DT Muon Sorter

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**1xBarrel Sorter**
In: max 24 tracks from 12 Wedge Sorters
Out: 4 “best” tracks

**12xWedge Sorter**
In: max 12 tracks from 6 φ Track-Finder of a wedge
Out: 2 “best” tracks
Wedge Sorter: test and production

WS board already had a hw integration test with PHTFs and ETTF in Vienna setup @ CERN (March05)

✓ 3 PHTFs + WS: sorting @ 40 MHz **OK**
✓ 1 PHTF + ETTF + WS: sorting @ 40 MHz **OK**

Full production (12 boards + 6 spares) finished

(All boards *fully tested* with dynamic patterns with our test jig: all boards **OK** with full functionality)
Barrel Sorter

40 MHz register

80 MHz register

75 ns
Barrel Sorter main features

- Ghost busting, sort 4 out of 24, 3 BX overall latency
- VME slave to tune clock phases and access main chip algorithm conf regs
  - Ghost buster block tuning
  - Quality filtering of muon candidates
  - Input masking
- Trigger output on LEMO (NIM/TTL/ECL through jumpers)
  - Configurable trigger condition
    - Quality thresholds, pattern matching, etc.
  - Int/Ext triggering of spy registers (with directVME A24D16 readout)
- Last but not least: firmware can be eventually updated (ie new trigger conditions) very easily thanks to good FPGA fitting capability
Barrel Sorter: test and production

Full test setup based on Pattern Units and bidirectional LVDS-TTL adapters

Production (1 board + 2 spares) finished
(All boards fully tested with dynamic patterns with our test jig: all boards OK with full functionality)
WS – BS transmission test

- Pattern Units
- VME Crate
- BS
- ETTF Adapter
- SCSI cables
- WS
- PHTF Adapter
- "PHTF Adapter"
- "ETTF Adapter"
- TTL
- GTL+
- 1 x Wedge Sorter
- LVDS
- 1 x Barrel Sorter
- LVDS
- LVDS → TTL
- TTL
- Pattern Unit
Software

✓ VME R/W accesses are used to set any option of WS/BS boards
  ✓ Synchronization (WS, BS)
  ✓ Ghost busting (WS, BS)
  ✓ Track masking (WS, BS)
  ✓ Board status (WS, BS)
  ✓ Trigger condition setting (BS)
  ✓ Trigger spy data readout (BS)

✓ Software tools have been developed as a "big" C++ class while setting up the test jig ...
  ...but different VME interface & OS wrt CMS official ones

✓ Next step: software integration with DTTF
**Summary**

- WS boards: production done, stand-alone tested: 12 + 6 spares
  - Needed in cosmic challenge: 2 (already at CERN)
- BS boards: production done, stand-alone tested: 1 + 2 spares
  - Needed in cosmic challenge: 1 (already at CERN)
- DTTF-WS connection tested at CERN
- WS-BS connection tested in Bologna
- ..we are ready to integrate hardware with DTTF people in the next days

**Important for Cosmic Challenge:**

- BS can output a trigger signal based on configurable settings (quality, geom, etc)
- BS is provided with a spy data pipe that can be readout directly by VME

**To do:**

- Software tools have to be integrated with DTTF software ...