



BBG-DSC2

Analog/Serial to 2-Channel Synchro/Resolver "SMART" Converter Card

Description



The BBG-DSC2 is a PCbus compatible card which interfaces to any slot of an IBM PC or clone. This board receives angular information from an analog or serial data input and produces three outputs: a two speed synchro or resolver signal, two analog channels, and/or a serial data channel.

The synchro format output is a standard 5 wire (S1, S2, S3, RL, and RH) at 90V LL or 11.8V LL. Resolver output is a standard 6 wire (Sin, Sin Return, Cos, Cos Return, RH, and RL) at 6.8Vrms. Standard reference inputs of 60 Hz and 400 Hz are supported with custom voltages and frequencies available upon request.

The serial data output uses the NMEA 0183 message structures and supports RS-232, RS-422, RS-423, RS-485, and MIL-STD-188C protocols. The analog I/O interfaces to dc signals over the range of -5 to +5 volts.

The BBG-DSC2 is a "SMART" interface due to the onboard processor which communicates with the PCbus through shared memory, thus, requiring minimum PC processor time. Angular information is available to the PCbus via shared memory.

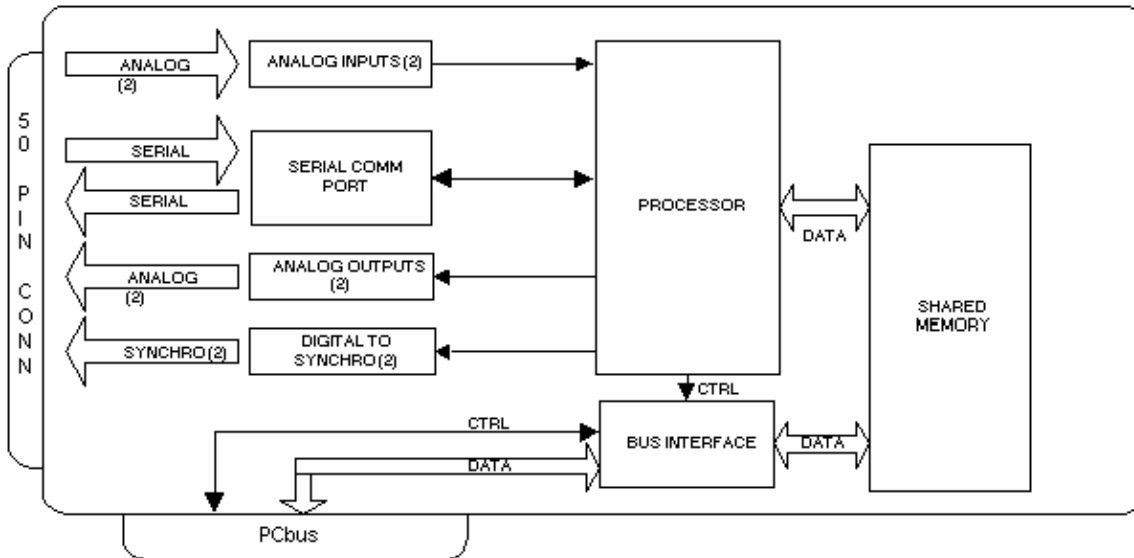
In situations not requiring a PC interface, the BBG-DSC2 operates in a "STAND-ALONE" mode. With the addition of an external +5 volt power supply, the onboard processor converts the serial inputs into synchro/resolver and serial data formats without the requirement of a PCbus.

Features

- IBM PC COMPATIBLE
- ANALOG/SERIAL INPUT
- ANALOG/SERIAL AND TWO SPEED SYNCHRO/RESOLVER OUTPUTS
- NEMA-0183 COMPATIBLE RS-232, RS-422, RS-423, RS-485, MIL-STD-188C PROTOCOLS
- DUAL PORT INTERFACE TO PCbus
- STAND-ALONE MODE WITH ADDITIONAL POWER SUPPLY
- CUSTOM IMPLEMENTATION AVAILABLE UPON REQUEST



Chart



Technical Specifications

BBG-DSC2 SPECIFICATIONS			
PARAMETER	UNITS	VALUE	
POWER SUPPLY	Volts	5	
	Milliamps		
TEMPERATURE RANGE			
	OPERATING	C°	0 to +50
STORAGE	C°	-65 to +150	
PHYSICAL CHARACTERISTICS			
	FULL SIZE IBM PC CARD	in.	4.5 x 13.5 x 0.6
		cm.	11.4 x 34.3 x 1.5

Table 1. BBG-DSC2 Specifications



Overview

The BBG-DSC2 is a full-size IBM PC card which interfaces between analog, serial, synchro, and/or resolver signals. Two channels of analog information (-5 to +5 voltage range) and/or one channel of serial information representing speed or angular position can be received and processed by the onboard microcontroller. This data, formatted as a binary angle measurement (BAM) number as shown in Table 2, is passed through dual port memory to the PCbus on demand from the host computer.

The processed angular information is, also, available in three different data formats on a 50 pin "D" connector. A NMEA-0183 serial data format updated at a rate of once per second is transmitted over both RS-232 and RS-422 interfaces. Two channels of analog information (-5 volt to +5 voltage range) is transmitted continuously. Two factory configurable synchro or resolver outputs representing speed and/or angular position is output continuously at a user defined voltage and frequency. The synchro/resolver outputs can be two independent channels or one dual speed channel (1X, 36X).

The BBG-DSC2 can, also, be used without a computer in a stand alone mode. During power up or reset, an onboard microcontroller reads the configuration switch and configures the card to provide all signals and control necessary for full interface operation.

When used in a computer configuration, switches provide for bus address selection and interrupts IRQ2 thru IRQ7 are jumper selectable. Baud rates are switch selectable and can programmed via the PC bus. Selectable baud rates include: 1200, 2400, 4800, 9600, and 19,200 bits per second. Default data output is 9600, 8 bits, no parity, and one stop bit (9600, 8, N, 1). Table 3 defines the switch position for the available baud rates.



BINARY ANGLE MEASUREMENT FORMAT		
BIT	DEG/BIT	MIN/BIT
1 (MSB)	180	10,800
2	90	5,400
3	45	2,700
4	22.5	1,350
5	11.25	675
6	5.625	337.5
7	2.813	168.75
8	1.405	84.38
9	0.7031	42.19
10	0.3516	21.09
11	0.1758	10.55
12	0.0879	5.27
13	0.0439	2.64
14	0.0220	1.32
15	0.0110	0.66
16 (LSB)	0.0055	0.33

Table 2. BINARY ANGLE MEASUREMENT FORMAT



BBG-DSC2 BAUD RATE SELECTION								
BAUD RATE (bits per sec)	Configuration Switch S1							
	1	2	3	4	5	6	7	8
1200	1	1	0	X	X	X	X	X
2400	0	0	1	X	X	X	X	X
4800	1	0	1	X	X	X	X	X
9600	0	1	1	X	X	X	X	X
19200	1	1	1	X	X	X	X	X

1 = off, 0 = on, X = Don't Care

Table 3. BBG-DSC2 Baud Rate Selection

SOFTWARE

A C driver program "dsc2.c" is included with the BBG-DSC2. This file contains the function calls needed to operate the pc interface. The function "get_ang_dsc2" reads the BAM value from dual port memory and converts the data to a floating point angle. The function "set_baud" allows changing of the baud rate under computer control. The function "reset_dsc2" is used to reset the interface card to it's default configuration.



SELECTING AN ADDRESS

The BBG-DSC2 uses sixteen (16) I/O addresses. The card reset register requires two addresses, the baud rate configuration register requires one address, and the BAM input register requires one address. The remaining 12 addresses are decoded and reserved for future requirements.

The base address of the card is set by switches SW1, SW2, and SW3. SW1 sets address bits 15-12, SW2 sets address bits 11-8, and SW3 sets address bits 7-4. This allows the card to be placed on any 16 bit boundary in I/O space.

Examples of switch positions and card addresses follow with an I/O map of the card shown in Table 4.

Example: SW1 is set to 0, SW2 is set to 3, and SW3 is set to 0. The address of the card is 300-30F. (Factory Default)

Example: SW1 is set to 0, SW2 is set to 3, and SW3 is set to 2. The address of the card is 320-32F.

BBG-DSC2 I/O ADDRESS MAP			
ADDRESS	REGISTER	ADDRESS	REGISTER
XX0	Set Baud	XX8	Not Used
XX1	Not Used	XX9	Not Used
XX2	Clear Reset	XXA	Enable Reset
XX3	Not Used	XXB	Not Used
XX4	Not Used	XXC	Not Used
XX5	Not Used	XXD	BAM Input
XX6	Not Used	XXE	Not Used
XX7	Not Used	XXF	Not Used

Table 4. BBG-DSC2 I/O Address Map



NMEA 0183 FORMAT

The BBG-DSC2 can be factory programmed for any NMEA 0183 data format. Current data format is as follows:

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$PTBBG,XXX.XX,A*CSCRLF
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\$ - start of message ascii character 24 Hex

PT - Proprietary message

BBG - BBG Incorporated

XXX.XX - channel 1 synchro/resolver angle (ex: 045.01)

A - validity (A = valid, V = Invalid)

* - ascii character 2A Hex

CS - checksum (8 bit XOR of characters between \$ and *)

CR - carriage return

LF - Line feed

OPTIONS**SYNCHRO OUTPUT**

The BBG-DSC2 can be factory configured for 90Vrms, 11.8Vrms, and/or 6.8Vrms synchro or resolver outputs at 60Hz or 400Hz. Custom voltages and frequencies are available upon request. Please specify desired voltage when ordering card.

CONFIGURATION JUMPER LIST

BBG-DSC2 JUMPER CONFIGURATION		
JUMPER	PINS	Not Used
P9	1-2	IRQ2
	3-4	IRQ3
	5-6	IRQ4
	7-8	IRQ5
	9-10	IRQ6
	11-12	IRQ7

Table 5. BBG-DSC2 Configuration Jumper List



CONNECTOR LIST FOR BBG-DSC2

I/O CONNECTOR TYPE: DD50PA

CONNECTOR MATE: DD50S

PIN NO	SIGNAL	PIN NO	SIGNAL
1	ANALOG OUT2	26	BCD6 (INPUT/OUTPUT)
2	ANALOG OUT REFERENCE 2	27	BCD5 (INPUT/OUTPUT)
3	S4_2 (OUTPUT)	28	BCD4 (INPUT/OUTPUT)
4	S3_2 (OUTPUT)	29	BCD3 (INPUT/OUTPUT)
5	S2_2 (OUTPUT)	30	BCD2 (INPUT/OUTPUT)
6	S1_2 (OUTPUT)	31	BCD1 (INPUT/OUTPUT)
7	RH2 (FUSED REF1+ INPUT)	32	BCD0 (INPUT/OUTPUT)
8	RL2 (REF1- INPUT)	33	-15V (INPUT) *
9	S4_1/+COS_1 (OUTPUT)	34	+5V (IN/OUT) **
10	S3_1/-SIN_1 (OUTPUT)	35	+5V (IN/OUT) **
11	S2_1/-COS_1 (OUTPUT)	36	GND
12	S1_1/+SIN_1 (OUTPUT)	37	GND
13	RF1 (REF2+ INPUT)	38	TXD232 (OUTPUT)
14	RL1 (REF2- INPUT)	39	RXD232 (INPUT)
15	ANALOG INPUT GND	40	TXC232 (OUTPUT)
16	+15V (INPUT) *	41	RXC232 (INPUT)
17	ANALOG INPUT 1	42	TXD422+ (OUTPUT)
18	ANALOG OUTPUT 1	43	TXD422- (OUTPUT)
19	ANALOG OUTPUT GND	44	RXD422+ (INPUT)
20	ANALOG OUT REFERENCE 1	45	RXD422- (INPUT)
21	BCTL4 (OUTPUT)	46	RXC422+ (OUTPUT)



22	BCTL3 (OUTPUT)	47	TXC422- (OUTPUT)
23	BCTL2 (OUTPUT)	48	TXC422+ (INPUT)
24	BCTL1 (OUTPUT)	49	RXC422- (INPUT)
25	BCD7 (INPUT/OUTPUT)	50	ANALOG INPUT 2

* NOTE: +15V and -15V are required for analog I/O and/or non reference powered Digital-to-Synchro Converters.

** NOTE: +5V is an output if using a standard PCbus computer and an input if operating in the stand alone mode.

