Scanner Fieldbus Interface Guide

This document provides information on the Scanner Fieldbus Interface which is used to transfer scanner status and control data between a Fieldbus client and the Scanner Interface Module.

Content:

1. *Data Types*

The following data types are used to construct the status and control blocks described below:

U32:   32-bit unsigned integer.
S32:   32-bit signed integer.
B32:   32-bit set of bits.

2. *Scanner Status*

Scanner Status is a block of data sent from the Scanner Interface to the Fieldbus client that reports current information regarding the scanner. The block is comprised of 32 bytes.

Bytes	Name	Type	Remark
0-3	Status	B32	See bit table below.
4-7	Port C	B32	See bit table below.
8-11	Port B	B32	See bit table below.
12-15	Window PD	U32	Window photo detector (raw value). See notes below for conversion to dBuA.
16-19	Head temperature	U32	Head temperature (raw value). See notes below for conversion to Celsius.
20-23	Frame ID	U32	ID of the last completed frame.
24-27	Object ID	U32	ID of the last completed object.
28-32	Job ID	U32	ID of the last completed job.

Head Temperature Conversion to Celsius

The code below is a sample showing how to convert 'Head temperature' from the Scanner Status block's raw value to Celsius:

```
float   int_max = 65536.0f;
float   head_temperature_celsius;
float   head_temperature_celsius_min = 3;
float   head_temperature_celsius_max = 66;
uint    head_temperature_raw = <value from Scanner Status block>;
if ((head_temperature_raw == 0) | (head_temperature_raw == 0xFFFF))
{
     head_temperature_celsius = 0;  // no thermistor present or shorted
}
else
{
     head_temperature_celsius = ((float)head_temperature_raw) *
((head_temperature_celsius_min - head_temperature_celsius_max) / int_max) +
head_temperature_celsius_max;
}
```

Window PD Conversion to dBuA

The code below is a sample showing how to convert 'Window PD' from the Scanner Status block's raw value to dBuA:

```
float   int_max = 65536.0f;
float   decades = 5.709f;
```

```
float   current_max = 222.8e-6f;
uint    window_pd_raw  = <value from Scanner Status block>;
float   window_pd_dbua = 20 * ((((float)window_pd_raw) - int_max) * decades / int_max +
(float)Math.Log10(current_max * 1e6f));  // units are dBuA
```

Bit Table: Status

The mapping of bits for the *Status* register is provided in the following table:

Bit	Name	Remark
0	Ready	Ready indicator (waiting for start)
1	Active	Active indicator (data is present)
2	Error	Error indicator (fault has occurred)
3	X Error	X galvo error (or not detected)
4	Y Error	Y galvo error (or not detected)
5	Z Error	Z galvo error (or not detected)
6	Communication	Head communication is present
7	Checksum (controller)	Head checksum error to controller
8	Focus Home	3D Head status: focus_home
9	Focus Away	3D Head status: focus_away
10	Camera Home	3D Head status: cam_home
11	Tray Not Present	3D Head status: !tray
12	Head Interlock Open	3D Head status: intlk_open
13	Reserved	3D Head status: rsv
14	Checksum (head)	3D Head status: cksum_err to head
15	Carrier	3D Head status: carrier_present from controller
18:16	Laser Status	Pins dependent on laser type (see laser manual)
19	Airflow/LaserStatus[3]	Laser status[3] or Airflow (pin dependent)
20	Sbus Present	Sbus detected in head
21	Sbus Checksum	Sbus to controller data errors
22	Fiber Interlock Closed	Fiber interlock relay output status

Bit Table: Port C

The mapping of bits for the *Port C* register is provided in the following table:

Bit	Name	Remark
11:0	General purpose	Each bit is a general purpose output signal corresponding to bits 11:0 in the scanner's Port C register.

Bit	Name	Remark
12	Laser enable	Laser beam is enabled
13	Guide enable	Guide beam is enabled
14	Focus enable	Focus beam is enabled
15	Focus mode	Focus beam mode
31:16	General purpose	Each bit is a general purpose output signal corresponding to bits 31:16 in the scanner's Port C register.

Bit Table: Port B

The mapping of bits for the *Port B* register is provided in the following table:

Bit	Name	Remark
7:0	Laser power	Current laser analog power
15:8	Reserved	Reserved bits.
16	Laser modulation	Modulation signal
31:17	Reserved	Reserved bits.

3. *Scanner Controls*

Scanner Controls is a block of data sent from the Fieldbus client to the Scanner Interface used to control scanner behavior. The block is comprised of 32 bytes.

Bytes	Name	Type	Remark
0-3	Control	B32	See bit table below.
4-7	Port A	B32	See bit table below.
8-11	XOFF	S32	X offset (used like encoder input).
12-15	YOFF	S32	Y offset (used like encoder input).
16-19	Reserved	U32	Reserve bytes.
20-23	Reserved	U32	Reserve bytes.
24-27	Reserved	U32	Reserve bytes.
28-31	Reserved	U32	Reserve bytes.

Bit Table: Control

The mapping of bits for the *Control* register is provided in the following table:

Bit	Name	Remark
0	Start	Start signal.
1	Enable	Enable signal.
31:2	Reserved	Reserve bits.

Bit Table: Port A

The mapping of bits for the *Port A* register is provided in the following table:

Bit	Name	Remark
7:0	General purpose	General purpose inputs (bit 0 is default select strobe). Bits 3:0 can be used as additional start signals.
14:8	Reserved	Reserve bits.
31:15		General purpose inputs (used for job select)