

Accelerator Clocks
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Three types of clock systems around the accelerators

Tevatron Clock (TCLK)

Machine Data (MDAT)

Beam Sync Clocks (TVBS, APTVBS, MIBS & RRBS)

Info can be found on BD/Acc. Controls/Timing & Links Web Page

http://www-bd.fnal.gov/controls/hardware_vogel/index.html

Info can also be found in the Controls Rookie Book (BD/Operations)

TCLK - Tevatron Clock

- Main accelerator clock system on site
- Coordinates operations across the complex
- Clock events provide high level timing within and between machines
- 256 possible clock events (\$00-\$FF)
 - 199 in use
 - http://www-bd.fnal.gov/controls/hardware_vogel/tclk.htm
 - TLG is source of major beam related events
 - Reflected Beam Sync events
 - General timing events (0.2Hz, 1Hz, 15Hz, 720Hz)
 - 1Hz is GPS sourced
- Originates in MAC Room
- TCLK is available in all Tevatron service buildings
 - transmitted on fiber and copper
 - A0=>C4; F4=>D0
 - New installations should all be on the fiber system
- Events prioritized (lower priority event can be bumped)

TCLK - Signal Description

- 10 MHz serial link
- Modified Manchester Encoding
- 10 bit event (start bit =0, 8 bit data, parity)
- minimum of two 1's between each clock event

MDAT – Machine Data

- Provides for transmission of machine related data
- 31 defined frames
 - Programmed magnet current, measured current
 - Low Beta Sequence Number, Time of Day, etc.
 - http://www-bd.fnal.gov/controls/hardware_vogel/mdat.htm
- 10 MHz serial link
- Modified Manchester Encoding
- 28 bit frame (start bits, 8 frame # bits, 16 data bits, parity, trailer)
- Set of frames repeat every 720 Hz
- 10uSec frame boundaries

Beam Sync Clocks

- TVBS

- Tevatron Proton Beam Sync Clock
- Tev proton rf/7
- Proton revolution marker (\$AA)
- Available at all Tev Service buildings via fiber & copper
 - fiber transmission also carries rf
 - new installs on fiber system
 - transmission around ring follows proton path
 - starts at F0

- APTVBS

- Tevatron Antiproton Beam Sync Clock
- Tev pbar rf/7
- Pbar revolution marker (\$AA)
- Available at all Tev Service buildings via fiber & copper
 - fiber transmission also carries rf
 - new installs on fiber system
 - transmission around ring follows pbar path
 - starts at F0

Available Decoding Hardware

CAMAC

TCLK – C377, C178

MDAT – C169

BS Clock – C279, C278, C479

VME

VUCD

VCDT

VRFT

IP-UCD

PMI-UCD