



# CNC-100



## **OPERATION AND INSTALLATION MANUAL**

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## ***TMQ CNC-100 Introduction***

The CNC-100 is a Compass Correction device. It is able store the offset between your Magnetic Heading and your Actual heading from GPS.



An automatic correction for the heading is then calculated and sent to your navigation equipment, in particular ARPA / MARPA / ATA equipped RADAR, thus reducing the difference in Magnetic and actual heading.

Compass correction can be carried out via a PC connected to the CNC-100 whenever required. For example after a vessel has changed its area of operation or its' magnetic signature has altered.

### **Specifications**

Power Supply:	Between 10-35V DC.
Dimensions:	9.5cm x 6.35cm x 2.8cm (3.72" x 2.5" x 1.1")
Connections:	Internal terminal strip.
Input Sentences:	Heading: HDT, HDM Position: RMC



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## *Installation Requirements*

TMQ CNC-100

### Position

The TMQ CNC-100 should be mounted in a position protected from Rain and Salt Water at all times.

### Wiring

Access for wiring should be provided at the sides of the unit. Cables should be allowed to run to all necessary equipment and power supply.

### Magnetic Effect

As a minimum amount of Steel is used in the construction of the TMQ CNC-100 there would be negligible affect on the steering compass.

Wiring to and from the CNC-100 should be kept away from other wiring on the vessel to avoid interference being created in the CNC-100 wiring.

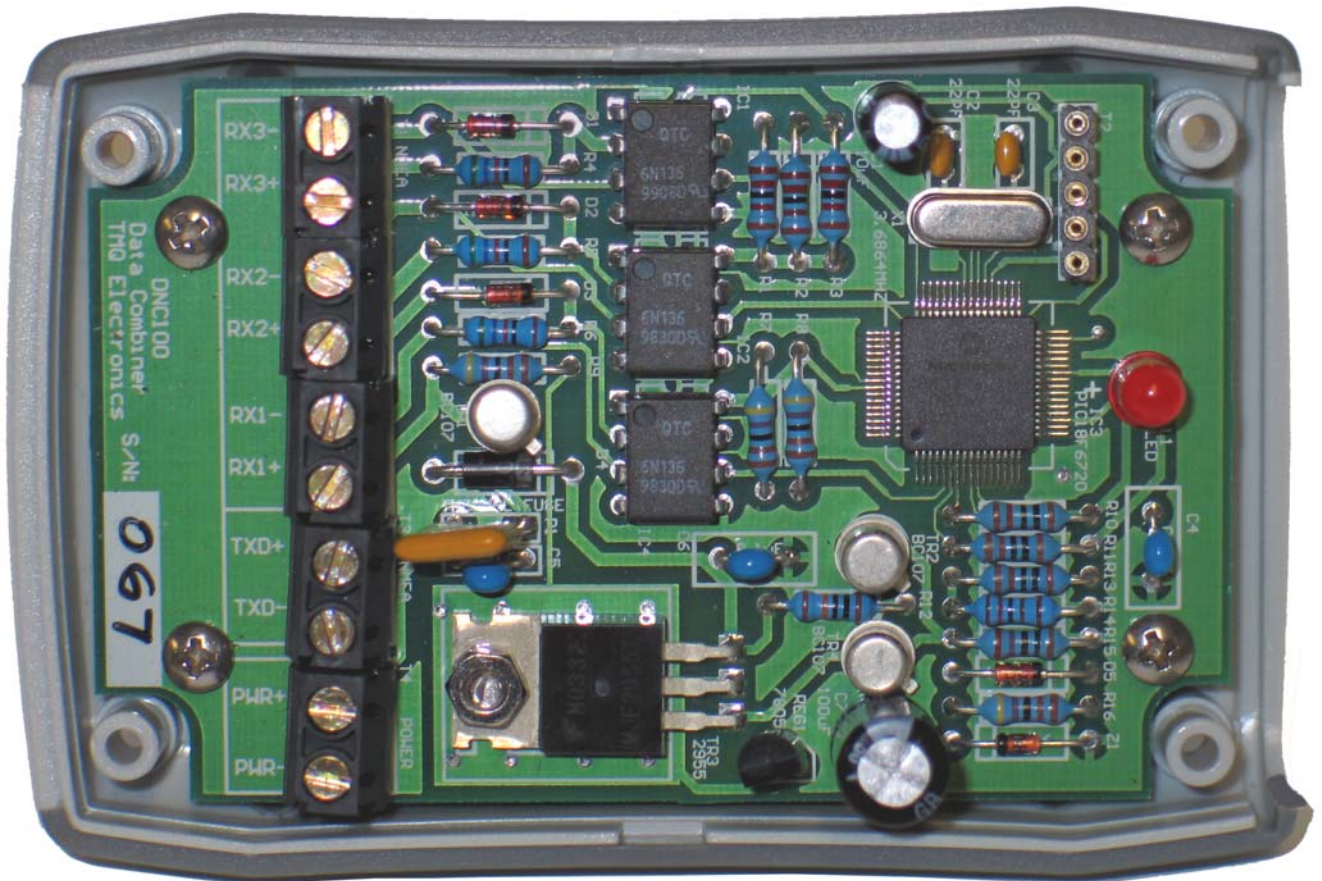
### Mounting

Double sided tape can be used to secure the TMQ CNC-100 to the required Surface. Alternatively, mounting holes can be drilled in the rear cover for screw fastening.

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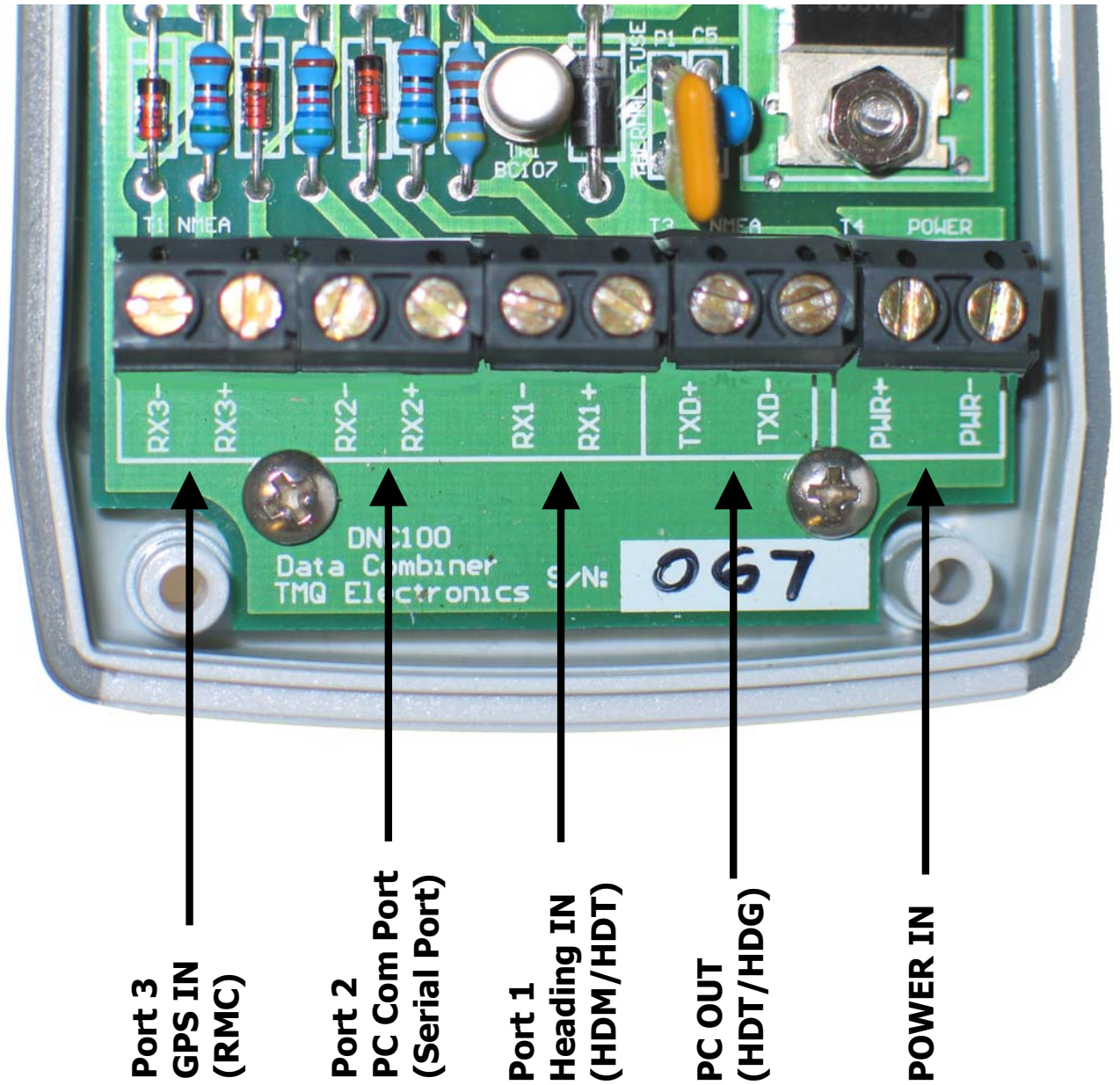
## *Internal Connections*

The casing of the CNC-100 must be removed by unscrewing the four screws holding the rear cover on. All connections to the CNC-100 are made internally via the terminal strip.



The PCB connections are shown in Figure 1.

Figure 1      CNC-100 Internal Terminal Strip



Power

The TMQ CNC-100 can be powered from 10-35V DC. Since there is no fuse within the unit, external protection is required.

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Connection is to the 2-Way Terminal strip as follows:-

PWR+            -----      10-35V Fused DC  
PWR -          -----      GND

### Data Input / Output

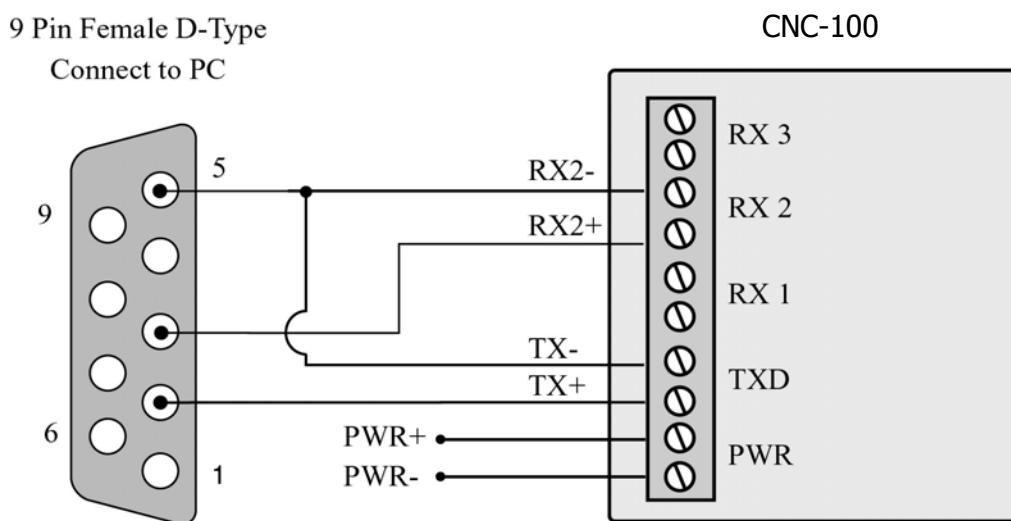
Data input is to the three Input Ports, Port 1 and Port 3

Note that RX1-, RX2-, RX3- and TXD- are the ground connections for their respective data lines (RX1+, RX2+, RX3+ and TXD+). Please note TX- is not isolated from negative (PWR-).

### Serial Data connections

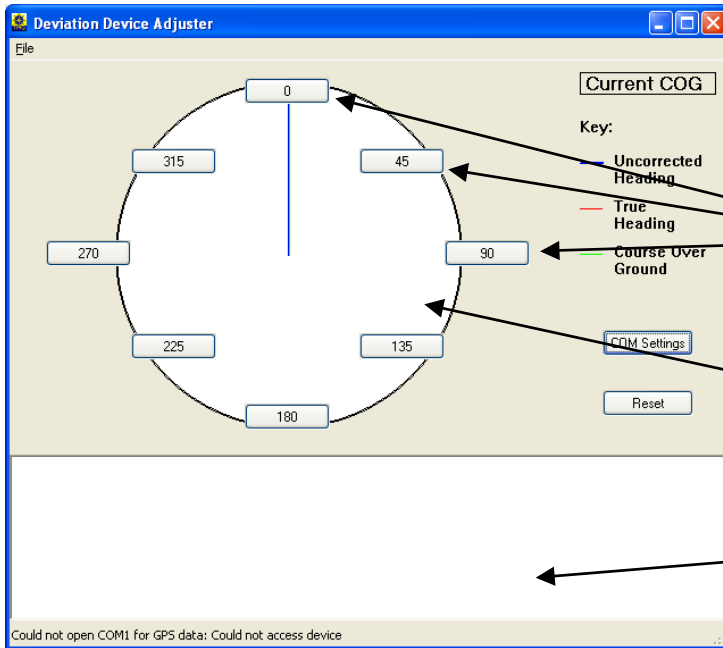
Heading (HDM/HDT Uncorrected Source)..... Port 1  
PC Connection..... Port 2  
GPS (RMC)..... Port 3

### ***Computer Connection Lead***



## Configuration Procedure

The TMQ CNC-100 connects to the PC is via Port 2 and TX+, TX-. Start the 'Deviation Device Adjuster', by running the TMQ 'Calibrate' Program, the window below will be displayed.



Actual Course Over Ground From GPS Data.

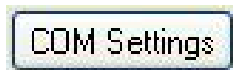
Heading Compensation Buttons

Deviation display

Serial Data Window. Transmit and Receive data. (Data will not be visible until connected to GPS etc.)

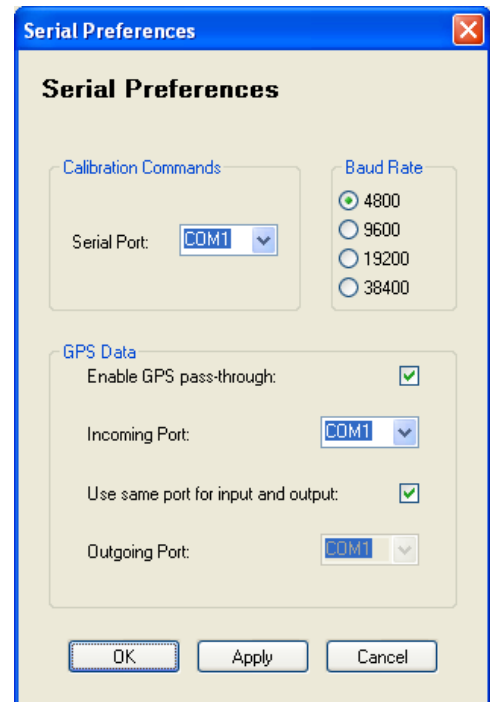
The Com Ports will require setting up.

Select



The 'Serial Preferences' - Com Port set-up window will be displayed.

All the Com Port configuration settings are made from within this window.

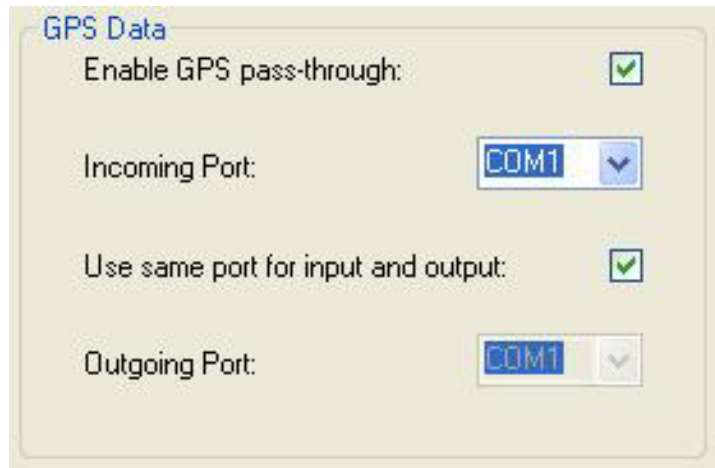


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Select the Serial Port from the 'Calibration Commands' section and speed from the 'Baud Rate' section for the Input data.



Select the Incoming and Outgoing Ports from the 'GPS Data' section.



The 'Enable GPS pass through' option will enable GPS Data to be ported through the COM ports on the PC. Select the COM ports from the drop down lists as required.

Place a 'Tick' in the box if this is required.



The 'Use same port for input and output' option will configure the CNC-100 to use the same serial port for both data input and output.

Place a 'Tick' in the box if this is required. (RECOMMENDED)

Click the  button when complete.

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After successful completion of serial port configuration data will be seen in the 'Serial Data Window' along with the COG in the 'Course Over Ground' box located in the top right corner of the 'Serial Data Window'.

It may be necessary to connect to the CNC-100 through the software. To achieve this the 'Say Hello' function is used. This will commence a valid serial connection to the CNC-100.

From the 'Deviation Device Adjuster' window click 'File', located at the top left of the window. Click 'Say Hello' to open the connection to the CNC-100. This will connect to the CNC-100 provided that the COM Port is configured correctly.

Note. If a connection is to be made to the CNC-100 via a serial program such as HyperTerminal, it will be necessary to disconnect from any active serial connection that the Deviation Device Adjuster software may have. Use the 'Say Goodbye' function.

From the 'Deviation Device Adjuster' window click 'File', located at the top left of the window. Click 'Say Goodbye' to close the connection to the CNC-100.

Deviation correction can now commence.

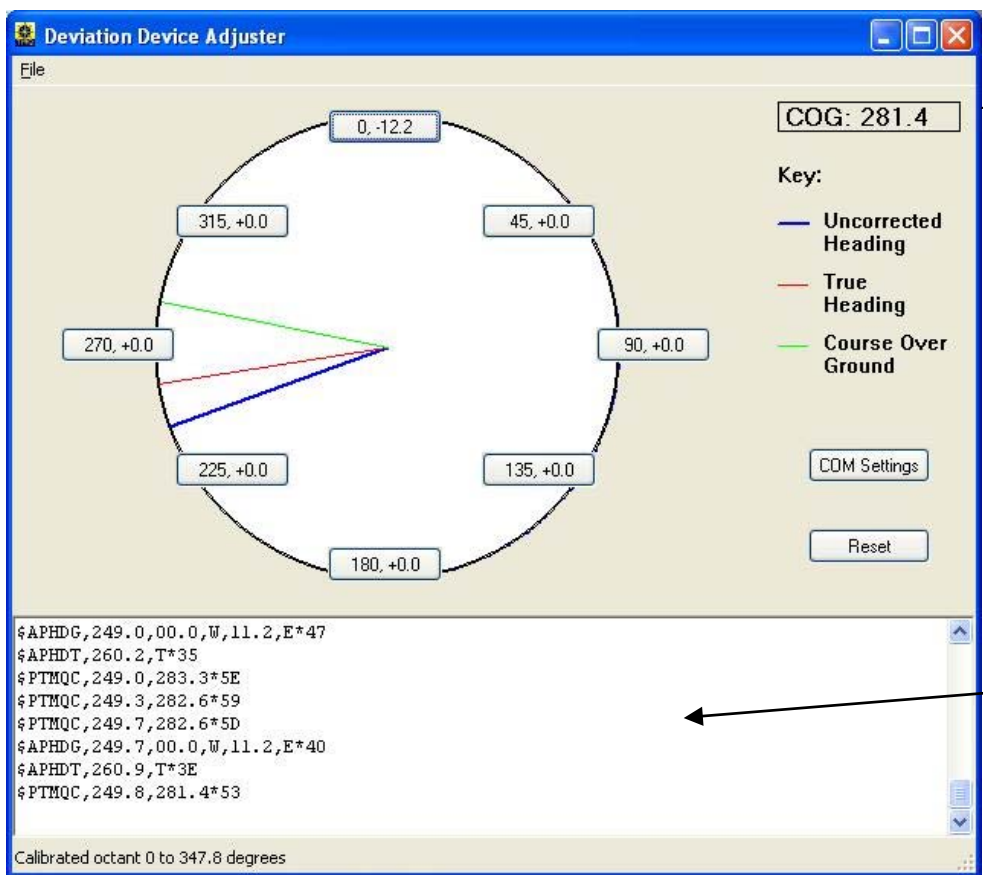
### ***Deviation Correction Explained***

There will be three lines visible within the simulated compass card of the 'Deviation Device Adjuster', each one represents a different component.

**Blue ----- Uncorrected Heading**, from magnetic compass

**Red ----- True Heading**, from GPS heading data

**Green ----- Course Over Ground**, from GPS data



Actual Course Over Ground From GPS Data.

Serial Data Window. Transmit and Receive data.

There are eight buttons, one every 45° (Octant) starting from the heading 000°. These are used for storing the deviation offset at each of these headings.


The appropriate button should be clicked when the vessel is travelling at each of those headings.

After a correction has been set for the particular heading the button will indicate the value of the correction made. The number is indicated within the button itself, for example **315, -12.2** this is showing a correction value of -12.2° for the heading of 315°.

Additionally, the calibration is confirmed at the bottom left of the 'Deviation Device Adjuster' window.

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The COG displayed in the top right corner of the 'Deviation Device Adjuster' window should be used to determine the current heading. Therefore the heading is the actual heading as received from the GPS.

The CNC-100 can be reset by clicking the  button at any time. All stored correction data will be reset to 0.

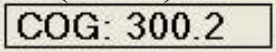
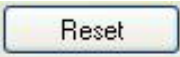
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## *Deviation Correction Procedure*

It is recommended that the GPS deviation is set to zero if the vessel is only working in a single area where the magnetic deviation will be constant. (Refer to your GPS users manual to achieve this.) Use Method 1 to correct the deviation.

If the vessel will be operating in different areas where the magnetic deviation will be different the correction requires to be carried out using the known deviation via the CNC-100. Use Method 2 to correct the deviation.

### Method 1

1. For best results this procedure should be carried out under calm conditions and at the top or bottom of the tide to alleviate the difference between Heading and COG. (i.e. no Leeway.)
2. Steer the vessel on the heading to be corrected (start at 000°, then 045°, 090°, 135°...). Use the Course Over Ground (COG) shown in the 'Deviation Device Adjuster' window. e.g.  Note: Course Over Ground is also the Green Line.
3. Click the appropriate button for the heading being corrected.
4. Repeat steps 2 and 3 for all eight headings. (Remember to start at 000° and go clockwise)
5. At any time if an error is made the  button can be clicked to reset all the stored correction values to zero. After the reset button has been clicked the entire Deviation Correction Procedure will have to be started again.

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## Method 2

(Example shown after method)

1. The Magnetic Variation must be known.
2. Use the COG from the GPS as displayed in the 'Deviation Device Adjuster' window.
3. Add or subtract (subtract for a Westerly variation, add for an Easterly variation) the known magnetic variation from each of the eight calibration headings (000, 045, 090, 135 etc).
4. Starting at the newly calculated heading for 000°. Head the vessel in the correct direction for 000° using the COG from the GPS and click the 000° button. **Note: The correction value will be displayed in the 000° button.**
5. Head in the newly calculated heading values and click the appropriate button for each of the remaining seven headings. **Note: Do this in a clockwise direction, 000, 045, 090, 135....**
6. After all eight corrections have been stored the deviation correction procedure is complete.

### **Example.**

Magnetic Variation is known to be 11°E.

As variation is East this value is required to be added to the heading for each of the eight calibration points. Calibrate in a clockwise direction.

<b>Heading to be corrected</b>	000°	045°	090°	135°	180°	225°	270°	315°
<b>COG to steer vessel</b>	011°	056°	101°	146°	191°	236°	181°	326°

Steer vessel to 011° COG and click the 000° button, then steer vessel 056° COG and click the 045° button, then steer vessel 101° COG and click the 090° button, continue until all eight headings have been calibrated.

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## *Troubleshooting*

If data is not coming from the output, Port 2 of the CNC-100:

- Check that the LED is flashing. If it is not flashing check the power supply to the CNC-100.
- Use the Serial View facility to check the types of sentences being received on each input port.
- Check that the speed of the COM port on the PC is the same as Port 2, this should be a Baud Rate of 4800.
- There is no data output while the menu is being displayed. Quit the main menu to resume data combining operation.

If typing '@CAL', Enter (↵) does not display the calibration menu:

- Ensure that there is a current serial connection to the CNC-100 by selecting 'File' from the 'Deviation Device Adjuster' window then click 'Say Hello' to open the connection to the CNC-100.
- Ensure that the transmit (TXD+) of Transmit Port and receive (RX2+) of Port 2 have been connected to the PC correctly. Refer to the Diagram 'Computer Connection Lead' if required.

**Do not enter the Bootloader section from the 'Options Menu' when connected to the CNC-100. This is for firmware reprogramming by TMQ only.**

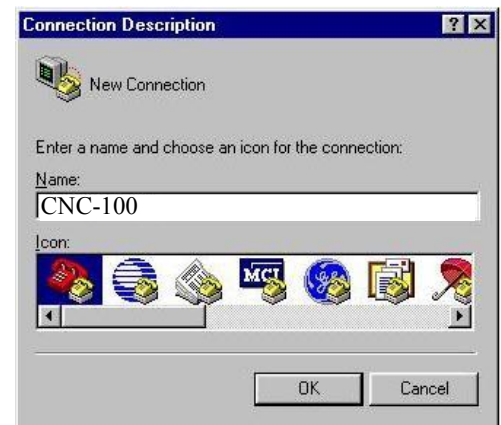
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## *HyperTerminal Set up procedure*

Serial data can be seen in the 'Serial Data Window' of the Deviation Device Adjuster program, however if required the serial data can be viewed in a terminal emulation program.

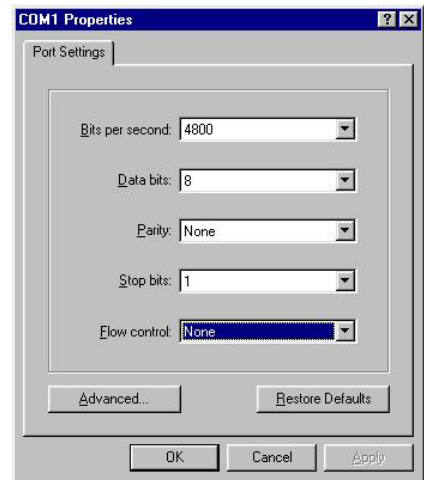
The following procedure details the connection method for 'HyperTerminal'.

1. Connect the CNC-100 to your Computer's Communication (com.) port; this requires to be an unused port for the duration of the system configuration.
2. Run a com. Server program such as HyperTerminal which is included on the installation discs for Windows 98SE, Windows 2000, Windows XP etc. (Start -> Programs -> Accessories -> Communications -> HyperTerminal)
3. Start a new connection and name it Data Combiner. For example in Hyper Terminal.



4. Select connection to the Com port that the programming lead is connected to, for example, connect using: Direct to COM1

- 
5. Set the baud rate to 4800,  
Data Bits = 8,  
Parity = None,  
Stop Bits = 1,  
Flow Control = None.



6. Switch on the CNC-100, using the Hyper Terminal Program connect to the com. port. Data should now be visible in the text editor window.
7. In that window type the text '@cal ' Enter (↵). The text is not visible as it is typed. The 'TMQ CNC-100 Configuration Main Menu' will now be displayed.
8. Following the instruction in the Menu to alter the configuration settings as required, save and exit the configuration menu.
9. These settings will be retained in the CNC-100s' memory.

Note. If a connection is to be made to the CNC-100 via a serial program such as HyperTerminal, it will be necessary to disconnect from any active serial connection that the Deviation Device Adjuster software may have. Use the 'Say Goodbye' function.

From the 'Deviation Device Adjuster' window click 'File', located at the top left of the window. Click 'Say Goodbye' to close the connection to the CNC-100.

**Do not enter the Bootloader section from the 'Options Menu' when connected to the CNC-100. This is for firmware reprogramming by TMQ only.**

# PCB Overlay

