

Procedure for synchronizing muon front-ends to the D0 TFW

During initial setup of the muon front-end (FE) sub-system, it is important to follow the steps listed below to guarantee proper timing and event synchronization of the FE sub-system to the D0 Trigger Framework (TFW).

- ❑ Set pipeline delay to 4.6..4.7 μ S (this is close to the maximum in most sub-systems).
- ❑ Request the TFW to run in a special mode with a Level 1 decision generated at a fixed crossing number
- ❑ Obtain the crossing number at which the TFW decision is generated as well as the crossing number attached to the decision
- ❑ Adjust FE test pulser to generate test data at the pre-calculated crossing number according the numbers from the item above
- ❑ Take a run with the TFW and observe crossing numbers associated with events and event data itself; adjust test pulser and/or pipeline and/or beam delay settings if necessary to achieve stable synchronization with the TFW

The next step is to set up external trigger for the FE sub-system. Since the pipeline setting is already fixed, the only adjustment necessary is the arrival time of the external trigger signal to the TFW. Currently (before the muon Level 1 trigger system is operational), the total external trigger delay of 3.3 μ S is provided by the TFW simulation delay and cable connections. The TFW setting cannot be changed, therefore, the cable delays of external triggers have to be equalized to guarantee the same propagation delay from the particular FE sub-system to the TFW. The total delay between the input of the sub-system and the TFW input is estimated as ~600 ns.

- ❑ Take data with the TFW and your external trigger defined and enabled
- ❑ Verify that there are no synchronization errors associated with the data

Running with the accelerator beam will require additional adjustments to the sub-system parameters. The necessary steps for that will be discussed later.