Gyro to NMEA Convertor

Synchro or Stepper Input to NMEA 0183

(Revision 1)

OPERATION AND INSTALLATION MANUAL

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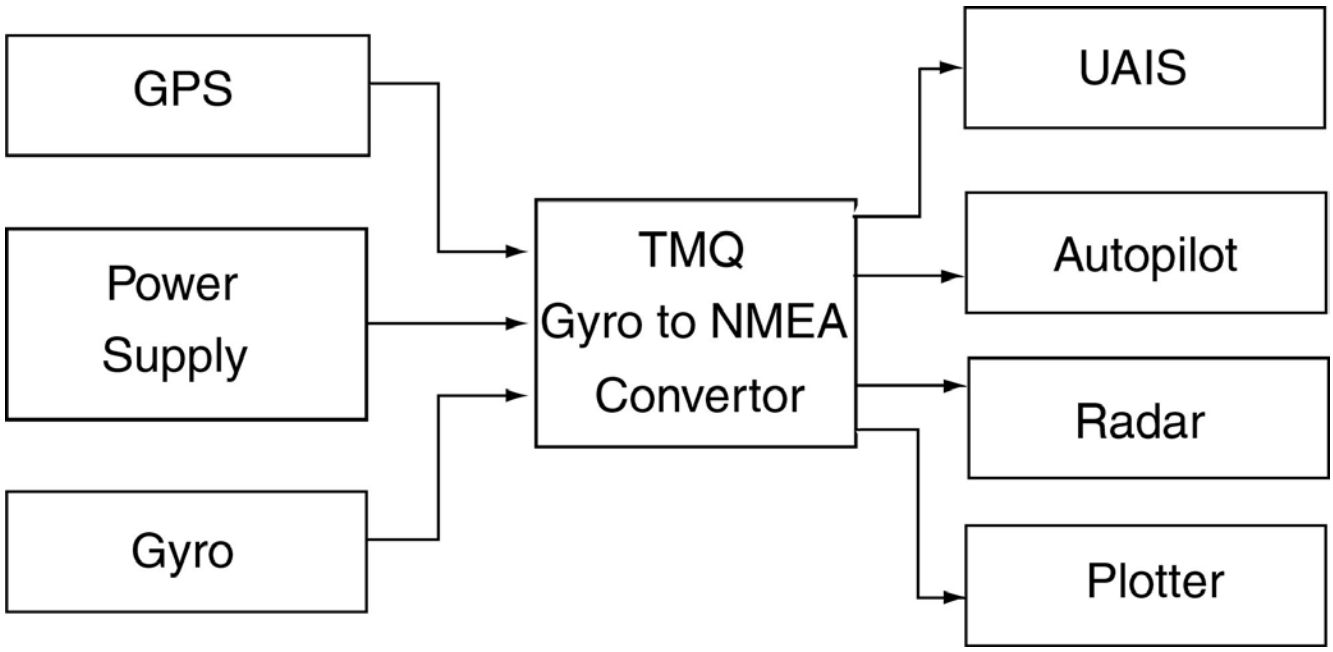
Introduction

The TMQ Gyro to NMEA Convertor when connected to the output from a Gyro's synchro resolver or stepper will convert the signals into NMEA Heading and Rate Of Turn formats. This will enable the output data to be connected directly to other devices such as UAIS, Plotters, Radars and Autopilots.

GPS data can also be connected into the TMQ Gyro to NMEA Convertor, this data will then be combined with output of the Gyro to NMEA Convertor providing easy connection to the other devices without the need of additional combiners.

System Block Diagram



Installation Requirements

Position
The TMQ Gyro to NMEA Convertor should be mounted in a position protected from Rain and Salt Water at all times, vibration should be kept to a minimum. Access to the front of the unit is required during normal operation.

Wiring
Access for wiring should be provided at the front and rear of the unit. Cables should be allowed to run to the existing Gyro unit, Power Supply and Data out connections.

Magnetic Effect
As a minimum amount of Steel is used in the construction of the TMQ Gyro to NMEA Convertor there would be negligible affect on the steering compass.

Mounting
The four mounting holes in the feet should be used to secure the "TMQ Gyro to NMEA Convertor".

Power Supply
The TMQ Gyro to NMEA Convertor requires 12 / 24 Volts DC. Use the supplied lead.

- Red +12 to +24 Volts DC (Positive)
- Black Negative

NMEA Output and Connection

NMEA HDT data output from the TMQ Gyro to NMEA Convertor. This data can be supplied to equipment such as UAIS, Radar, Autopilot or Plotter. Connection should be made using the supplied 5 Pin Industry Standard Waterproof plug,

Output data types are as follows :-

NMEA 0183
$**HDT
$**ROT

Additionally when GPS data is supplied to the internal contacts the following data sentences if available will be combined and output from the Gyro to NMEA Convertor.

NMEA 0183
$**VTG
$**GGA
$**RMC

System Operation

The TMQ Gyro to NMEA Convertor is designed to be continually powered, as are the Gyros it is to be connected with.
After initial power up the Gyro to NMEA Convertor will require calibrating to the Gyro. This is carried out using the two push buttons on the end panel of the unit. The heading output of the Gyro to NMEA Convertor can be increased by pressing the UP button or decreased by pressing the DOWN button. This procedure will have to be carried out every time the device is switched on.

Master Reset

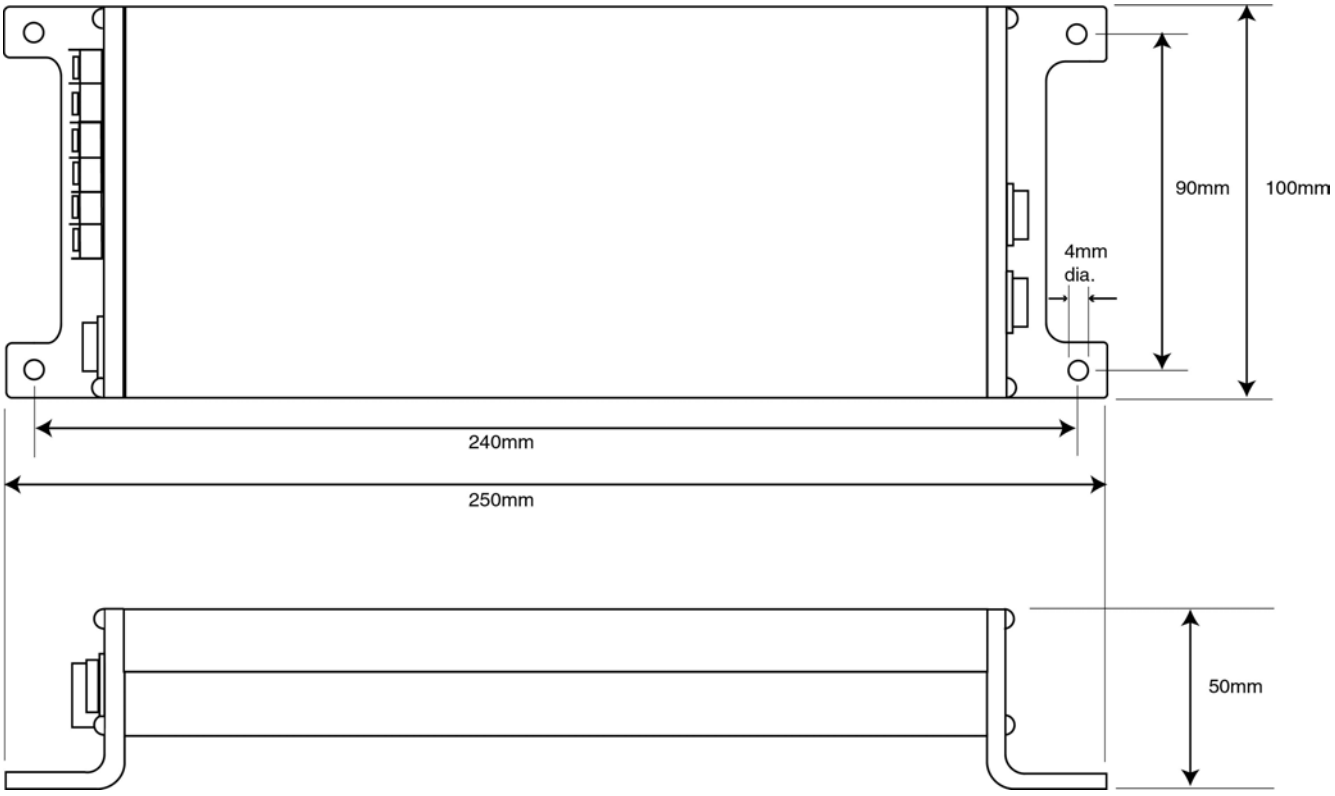
To perform a master reset or to reset Data out to 000 push and hold both calibration buttons at the same time for 5 seconds. This may be required after a Gyro failure or power has been lost from the Gyro.

Installation of Gyro to NMEA Convertor

Position:

The Gyro to NMEA Convertor unit should be mounted in an easily accessible position so that it is possible for a technician to make adjustments to the unit. To access the internals of the unit, two screws either end allow the top lid to be removed.
The unit should be protected from rain, salt water, condensation and vibration. Inside a locker or on a bulkhead below decks are suitable.

Figure 1 Gyro to NMEA Convertor Dimensions

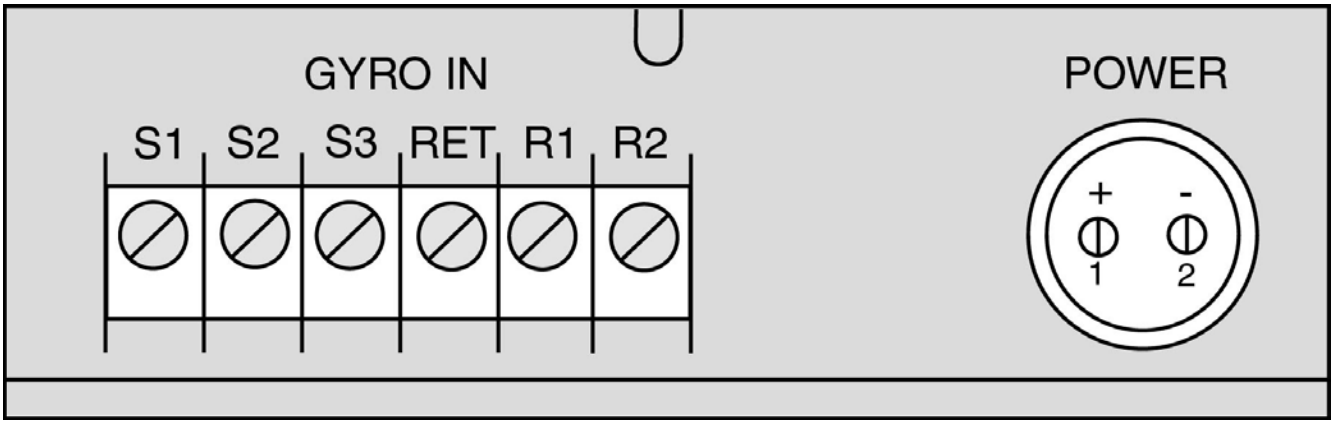


Connection Requirements

Access for wiring must be provided. Cabling will have to be run to the Power Switchboard, existing Gyro and if required to the UAIS, Autopilot, GPS, Radar or Plotter. Wiring should be kept as far as possible from radio aerials and aerial cables to prevent interference to the radio and to prevent transmitted signals from the radio interfering with the Gyro to NMEA Convertor.

The Gyro to NMEA Convertor must have a direct connection to power supply via a 5 amp fused circuit and an isolating switch. A power cable rated at 5 amps should be connected between the power input switch and the POWER connector on the Gyro to NMEA Convertor.

Figure 2 Gyro / Power Input connections



The Output signals from the Synchro or Stepper are required to be connected to the relevant inputs of the Gyro to NMEA Convertor, refer to the Gyro manufacturers handbook if required. Figure 3 shows connection to either a Synchro or a Stepper.

Figure 3 Gyro Connection

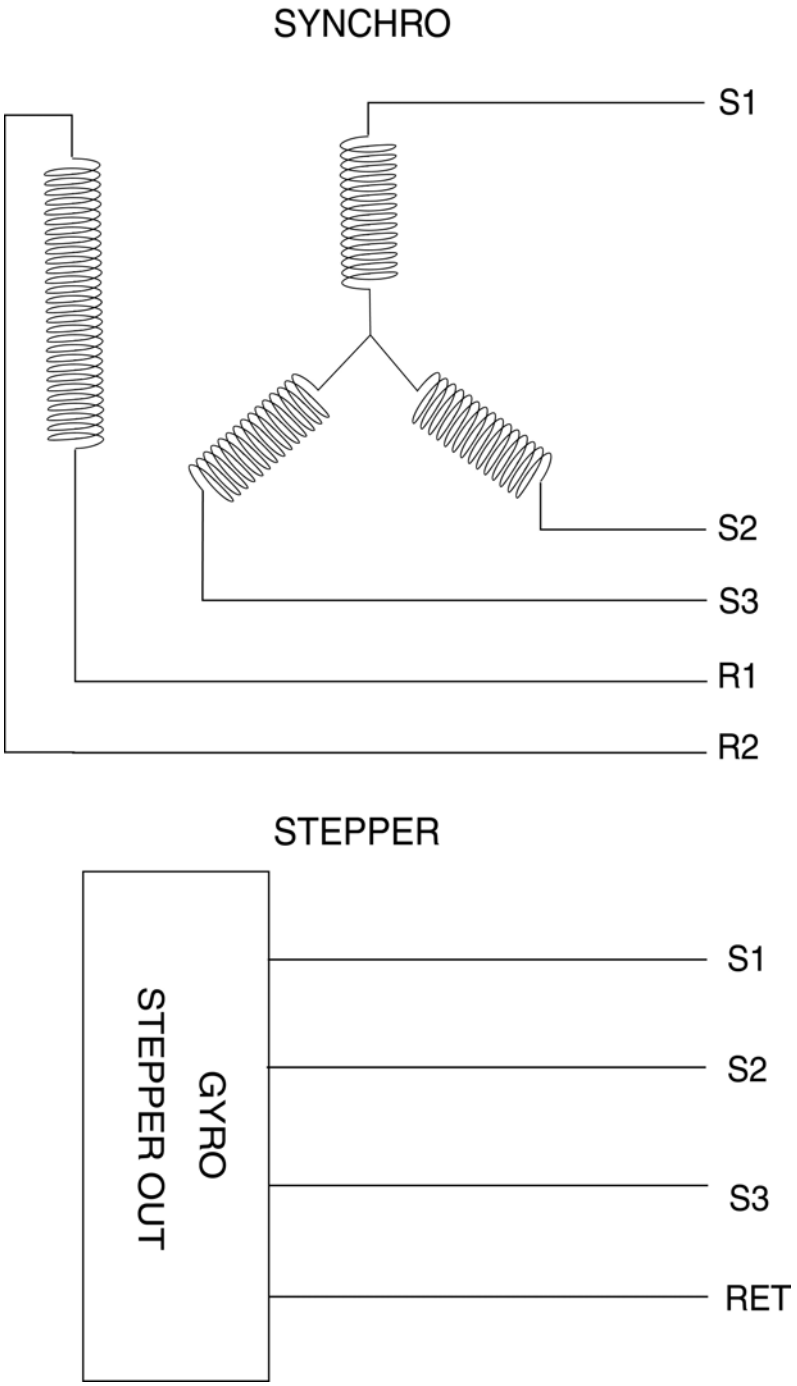
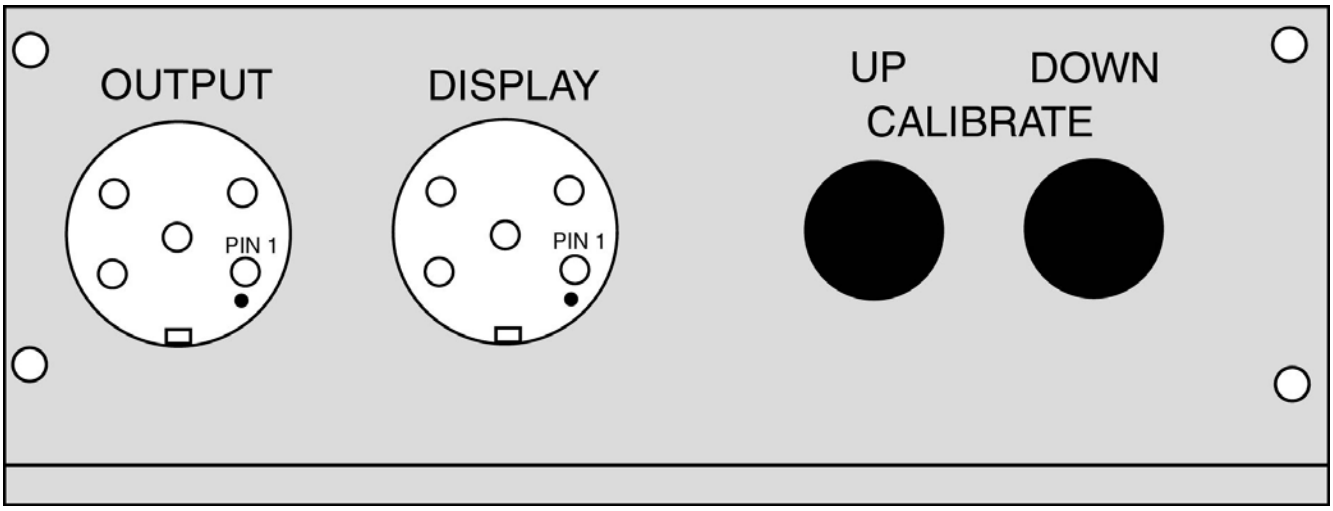


Figure 4 Gyro to NMEA Convertor Output Connections



Output Connector

Pin 1…….V+
Pin 2…….V-
Pin 3…….RXD-
Pin 4…….RXD+
Pin 5…….TXD+

Display Connector

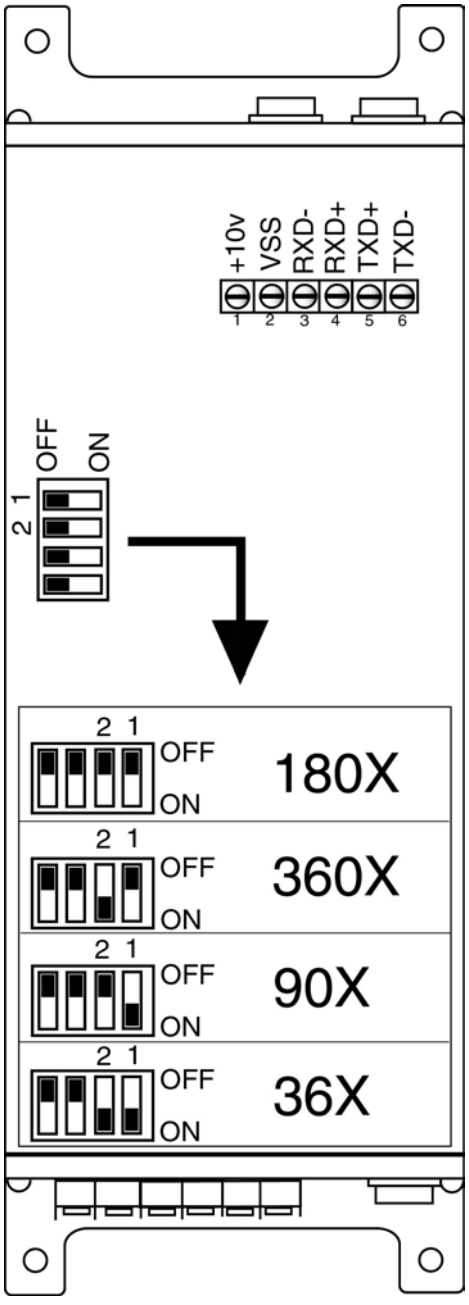
Pin 1…….V+
Pin 2…….V-
Pin 3…….RXD-
Pin 4…….RXD+
Pin 5…….TXD+

(Note:- Pin 1 is shown with the dot on the plug and socket)

Gyro to NMEA Convertor DIP switch settings

Set the DIP switches 1 and 2 in accordance with the output of the Gyro. Figure 5 shows the DIP switch position and the four options available.

Figure 5 DIP Switch Settings for Gyro output selection:



Refer to the Gyro manufacturers handbook for Gyro output specification.

Degrees change per Revolution

360X = 1 revolution per degree change
180X = 1 revolution, 2 degree change
90X = 1 revolution, 4 degree change
36X = 1 revolution, 10 degree change

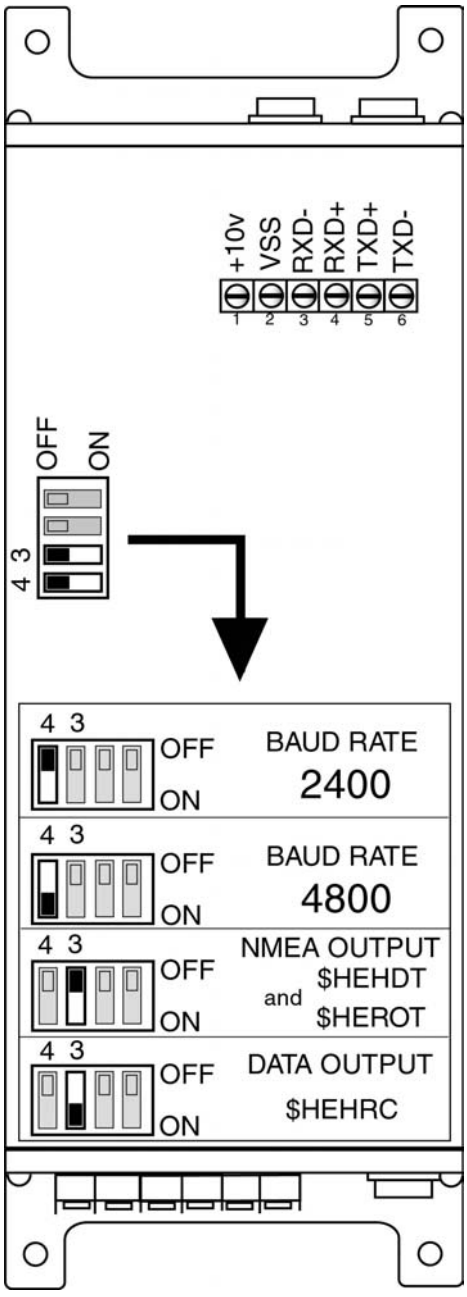
Resolution

The following table indicates the resolution for each setting.
For accurate autopilot operation a setting of 360 or 180 is recommended.

360X provides a resolution of 0.3 degree
180X provides a resolution of 0.6 degree
90X provides a resolution of 1.2 degree
36X provides a resolution of 2.0 degree

Set the DIP switches 3 and 4 in accordance with the required output of the NMEA sentence. Figure 6 shows the DIP switch position and the options available.

Figure 6 DIP Switch Setting for NMEA Output selection:



Set the DIP switches 3 and 4 according to the required NMEA sentence output.

Baud Rate

Switch 4, ON = **4800**

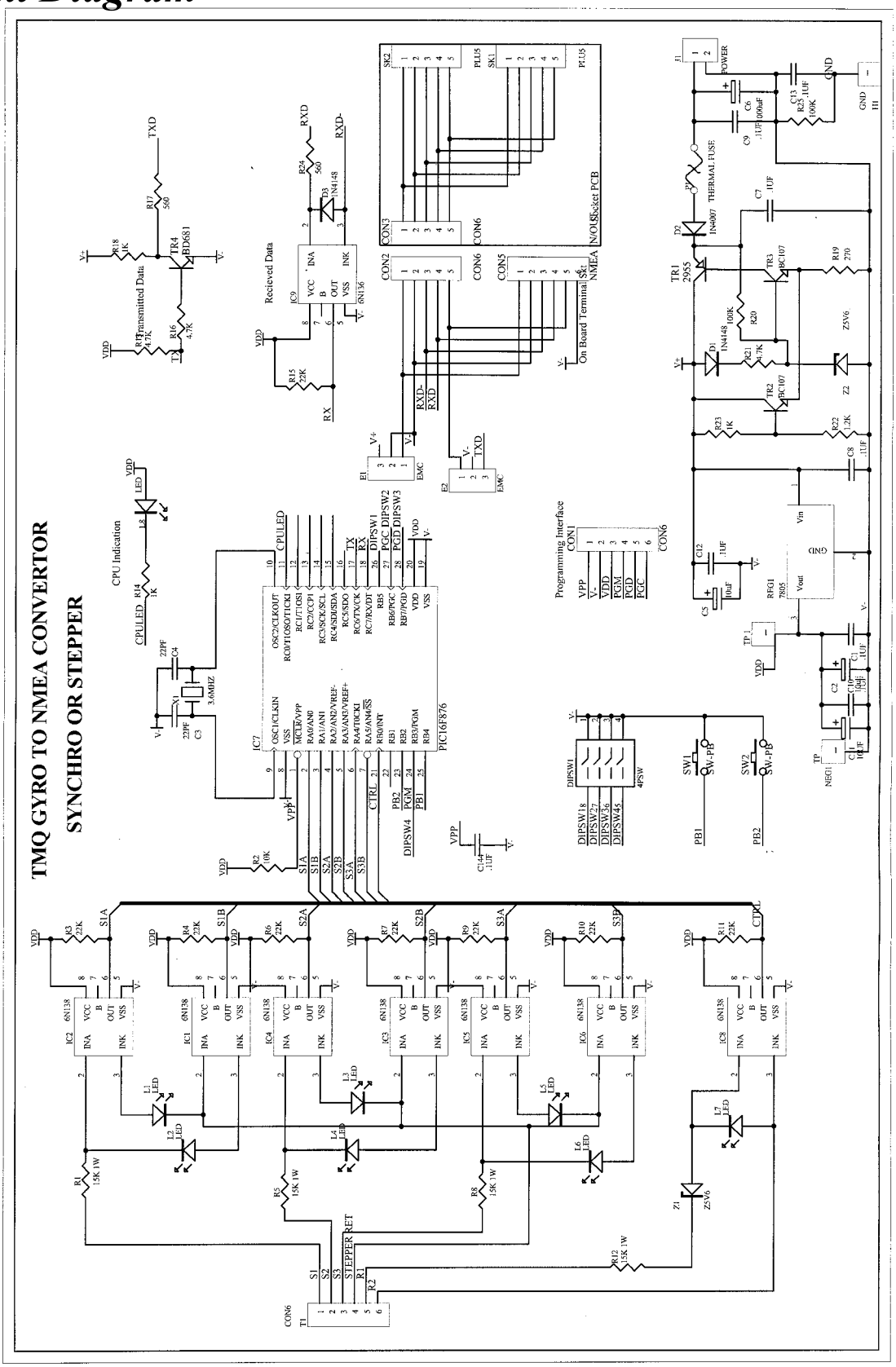
Switch 4, OFF = **2400**

NMEA Output Sentence

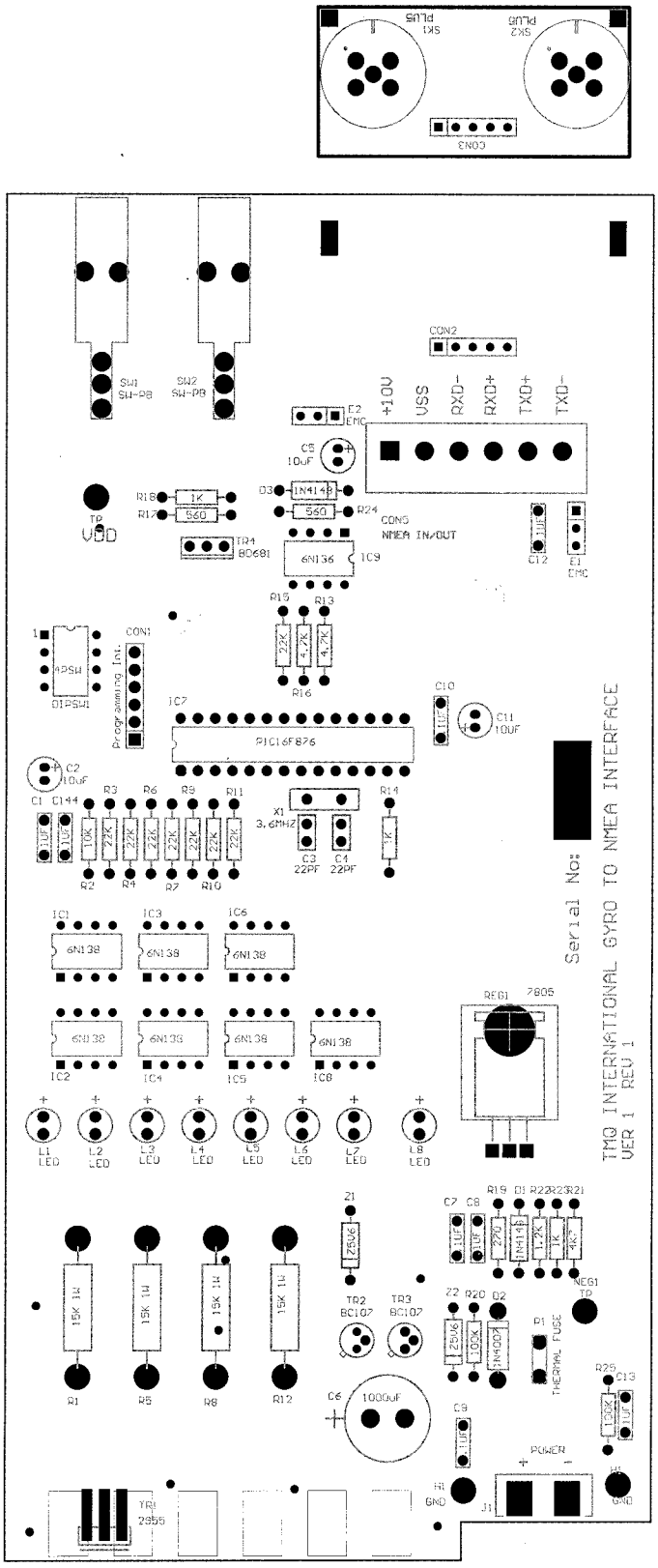
Switch 3, ON = **$HEHRC (Not NMEA Standard)**

Switch 3, OFF = **$HEHDT** and **$HEROT**

Circuit Diagram



PCB Layout


SK1 PLUG
SK2 PLUG
CON3
CON2
+10V
VSS
RXD-
RXD+
TXD+
TXD-
SW1 SW-PB
SW2 SW-PB
E2 EMC
C5 10uF
R18 1K
R17 560
D3 1N4148
R24 560
CONG NMEA IN/OUT
TP VDD
TR4 BD681
6N136 IC9
C12 1UF
E1 EMC
R15 22K
R14 4.7K
R16
CON1
Programming Int.
DIPSW1
IC7
PIC16F876
C10 1UF
C11 10UF
C2 10uF
C1 C144 0UF
R3 R6 R9 R11 22K
R2 R4 R7 R10 10K
X1 3.6MHZ
C3 22PF
C4 22PF
R14 1K
IC1 IC3 IC6 6N138
IC2 IC4 IC5 IC8
REG1 7805
L1 LED
L2 LED
L3 LED
L4 LED
L5 LED
L6 LED
L7 LED
L8 LED
Z1 Z5V6
TR2 BC107
TR3 BC107
R1 R5 R8 R12 15K 1W
C7 C8 1UF
R19 270
D1 1N4148
R22 1.2K
R23 1K
R21 4.7K
NEG1
TP
Z2 Z5V6
R20 100K
D2 1N4004
P1 THERMAL FUSE
R26 100K
C13 1UF
D6 1000uF
C9 1UF
POWER
+ -
H1 GND
J1
H2 GND
TR1 2955
TMQ INTERNATIONAL GYRO TO NMEA INTERFACE
VER 1 REV 1
Serial No:

Options

Compass display head.

Large 25mm (1”) digits display current heading.

Alarm function provides a user adjustable off course alarm.

Alarm band adjusted in degree increments.