

SS Microelectronics Technology Pvt. Ltd.

SS SONDE 01 : Radiosonde

SS SONDE 01 Radiosonde (GPS Aerological Meteorological Sounding System) can accomplish the measurement of the five meteorological elements viz. temperature, air pressure, humidity, wind direction and wind speed with accuracy comparable with the best in the industry. High speed data processing terminal automatically records and process the meteorological data and print reports needed to predict the weather accurately for research of boundary layer and weather prediction.

FEATURES
• Availability of raw and processed data during sounding.
• High quality PTU and wind data with error detection and correction.
• Low power consumption insuring long battery life (upto 2 hours flight with dry cells).
• Digital data transmission which consumes less power.
• Radiosonde frequency adjustable within the range $403\text{MHz} \pm 3\text{MHz}$ to avoid any interference.
• Availability of raw and processed data during sounding.
• High quality PTU and wind data with error detection and correction.



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Technical Index

MODEL	SS SONDE 01
Temperature Sensor	
Type	Bead Thermistor
Measuring Range	+60°C ~ -90°C
Endurable Error (Standard Deviation)	±0.3°C (+60°C ~ -80°C) ±0.5°C (-80 ~ -90°C)
Resolution	0.1°C
Response time	1S
Humidity Sensor	
Type	Thin – Film Capacitor
Measuring Range	0%RH ~ 100%RH
Endurable Error (Standard Deviation)	±5%RH
Resolution	0.1%RH
Response time	1.5S
Pressure and Geopotential Height	Derived from GPS Heights
Measurement Range	1060hPa ~ 3hPa
Endurable Error (Standard Deviation)	±1.0hPa (100hPa ~ 1060hPa) ±0.5hPa (3hpa ~ 100hPa)
Resolution	0.1hPa
Wind Detection (Derived from GPS Signals)	
Measurement Range of Wind Speed	0 ~ 150 m/s
Wind Speed Accuracy	0.15 m/s
Wind Speed Resolution	0.1 m/s
Measurement Range of Wind Direction	0° ~ 360°
Wind Direction Accuracy	2°
Wind Direction Resolution	0.1°
Positional accuracy	10m
Dimensions and Weight	
Dimensions	160mm*50mm*65mm, ±5mm
Weight with Dry Cell Batteries	≤100g
Dry Cell Batteries	6V,9V
Operating time	≥140min

Transmitter	
Working Frequency	403MHz ± 3MHz (Adjustable)
Output Power	100mW ~ 200mW (Average Power)
Transmission Range	>250 km.
Modulation Mode	GFSK
Modulation Speed	1200bps
Transmitting Time Interval	1s

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SS SONDE GRS 01 : Ground Receiving System

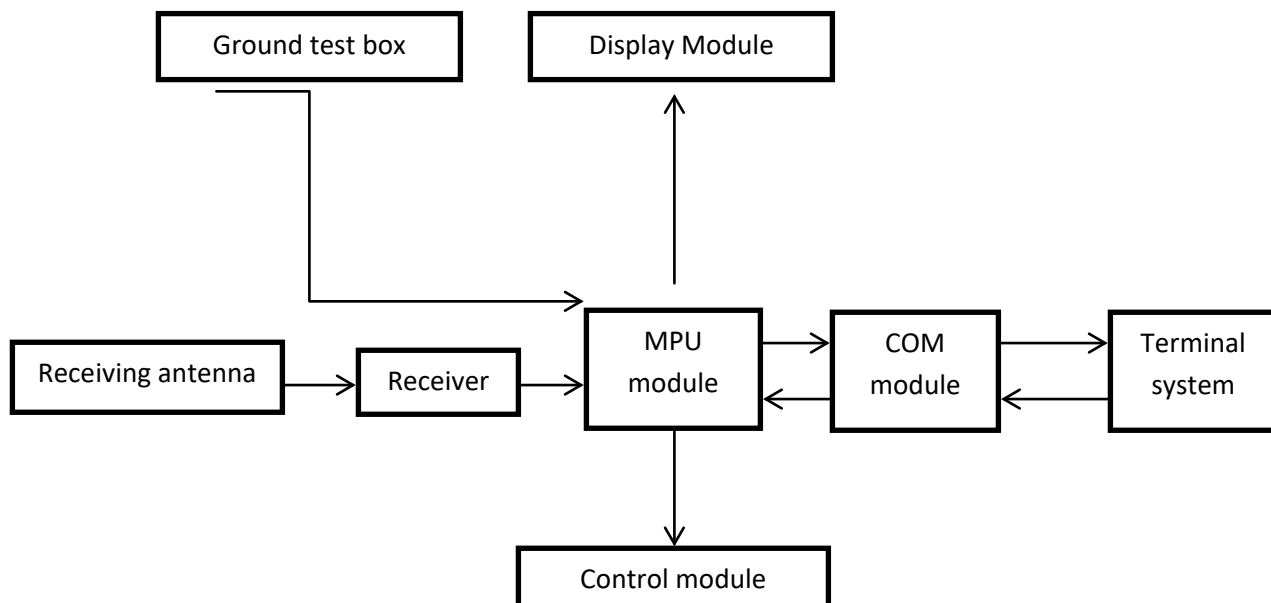
In the past few years many countries has rapidly developed and adopted Upper-air operational system, GPS sounding systems. We S S Micro Electronics Technology (P) Ltd. has also developed Indigenous Upper-air operational system, GPS sounding systems. This system is used to measure the meteorological elements as temperature, air pressure, humidity, wind direction, wind speed and altitude etc. from ground to around 40 Km in the aerological atmosphere directly and accurately. Radar tracking on ground is not used in this system, but it employs a high precision GPS to automatically track the sounding of the balloon. As a result of this automaticity the accuracy of the system improves significantly.

System Components and Features

The Ground Receiving System (SS SONDE GRS 01) developed by S S Micro Electronics Technology (P) Ltd. mainly consists of directional UHF antenna (hereinafter referred to as antenna), ground receiver, ground check box, sounding software and terminal computer or tough book as per user requirements.

In control of the terminal computer the antenna automatically tracks the flying radiosonde. The receiving module of the ground receiver receives the signals from antenna and demodulates the received signals into temperature data, humidity data, pressure data, longitude, latitude and height as well as other signals and sends them to the terminal computer through serial port time per second. The sounding software completes the editing of the original data detected and makes all the reports as per the user requirement. Terminal computer is used for data collection, data processing, data verification, system fault monitoring, alarming and so on. The ground test box is used to check whether the checked radiosonde works well or not.

Principle Block Diagram of Ground Receiving System:



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Antenna

The antenna is a directional UHF antenna to receive radiosonde signals in the 400 MHz meteorological band. The antenna consists of six antenna segments for horizontal reception and one segment for upwards direction. The ground receiving system determines automatically which antenna segment will be selected according to the GPS information transmitted from the flying radiosonde. The signal of the radiosonde received by the antenna is sent to the receiver for further processing after being prefiltered and amplified.

SPECIFICATIONS	
Operating Frequency	400 ~ 406MHz
Antenna Gain	$\geq 6\text{dB}$
LNA Gain	$\geq 15\text{dB}$
Noise Figure	< 1
Operating temperature	$-40 \sim +80^{\circ}\text{C}$

Ground Receiver

Ground receiver demodulates the signals under the control of terminal computer and then sends the demodulated data to the terminal computer directly.

When the signals are received by antenna input into the receiver, they are first amplified, mixed and detected, and then these digital signals are sent to the terminal computer for further processing.

SPECIFICATIONS	
Working Frequency	403MHz \pm 3MHz (Adjustable)
Receiving Sensitivity	$\leq -115\text{dBm}$; (includes pre-field amplifier)
Receiving Bandwidth	60kHz ~ 100kHz

Ground Test Box

The ground check box is used to check the accuracy of the radiosonde sensors. The ground check box includes one high precision humidity sensor and one temperature sensor as humidity and temperature reference. When checking before releasing, the temperature and humidity sensor of the radiosonde are put into a standard chamber where the reference sensors of the ground check box are fixed, and then system will compare the data of the radiosonde and the same of the ground check box, if the difference between radiosonde sensor and references is beyond the set tolerance, the system will inform the operator to change another one.

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SPECIFICATIONS	
Operating conditions	
Humidity	0~95%RH
Temperature	0 ~ +50°C
Temperature Sensor	
Accuracy	0.2°C
Resolution	0.01°C
Humidity Sensor	
Accuracy	2%RH
Resolution	0.1%RH

Sounding Software

The software of GPS sounding system is in charge of controlling and testing and monitoring ground receiving equipment.

System control, monitoring and data collecting

Antenna tracking & control mode manual/auto.

Failure locating, displaying and warning.

Real-time displaying the GPS working state.

Real-time recording, restoring initial information of GPS and air sounding.

Real-time measuring the power voltage and inbox temperature of radiosonde.

Produce standard and significant level points. Significant level (Maximum/Minimum temperature, humidity, freezing level, tropopause, last level reached and balloon burst) data is stored for generation of reports and messages for transmission to network.

Generates TEMP, PILOT, STANAG, CLIMAT, etc. messages for transmission in WMO format.

Terminal Computer / Tough Book

The sounding software is installed on the terminal computers or tough books. The terminal computer / tough book are window based systems which are used to control the antenna with the help of sounding software. All the graphs and plots in real time can be seen on the screen of the terminal computer / tough book. The terminal computer / tough book are generally the latest configuration available in the market with a minimum configuration of 4GB RAM and 500GB Hard Disk. The terminal computer / tough book also comes with a printer to take the print outs of the necessary messages and reports of charts. For a uninterrupted sounding during power shutdown the terminal computer / tough book also includes a UPS with a minimum 120 minutes backup at full load.