

# AMIGA-UUB Trigger Interface Specifications

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## UUB

In T3 request message from CDAS the UUB gets the following information:

Variable	Width	Description
GPS_SECONDS	32 bits	GPS second of the requested event
GPS_USEC	32 bits	Microseconds since beginning of GPS second of event
OFFSET	8 bits	Offset from nominal time in microseconds
WINDOW	8 bits	Acceptance window around specified time
T3_ID	16 bits	Identifier of this T3 request

For each shower we make use of on the UUB the following information from the FPGA:

Variable	Width	Description
TTAG_SHWR_SECONDS	32	Seconds counter (at time of event) from last reset, updated on PPS
TTAG_SHWR_TICS	32	Tics counter from last reset at end of shower trace
TTAG_PPS_TICS	32	Tics counter from last reset at last PPS
TTAG_SHWR_PPS_CAL	32	120 MHz calibration counter at last PPS before shower
TTAG_PPS_SECONDS	32	Current seconds counter from last reset, updated on PPS
SHWR_EVT_ID	16	Event ID of event; rolls over approx every 10 minutes

- To match T3 with a particular shower the UUB performs the following computations:
  - $SHWR\_USEC = 1,000,000 * TTAG\_SHWR\_TICS / SHWR\_PPS\_CAL$  to get microseconds since last PPS
  - Shortly after every PPS compute  $GPS\_OFFSET = GPS\_SECONDS - TTAG\_PPS\_SECONDS$
  - For each shower compute  $SHWR\_GPS\_SECONDS = GPS\_OFFSET + TTAG\_SHWR\_SECONDS$
- Then to find a matching shower the UUB requires
  1.  $SHWR\_GPS\_SECONDS = GPS\_SECONDS$ 
    - (a)  $GPS\_USEC + OFFSET - WINDOW < SHWR\_USEC < GPS\_USEC + OFFSET + WINDOW$
    - (b) For events near PPS second, both near end of second and near beginning of next second are checked.

## AMIGA

Shortly after every T1 trigger, the UUB FPGA sends to AMIGA the SHWR\_EVT\_ID of the event via LVDS. This is sent at the time of the trigger, not the end of the trace.

When the UUB finds an event matching a T3 request, it sends to AMIGA an AMIGA-T3 broadcast packet on the local ethernet containing the original T3 request plus the SHWR\_EVT\_ID of the shower that matches the T3 request.