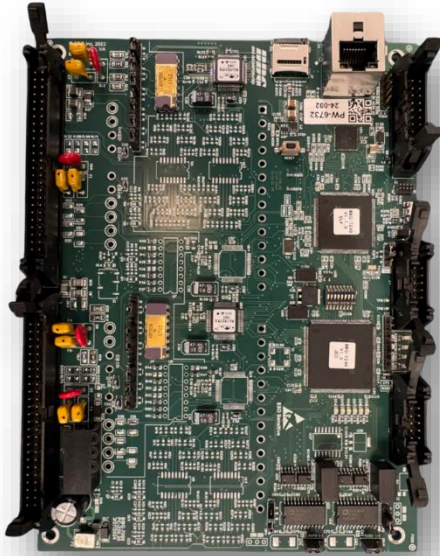# BBG-7XXX-PCA

Data Acquisition PCA

Description

The BBG-7XXX-PCA is a standalone PCB module with an embedded NMEA processor, up to four synchro receive channels, and two synchro transmitters.

The NMEA processor can be configured in the field to generate arbitrary sentences in real time over serial and ethernet.

Applications

- Radar Systems (antenna azimuth)

- Navigation Systems (Gyrocompass, speed log, course, pitch, and roll)

- Industrial Processes (position, velocity)

- Meteorology Instruments (wind speed and direction)

- Many Others

Features

- Factory configurable with up to two low-power synchro outputs, and up to four synchro inputs

- Gigabit Ethernet (GbE) Network interface (TCP, UDP, multicast...)

- Dual isolated serial ports, user configurable as RS-422 or RS-232

- Field configurable NMEA engine, with up to 32 custom sentences

- Debug utilities for on-site problem solving

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Revision History

Revision Number	Date	Page	Changes

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Block Diagram
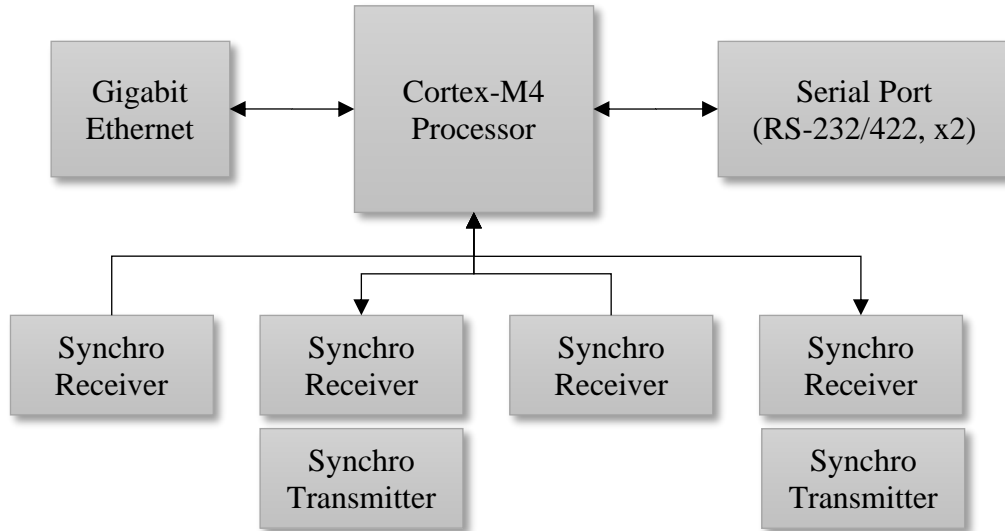
The BBG-7XXX-PCA can support up to four synchro receive channels. Two of the receive channels are factory configurable with synchro transmitters. When ordering, please specify the desired synchro configuration.

Technical Specifications

Unit Name	Dual Channel Synchro Serial PCB			
Unit Part Number	BBG-7XXX-PCA			
Unit Color	N/A			
Parameter	**Value**			**Units**
	Min	**Nom**	**Max**	
Power Input				
Voltage	5	12	36	VDC
Power Draw	-	2.5	-	W
Reference Input				
Voltage	104	115	126.5	VAC
Frequency (60 Hz Model)	57	60	63	Hz
Frequency (400 Hz Model)	360	400	440	Hz
Current (Load Dependent)	-	200	500	mA
Data Output				

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Ethernet	10/100/1000 Base-T		*
Message Rate	0	1	>10**	Hz
Baud Rate	120	115200	> 1M	Baud
Configurable Sentences	32		NMEA
Synchro Input			
Reference	115		VAC
	60 or 400		Hz
	1		A
Synchro	90		VAC
	60 - 400		Hz
Accuracy	+/- 4		arc minutes
Physical Characteristics			
Size	5.5 in	140 cm	Height
	7.5 in	170 cm	Width
	~2 in	~5cm	Depth
Weight	~5.6 oz	~160 g	
Heat Dissipation	<10 Watts		
Mounting Clearances	3 in	7.62cm	Top
	-	-	Bottom
	1 in	2.54 cm	Side

Note: Reference input frequency is factory configured. Synchro output frequency is matched to reference input frequency. 60 Hz outputs available at 1.5 VA.

* Custom protocols available
** Maximum rate dependent on configuration

Overview

The BBG-7XXX-PCA (PCA) is a standalone PCB assembly that provides flexible connectivity between synchros and NMEA interfaces. Users can connect to a USB serial console to reconfigure application behavior in the field, as well as debug and test system behavior.

The PCA can be factory configured to support up to four synchro inputs, and two synchro outputs. When ordering, please specify the configuration and reference frequency (60 Hz, or 400 Hz). Users can arbitrarily scale the synchro values to support any synchro scaling requirements.

In stock configuration, the PCA comes with two isolated serial ports, user configurable as RS-232 or RS-422. The ports are independently configurable to operate at any baud rate

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with any valid NMEA message. A Gigabit Ethernet interface provides network connectivity where required.

The NMEA engine (or, application firmware) currently supports arbitrary message generation and transmission on all interfaces and can populate the messages with any combination of supported variables – such as the current synchro angles, or network time.

In standard configuration, the PCA is powered with 12VDC through either J1 or J2. Users may also power the PCA through their computer's USB port for debugging operations, including checking servo motor positions, manually writing servo output values, and monitoring UART data.

The BBG-7XXX printed circuit assembly receives, interprets, and provides data to the digital to synchro converter modules located on the underside of the PCA. PCA functionality is determined by jumpers and configuration switch (S1) at power-on or reset. The PCA has one ethernet input channel and two output synchro channels. A 3-port on-board gigabit ethernet switch provides high bandwidth packet filtering and routing while also supplying interfacing and buffering. During power-on or reset, an onboard microcontroller reads the configuration switch and internal memory, configures the network interface, and provides all signals and control necessary to read the desired interface, process the data, and output the converted information. The digital to synchro converter modules receive the "digital" angle and drives the attached equipment to that angle. A serial console is provided via USB for configuration and debugging.

Mode Configuration

PCB operating modes are defined in **Table 1**. The PCA comes factory set to customer requirements. Configuration changes can be made based on **Table 1.** A power reset is required after any configuration changes.

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BBG-7XXX-PCA

Configuration Switch S1

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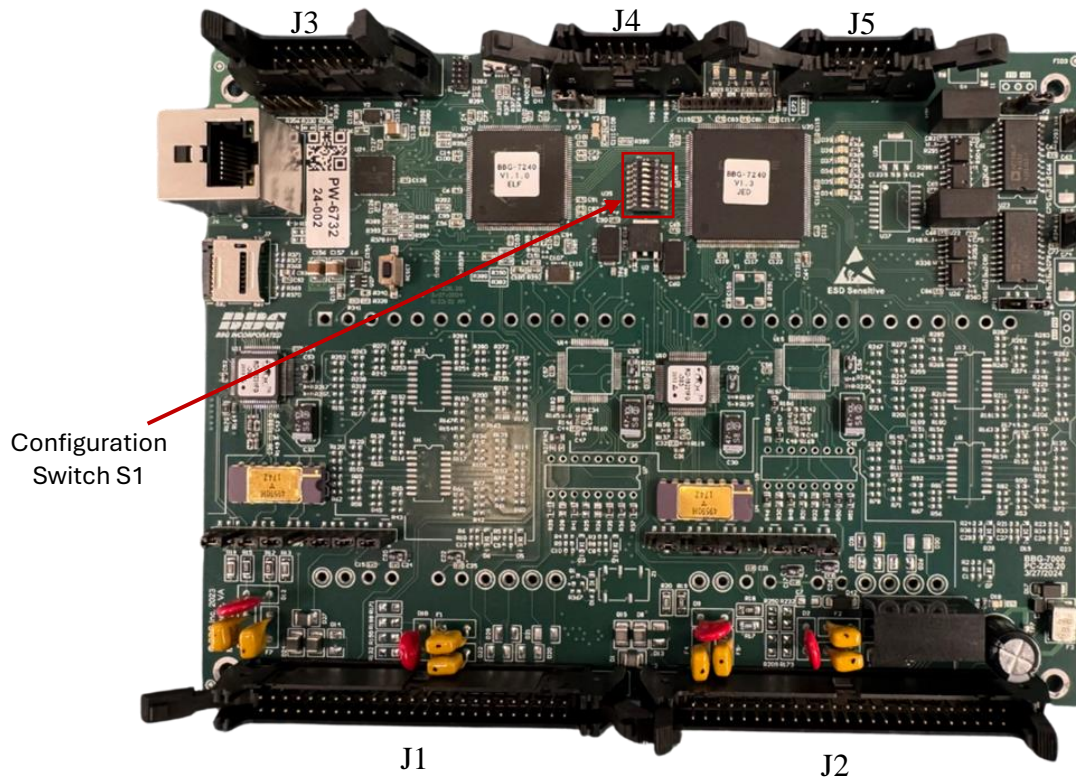
Table 1. PCA Mode Selection

PCA MODE CONFIGURATION SETTINGS								
	Configuration Switch S1							
	8	7	6	5	4	3	2	1
Factory Default	OFF	OFF	OFF	OFF	OFF	ON	ON	ON
1200 Baud	-	-	-	-	-	OFF	OFF	OFF
2400 Baud	-	-	-	-	-	OFF	OFF	ON
4800 Baud	-	-	-	-	-	OFF	ON	OFF
9600 Baud	-	-	-	-	-	OFF	ON	ON
19200 Baud	-	-	-	-	-	ON	OFF	OFF
38400 Baud	-	-	-	-	-	ON	OFF	ON
57600 Baud	-	-	-	-	-	ON	ON	OFF
115200 Baud	-	-	-	-	-	ON	ON	ON
Invert Reference Polarity	-	ON	-	-	-	-	-	-
Use DHCP	ON	-	-	-	-	-	-	-

Each mode configuration option is independent. The meanings of the configuration options are explained below. Users may change switches while the unit is running, but changes will not apply until the unit is rebooted or power cycled.

Baud Rate: This setting provides a simple way to set the baud rate for both UART channels.

Reference Invert: During installation, the "high" and "low" synchro reference inputs may be swapped. This causes both synchro channels to add 180° to their direction. Set SW1-7 high to subtract this offset. Since both synchro channels use the same reference, this switch will remove the offset from both channels.

Use DHCP: The PCA provides one channel of network based 10/100/1000BaseT ethernet protocol input. The interface arrives factory set with a static IP address per customer requirements. The Ethernet Interface is user configurable via a micro-USB port located on the PCA. The interface port enumerates on Windows, Mac, and Linux as a serial COM port, and can be communicated with over any standard serial

terminal program, such as Hyperterm, PuTTY, Screen, and many others. Setting this switch on will cause the unit to attempt to acquire it's network address through DHCP.

Connector List

Inputs and outputs are available on rectangular connectors provided with the BBG-7XXX-PCA. Inputs and outputs are listed below:

J1 & J2   DC Power, and Synchro Channels

Pin Count	50	PCB Connector	3M N3433-6302RB
# Rows	2	Mating Connector	Molex 0022552502
Pin Spacing	0.1"		

Pin	J1	J2	Pin	J1	J2
1	Power In		26		
2	Power In		27		
3			28		
4			29		
5	Power GND		30		
6	Power GND		31		
7	Power GND		32		
8			33		
9	SD3/DS1: RH	SD2/DS0: RH	34		
10	SD3/DS1: RL	SD2/DS0: RL	35		
11	SD3/DS1: RH	SD2/DS0: RH	36		
12	SD3/DS1: RL	SD2/DS0: RL	37		
13	SD3/DS1: S4	SD2/DS0: S4	38		
14	SD3/DS1: S3	SD2/DS0: S3	39		
15	SD3/DS1: S2	SD2/DS0: S2	40		
16	SD3/DS1: S1	SD2/DS0: S1	41		
17			42		
18			43		
19			44	SD1: RH	SD0: RH
20			45	SD1: RL	SD0: RL
21			46		
22			47	SD1: S4	SD0: S4
23			48	SD1: S3	SD0: S3
24			49	SD1: S2	SD0: S2
25			50	SD1: S1	SD0: S1

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J3   Display Connector

Pin Count	16	PCB Connector	3M N3408-6302RB
# Rows	2	Mating Connector	Molex 0022552162
Pin Spacing	0.1"		

Pin	J3	Pin	J3
1	+5V / GND	9	D2
2	+5V / GND	10	D3
3	CMDEN	11	D4
4	GND	12	D5
5	STRB	13	D6
6	DWR	14	D7
7	D0	15	Backlight GND
8	D1	16	+5V

Pins 1&2 are configurable to either 5V or GND, as needed for your system. Use the jumpers on JP14 to configure the pins.

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
GND	J3-P2	+5V	J3-P1	GND

J4 & J5   Serial

Pin Count	16	PCB Connector	3M N3408-6302RB
# Rows	2	Mating Connector	Molex 0022552162
Pin Spacing	0.1"		

8 Data Bits, 1 Stop Bit, No Parity, No Flow Control

Pin	J4 (UART1)	J5 (UART0)	Pin	J4(UART1)	J5(UART0)
1	DNC	DNC	6	RX B (422)	RX B (422)
2	J4-P7	J5-P7	7	J4-P2	J5-P2
3	TX (232) / TX_A (422)	TX (232) / TX_A (422)	8		
4	TX B (422)	TX B (422)	9	GND	GND
5	RX (232) / RX A (422)	RX (232) / RX A (422)	10		

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Mounting Information
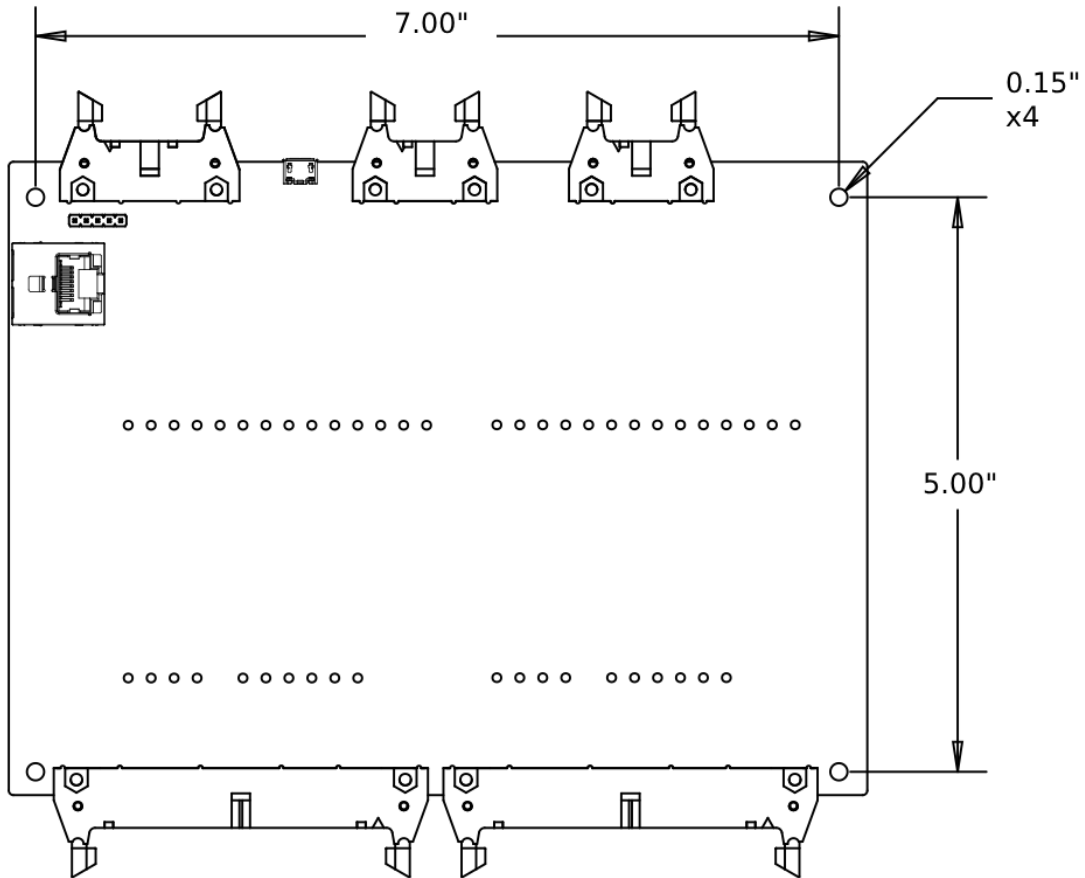
Note: PCA depicted with horizontal connectors.

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