

Scintillator Front End (SFE)

Time-of-Flight (TOF) Mode Specification

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Introduction

The Time-of-Flight (TOF) mode will be an alternate mode of operation in addition to the existing specified mode of operation expect for only minor changes to the format of the recorded timing data. The primary purpose of the SFE is to generate hit information that is output to the Level 1 Muon trigger system via L1 Serial Link and is not effected by any design changes to implement the TOF Mode. The hit information generated is determined by the previously specified timing gate, which will now become known as the Trigger Gate. A wider TOF Gate will be generated in addition to the Trigger gate. When TOF Mode is enabled, timing data from all hits falling within the TOF Gate will be measured by the TMC and recorded for possible transfer to the SRC. A bit will always be set in the data of those channels that made up the Level 1 trigger information that was sent to the Muon trigger system independent of the TOF Mode.

Trigger and TOF Gate Control and Timing

Gate generation and control logic on the SFE is divided into three separate sections identified as A, B, and C which control channels 0:15, 16:31, and 32:47, respectively. The Trigger Gate in each section has separate controls for Delay and Width. The Delay has 3 bits of programmable coarse setting with a resolution a 18.8ns or 1 RF cycle plus a 4 bit fine setting with 2 ns resolution. The Width is programmable using 6 bits with a resolution of 2 ns. The minimum width will be determined by a fixed delay and be in the range of 10 to 15 ns. If the Trigger Gate is programmed to extend into the next crossing interval, it will be cut short to coincide with the end of the current crossing interval. If this occurs, a timing gate error bit will be set in one of the SFE's control and status registers, but no L1 Error or other indication will be generated.

The leading edge of the TOF Gate in each section will be coincident with the Trigger Gate of that section. The trailing edge will be fixed at a resolution of 18.8ns (1 RF cycle) by separate programmable logic in each section. The fact that programmable logic is used should not be construed that this parameter is programmable. **If there is any chance whatsoever that the timing of the trailing edge will change or be different for various parts of the detector, it is important that it be designed to be programmable via VME before the boards are manufactured.**

Effect of TOF Mode on Recorded TMC Data.

The format of the output data at the SRC is shown below. Bit 5, marked "T", of each word of TMC data will be set if that channel contributed to the L1 hit information that was sent to the Level 1 trigger system via the L1 Serial Link.

