

LITTON MARINE SYSTEMS

BridgeMaster E Service Bulletin No. 1

BridgeMaster E Radars and GPS Interfacing

The following notes may help resolve problems when interfacing GPS Receivers to BridgeMaster E series of Radars.

The problems can be split into two categories. Software or Hardware. A Software category suggests that there is a commissioning problem or a GPS message incompatibility. A Hardware category suggests that there is an electrical mismatch with the GPS's serial output and the BM E's serial input. In either case the Display will generate an Alarm. There are 3 alarms associated with the Nav Sensor input. All alarms are accompanied by an audible 'bleeping'.

NAV INPUT

This is displayed 15 seconds after *NO* serial data is detected. The Lat/Long readout colour is then changed from green to red. After acknowledging the alarm, POSITION alarm is then displayed 45 seconds later and the Lat/Long readout is replaced with a red --⁰--.-- . If serial data has never been present then when switching on the Display, the same events will occur except that there will be no Lat/Long displayed at all. This problem is generally due to Hardware.

However, certain Software configurations can also cause this condition. That is if *none* of the message headers (selected at commissioning on the BM E) is sent by the GPS receiver. This can be misleading as although there is serial data present, NO readable data exists, hence NAV INPUT alarm will occur.

POSITION

This is displayed 1 minute after an *INVALID STATUS* indicator is received (or NO status is received when it is expected). The Lat/Long readout is replaced with a red --⁰--.-- . This condition would generally be due to Software.

GPS QUALITY

This will be displayed when the quality indicator (found in the GGA message only) decreases. This is not normally considered a problem. It is for information only. However, consistent alarming would suggest a Receiver problem or poor reception area.

SOFTWARE PROBLEMS

The GPS serial input port is defined and configured via the Initialisation - I/O Options page during the commissioning process. When the desired port is defined as a Nav Sensor, there are several options available to select various Input Message Headers. These Headers are selected as required with *caution* particularly the Lat/Long and Time headers.

LAT/LONG HEADERS

The following Headers are available: GLL, GGA, GLL & SLL, GLL & SNU

TIME HEADERS

ZZU and ZDA is available for the time.

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The selected Header **MUST** match the Header being received or a Position Alarm will be generated by the Display.

Examples of mismatched headers:

- GGA is selected but GLL is being received or vice versa.
- GLL & SLL is selected but only GLL is being received (this is quite common).
- GLL & SLL and ZZU is selected but GLL and ZDA is being received (this is also a common problem as this is the default setting).
- GGA and ZZU is selected but GLL and ZDA (only) is being received. This condition would actually cause a NAV INPUT alarm. Similarly, If *only* a Lat/Long message is being sent by the GPS (which will rarely be the case) and there is a Header mismatch then a NAV INPUT alarm condition will exist. *These examples could be mistaken for a Hardware fault.*

STATUS

A STATUS indicator shows if the GPS is *VALID* or *INVALID*. In an SLL message a single ASCII character indicates this. In a GLL message (*V2.0 and above*) this is also indicated by a single ASCII character. In a GGA message this is indicated by a value of 0 in the GPS quality indicator. If a STATUS message is expected but none is received or the STATUS message reports *INVALID*, then a POSITION alarm condition will exist.

Examples of invalid status conditions:

- GLL & SLL is selected but only GLL is being received.
- GLL & SNU is selected but only GLL is being received.
- With BSH *ON* and GLL is selected but GLL (version 1.5 or older) is being received.

COMMISSIONING DEFAULTS

With software V 3.0 or earlier, the Nav Sensor defaults are set to:
GLL & SLL, ZZU, R00 & WPL and VTG.

It is recommended that the Lat/Long header is changed to GLL or preferably GGA (if available) and the Time header is changed to ZDA.

Software V 3.01 onwards sets the default Lat/Long header to GLL. The other headers are not effected. In this case it is recommended that the Time header is changed to ZDA.

Note:

If BSH has to be *ON* then the GLL message must be NMEA V2.0 or greater in order for no alarms to occur.

HARDWARE PROBLEMS

Most NAV INPUT alarm conditions are due to a Hardware problem. Remember, a persistent NAV INPUT alarm is followed by a POSITION alarm after 45 seconds, so don't let this mislead you.

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The BM E has 2 serial input ports available for use. Either (Port 1 or Port 2) may be used to interface to a GPS receiver provided the correct Port is set up at commissioning.

At installation, is very important that the correct connections are made with respect to the type of signal being received. The following table shows the correct connections.

	PORT 1		PORT 2	
	TSE 1	TSE 3	TSF 1	TSF 3
RS 232	Return	Signal	Return	Signal
RS 422	+VE	-VE	+VE	-VE

If the GPS has a selectable output, then RS422 should be used in preference to RS232.

Most hardware problems occur with RS232 lines. The voltage swing with RS232 must be greater than 5 volts. **That is + 2.5 volts to -2.5 volts on the signal line and capable of a current source of at least 1 mA.** This is very important as if the GPS receiver's output is not of the stated level then it is very likely that the BM E's Serial Port's interfacing circuits will not 'see' the signal. We will almost certainly then have a NAV INPUT alarm condition indicating that there is NO serial data present. The only solution then is to use a suitable in-line serial buffer.

We are currently evaluating various buffers for recommendation in the near future.

Notes

DISPLAY PROCESSOR PCB 65800811

On an issue 1 Display Processor PCBs, there is a possibility that a NAV INPUT alarm could occur although the Hardware is correctly interfaced. In this case the only solution is to change the Processor PCB for an issue 2 or greater.

There are a number of wrongly marked up issue 2 PCBs. These boards are in fact issue 1 but marked up as issue 2. The only solution then is to change the board.

GPS RECEIVERS

At the time of writing, the following receivers are known to work:

LMX 400

FURUNO GP80

FURUNO GP30 (Use Data2 SD(Yellow) for Signal & SG(Blue) for Return, I/O setup for NMEA-REM/Ver2.0)

KODEN 931D (Use Data3 pin 6 for Signal and pin 7 for Return, set Output format to 0183-C)