



RAPID CONTROLS

Product Specification for SAB-A



The SAB-A module converts change in two channels of magnetostrictive transducer position and velocity to four –10 to 10 VDC analog outputs. The conversion is implemented with a micro-controller, EPLD, and 16-bit DACs, giving accurate, low-latency output. The module continually interrogates the magnetostrictive transducers for position and updates both the position and velocity analog outputs after each interrogation. The transducer update rate, velocity window size, and analog output ranges are configurable using a text-based menu accessible via the RS-232/485 port. Visual transducer status is provided by status LEDs. A ‘transducer OK’ output signals the proper functioning of the transducer electrically for each channel.

Features

- Two channels of 24-bit position from Start/Stop, PWM or SSI magnetostrictive transducers
- Ability to use one sensor for all channels of analog output
- Transducer OK output and LED signals valid transducer operation
- Software update rate, velocity window, and analog position/velocity ranges
- Setup mode uses RS232 or RS485 at 9600 baud
- Blinking LED indicates good operation of SAB-Q2
- Watchdog timer for reset upon software failure
- EEPROM for non-volatile storage of setup parameters
- Convenient screw terminal connections

Specifications

- Two channels of 24-bit magnetostrictive transducer measurement
- 56 MHz oscillator for 0.001 inch resolution with 2 recirculations (when using start/stop)
- 28 MHz 87C520 processor with 1KB local RAM
- Sixty-four words of non-volatile EEPROM storage
- Two electrically isolated DC outputs for Transducer OK (0-24 VDC at 50 ma)
- Power requirements: 7.5 – 26 VDC at 300mA (420 ma with 2 transducers attached)
- Enclosure is 4.64 inches deep x 5.31 high x 1.77 wide (118 x 135 x 46 mm)
- Enclosure occupies 1.77 inches (45 mm) of DIN rail space
- Analog outputs:
 - Resolution is 16-bit (0.3 mV) with –10.0V to +10.0V output range
 - Maximum output current +/-5mA

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Specify model: **SAB-A-A-B-C-D**

- A. Number of Channels**
 - 2** One 2 channel board in DIN enclosure
- B. Transducer Interface**
 - RPM** Start Stop or PWM
 - SSI** SSI
- C. Position Output Options**
 - Omit for no analog position output
 - PA** Two-channel 16-bit analog position output
- D. Velocity Output Options**
 - Omit for no analog velocity output
 - VA** Two-channel 16-bit analog velocity output

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General Operation

At power-on the board sends version information over the RS232/485 port at 9600 bps, 8 data bits, no parity, 1 stop bit. It then immediately begins measuring the transducer position, and analog velocity and position information is output. A setup menu is available via the RS232/485 port, and can be accessed by sending escape (ASCII 27) 3 times with no intervening characters.

Status

A red LED on the board blinks during operation. Two green LEDs indicate the status of the transducers. A lit LED indicates a good transducer, and a dim or dark LED indicates a missing or failing transducer or magnet.

At power-on, the board will print a sign-on message indicating the date of software in the board and the status of the retrieval of data stored in the EEPROM. A message similar to the following is displayed:

```
Rapid Controls Inc. SAB-A Copyright(c) 1997-1999 Rapid Controls Inc. 06-03-2002
EEPROM load successful.
```

Setup

Setup can be accomplished with a terminal or computer connected to the JP1 (host) connector. If the host desires to enter the 'Setup Mode' the host should send three escape (ASCII 27) characters rapidly at 9600 bps, using 8 data bits, no parity bits, and 1 stop bit until the board acknowledges with a setup menu. Setup values are stored in non-volatile EEPROM memory.

Default Setup

The default setup is programmed at the factory and is available via the 'Factory Defaults' setup command.

Setup item	Default Value
Transducer Update Time	2 ms
Eavesdrop Mode	Normal
Detected Update Time	N/A
Recirculations	0
Transducer Type	24-bit SSI
Velocity Window Size	50 transducer updates
Analog Position Start	0 counts
Analog Position Range	100000 counts
Analog Velocity Range	100000 counts/sec

Setup Operation

To start the setup process, connect a 9600-bps terminal to the serial port and press the escape key or space bar three times. The SAB-A will then enter setup mode. A menu will appear offering various setup possibilities. In addition status information will be displayed, including the currently measured transducer position in counts. To exit the setup mode, choose 'Quit' from the setup menu or cycle the power to the board.

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Setup Menu Items

Eavesdrop Mode

If eavesdrop mode is set to *Normal*, sensor interrogation is carried out as normal - a 1 microsecond pulse is sent to the sensor each update period.

If eavesdrop mode is set to *Eavesdrop*, sensor interrogation is expected to be carried out by an external device. In this mode, the interrogate pulse is detected by the SAB-A and used to detect the update period.

Detected Update Time

The detected update time is only valid when operating in eavesdrop mode. The update time is detected by monitoring the interrogate pulses received from the external device that is interrogating the sensor.

When operating in *Normal* mode, this value can be ignored. The desired update period can be set by changing the *Transducer Update Time* setup item.

Recirculations

The number of recirculations is the number of times a Start/Stop transducer is re-read to increase the precision of measurement. The value of each count is reduced as the number of recirculations increases. This setting is ignored for all other transducer types than Start/Stop.

Transducer Type

The transducer type indicates the type of transducer expected on a particular channel. Available options are SSI 24, SSI 25, Start/Stop, PWM, and Copy Other. The SSI options indicate the number of bits returned by the transducer and should be used with SAB-A-S models. The Start/Stop and PWM settings are to be used with SAB-A-R models.

The Copy Other option is a special option that causes the selected channel to use the position information from the other channel. This mode is designed for operation with a single sensor. Although the position information is copied from the other channel, the setup items may differ between the channels. For example, the 2nd channel could have a different velocity window size or a different analog range.

Transducer Update Time

The transducer update time is the number of milliseconds between each update of the transducer position information.

Velocity Window Size

The velocity window size determines the number of position updates that are included in each calculation of the channel's velocity output. For example if the velocity window size is 10, the current position and the position 10 transducer updates ago are used to calculate the velocity.

Analog Position Start

The number of counts at which analog position output begins. Any positions below this value are output as -10VDC.

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Analog Position Range

The number of counts covered by the total range of the analog position output. For example, if analog position start is 5000 and analog position range is 25000, output will be -10V at 5000 or less counts, 0V at 15000 counts, and 10V at 30000 counts and higher.

Analog Velocity Range

The number of counts/sec covered by each half of the analog velocity output. For example, if the analog velocity range is 20000, the output will be -10V at -20000 counts/sec, 0V at 0 counts/sec, and 10V at 20000 counts/sec. 0V is always output when the speed is 0 counts/second.

Save to EEPROM

Select this item to save the values to the EEPROM. They values will not be saved until this is selected.

Load from EEPROM

Select his item to load the values from the EEPROM to memory.

Factory Defaults

Select this item to change all of the setup values to the factory defaults. Note that this does not save the factory default settings in the EEPROM.

Quit

Select this item to exit setup and begin operation. The values you have chosen will now be in effect. However any values not saved to the EEPROM will be lost when power is removed.

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Dip Switch

Dip switch S1 is not used.

Jumpers

Jumper X1

This jumper selects the source of the program to execute.
X11-2 Runs the internal program. (Soldered in this position)
X12-3 Runs an external program.

Jumper X2

This jumper selects the serial communications format.
X2 1-2 RS485
X2 2-3 RS232

Jumper X3

This jumper connects RS485 line termination resistors Install 1-2 and 3-4 for the last board in a series of RS485 configured boards to provide line termination.

X3 1-2 Connects RS485 – to +5V pull up terminator
X3 3-4 Connects RS485 + to ground pull down terminator

Jumper X4

This jumper is used to properly connect the transducer status outputs, based on the choice of common applied to the JP1-8 connector. The status outputs must be configured according to the choice of common applied to JP1-8. If ground is applied to pin JP1-8 the outputs will be sinking and the jumpers must be installed 1-3, 5-7, 2-4 and 6-8. If a voltage (12 to 24V) is applied to JP1-8 the outputs will source the voltage and the X4 jumpers must be installed 1-2, 3-4, 5-6 and 7-8.

Jumper JTAG

The JTAG jumper is used at the factory and has no function in the field.

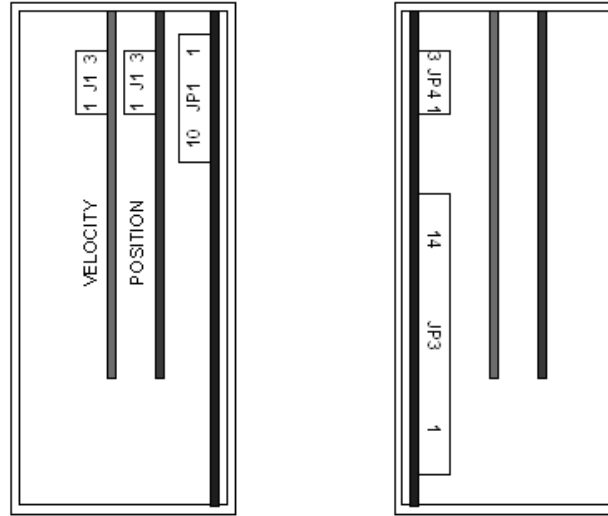
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Connectors



Pin	Function	Pin	Function
JP1-1	Logic Ground	JP3-1	Ch 0 Clk+ to sensor
JP1-2	RS232 Receive from host	JP3-2	Ch 0 Clk- to sensor
JP1-3	RS232 Transmit to host	JP3-3	Ch 0 Data+ from sensor
JP1-4	RS485 TxD/RxD – (RS485 A)	JP3-4	Ch 0 Data- from sensor
JP1-5	RS485 TxD/RxD + (RS485 B)	JP3-5	+24VDC Power to sensor
JP1-6	Input 1	JP3-6	Ground
JP1-7	Input 2	JP3-7	No Connect
JP1-8	Input common	JP3-8	Ch 1 Clk+ to sensor
JP1-9	Ch 0 Sensor status output	JP3-9	Ch 1 Clk- to sensor
JP1-10	Ch 1 Sensor status output	JP3-10	Ch 1 Data+ from sensor
		JP3-11	Ch 1 Data- from sensor
JP4-1	+24 VDC power	JP3-12	+24VDC Power to sensor
JP4-2	Power common and signal ground	JP3-13	Ground
JP4-3	No Connect	JP3-14	No Connect
J1-1 (Position)	Ch 0 Position Analog Out	J1-1 (Velocity)	Ch 0 Velocity Analog Out
J1-2 (Position)	Analog ground	J1-2 (Velocity)	Analog ground
J1-3 (Position)	Ch 1 Position Analog Out	J1-3 (Velocity)	Ch 1 Velocity Analog Out

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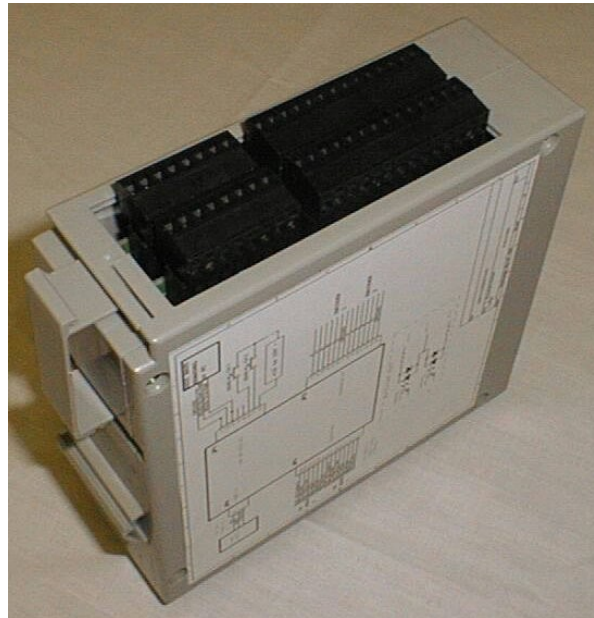
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Power Consumption

The board consumes approximately 300 milliamps of the + input voltage supplied to JP4-1 for its own operation. Each transducer attached requires approximately 60 milliamps of the + input voltage for a total of 420 milliamps. The board does not require the – input voltage at JP4-3 but passes it along to the transducer.

Enclosure

The SAB-A is mounted in a DIN rail mounted enclosure, containing one SAB-A board and 2 analog daughter boards. The enclosure is 4.64 inches deep x 5.31 deep x 1.77 wide, and uses 1.8 inches or DIN rail space.

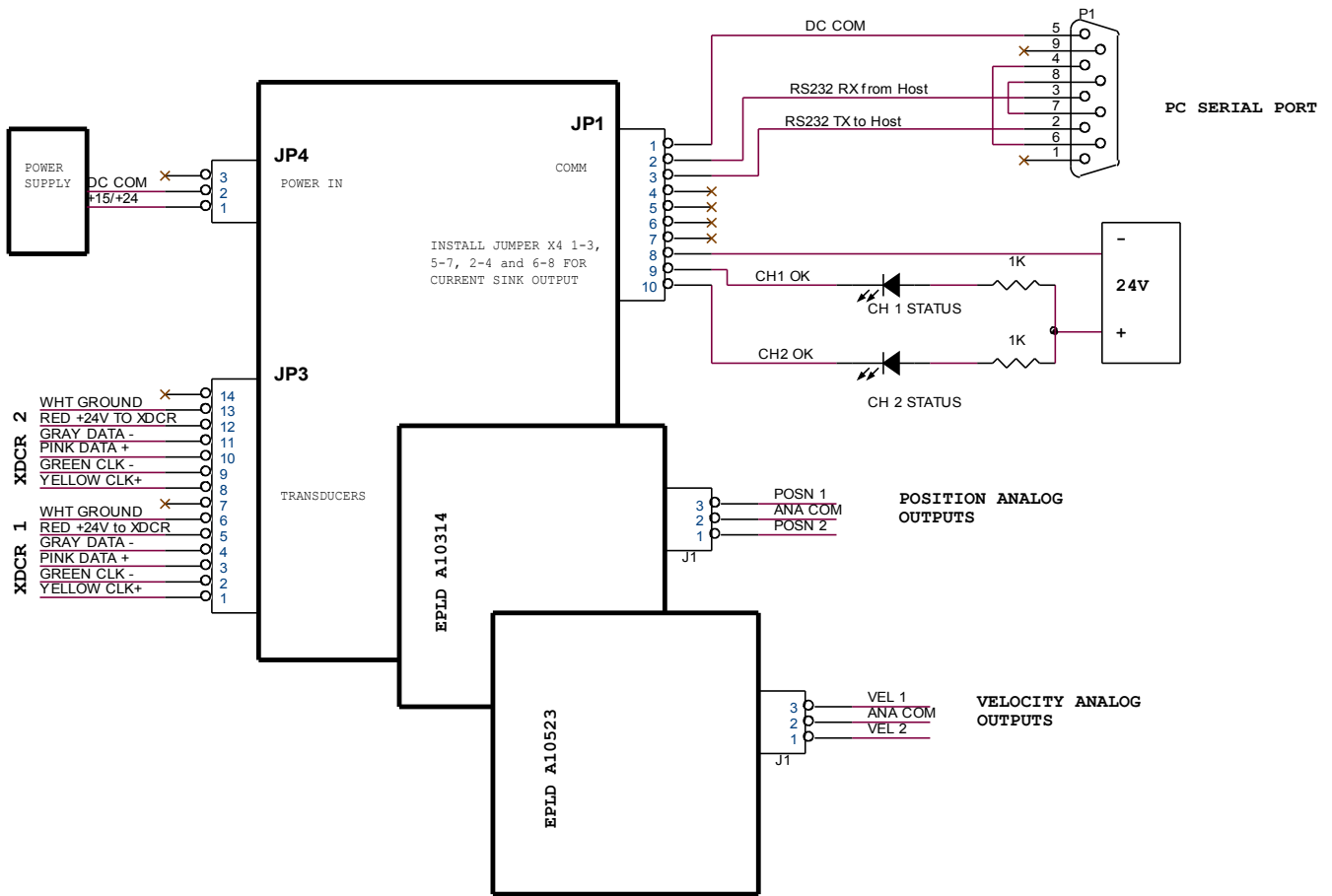


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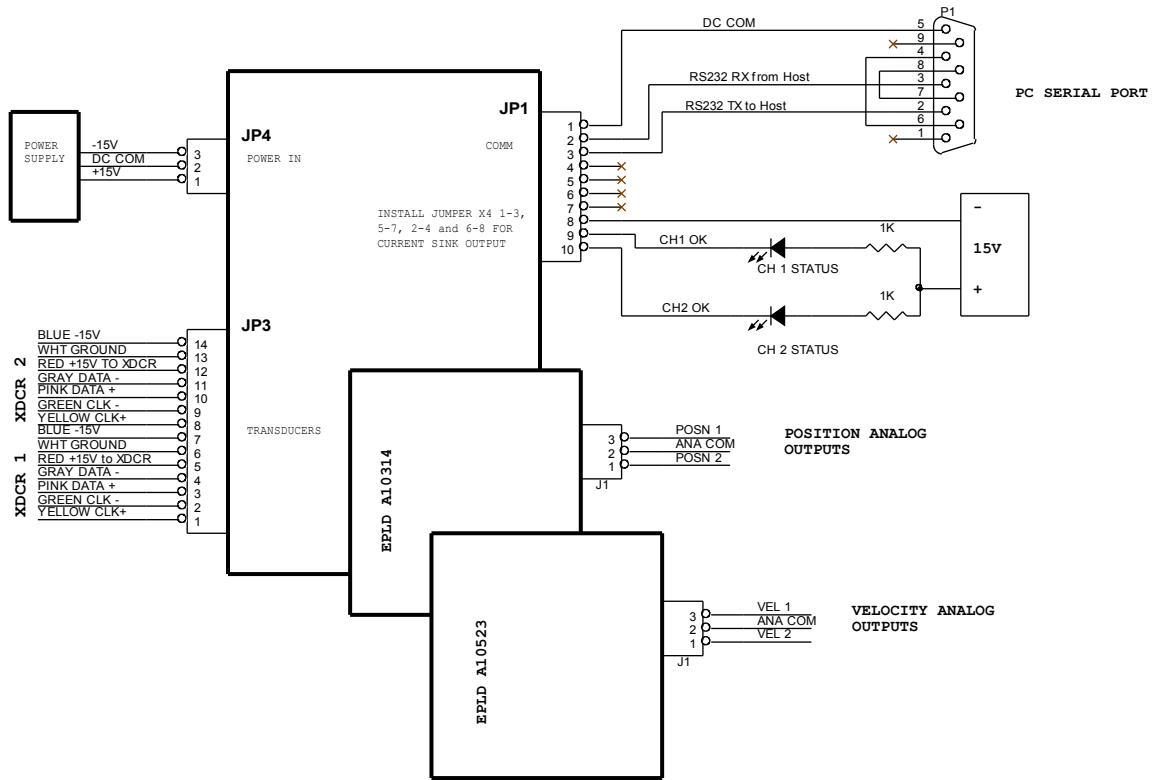
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Typical Connections 24V transducer



Typical Connections +/-15V transducer