

**Application Bulletin** 

August 3. 2007

Garmin GPS to XLe

# Garmin GPS to XLe Application Note

### <u>Overview</u>

The HE200GPS183 GPS Receiver (GPS183) is an OCS accessory that provides a variety of GPS data to the control system with a high degree of accuracy. GPS stands for "Global Positioning System" – which consists of a set of earth-orbiting satellites and ground stations. GPS allows a portable receiver to calculate with a high degree of accuracy its current position, time, velocity, etc.

The GPS183 uses NMEA0183 protocol – which is a standard established by the National Marine Educators Association. The GPS183 utilizes RS-232 for data communications, and is powered by 5Vdc. Most OCS models (NX, LX, QX) provide an appropriate 5V output on their serial ports. The XLe does not feature a 5V output – it requires an external 5V, 60mA power supply to power the GPS183.

F7 F8 F9

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Products used: HE200GPS183	Horner GPS		
HE-XE105	Horner XLe	72       CF1       Neter	

### References:

Horner GPS Manual MAN0857-01 XLE Hardware Manual MAN0808-01, 0809-01 and 0810-01

### GPS Cable Pin out\_

Pin	Color	Signal Name	Direction
1	Yellow	1Hz Measurement Pulse	Out
2	Red	Supply Voltage In (5V)	ln
3	Black	Signal Common (0V)	-
4	White	Transmit Data (TXD)	Out
5	Black	Supply Voltage Common (0V)	-
6	Green	Receive Data (RXD)	ln

### Note:

- 1. The Yellow wire from the GPS is NOT used
- 2. The Thicker Black wire is for the supply voltage common
- 3. The XLe pin out is for the port, NOT the cable connector

#### XLe Port Pin out

	Pin	MJ1	1 Pins	MJ2 Pins		
	8	TXD	OUT	TXD	OUT	
E %	7	RXD	IN	RXD	IN	
	6	0 V	Ground	0 V	Ground	
┞ ┌╯	5	NC	No Connect	NC	No Connect	
	4	CTS	OUT	TX-	OUT	
	3	RTS	IN	TX+	OUT	
	2	RX-/ TX-	IN / OUT	RX-	IN	
	1	RX+/ TX+	IN / OUT	RX+	IN	

#### 



5 Black (Thick) ------ Supply Voltage Common (0V) 6 Green ------ 8 TXD

## Configuration inside of CsCAPE (v8.10 or higher)

Use comm. Port 2 (MJ2) on the XLe. This will keep you programming port (MJ1) available for CsCAPE programming, diagnostics, and troubleshooting.

Use CsCAPE to set MJ2 protocol to the GPS protocol

- 1. Open CsCAPE
- 2. Set the hardware configuration to your model of XLe
- 3. Select Program then Protocol Config...
- 4. From the drop down list on MJ2 select GPS Protocol v1.03

This will add the GPS Protocol to the MJ2 field. You are now ready to start the three steps required for any protocol configuration

Protocol Config		
Serial Protocols-		
MJ1/Com Option	None	•
MJ2	None	•
Ethernet	- None Allen Bradley DF1 v 1.01 CsCAN Serial v 1.02 GE SNP (Series 90 Protocol) v 1.01 GPS Protocol v 1.03 Modbus Master v 1.05	

Protocol Config					×
Serial Protocols					
MJ1/Com Option	None	Network	Devices	Scan List	
MJ2	GPS Protocol v 1.03	Network	Devices	Scan List	
	None	Network	Devices	Scan List	
Ethernet	None	Network	Devices	Scan List	
		01	K Can	cel	

5. The first step is to set the **Network Setup** parameters. This is to configure the comm. Port settings. Baud Rate, Parity, Data Bits, Stop Bits, Handshaking, Protocol, RS232 or RS485, Scan Update Rate, Timeout and retries. All of these parameters are defaulted to the correct parameters. **The only thing you need to set in this box is the Status Registers.** I used %R1 for this demo. This will give you information about the status of the communications between the GPS and the XLe on MJ2.

Network Confi	g (GPS Pro	otocol)			×
Port Configuratio	on		Update Scan		
Baud Rate:	4800	~	Automatic		
Parity:	None	~	ReacquireTime:	10000	mSec
Data Bits:	8	~	C Manual		
Stop Bits:	1	-	Trigger:		(1-BIT)
Handshake:	None	-	ID Select:		16-BIT
Protocol:		~	Status		
Mode:	RS-232	-	Register: %R000	01 4 x 32-8	•
Retries:	2	(0-255)			_
Timeout:	1000	mSec	- Master ID / Address		
				OK (	Cancel
Protocol Help					

- 6. The second tab is to configure the device. In this case there is only one device and this has been done for you. With the GPS protocol selected, you will not be able to select this tab.
- 7. The last step in the protocol setup is to set the scan list. Click this tab and select the Add Button. You only need to fill in two fields in this area. Set the Length (number of words) to 25 Set the Local Register Address (I used %R101). Note that the Target-Device Register defaults to main. You do not need to fill this in

Data Mapping	E
- Target	
Device Name: One To O	ne Link Requires No Id. 📃 💌
Device Register: main	> 32-bit access
Length: 25	
Local	
Register: %R0101	
Name: GPS_Lat_	Deg 💌
Update Type	
Polled Read	C Triggered Read
C Polled Read/Write	C Triggered Write
C Polled Read/Write Init	Trigger Register:
	OK Cancel

8. Click **OK**. You should see your scan list updated to the following

Scan List (GPS Pro	Scan List (GPS Protocol)									
Edit View Sort										
Index Local Name O GPS_Lat_Deg	Register %R0101	Type <	Dev Name garmin	ID 1	Target main	Len 25	Trig None	Add Delete Config Edit Names		
Filter By	Device:	All		•			OK	Cancel		

- 9. Click **OK** to accept the Scan List
- 10. Click **OK** to Accept the Protocol Configuration. You are now done with the protocol setup
- 11. The next step is to **do the I/O Name setup** for all of the GPS data. This data will start at %R101 and go through %R125.

See Table below for actual GPS data descriptions: (The GPS Manual will also give you detailed descriptions, Ranges, and engineering units for each data point)

1/0 N	lames					
Point	Tyj	pe	Name		-	
%HU %B0	101 16 102 16	5-bit S-bit	GPS_Lat_Deg GPS_Lat_Min	^		
%R0	103 16	S-bit	GPS Lat Sec			
%R0	104 16	S-bit	GPS_Lat_Hem		<u>C</u> opy All	
%R0	105 16	S-bit	GPS_Lon_Deg			
%R0	106 16	S-bit	GPS_Lon_Min		<u>P</u> aste	
%HU	107 16	5-bit	GPS_Lon_Sec			
280	108 16	D-DIC Subit	GPS Dau			
%R0	110 16	S-bit	GPS Month		Add	
%R0	111 16	S-bit	GPS_Year			
%R0	112 16	S-bit	GPS_Sec		<u>E</u> dit	
%R0	113 16	S-bit	GPS_Minutes			
%R0	114 16	S-bit	GPS_Hours		<u>R</u> emove	
~RU	115 15	DIC-C	GPS_Quality		) i fhara	
280	110 10	5-Dit 2.Біғ	GPS Har Dil	_		
2×R0	119 32	2-bit	GPS Elev			
%R0	121 32	2-bit	GPS_Geodial_Height			
%R0	123 32	2-bit	GPS_Ground_Speed			
~%R0	125 32	2-bit	GPS_course_over_ground			

12. **Create a Data Watch** window with all of the GPS data in it. See this to the right:

C	🔍 Watch - GPS_XLE demo(253)						
F	ile						
	Memory	Value	Туре	Name			
	%R0101	45	INT	GPS Lat Deg			
	%R0102	8	INT	GPS_Lat_Min			
	%R0103	50	INT	GPS_Lat_Sec			
	%R0104	78	INT	GPS_Lat_Hem			
	%R0105	92	INT	GPS_Lon_Deg			
	%R0106	59	INT	GPS_Lon_Min			
	%R0107	7	INT	GPS_Lon_Sec			
	%R0108	87	INT	GPS_Lon_Hem			
	%R0109	26	INT	GPS_Day			
	%R0110	7	INT	GPS_Month			
	%R0111	2007	INT	GPS_Year			
	%R0112	14	INT	GPS_Sec			
	%R0113	25	INT	GPS_Minutes			
	%R0114	15	INT	GPS_Hours			
	%R0115	1	INT	GPS_Quality			
	%R0116	8	INT	GPS_Sats			
	%R0117	11	DINT	GPS_Hor_Dil			
	%R0119	2919	DINT	GPS_Elev			
	%R0121	-314	DINT	GPS_Geodial_Height			
	%R0123	0	DINT	GPS_Ground_Speed			
	%R0125	3580	DINT	GPS_course_over_ground			
1							
	Print			Add Bupping			

13. The last step is to use the GPS data in your Relay Ladder Logic, Data Logging or Display Screens.

See Examples of GPS Data on the XLe Screens Below:

GARMIN GR LATITUDE HHH Lohgitude HHH Elev Above Sea Level	S DEMD * ##" ##" * ##" ##" Groumd Speed		
SEA LEVEL HHHH.H METERS HH:mm:ss	SPEED HHHH.HKHOTS dd-mm-yyyy	0	

### Additional Information to Connect GPS to other OCS X Products (see Below table)

Pin	Color	GPS183 Signal Name	XLe MJ2 RJ45	NX CN1 10-pos terminal	LX CN1 25-pin Dsub	QX CN1 25-pin Dsub	QX MJ2 RJ45
2	Red	Supply Voltage In (5V)	Ext. P/S*	9	9	9	3 or 4
3	Black	Signal Common (0V)	6	6**	7	7	5
4	White	Transmit Data Out (TXD)	7	7	3	3	7
5	Black	Supply Voltage Common (0V)	Ext. P/S*	6**	10	10	6
6	Green	Receive Data In (RXD)	8	5	2	2	8

### **Summary**

Horner APG wrote this document on August 3, 2007. Questions or comments can be directed to the Tech Support Department by phone at 317-916-4274 or email <u>techsppt@heapg.com</u>.