MENTOR
E N G I N E E R I N G

BBX Version 3.2

General Description

BBX is a wireless GPS unit with AVL (Automatic Vehicle Location) capability. The unit has been designed for use with a Computer Aided Dispatch system to monitor fleet vehicles on the road. It can interface with several different RF Data Modems or a Conventional radio system. As well, the device has multiple vehicle inputs and can attach to several different peripheral devices via RS232 or USB communication.

- 16Mb of Flash (Expandable to 80 Mb)
- 8Mb of RAM
- Voltage output on RS232 (5V or Vswch)
- USB Device controller
- Built in odometer signal conditioner
- Software selectable pull up or pull down on VEH-I4 and VEH-I5
- 16 channel GPS receiver
- Optional internal wireless modem (Spread Spectrum, 1xRTT, Mobitex, Datatac, iDEN, 802.11b)
- J-1708 Capability

Standard Features

- 2 Analog Inputs
- 3 Biased Analog Inputs
- 4 Open Drain Digital Outputs
- 2 Additional I/O

Optional Features

- Internal 16 Channel GPS receiver – Requires Active GPS Antenna
- Internal Wireless Data Modems 4800 – 9600 bps Modem

Key Specifications

- Supply Voltage

Typical	12 V
Min	9 V
Max	32 V

- Current Consumption[1]

Input	Current Draw (mA)		
	Standby	No DSP	DSP Equipped
9	2.5	108	165
18	5	57	90
32	10	36	60

  Maximum[2]   2A

- Operating Temperature

Min	-30 ^{o}C
Max	65 ^{o}C

- Storage Temperature

Min	-40 ^{o}C
Max	80 ^{o}C

Compliance and Testing

- FCC part 15, Class A
- ISO 7637-1 Load Dump Transient
- MIL STD 810F: General Vibration
- MIL STD 810F: Shock

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1. No modem option or peripheral devices are included in these numbers. Installing a modem and peripheral devices will increase current consumption considerably.
2. This is an absolute maximum which includes an installed modem and all peripheral devices

WARNING

MENTOR ENGINEERING INC. RESERVES THE RIGHT TO CHANGE CIRCUITRY AND SPECIFICATIONS WITHOUT NOTICE AT ANY TIME. PLEASE ENSURE YOU HAVE THE MOST RECENT REVISION OF THIS DOCUMENT.

NOTE

OPERATION AT TEMPERATURES OUTSIDE THE RECOMMENDED RANGES IN NOT RECOMMENDED.

NOTE

ONLY USE MENTOR ENGINEERING APPROVED CABLES FOR INSTALLATION PURPOSES. REFER TO THE HARDWARE INSTALLATION MANUAL FOR ADDITIONAL INFORMATION.

BBX Connections

The cable cover on the BBX unit can be removed by hand or by using a flathead screwdriver to loosen the two screws. Removing the cable cover gives access to the BBX interface connectors, which are detailed below.
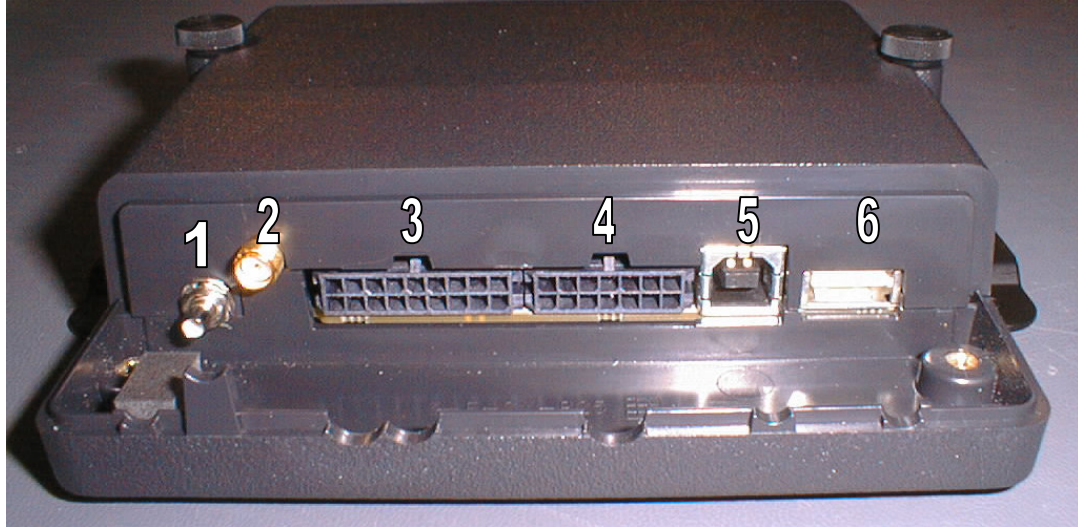

Figure 3 BBX Interface points (Rear View)

Figure 4 BBX Interface points (Front View)

Interface Summary

1. Straight SMB Connector
    GPS Antenna
2. Straight SMA Connector
    Modem Antenna
3. 18pin Micro Fit Connector (MOLEX 43045-1806)
    Power, Ignition Sense, Odometer and Vehicle I/O
4. 14pin Micro Fit Connector: (MOLEX43045-1406)
    Radio I/O
5. USB-B Slave Port
6. *Future Use*

7. User Interface
LEDs to indicate – USB Good link, Error, In Coverage, Transmit Indicate, GPS, Power (IGN on).
8. 8 position Modular Jack - RJ48 (AMP 406525-1)
RS232 Comm Port (Debug)

RS232 COM Port

PIN NO.	NAME	I/O Type	MIN	TYP	MAX	UNIT	DESCRIPTION
1	DSR	RS232 In	+/-3		+/-15	V	Data Set Ready.
2	~PRG	Digital In	0		5	V	Puts the BBX into programming mode when held low during power-up. BBX enters debug mode when held low after power-up.
3	DTR1	RS232 Out	+/-5	+/-5.4		V	Data Terminal Ready.
4	GND			0		V	Ground.
5	RX	RS232 In	+/-3		+/-15	V	Receives RS232 data from an external device.
6	TX	RS232 Out	+/-5	+/-5.4		V	Transmits to external device at RS232 levels.
7	CTS	RS232 In	+/-3		+/-15	V	Clear to Send. JP15 in position B.
8	RTS	RS232 Out	+/-5	+/-5.4		V	Ready to Send. JP16 in position B.
7[1]	VCC_5	Voltage Out		5.0		V	5V power supply output. JP15 in position A.
					250	mA	Maximum current draw (Split with Radio connector voltage out)
8[1]	VSWCH[2]	Voltage Out	9	12	32	V	This voltage is typically within 1 V of the BBX supply voltage. JP16 in position A.
					500	mA	Maximum current draw[3]

1. CTS and/or RTS inputs cannot be connected when using outputs VCC_5 and/or VSWCH respectively.
2. Only available on 12V Input systems.
3. The current consumed by the BBX and all peripheral devices must not exceed 3A.

14 pin Radio Interface

PIN NO.	NAME	I/O TYPE	MIN	TYP	MAX	UNIT	DESCRIPTION
1	RAD-TXA	Audio Out Type I	0.5		16	Vpp	Transmit radio signal. See Audio Type I section in Appendix.
2	RAD-RXA	Audio In	0		4	Vpp	Audio signal input.
3	MIC-IN	Audio In	0		4	Vpp	Microphone input.
4	RAD-TXA1	Audio Out Type I	0.5		16	Vpp	Transmit radio signal. Second output. Could be used for differential output situations or Mic Out. See Audio Type I section in Appendix.
5	PTT	Open Drain Output Type I	0		32	V	See Open Drain Output Type I section in Appendix.
			0		175	mA	
6	COS	Analog In Type I	0		32	V	This line divides the input voltage by four and a half. See Analog Type I section in Appendix.
7	RAD-I1	Analog In Type I	0		32	V	This line divides the input voltage by four and a half. See Analog Type I section in Appendix.
8	RAD-I2	Digital In Type I	0		32	V	See Digital In Type I section in Appendix.
9	RAD-I3	Digital In Type I	0		32	V	See Digital In Type I section in Appendix.

PIN NO.	NAME	I/O TYPE	MIN	TYP	MAX	UNIT	DESCRIPTION
10	RAD-01	Open Drain Output Type I	0		32	V	See Open Drain Output Type I section in Appendix.
			0		175	mA	
11	RAD-02	Open Drain Output Type I	0		32	V	See Open Drain Output Type I section in Appendix.
			0		175	mA	
12	RAD-03	Open Drain Output Type I	0		32	V	See Open Drain Output Type I section in Appendix.
			0		175	mA	
5[4]	MDM-MODESEL[5]	RS232 Out	+/-5	+/-5.4		V	Low Power Selection.
6[4]	MDM-CTS[5]	RS232 In	+/-3		+/-15	V	Clear to Send
7[4]	MDM-DSR[5]	RS232 In	+/-3		+/-15	V	Data Set Ready
8[4]	RFM-RX[5]	RS232 In	+/-3		+/-15	V	Receives RS232 data from an external modem.
9[4]	MDM-DCD[5]	RS232 In	+/-3		+/-15	V	Connection Status.
10[4]	MDM-RTS[5]	RS232 Out	+/-5	+/-5.4		V	Ready to Send.
11[4]	MDM-DTR[5]	RS232 Out	+/-5	+/-5.4		V	Data Terminal Ready
12[4]	RFM-TX[5]	RS232 Out	+/-5	+/-5.4		V	Transmits to external Modem at RS232 levels.
13	VCC_5	Voltage Out		5.0		V	5V power supply output
					250	mA	Maximum Current draw (split with RS232 voltage out?)
14	GND			0		V	Ground.

4. Radio interface is not available when these pins are configured to communicate with an external modem.
5. These signal are for external modem use.

18 pin Vehicle Interface

PIN NO.	NAME	I/O TYPE	MIN	TYP	MAX	UNIT	DESCRIPTION
1	VIN	Unregulated Voltage	9	12	32	V	BBX supply input. 3A Max.
2	GND			0		V	Ground. Can sink high currents.
3	IGN	Digital In	0		32	V	Refer to Ignition sense section in the Appendix.
4	VEH-ODOM	Odometer In	0.5*		32	Vpp	Can be connected directly to a digital (0-5V) odometer signal or the odometer signal can be amplified and cleaned up within the BBX. **Refer to the Odometer section in the Appendix.**
			1		250**	Hz	
5	VEH-I1	Analog In Type II	0		32	V	Refer to the Analog Input Type II section in the Appendix.
6	VEH-O1	Open Drain Output Type I	0		32	V	Refer to the Open Drain Output Type I section in the Appendix.
					175	mA	
7	VEH-I2	Analog In Type II	0		32	V	Refer to the Analog Input Type II section in the Appendix.
8	VEH-O2	Open Drain Output Type I	0		32	V	Refer to the Open Drain Output Type I section in the Appendix.
					175	mA	
9	VEH-I3	Analog In Type II	0		32	V	Refer to the Analog Input Type II section in the Appendix.
10	VEH-O3	Open Drain Output Type I	0		32	V	Refer to the Open Drain Output Type I section in the Appendix.
					175	mA	

PIN NO.	NAME	I/O TYPE	MIN	TYP	MAX	UNIT	DESCRIPTION
11	VEH-I4/O4	Digital In Type II /Open Drain Output Type II	0		32	V	When used as an input refer to the Digital Input Type II section in the Appendix. When used as an output, refer to the Open Drain Output Type II section in the Appendix.
12	VEH-I5/O5	Digital In Type II /Open Drain Output Type II	0		32	V	When used as an input refer to the Digital Input Type II section in the Appendix. When used as an output, refer to the Open Drain Output Type II section in the Appendix.
13	N/A						Future Use
14	N/A						Future Use
15	VEH-I6	Analog In Type III	0		5	V	Refer to the Analog Input Type III section in the Appendix.
16	VEH-I7	Analog In Type III	0		5	V	Refer to the Analog Input Type III section in the Appendix.
17	VEH-O6	Open Drain Output Type I	0		32	V	Refer to the Open Drain Output Type I section in the Appendix.
					175	mA	
18	GND			0		V	Ground. Can sink high currents.

* 	Odometer circuit sensitivity is dependant on frequency, Refer to the Odometer section in the Appendix.

** 	This is the ideal frequency range of the circuit, Refer to the Odometer section in the Appendix for extended frequency operation characteristics.

WARNING: DO NOT CONNECT ANY I/O LINE TO A VALUE GREATER THAN 32V