# Ultrasonic Surface Wind System

The AGI Ultrasonic Wind system is comprised of the following modules.

- Gill Ultrasonic wind sensors.
- Field Electronics Units.
- AGI Multi-function Aviation Display

## Gill Ultrasonic Wind Sensor

Ultrasonic wind sensors measure the time taken for an ultrasonic pulse to travel between equally spaced transducers. The measurement of speed and direction is derived from the measurement of a sound pulse travelling from one transducer to another and comparing that with a pulse travelling in the opposite direction. The resulting digital signal output is processed in the AGI Display module.

Fabricated in stainless steel to an IP 66 standard, the Gill ultrasonic wind sensor is specially designed for use in hostile environments. AGI also uses this sensor in naval marine applications

## Field Electronics Unit (FEU)

A small box called a Field Electronics Unit is used to support the ultrasonic sensor. A block diagram of the FEU is shown in Fig 1. It contains power supplies to drive the wind sensor, obstruction light, internal heater and the modem. This transmits the raw wind data using copper, fibre or radio links to the AGI Wind Display Unit.

## Wind Display Unit

The AGI Multifunction Aviation Display Wind Display (MFAD) module contains a microprocessor that processes the raw wind data and displays ICAO compliant wind information. It is a compact module measuring 227 x 151 x 130mm.

The MFAD is a flexible unit with the following capability:

- Operating in a master slave configuration with other AGI LED displays as slaves .
- Driving multiple MFAD or LED displays in a daisy chain.
- Sending Wind information on a LAN for archiving.

Operationally ultrasonic wind data is received from the sensors 4 times a second and passed through a series of filters to produce the ICAO 2minute and 10minute wind information. The wind information output is as follows:

- mean wind speed
- mean wind direction,
- The wind extremes (gusts, lulls, backed and veered).
- Instantaneous wind data

Marked Discontinuities processing rules are also applied.

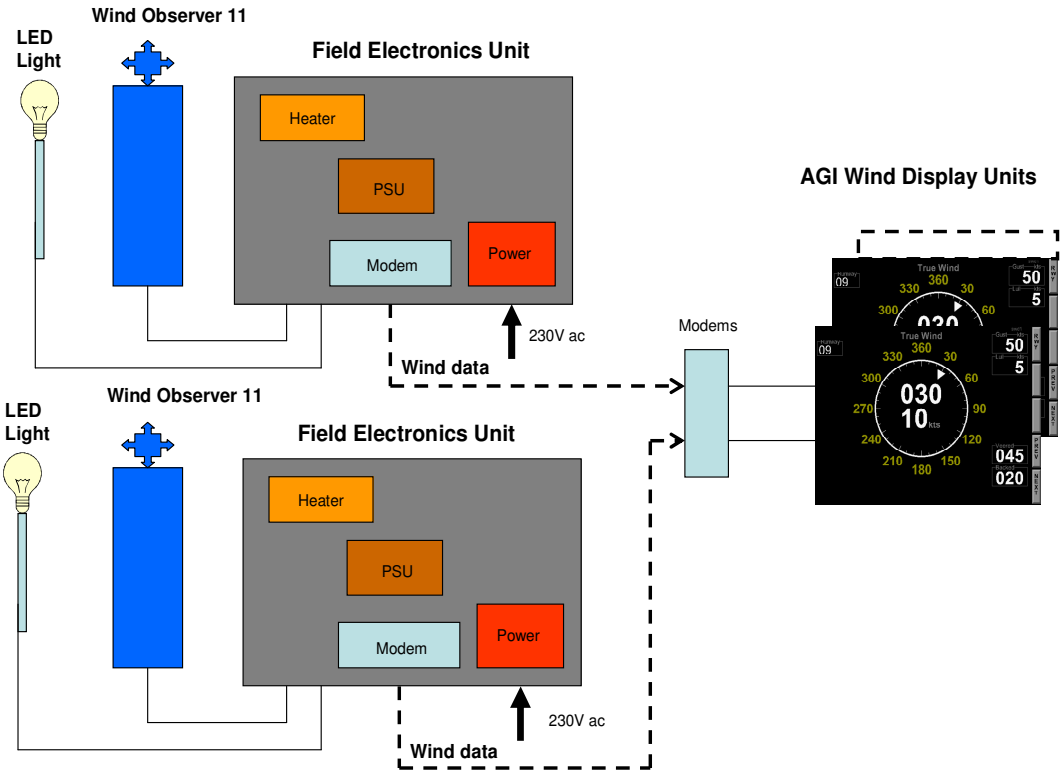


**Figure 1 UWS Block Diagram**

The MFAD is a paged display module that enables different wind information to be shown on user selectable pages. In this mode the MFAD can show METARS . Another option is a display of head ,tail and cross wind as shown in figs 2 & 3.

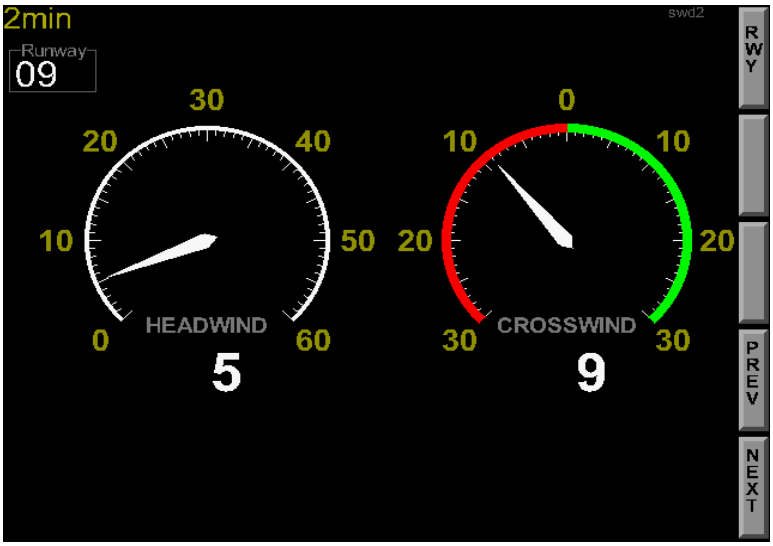


**Figure 2 MFAD Paged display**

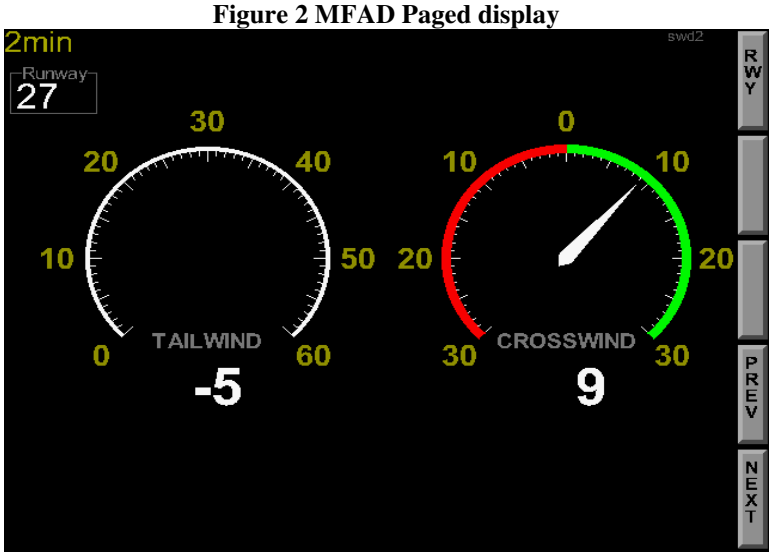


**Figure 3 MFAD Paged Display example**

**Surface Wind Display**
The other wind output display module is the AGI LED display shown below.


**Figure 4 AGI LED Wind Display Module**

Each display measures 150mm x150mm x 80mm deep.

Internally the display also contains a CPU with embedded software providing functionality to store and display specific wind data. The data from the wind sensor can be checked on the display using the Runway Button. As shown in Fig 5, the Runway Number is the red number 06 in the top left of the display.

In normal operation the display shows the two minute mean wind speed and direction, as indicated by the Red LED display in Fig 4. Only two digit wind speed is displayed. If the wind speed is in excess of 99 knots, the display will flash dashes. It takes two minutes after the ISU has been switched on for these mean values to be displayed. During this latent period the display will present dashes.

When the wind starts to gust, the display shows the ten minute wind extremes, using the yellow LEDs. These only indicate the maximum and minimum wind gusts when there is ±10 knot discrepancy from the mean. The outer compass ring also illuminates showing wind direction variations that are greater than 60º from the mean direction. Resolution in this mode is 10º.
ICAO rules embedded in the software take account of any “MARKED DISCONTINUITIES”.

Instantaneous wind information can be displayed when the MAIN/INST button is pressed. A green INST LED is illuminated to indicate that this mode is selected. In the INST mode gust information and direction variability are not shown. The Wind direction is displayed to the nearest 1º and data is updated four times per second. The Main mode is the default condition.

Display brightness is controlled by the two buttons at the bottom right of the display.

A display test condition is activated when both brightness buttons are depressed simultaneously.

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