KAD/BIT/101

Built-in self test module

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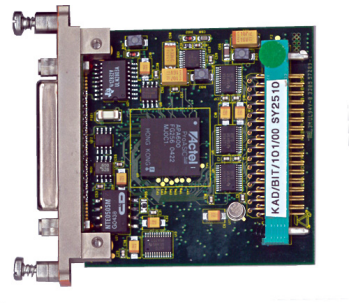

Key Features

- Provide up to 120 window functions (limit checking); up to 32 parameters can be sent to each window function
- Monitors voltage, temperature, format running and address checksum
- Counts number of power-ons and total time powered on
- 4 x 3 types of status output (TTL, LED and doll's eyes)
- Selected errors transmitted in First In First Out (FIFO) with optional time tagging and via RS-422

Applications

- System monitoring

Overview

The KAD/BIT/101 is a Continuous Built-In Test module (CBIT) which checks the Acra KAM-500 backplane to verify correct system operation.

The KAD/BIT/101 measures the precise value of the ±12V, ±7V, and +5V power lines to ensure they are within specifications. Temperature sensors are located at the top block and the center of the module to allow the measurement of both the chassis top block temperature and the chassis internal temperature.

The KAD/BIT/101 checks that the current acquisition cycle is a valid format, measures the duration of each acquisition cycle, and performs a checksum of all addresses transferred on the backplane to ensure the correct operation of the current format.

The KAD/BIT/101 can be used to check both analog signal conditioning modules and bus monitor modules in a chassis. Channels on analog signal conditioning modules are checked to confirm that the signal stays within a minimum and maximum value. The KAD/BIT/101 can check the status register from each bus monitor module in the chassis to indicate when an error occurs.

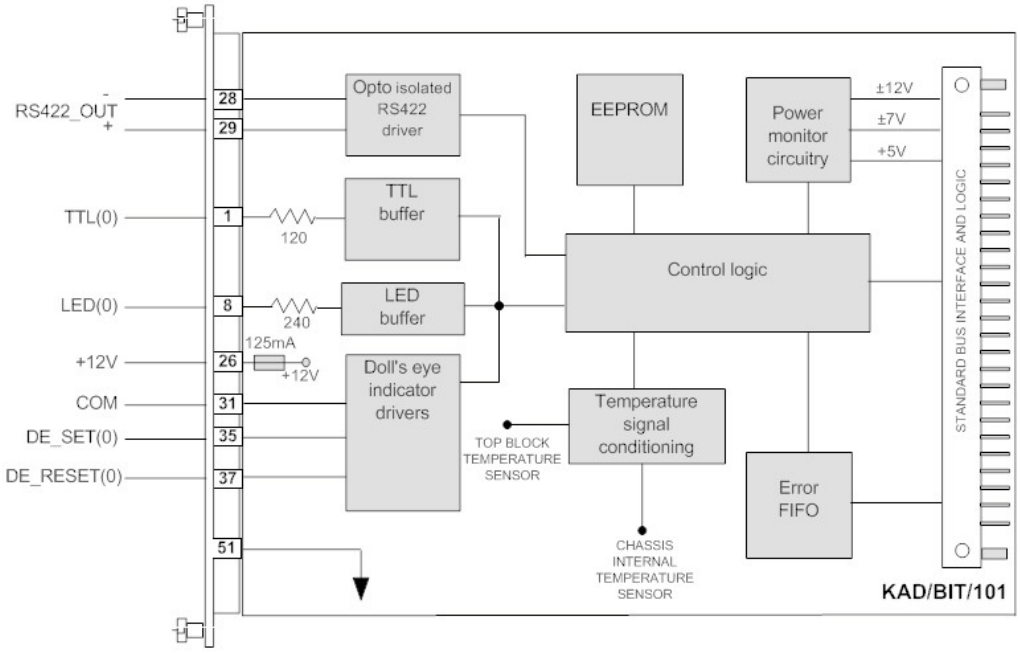

Figure 1: First of each of the four status outputs for KAD/BIT/101

Specifications

All values provided in the following specification tables are valid within the operating temperature range specified under "Environmental ratings" in the "General specifications" table.

TABLE 1	General specifications				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Slots	–	–	1	–	Can be placed in any user-slot in any combination.
Mass					Design metric is grams.
	–	70	–	g	
	–	2.47	–	oz	
Height above chassis					For recommended clearance requirements see the *CON/KAD/002/CP* data sheet.
bare connector	–	–	11	mm	Design metric is millimeters.
bare connector	–	–	0.43	in.	
Access rate	–	–	2	Msps	Maximum combined access rate for read and write.
Power consumption					
+5V	85	–	140	mA	Excludes current used by TTL, LED and RS-422 outputs.
±7V	0	–	0	mA	
+12V	5	–	20	mA	Excludes current sourced from +12V excitation for doll's eye indicators.
-12V	5	–	10	mA	
total power	0.55	–	1.06	W	Particular combinations of chassis and Acra KAM-500 modules may have power or current limitations. For details, see *TEC/NOT/016 - Power dissipation, TEC/NOT/049 - Power estimation*, and the relevant chassis data sheet.
Environmental ratings					See *Environmental Qualification Handbook*.
operating temperature	-40	–	85	°C	Chassis base/side plate temperature.
storage temperature	-55	–	105	°C	

TABLE 2	BTTL outputs (TTL)				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Outputs	–	–	4	–	
Signaling rate					
TTL[3:0]	–	–	5	Hz	
Output voltage					
logic 0	–	–	0.1	V	Sinking 0.1mA.
logic 1	4.4	–	–	V	Sourcing 0.1mA.
short circuit current	–	–	50	mA	Only one output may be shorted at a time.
short circuit duration	∞	–	–	s	To GND.
Output resistance	–	140	–	Ω	

TABLE 3	BTTL outputs (LED)				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Outputs	–	–	4	–	
Signaling rate					
LED[3:0]	–	–	5	Hz	
Output voltage					
logic 0	–	–	0.1	V	Sinking 0.1mA.
logic 1	4.4	–	–	V	Sourcing 0.1mA.
short circuit current	–	–	50	mA	Only one output may be shorted at a time.
short circuit duration	∞	–	–	s	To GND.
Output resistance	–	260	–	Ω	

TABLE 4	RS-422 outputs				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Outputs	–	–	1	–	
Signaling rate					
RS-422 OUT	9,600	–	115,200	bps	
Output voltage					
absolute operating range	-5	–	5	V	Absolute voltage of the operating signal must stay within this range.
logic 0	–	–	-3	V	V_{0+} - V_{0-} ; R_{LOAD} = 100Ω.
logic 1	3	–	–	V	V_{0+} - V_{0-} ; R_{LOAD} = 100Ω.
common mode voltage	2.2	–	3.3	V	
short circuit current	–	–	250	mA	
short circuit duration	–	–	1	s	
ESD protection	16	–	–	kV	Human Body Model.
Output resistance	–	20	–	Ω	

TABLE 5	Open collector outputs				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Outputs	–	–	4	–	Four pairs of DE_SET(x) and DE_RESET(x).
Signaling rate					
DE_SET[3:0]	–	–	2	Hz	
DE_RESET[3:0]	–	–	2	Hz	
Output voltage					
logic 0	–	0.9	–	V	Sinking 100mA.
logic 1	–	–	–	V	High impedance (open collector).
Output resistance	–	2	–	Ω	Equivalent dynamic resistance when sinking 100mA.

TABLE 6	Single ended DC voltage excitation outputs				
PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITION/DETAILS
Outputs	–	–	1	–	
Output voltage					
operating range	11.6	12	12.2	V	Connected via 125mA fast-acting fuse from internal +12V supply rail.
compliance	–	–	125	mA	
short circuit current	–	–	1,000	mA	Drawing this current causes the fuse to blow within 1ms.
short circuit duration	–	–	0	s	Short of this output causes protection fuse to blow. As the fuse is soldered on the PCB, the module must be returned to Curtiss-Wright support (acra-support@curtisswright.com) for fuse replacement.
Output resistance	–	2	–	Ω	

Setting up the KAD/BIT/101

All module setup can be defined in XML using XidML® schemas (see http://www.xidml.org).

Instrument settings

SETUP DATA	CHOICE	DEFAULT	NOTES
Manufacturer	-	-	-
Name	ACRA CONTROL	ACRA CONTROL	Name of manufacturer.
PartReference	KAD/BIT/101	KAD/BIT/101	The instrument part reference.
SerialNumber	AB1234	AB1234	Unique name for each module.
Settings	-	-	-
Baud Rate	9600 115200	9600	Baud rate of RS-422 data stream.
FIFO Select	None Micro Only High Low Micro	High Low Micro	Format of time tag stored in FIFO with ERROR_CODE
Settings Dolls Eye Polarity	-	-	Active position of Dolls Eye.
Dolls Eye 0	Active Set Active Reset	Active Set	Active position of Dolls Eye 0.
Dolls Eye 1	Active Set Active Reset	Active Set	Active position of Dolls Eye 1.
Dolls Eye 2	Active Set Active Reset	Active Set	Active position of Dolls Eye 2.
Dolls Eye 3	Active Set Active Reset	Active Set	Active position of Dolls Eye 3.
Settings LED Polarity	-	-	Active level of LED outputs.
LED 0	Active Low Active High	Active High	Active level of LED output 0.
LED 1	Active Low Active High	Active High	Active level of LED output 1.
LED 2	Active Low Active High	Active High	Active level of LED output 2.
LED 3	Active Low Active High	Active High	Active level of LED output 3.
Settings TTL Polarity	-	-	Active level of TTL outputs.
TTL 0	Active Low Active High	Active High	Active level of TTL output 0.
TTL 1	Active Low Active High	Active High	Active level of TTL output 1.
TTL 2	Active Low Active High	Active High	Active level of TTL output 2.
TTL 3	Active Low Active High	Active High	Active level of TTL output 3.
Processes	-	-	-
Event(127:0)	-	-	Configuration for each event generator.

SETUP DATA	CHOICE	DEFAULT	NOTES
Settings Event Settings	-	-	Event algorithm settings.
Trigger Condition	Algorithm Reference Alarm Boolean-Simple	MyTriggerCondition	A reference to an algorithm that defines the valid conditions for this event. Parameter values that do not satisfy this condition trigger the outputs.
Output 0	Off On	Off	Activate bit 0 of output when Trigger Condition value is false.
Output 1	Off On	Off	Activate bit 1 of output when Trigger Condition value is false.
Output 2	Off On	Off	Activate bit 2 of output when Trigger Condition value is false.
Output 3	Off On	Off	Activate bit 3 of output when Trigger Condition value is false. This setting also enables writing error events to the FIFO.
Sample Rate	1 to 100000	1	Number of times per second (Hz) the event is checked.

Parameter definitions

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
Global Parameters				
+12V 16-bit value of +12V power line on chassis backplane. Calculate voltage using formula in "Getting the most from" section of data sheet.	Volt	OffsetBinary	16	R[15:0]
-12V 16-bit value of -12V power line on chassis backplane. Calculate voltage using formula in "Getting the most from" section of data sheet.	Volt	OffsetBinary	16	R[15:0]
+7V 16-bit value of +7V power line on chassis backplane. Calculate voltage using formula in "Getting the most from" section of data sheet.	Volt	OffsetBinary	16	R[15:0]
-7V 16-bit value of -7V power line on chassis backplane. Calculate voltage using formula in "Getting the most from" section of data sheet.	Volt	OffsetBinary	16	R[15:0]

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
5V 16-bit value of +5V power line on chassis backplane. Calculate voltage using formula in "Getting the most from" section of data sheet.	Volt	OffsetBinary	16	R[15:0]
InternalTemperature Internal chassis temperature BCD ratio. Calculate temperature using formula in "Getting the most from" section of data sheet.	Celsius	BCD	16	R[15:0]
ChassisTemperature Chassis temperature BCD ratio, measured at top block. Calculate temperature using formula in "Getting the most from" section of data sheet.	Celsius	BCD	16	R[15:0]
BackplaneTicks Count of 8MHz clock ticks in the previous backplane acquisition cycle. Counts from 0.	Count	OffsetBinary	32	R[31:0] R[31:16] Ticks_Hi R[15:0] Ticks_Lo
CurrentFormat Current backplane format. Note: This parameter is internal to the module only. It can be applied to an algorithm Trigger Condition but its value cannot be read or placed.	BitVector	BitVector	16	R[15:0]
Status Status output changes since last read.	BitVector	BitVector	16	R[15:0] R[15:12] Reserved R(11) EepromAccessError R[10:4] Reserved R[3:0] STS - Current value of 4 status bits, with all changes OR'd in.
FifoError Error Code	BitVector	BitVector	16	R[15:0] R[15:14] Reserved R(13) FifoFull R(12) FifoEmpty R[11:7] ParameterID R[6:0] FunctionID
FifoTime 48-bit wide IRIG time word.	BitVector	BitVector	48	R[47:0]
FifoTimeHi Hours and minutes time midway through first transmitted bit.	BitVector	BitVector	16	R[47:32] R[15:13] Reserved - Reserved for future use. R[12:7] Hours - BCD Hours 0 to 23. R[6:0] Minutes - BCD Minutes 0 to 59.

NAME/DESCRIPTION	BASE UNIT	DATA FORMAT	BITS	REGISTER DEFINITION
FifoTimeLo Seconds and centiseconds time midway through first transmitted bit.	Second	BCD	16	R[31:16] R(15) Reserved - Reserved for future use. R[14:8] Seconds - Seconds 0 to 59. R[7:0] Centiseconds - Centiseconds 0 to 99.
FifoTimeMicro Microseconds time midway through first transmitted bit.	Second	BCD	16	R[15:0] R[15:0] Microseconds - Microseconds 0 to 9999.
ErrorCounter Count of error messages generated.	Count	OffsetBinary	16	R[15:0]
PowerUpCount Number of times the module has been powered on. The value is non-volatile.	Count	OffsetBinary	32	R[31:0] R[31:16] PowerUpCount_Hi R[15:0] PowerUpCount_Lo
TimeOn Increments by one each time the module is powered on and at every 5 minute interval thereafter. The value is non-volatile.	Count	OffsetBinary	32	R[31:0] R[31:16] TimeOn_Hi R[15:0] TimeOn_Lo

NOTE: It is recommended that names are less than 20 characters, have no white space or contain any of the following five characters "/><\.

Getting the most from the KAD/BIT/101

The KAD/BIT/101 is a CBIT module that monitors an Acra KAM-500 system, using window functions to ensure that it is operating correctly. A window function is a table with an entry for every possible value of a parameter with a corresponding output entry. Up to 120 window functions can be configured. Each window function can check up to 32 parameter inputs with a 4-bit output. The outputs of all of the window functions are OR'd together to produce a 4-bit result.

The KAD/BIT/101 has six methods to indicate the results of the window functions, shown in the following figure. Each output bit activates the related LED, TTL output, and doll's eye output (for example, output 0 activates LED 0, TTL 0, and Dolls Eye 0). The RS-422 output is activated by output 3 only.

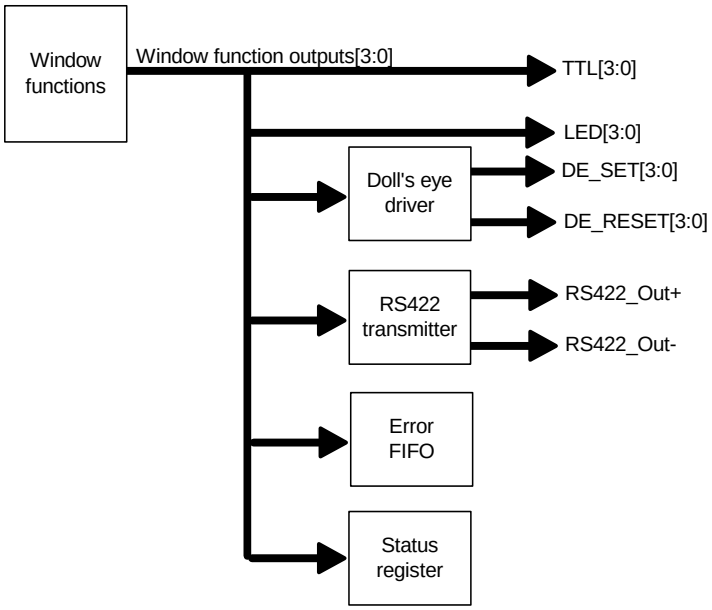

Figure 2: Six methods to indicate window functions

The KAD/BIT/101 accepts internal parameters and parameters from other modules present in the same chassis (or backplane) as inputs for window functions. There are window functions that can be configured to monitor the KAD/BIT/101 internal parameters to check power, temperature, and Acra KAM-500 backplane operation. Other window functions can be configured to monitor parameters from other modules to ensure they are operating correctly.

An example of two window functions is shown in the following figure. Window function 1 is used to check one of the internal power parameters of the KAD/BIT/101. The output of window function 1 is 0001, because the value of the input parameter is not above 2. Window function 120 is used to check a parameter from another module. The output of window function 120 is 0010, because the value of the input parameter is less than 65535.

NOTE: The 10ms gap ensures that SET and RESET are never active at the same time. This is required due to the latched nature of the doll's eye indicator.

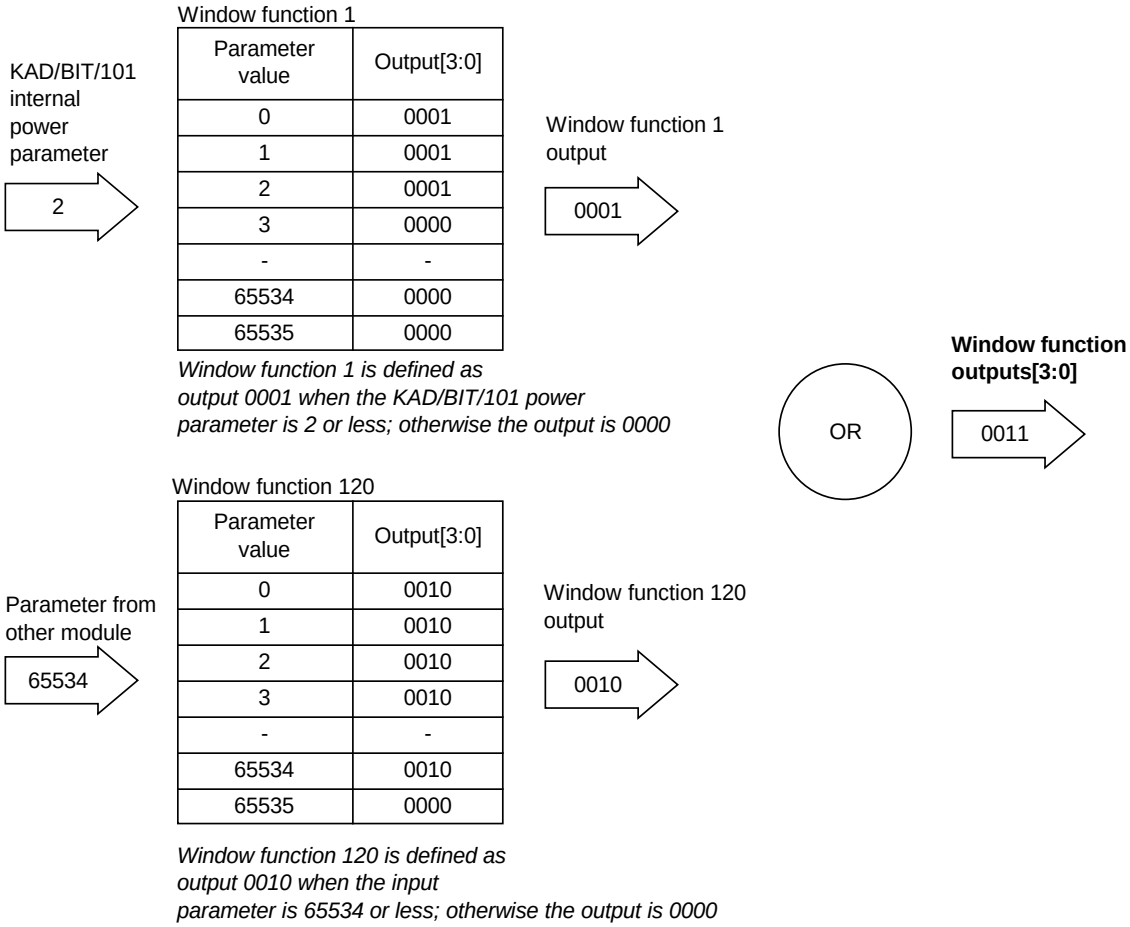

Figure 3: Example of two window functions

The PowerUpCount and TimeOn counters are stored in an EEPROM, which has an approximate life of ten years. The status register contains a bit which indicates when the module must be returned to Curtiss-Wright support (acra-support@curtisswright.com) for a replacement EEPROM.

The TimeOn counter takes up to 250ms to be updated and can be updated asynchronously from the acquisition cycle.

The LED and TTL outputs are updated for 200ms or the length of the acquisition cycle, whichever is longer. If the acquisition cycle is longer than 200ms, the LED and TTL outputs are updated at the start of the cycle and remain the same for the cycle. If the acquisition cycle is shorter than 200ms the LED and TTL outputs have an output period of 200ms. If the error condition is met again during an output active period, then the period is extended.

The KAD/BIT/101 powers up to four dual-coil doll's eye indicators. The KAD/BIT/101 set and reset outputs are energized with a 40ms pulse to select the display state of the doll's eye indicator. The outputs that drive the doll's eyes are updated every 500ms, asynchronously from the acquisition cycle. To reduce the power requirement, the update pulses are staggered in time to ensure that only one output pulse can be activated at any instant (that is, one from the eight outputs for set or reset for each of the four doll's eyes). Each pulse is 40ms wide with a minimum gap of 10ms between pulses. If an error is asserted and deasserted quickly, the shortest time the doll's eye is active is 500ms. The KAD/BIT/101 outputs a +12V supply, which can be used to power the doll's eye indicators, or an external +12V source can be used. It is required that the KAD/BIT/101 COM input is connected to the power supply that is used to power the indicators (as shown in the following figure). Only +12V operation is supported.

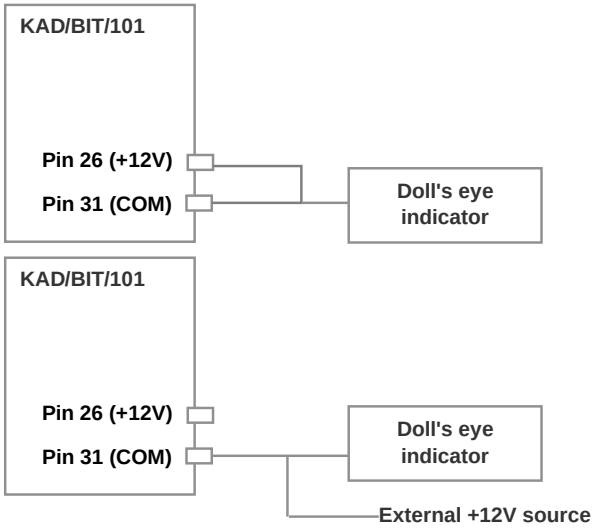

Figure 4: Doll's eye indicator and COM input power source

The COM input is connected to the doll's eye driver within the KAD/BIT/101 and protects drivers against damage when switching doll's eye indicators. It is not recommended that the doll's eye indicator is used when monitoring the supply rails as the current drawn by the indicators themselves is sufficient to cause a voltage spike on the supply rail that can be detected by the monitoring circuit causing continuous switching of the output.

The circuitry for voltage monitoring on all of the supply rails is measured using the +12V supply. Any changes on the +12V supply affects all the voltages that are measured. In other words an error on the +12V supply may cause the other channels to incorrectly show an error.

When the format of the current acquisition cycle is changed, then the error counter and FIFO in the KAD/BIT/101 are reset.

The KAD/BIT/101 contains two non-volatile counters. The first counter increments each time the chassis containing the module has been powered on, the second counter increments when the module is powered on and every five minutes thereafter.

The KAD/BIT/101 has four status bits (corresponding to outputs 0 to 3), which indicate when an error occurs; these can be configured for each error condition. The status bits drive four TTL outputs, four LED outputs, and four doll's eye indicators on the top block of the module. The fourth status bit (output 3) is also used to specify that an error code (ERROR_CODE) corresponding to the error is written to the Error FIFO and transmitted via the RS-422 output stream. The error code is stored in the Error FIFO with optional time-tags.The Error FIFO can store a maximum of 4,096 errors or tags. If the FifoTimeMicro tag is also stored, then the FIFO can hold 2,048 errors or tags, and with all three time tags stored, then the FIFO can hold 1,024 errors or tags.

If using the KAD/BIT/101 in a KAM/CHS/13U, KAM/CHS/13U/B, or KAM/CHS/13U/C, two KAD/BIT/101 modules are required to monitor the +12V supply of all slots. The +12V supply is split between two supply rails; the first rail supplies the first four module slots while the second rail supplies the last nine slots.

The following figure shows an example of the operation of the window function outputs when the acquisition cycle is less than 200ms.

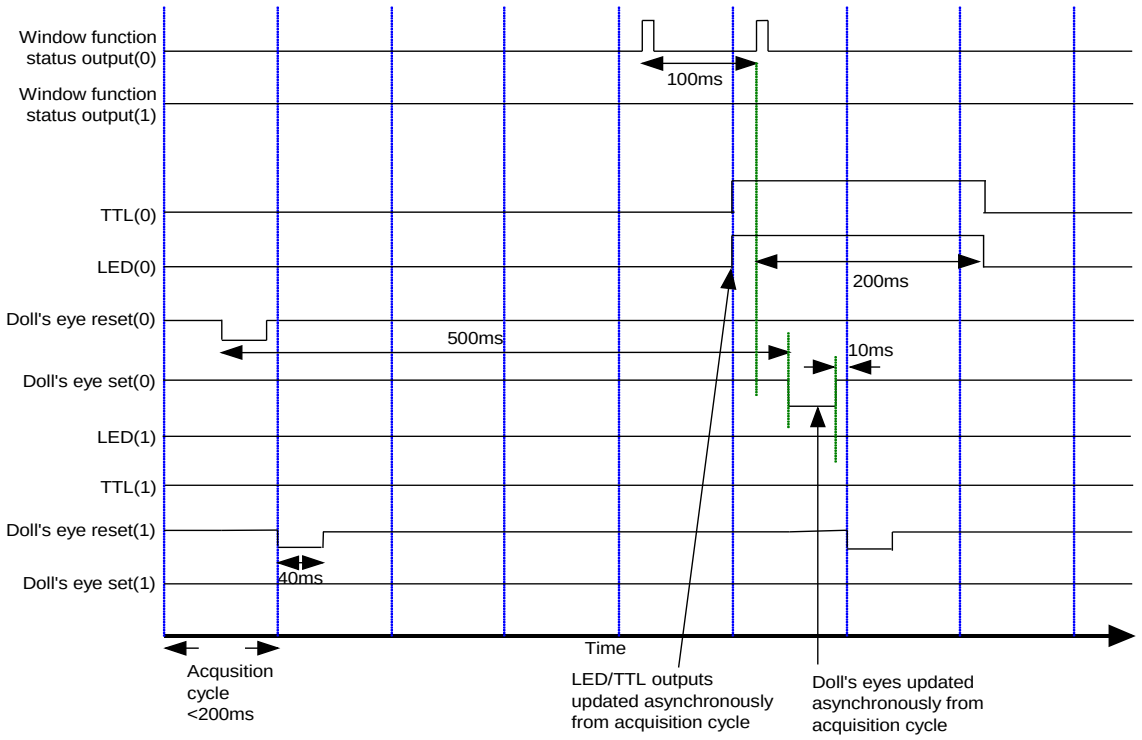

Figure 5: Example of the operation of window function outputs when the acquisition cycle is less than 200ms

KSM-500 fixed window functions

KSM-500 has fixed window functions compared to DAS Studio 3, which include the following:

Power line voltage levels

The KAD/BIT/101 measures the precise value of the +12V, -12V, +7V, -7V, and +5V power lines at greater than 1% accuracy.

Chassis temperature

The KAD/BIT/101 measures chassis and chassis internal temperatures at greater than ±6°C accuracy.

Acra KAM-500 operation

The KAD/BIT/101 ensures the operation of the acquisition cycle by checking the selected formats address checksum and the number of clock cycles.

Errors transmitted via RS-422

The KAD/BIT/101 transmits selected error codes in a 20-character message over an RS-422 output stream when the fourth status bit is set. (This bit also controls whether messages are recorded via the FIFO.) This message also contains the error number and an overflow indicator. The transmission bit-rate can be either 9.6kbps or 115.2kbps. When the module is power-cycled, there may be an extra character transmitted on the RS-422 serial output.

The total message length is 20 ASCII characters (including $E and commas).

The message format is:

$E<ERR_COUNT>, <PARAMETER-ID>, <WINDOW_FCT-ID>, <STS_OUT>, <SKIPPED> <CR><LF>

where:

<ERR_COUNT>: BCD count which increments every error (five characters).

<PARAMETER-ID>: BCD ID number of parameter (two characters).

<WINDOW_FCT-ID>: BCD ID number of window function (three characters).

<STS_OUT>: Error status output (one character).

<SKIPPED>: ASCII O when an overflow occurred; otherwise N (one character).

<CR>: ASCII carriage return (one character) 0x0D.

<LF>: ASCII line feed (one character) 0x0A.

Checking status registers

The KAD/BIT/101 can check whether individual bits are set or cleared in another module's status register. For example, the KAD/BIT/101 checks the status of the KAM/MEM/003 and KAD/MEM/004 modules to determine whether the following is true:

- CompactFlash® card in the module is empty
- CompactFlash card in the module has stored data over a specified threshold
- CompactFlash card in the module is full

In kSetup, you can mask a bit window function by using 1 to check whether a bit is set, and 0 to check whether a bit is cleared. Use X as a wildcard to ignore all other bits. For example, use XXXX.XXXX.1XXX.XXXX to check if bit 7 is set.

NOTE: The same parameter cannot be sent to multiple window functions. This means that a parameter can generate only one output function based on its content.

Status sampling rate

The value returned by the status register depends on the sampling rate of the status register and the rate at which parameters to be monitored are sunk into the KAD/BIT/101. If this sink rate is less than the sampling rate of the status register, the register returns zeros for some samples. It is important to sample the status register at least as fast as the parameter that is sunk fastest into the KAD/BIT/101, otherwise some status updates may not be read.

Measuring the temperature of the chassis

The KAD/BIT/101 has two temperature sensors that measure the chassis top block and internal temperature. The temperatures measured can be inputs to window functions and/or can be read as parameters. The temperature parameter is a four-digit BCD value with a range from 0000_{10} to 9999_{10}.

To calculate the temperature measured, use the following formula:

$$\text{Temperature } °C = -200 \times (0.85 - (\text{ratio}_{10} / 10000_{10}))^3 + (425 \times (\text{ratio}_{10} / 10000_{10})) - 273$$

If the temperature is more than 50°C, then the formula above can be approximated using the following formula:

$$\text{Temperature } °C = (425 \times (\text{ratio}_{10} / 10000_{10})) - 273$$

NOTE: Ratio_{10} is the parameter that is read from the module. When viewing this parameter, care must be taken to treat it as BCD and not as hex or offset binary.

Reading power supply voltage parameters

The KAD/BIT/101 measures the voltage on each of the backplane power supply rails and presents each value as a parameter that can be checked for out of range values or read as a placeable parameter. Use the following formulae to calculate the actual voltage from the value that is read.

For ±12V power supplies:

Voltage in volts = (parameter x 20 / 65536 - 10) x 2

For ±7V and +5V power supplies:

Voltage in volts = (parameter x 20 / 65536 - 10)

Connector pinout of the KAD/BIT/101

PIN	NAME	SEE SPECIFICATIONS TABLE	COMMENT
1	TTL(0)	BTTL outputs (TTL)	Status TTL output
2	TTL(1)	BTTL outputs (TTL)	Status TTL output
3	TTL(2)	BTTL outputs (TTL)	Status TTL output
4	TTL GND		Ground for TTL outputs
5	TTL(3)	BTTL outputs (TTL)	Status TTL output
6	DNC		Do not connect
7	DNC		Do not connect
8	LED(0)	BTTL outputs (LED)	Status LED output
9	LED GND		Ground for LED outputs
10	LED(1)	BTTL outputs (LED)	Status LED output
11	LED GND		Ground for LED outputs
12	LED(2)	BTTL outputs (LED)	Status LED output
13	LED GND		Ground for LED outputs
14	LED(3)	BTTL outputs (LED)	Status LED output
15	LED GND		Ground for LED outputs
16	DNC		Do not connect
17	DNC		Do not connect
18	DNC		Do not connect
19	DNC		Do not connect
20	DNC		Do not connect
21	DNC		Do not connect
22	DNC		Do not connect
23	DNC		Do not connect
24	DNC		Do not connect
25	DNC		Do not connect
26	+12V	Out	+12V to doll's eye indicators
27	DNC		Do not connect
28	RS-422_OUT-	RS-422 outputs	
29	RS-422_OUT+	RS-422 outputs	
30	DNC		Do not connect
31	COM		Doll's eye driver; supply voltage
32	DNC		Do not connect
33	DNC		Do not connect
34	DNC		Do not connect
35	DE_SET(0)	Open collector outputs	Doll's eye indicator set
36	DNC		Do not connect
37	DE_RESET(0)	Open collector outputs	Doll's eye indicator reset
38	DNC		Do not connect
39	DE_SET(1)	Open collector outputs	Doll's eye indicator set
40	DNC		Do not connect
41	DE_RESET(1)	Open collector outputs	Doll's eye indicator reset
42	DNC		Do not connect
43	DE_SET(2)	Open collector outputs	Doll's eye indicator set
44	DNC		Do not connect
45	DE_RESET(2)	Open collector outputs	Doll's eye indicator reset
46	DNC		Do not connect
47	DE_SET(3)	Open collector outputs	Doll's eye indicator set
48	DNC		Do not connect
49	DE_RESET(3)	Open collector outputs	Doll's eye indicator reset
50	DNC		Do not connect
51	GND	Internal ground	
52	CHASSIS	Chassis	Double-density connector only

Ordering information

PART NUMBER	DESCRIPTION
KAD/BIT/101	Built-in self test module (with 52-way double-density connector)
KAM/BIT/101	Built-in self test module (with 51-way micro-miniature connector)

By default, the standard mating connector (CON/KAD/002/CP for KAD modules; or ACC/CON/008/04 for KAM modules), is included with each module in the shipment. Its part number will be added to the Confirmation of Order unless an alternative option is specified (see the *Cables* data sheet). In this data sheet, KAD/BIT/101 refers to both the KAD and KAM version of the module.

Revision history

REVISION	DIFFERENCES	STATUS
KAD/BIT/101	First release	Recommended for new programs

Supporting software

SOFTWARE	DETAILS
DAS Studio 3	User interface for setup and management of data acquisition, network switches, recorders and ground stations in an integrated environment
KSM-500	This module is supported by the KSM-500 suite of software tools

Related documentation

DOCUMENT	DETAILS
DOC/DBK/001	Acra KAM-500 Databook
DOC/HBK/002	Environmental Qualification Handbook
DOC/MAN/018	KSM-500 Databook
DOC/MAN/030	DAS Studio 3 User Manual
TEC/NOT/016	Power dissipation
TEC/NOT/045	Using the KAD/BIT/101
TEC/NOT/049	Power estimation

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