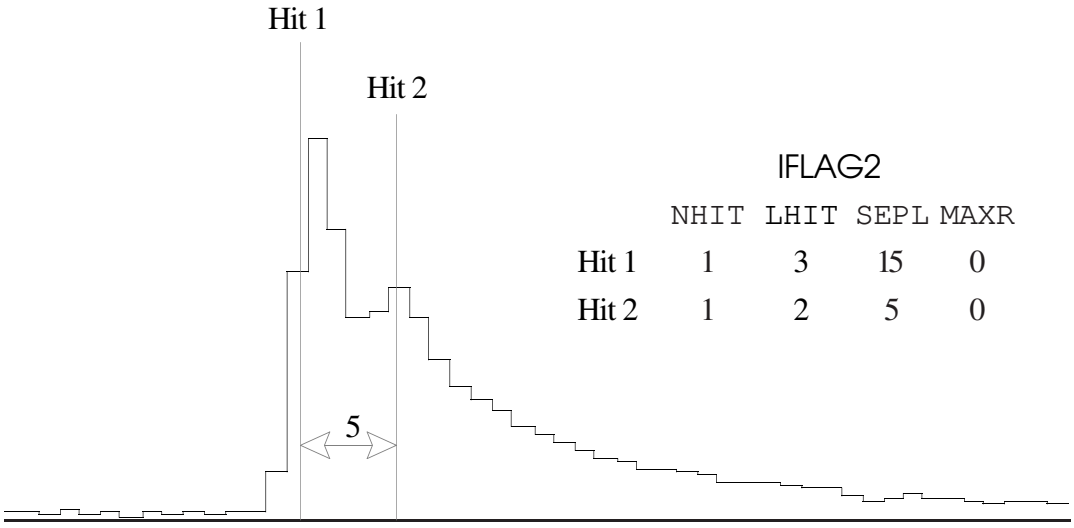

Figure 1 Illustration of IFLAG2 contents.

FRRD bank

This bank contains those blocks of original raw data which were kept by the QT algorithm running in the FEP. Unlike the FRRE bank this does not have a tabular structure. It will consist of blocks of 'Radial type' data as defined in the section Raw Data formats in the note **Processing code in DC FEPs**, written by Scott Kolya, December 11th, 1990, revised June 6th, 1991 (this is identical to the DCRD banks produced in the RAL cosmic tests on the forward tracker).