



National Centre for Radio Astrophysics

Note
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A note on ultrasonic wind sensor

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Revision	Date	Modification/ Change
Ver. 1	28 May 2012	Initial Version

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1. Purpose of commissioning ultrasonic wind sensor

The antenna is operated under effect of wind for about 80 percent of its operation time. Wind is a stochastic process and its influence on tracking accuracy can change from time to time. The simulations help us to study the performance of antenna servo even under the influence of varying wind conditions. The simulations help us to predict the decrease of tracking accuracy under various wind speeds. Study in this regards is in progress

Simultaneously it is also necessary to experimentally measure wind power spectrum and verify the simulated and measured wind loads. The wind meters used at GMRT are cup type anemometers. These wind anemometers are have mechanical moving parts and hence slower response time. This makes them inefficient to measure fast varying wind gusts. A more precise wind meter should be used to measure wind gusts at GMRT and consequently its effect on antenna tracking accuracy. Ultrasonic wind sensor procured from Gill instruments adheres to project requirements. A preliminary test result for this sensor is given in subsequent sections of the document.

2. Specifications details of wind sensor

Measurement

Output	1, 2, 4, 5, 8, 10Hz
Parameters	UV, Polar, NMEA, Tunnel
Units	m/s, Knots, MPH, KPH ft/min
Averaging	Flexible 1-3600 seconds

Wind Speed

Range	0 - 65m/s (0-145mph)
Accuracy	±2%@12m/s
Resolution	0.01m/s
Offset	±0.01m/s

Direction

Range	0 - 359°
Accuracy	± 2°
Resolution	1°

Digital Output

Communication	RS422, full duplex, network facility
Baud rates	1200, 2400, 4800, 9600, 19200, 38400
Formats	8 data, odd, even or no parity

Analogue Output - Optional

Quantity	3 (speed, direction, status, SOS or Sonic Temperature)
Scale	Multiples of ± 10m/s up to ± 70m/s
Type	± 2.5V, 0-5V or 4-20mA
V output resistance	60 Ohms
4-20mA loading	10-300 Ohms

Dimensions

Size	See manual Fig 2b for dimensions	
Weight	WindObserver 65	1.34kg (no mount or lead).
	Base Mount Short	0.63kg.
	Base Mount Long	1.05kg.
	Pipe Mount	1.06kg.

Materials

External Construction	Stainless Steel 316
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Environmental

Moisture protection	IP66 (NEMA4X)
Operating temperature	-55°C to +70°C (heated version)
Humidity	0% to 100% RH
Precipitation	300mm/hr
EMC	EN 61326-1:2006 EN 60945:2002
Icing	MILSTD810E Method 521.1 Procedure 1

3. Image of wind sensor procured

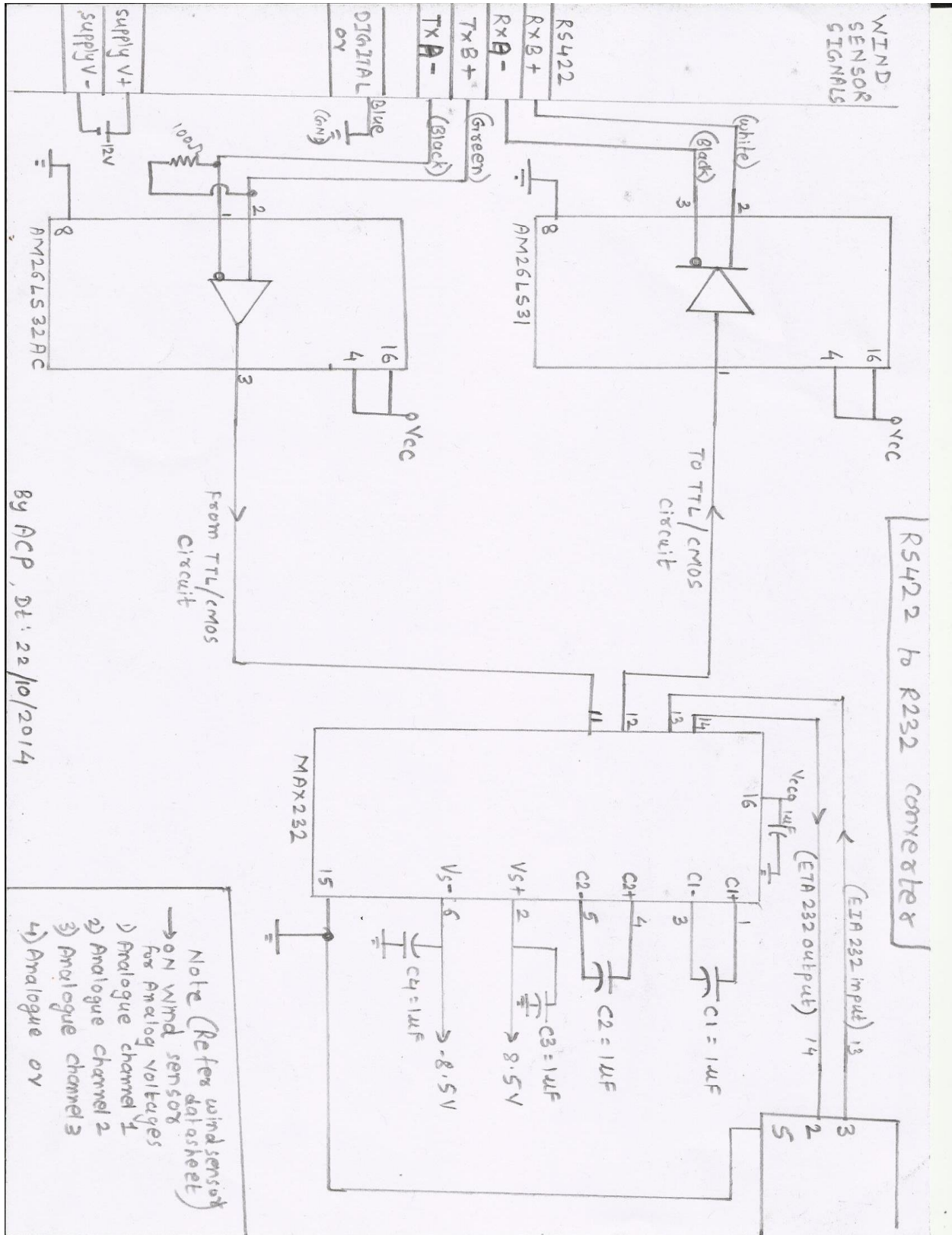


4. Hardware configuration details

a. Pin out details

19 Way Connector Terminal Letter	Cable Gland Option		Signal Designation
	Conductor	Colour	
P	Pair 1	Green	RS422 TXB (+)
C	Pair 1	Black	RS422 TXA (-)
U	Pair 2	White	RS422 RXB (+)
V	Pair 2	Black	RS422 (RXA (-)
R	Pair 3	Red	Supply V+
D	Pair 3	Black	Supply V -
M	Pair 4	Blue	Digital 0v
N	Pair 4	Black	Not Used (Isolate)
A	Pair 5	Yellow	Heater + * ¹
B	Pair 5	Black	Heater - * ¹
H	Pair 6	Brown	Analogue Ch 3 * ²
G	Pair 6	Black	Analogue 0v * ²
E	Pair 7	Orange	Not Used (Isolate)
F	Pair 7	Black	Not Used (Isolate)
T	Pair 8	White	Analogue Ch 1 * ²
S	Pair 8	Red	Analogue Ch 2 * ²
L No Connection	Pair 9	Green	Not Used (Isolate)
K No Connection	Pair 9	Red	Not Used (Isolate)
J No Connection	Not Applicable	Not Applicable	Not Used

b. Interfacing board for converting differential RS422 signal to RS232 signal



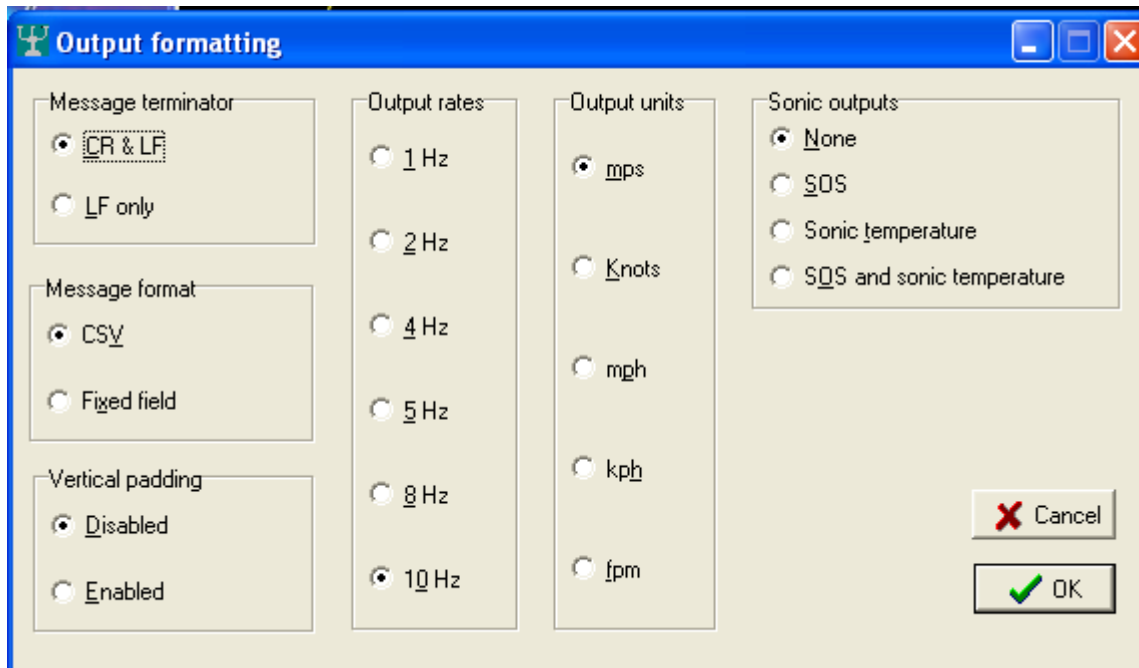
By ACP, Dt: 22/10/2014

4. Software details

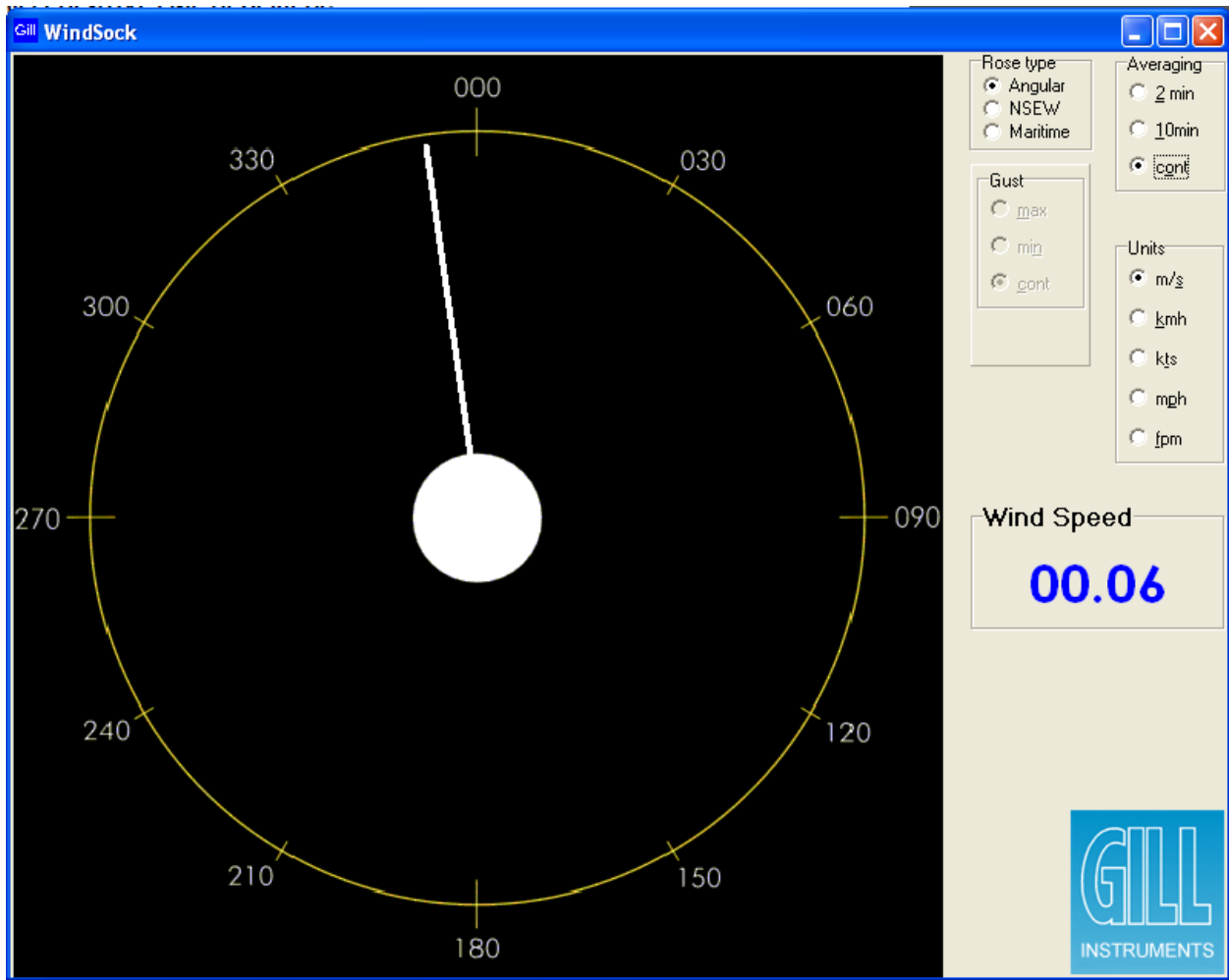
a. Software used for data logging



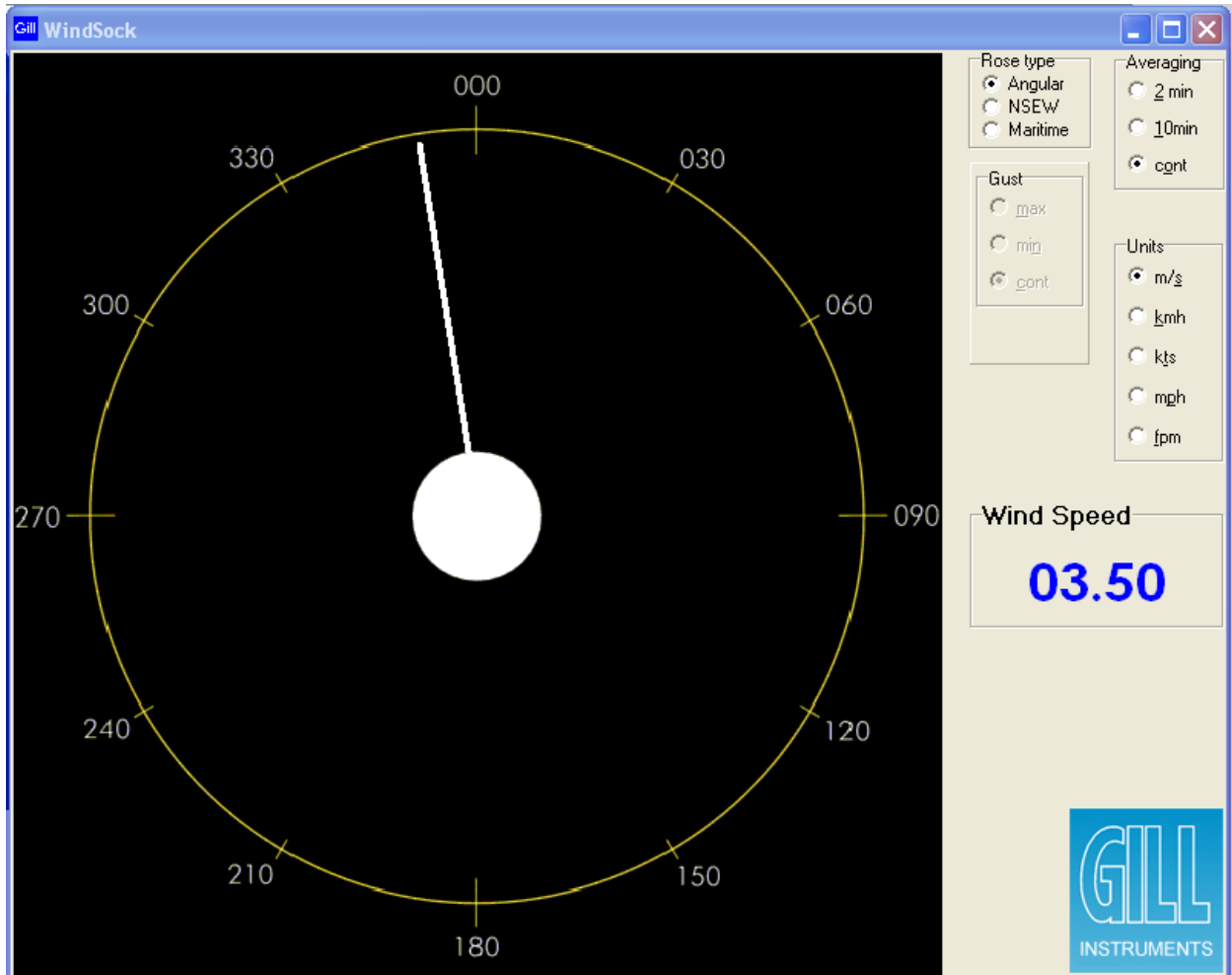
b. Configuration window details



c. Status display window (Wind measured: 00.006 m/s)



Status display window (Wind measured: 3.50 m/s) (Fan turned on)



d. Data logged using hyper terminal of computer at output rate of 1Hz

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Data logged using hyper terminal of computer at output rate of 10Hz

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5. Details about analogue output from sensor

Pins in Pair6 are used for measuring analog output voltage corresponding to wind speed.

Default configuration (Factory settings): 5V corresponds to 10m/s

Configuration can be changed as per user requirement.

Experiment done:

When wind is blown using fan analog output pins measures 2.5V, which corresponds to 5m/s.