Improvisation of indigenously developed Current Weather Instrument System for Airport Meteorological Services.

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Aviation meteorological services are one of seven strategic priority areas under the WMO Strategic Plan 2016 – 2019. The plan seeks to improve the ability of National Meteorological and Hydrological Services (NMHSs) to provide sustainable high-quality services in support of safety, efficiency and regularity of air traffic management worldwide, with due account to environmental factors.

In recent years India has done significant progress in improvement of efficiency and safety of domestic and international aviation through implementation of Global Air Navigation Plan of the International Civil Aviation Organization (ICAO).

AIRPORT METEOROLOGICAL INSTRUMENTS

India Meteorological Department is a nodal agency responsible for providing aviation meteorological services including installation, commissioning and maintenance of airport meteorological instruments at all civilian airports across the country. In order to provide aviation services, IMD has commissioned various aviation meteorological instruments such as Integrated Automated Aviation Meteorological Systems (IAAMS), Current Weather Instrument System (CWIS), Distant Indicating Wind Equipment (DIWE) and "Drishti" transmissometer systems at airports across the country.

Distant Indicating Wind Equipment: DIWE

This system contain following main parts:

- Data Logger : DIWE – 03
- Sensors
- Mini Slave Displays (Wind Direction – Wind Speed)
- PC Software

DIWE-03 specially designed to monitor Wind Direction and Wind Speed Inputs for small / medium airports.

DIWE- 03 performs the following functions:

- Reads Wind Direction and Wind Speed sensors connected to it.
- Converts the sensor values into digital format.
- Transmits the data over RS422 to Slave Display.
- Stores the data in the internal memory

Digital Current Weather Instrument System: - DCWIS

This system contains following main parts:

- Data Digitiser: METLOG-03
- Data Logger: METLOG-03
- Slave Displays Indicating Weather Parameters with Pressure
- Mini Slave Display Indicating Wind Parameters
- Wireless Modems
- Wired Modems
- PC Software.

Data Digitizer is located near Runway touchdown zone. Data Digitizer performs following functions:

- Reads various weather sensors connected to it.
- Converts the sensor values into digital format
- Transmits the data over Wireless Modem to Data Logger
- Transmits the data over cable modem to data logger

Potentiometric wind vane: The potentiometer in the wind vane is a servo-micro torque potentiometer and has a maximum resistance of 10 kilo-ohms over an end gap of about 4 degrees. The potentiometer is coupled to the wind vane shaft so as to give a resistance output increasing linearly with the increasing of wind direction. Thus 0 KΩ corresponding to the north, 2.5 KΩ for east, 5 KΩ for south, 7.5 KΩ for west and the variation of 0-360 degree corresponds to 0 to 10 kilo ohms .

Optical Anemometer: The basic operating element is an opto-coupler, which is having a transmitter and a receiver with a toothed wheel connected to the shaft of the cup anemometer. The receiver, which is a photo detector, receives infrared light from the transmitter through the gaps between the teeth of the wheel generates pulses proportional to the true wind speed. These pulses are counted by an inbuilt counter in the 16–bit microprocessor (Microchip make model no.12F682). The counter resets every 250 milliseconds, and hence 4 samples per second can be measured. A piecewise linearity is derived between the wind speed in knots and no. of pulses from the anemometer during the course of calibration in wind tunnel. The required range of measurement is fixed as 0-100 knots. This range is obtained in three segments with three slopes due to the different levels of friction at different stages as shown in Fig.3. Wind speed can be calculated by using the mathematical formula: Y= MX+C where, Y is the wind speed in knots, X is the number of pulses, M is the slope of the segment and C is threshold speed.

we improved design of indigenously developed CWIS with minimal hardware.

The data logger at filed site is based on open architecture (real time Linux) and is modular in design.

It is scalable in terms of input and output channels and measurement and sampling requirements of end users.

Third party GPRS modem can be interfaced with the logger. The data logger configuration can be done Over The Air (OTA).

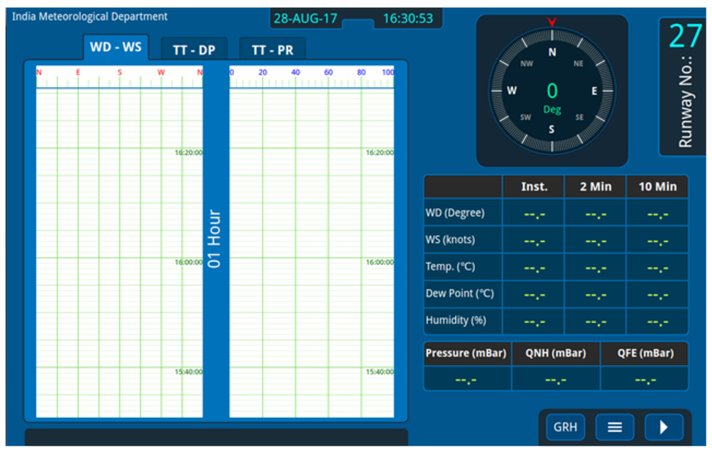
The data are stored in accordance with ICAO regulations.

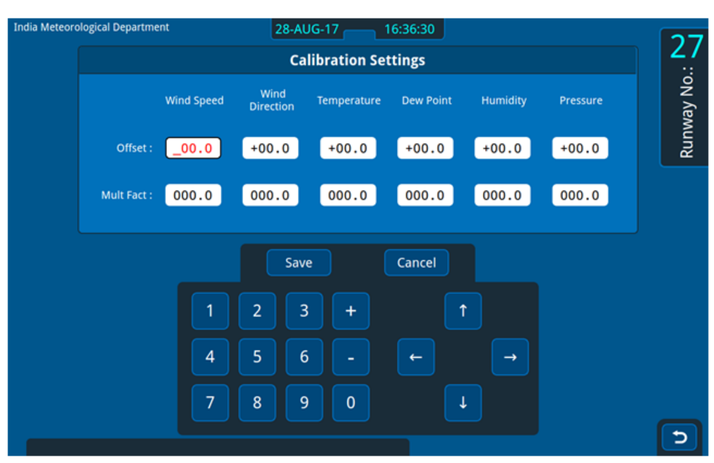
Dew Point temperature, QNH and QFE are also derived and stored.

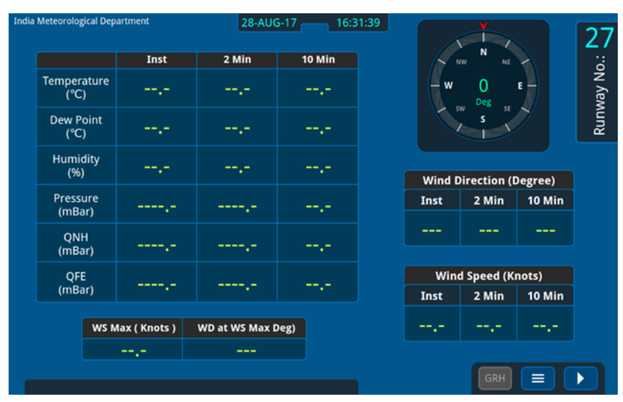
The data transmitted from multiple field systems installed along the runway are received in a desktop computer (Data Acquisition PC) in MBR/ATC via wireless or cable communication mode.

Data Acquisition PC stores data of received and derived parameters with time stamp in real time and outputs the received data over RS232 port of PC. 1-min, 2-min and 10-min average data along with instantaneous data and metadata are stored in suitable relational database.

Te archived data are available to PC based data display software for real time display of data in ATC and MBR. The data are displayed in both numerical and graphical form. Multiple software based ge-







The advantage of this system is that it removes dependency on vendor for hardware. Data can seamlessly be made available in displays and website. The system is easy to maintain and manage.