Record Details 2

BaBar-ESD Training

May, 2002
Input Records

- Analog in
  - Read analog value, convert to engineering units, four alarm levels, simulation mode
- Binary in
  - Single bit, two states, assign strings to each state, alarm on either state or change of state, simulation mode
- Multi-bit binary in
  - Multiple bit, sixteen states, assign input value for each state, assign strings to each state, assign alarm level to each state, simulation mode
- Multi-bit binary in Direct
  - Read an unsigned short and map each bit to a field (16 BI records in one)
- String in
  - 40 character (max) ascii string, simulation mode
Input Records (cont..)

- **Long in**
  - Long integer, four alarm levels, simulation mode

- **Pulse counter**
  - Written to support a Mizar 8310 timing module

- **Waveform**
  - Configurable data type and array length (16,000 bytes max for CA)


- **Calc**
  - 12 input links, user specified “calc expression” (algebraic, trig, relational, Boolean, Logical, “?”), four alarm levels
  - Examples:
    - \((A-B) \times C\)
    - \((\text{if } (A<<2) & B \text{ then } C)\)
    - \((A+B) < (C+D) \text{? } E:F+L+10\)

- **Calcout**
  - Same as CALC with a conditional output link, separate output CALC expression, output delay, and output event
  - Options: "Every Time", "On Change", "When Zero", "When Non-zero", "Transition To Zero", "Transition To Non-zero"

- **PID**
  - Proportional/Integral/Derivative Control
Algorithms/Control Records (cont..)

- **Select**
  - 12 input links, four select options (specified, highest, lowest, median), four alarm levels
- **Compress**
  - Input link can be scalar or array
  - Algorithms include N to 1 compression (highest, lowest, or average), circular buffer of scalar input
- **Subroutine**
  - 12 input links, user provided subroutine, four alarm levels
- **Fanout**
  - Forward links to six other records
- **Dfanout**
  - Writes a single source of data to eight output links
Sequence
- Ten “Input link to Output link” pairs with a specified delay between link execution. Subsets of the ten pairs can be executed by specifying a mask or a specific link pair (Select options include ALL, SPECIFIED, MASK).

Event
- Posts a “soft” event which may trigger other records to process, simulation mode

Scan
- Four “positioners”, fifteen “detectors”. A scan steps through values of the positioners and records the detector values at each point. All arrays are accumulated within the record and posted when the scan is complete

SubArray
- Extracts a sub-array from a waveform
Output Records

- **Analog out**
  - Write analog value, convert from engineering units, four alarm levels, closed_loop mode, drive limits, output rate-of-change limit, INVALID alarm action, simulation mode

- **Binary out**
  - Single bit, two states, assign strings to each state, alarm on either state or change of state, closed_loop mode, momentary ‘HIGH’, INVALID alarm action, simulation mode

- **Multi-bit binary out**
  - Multiple bit, sixteen states, assign output value for each state, assign strings to each state, assign alarm level to each state, closed_loop mode, INVALID alarm action simulation mode

- **Multi-bit binary out direct**
  - 16 settable bit fields that get written as a short integer to the hardware, closed_loop mode, INVALID alarm action simulation mode
Output Records (cont..)

- **Stepper motor**
  - Position control, retry, speed, ramps, etc
- **Pulse delay**
  - Written to support a Mizar 8310 timing module
- **Pulse Train**
  - Written to support a Mizar 8310 timing module
- **Long out**
  - Write long integer value, four alarm levels, closed_loop mode, INVALID alarm action, simulation mode
- **String out**
  - Write a character string (40 max), closed_loop mode, INVALID alarm action, simulation mode
Calculating “Rate-of-Change” of an Input

In PA fetches data that is 1 second old because it does not request processing of the AI record. INPB fetches current data because it requests the AI record to process. The subtraction of these two values reflects the ‘rate of change’ (difference/ sec) of the pressure reading.

* The direction of the arrows indicates where a link points to, not necessarily the direction of the data flow.
Automatic Shutdown on Logout

If no monitor exists on the BI record (i.e. the operator has logged out), .MLIS will be NULL. The subroutine record .VAL field will become 0, which will cause the sequence record to process.

* A subroutine record is required because the .MLIS field is defined as a NO_ACCESS field (for links).
Quick Prototyping with Standard Records

Custom Record Definition
Tick Tock

Select Mechanism
Link Selection Loc
Forward Link 1
Forward Link 2

SELH MENU
SELL INLINK
LNK1 FWDLINK
LNK2 FWDLINK

Menu Specified
PB60:TICKTOCK,VAL PP MS
HB60:TICKTOCK,VAL
LB60:TICKTOCK,VAL
Luminosity Integrator
Compressed Records
Plot of compressed data

Channel Plot

Channels:
- HB601BENCHCURR:MINICOMP [ua]