

SLC Analog Status Facility

Kenneth Underwood
September 28, 1999

Preliminary Document

Introduction

The SLC Analog Status (ASTS) facility monitors, scales, and generates status for a variety of analog inputs. Typical analog inputs include voltage, temperature, pressure, and phase. All ASTS channels in a micro are processed either periodically (5 seconds) or on demand by a control system application. There is no provision for monitoring a subset of ASTS channels within a micro.

Principles of Operation

All of the data acquisition, scaling, and status generation is done by the ASTS micro job. Raw and scaled data as well as the generated status are sent back to the Alpha database for use by control system applications.

Control system applications access ASTS channel data primarily by specifying the micro name and an 8-character channel name. This channel name should be unique within a micro, but may exist in more than one micro. Should the same channel name exist more than once within a micro, the other channels will be unreachable.

The channel name may consist of any 8 arbitrary characters, but leading or embedded spaces are administratively disallowed because of the difficulties they would present in user prompts.

Functions Provided

Module Types

Most of the analogs in the SLC utilize the Smart Analog Monitor (SAM) module. However, a number of specialized modules such as a FIFO, BLM, PIC, SBDL, and BOAT modules are also supported.

All raw analog data are represented as a single precision floating point value. Any data variants such as integers or packed exponential data are converted to simple floating point values for later scaling into engineering units. 15 channels of type K and T thermocouples are pre-scaled into Celsius utilizing a 16th channel monitoring the iso-plane temperature.

Engineering Unit Scaling

A number of scaling options exists for conversion of raw analog values into engineering units such as linear, logarithmic, and polynomial. Linear scaling is the default, but other specialized scaling is controlled through the use of database flags and pointers to other database elements.

Status Generation

Status generation determines the quality of the data. Status flags for each channel indicate data acquisition problems, data validity, and tolerance checks. Only a single set of tolerance limits are available for each channel, but these limits can be specified either as a lower-upper limit or a setpoint-tolerance band. The tolerance limits can define either an inclusion region (in tolerance) or an exclusion region (out of tolerance). Another flag indicates whether 5% of the limit region is applied as a hysteresis band about each limit.

Functional Elements

Database

Two database structures are used to manage the ASTS facility. The ASTS database describes each module or subset of a module while the ASDF database describes the control system display.

The ASTS database includes information that the ASTS micro job will need as well as the 8-character channel name for each analog. Module specific information includes the CAMAC address, the starting channel and the number of channels, the module type, scaling parameters and flags, limit parameters and flags, and pointers to ancillary database items.

The ASDF database consists of a display name, a list of channel names to be used for the display, and engineering units. The control system parameters for an analog status display specify the display name and a starting micro name. The display will find all ASTS channel names that match the specified ASDF display channel names, then displays them in a matrix format.

Micro

The ASTS micro job utilizes the ASTS database entries to monitor, scale, and generate status for each defined analog status channel. The latest raw and scaled data as well as the generated status are replicated into the Alpha database for all channels.

Applications

Applications that run on the Alpha utilize the DB*_ASTS family of utilities in the DBSSHR shareable image to access the current ASTS data. Calling the ASTS_CHECK utility in the MISCSHR shareable image generates forced updates of the Alpha database.

Control System Services

DB*_ASTS

These utilities provide structured access to all of the ASTS data for a specified micro and channel name. A simple form of wild-carded channel names is supported.

ASTS_CHECK

The ASTS_CHECK utility in the MISCSHR shareable forces an immediate update of the ASTS database on the Alpha based upon the specified set of micro names.

NLC Specific Functions or Attributes