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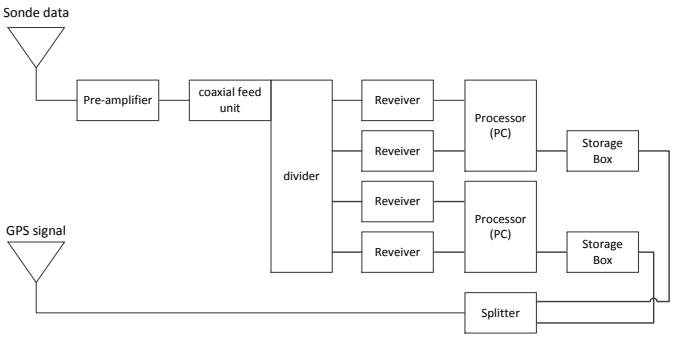
Dropsonde Receiving System

Meisei Dropsonde System (MDSS)

Outline

This system is an upper-air meteorological observation instrument which measures a vertical profile of upper-air atmosphere using a dropsonde. Dropsonde will be dropped from the aircraft and will transmit temperature, humidity, atmospheric pressure and GPS information on the carrier wave of the 400 MHz meteorological band.
This system is installed in the aircraft, receives and de-modulates this carrier wave, and visually displays trans-mission data.
MEISEI's dropsonde (iMDS-17) is lighter than the previ-ous dropsonde that measurement can be performed without parachute. This dropsonde also can be dropped from the shooter on the air craft since a parachute is no longer needed.
As of 2017, in Japan, Gulfstream - Ⅱ (G - Ⅱ) operated by Diamond Air Service (DAS) is equipped with the drop sonde receiving system and is contributing to typhoon observation.

Block diagram



Features

- It can receive 4 systems of up to 2 ch × 2 systems.
  (The image picture is a 2 ch × 1 line system.)
- Lighter dropsonde (iMDS - 17) can observe without using a parachute. The risk of observa-tion failure due to deployment of parachute has been minimized.
- Soundness of sensors can be confirmed using sonde storage box before observation.
- Preparation of dropsonde observation software takes only 5 minutes. Dropsonde data can be confirmed from observation preparation until the end of observation.
- This system can create WMO messages. Output files of this dropsonde are 1-second reso-lution CSV file and TEMP DROP (FM 37) file.

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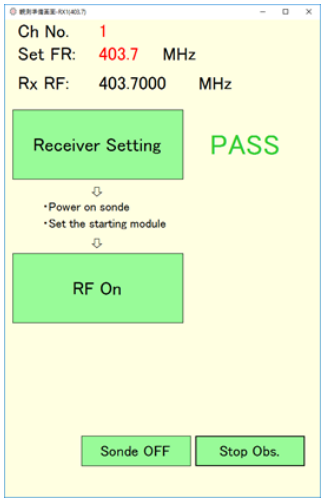
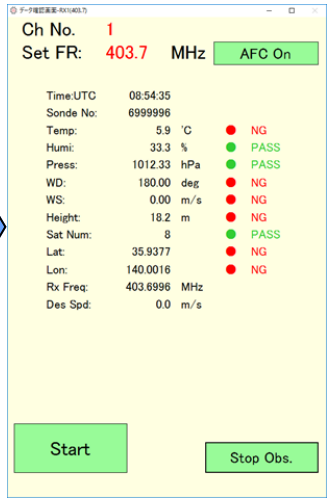
Observation Software for Dropsonde

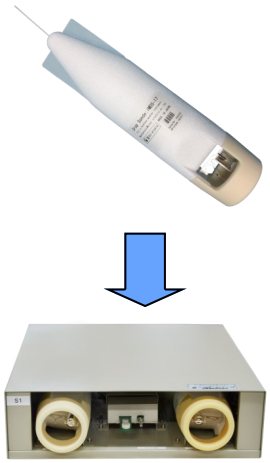
Preparation of Observation screen



Pre observation checking screen



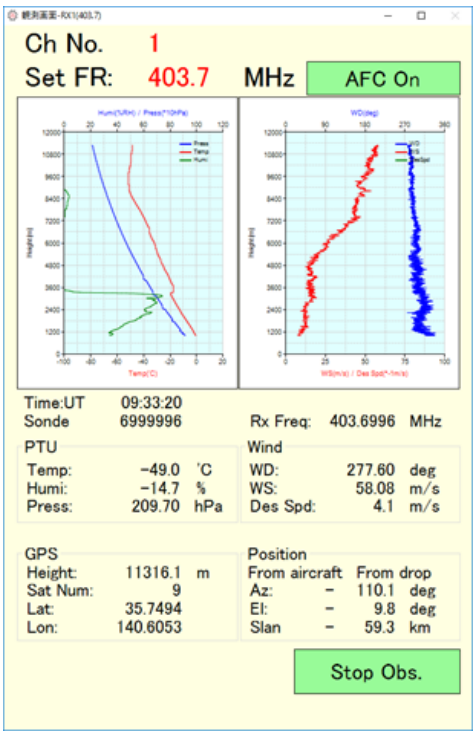
Set dropsonde to storage box



◎Connection confirmation screen
This screen shows the connection between the processing PC equipped with observation software and the receiver, and communication between the dropsonde and the sonde storage box.

◎Sonde sensor check
On the data confirmation screen, software checks the soundness of the dropsonde based on the predetermined reference value of these parameters: temperature, humidity, pressure, wind speed, wind direction, altitude, number of GPS satellites, latitude, and longitude.
・Green status means pass, red status means failure.

Observation screen



◎Observation screen
· On the observation screen, received data is displayed with numerical value and graphs.
· Data is updated every second.
· The display area of the graph can be changed on the setting screen.
· Observations can be terminated automatically or manually.

◎Position
From aircraft
It is calculated by comparing GPS position data of the aircraft and position data of the dropsonde.

From drop
It is calculated by comparing position of the beginning of observation and position collected from dropsonde.

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Dropsonde (iMDS-17)

Outline

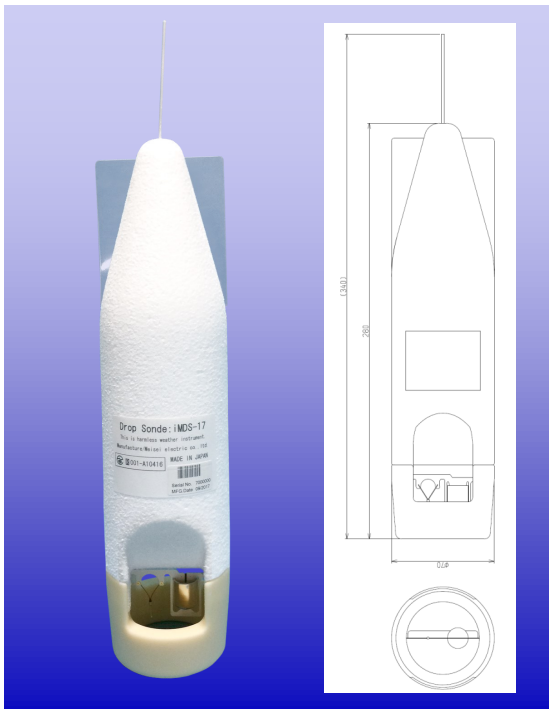
- The iMDS-17 Dropsonde is a dropped type radiosonde that adopted the latest electronic components iMS-100 GPS radiosonde.
- Due to compactness and weight reduction, it is possible to suppress the descending speed when it falls without parachute or reduce influence from deployment of parachute. Observation from 12km altitude to the sea level takes approximately 12 minutes.
- In the aircraft, after the power is on, this dropsonde will minimize its transmitter power. Through analysis of pressure from embedded pressure sensor and GPS information, descend can be detected, and the transmitter power will increase automatically.

Temperature	Measurement range	−90℃ to +50℃
	Resolution	0.1℃
	Sampling rate	2 Hz
	Accuracy*1	±0.5 ℃
	Response time	< 0.4 s (1,000 hPa, 5 m/s)
Humidity	Measurement range	0%RH to 100%RH
	Resolution	0.1%RH
	Measurement cycle	2 Hz
	Accuracy*1	±5%RH
	Response time	< 0.2 s (Absorbing, 1,000 hPa, 6 m/s , 0℃) < 14 s (Absorbing, 1,000 hPa, 6 m/s, −60℃)
Pressure	Measurement range	1050.0 hPa to 3.0 hPa
	Resolution	0.1 hPa
	Measurement cycle	2 Hz
	Accuracy*1	± 1 hPa
	Response time	< 1 s
Geopotential Height	Measurement range	−500 m to 40,000 m
	Resolution	0.1 m
	Uncertainty *2*3	11 m
Wind Direction	Measurement range	0 ° to 359.99°
	Resolution	0.1 °
	Measurement cycle	1 Hz
	Uncertainty *2*3	Surface to 10 hPa: 1 °
Wind Speed	Measurement range	0 m/s to 200 m/s
	Resolution	0.01 m/s
	Measurement cycle	1 Hz
	Uncertainty*3*4	Surface to 10 hPa: 1 m/s
GPS Receiver	Frequency	1574.25 MHz ±1MHz C/A code
	Number of channels	66 parallel channels
	Positioning Technology	DGPS (SBAS)
Descending speed	Termination speed	Approximately 13 m/s

Operating environment	Pressure	1050.0 hPa to 3.0 hPa
	Temperature	−90 ℃ to −60 ℃
	Humidity	0 %RH to 100 %RH
Transmitter	Tuning range *5	400 MHz ～ 406MHz
	Band width	< 15 kHz
	Output power	< 100 mW
	Transmitter type	FM
Modulation	Modulation type	Digital PCM
	Baud rate	1,200 bps
	Range	< 200 km
	Sampling	1 second
Power	Voltage	3.0 VDC
	Current	< 300 mA
	Battery type	Lithium battery × 1(CR-123)
	Operating time	> 120 min.
	Dimension	Φ 70 mm × 280 mm
	Weight	110 g

*1: measurement accuracy at the laboratory
*2: Unless otherwise specified, the measurement uncertainty is expressed with the inclusion factor k = 2
*3: "PDOP = 1" indicates good GPS positioning
*4: Standard deviation (1σ) evaluated using GPS simulator
*5: Frequency can be changed every 100 kHz within specification range. Please follow the Radio Law for the frequency to use.
※Dimensions exclude antenna (or protrusion)

Outline view



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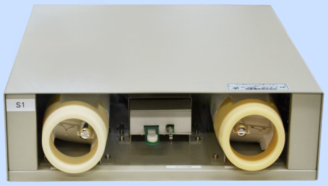
Dropsonde Receiving System (MDSS) Specification and composition

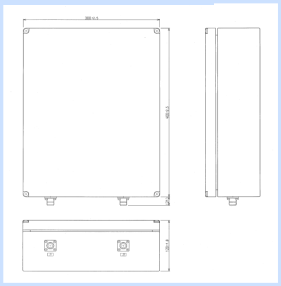
▪Indoor equipment ▪Outdoor equipment

① Receiving System

② Dropsonde storage Box



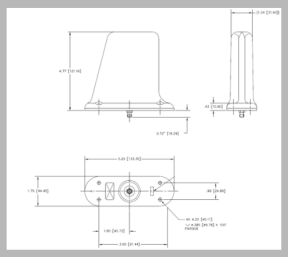
③ Pre-Amplifire



④ Observation Software

⑤ Dropsonde (iMDS-17)

⑥ Antenna



Receiver	Tuning range	400.0 MHz～406.0 MHz
	Channel	100 kHz steps (60 ch)
	Sensitivity	< −107 dBm
	Indicator	Signal strength, Lock lamp
	Functions	AFC, Limiter AMP, ATT
Demodulator	Type	PCM-FM, Biφ
	Baud rate	1200 bps
	Error correcting	BCH, 1 bit error correction
Communications	Data port	LAN (10/100BASE-T)
	Sonde I/F port	D-sub connector
	Audio port	Output x 1, Input x 1
Size & Weight	Dimensions	320(W) × 260(D) × 60(H)mm
	Weight	Approx. 2.0kg
Power	Voltage	100 – 240 VAC (or 12 VDC)
	Wattage	36 W
Antenna	Absolute gain	< 1.5 dB
	Directionality	Non
	Center Frequency	405 MHz
	Input impedance	50 Ω
	Transmission range	< 200 km

Data Processor (Laptop PC)	OS	Windows 10 64 bit
	CPU	> 1GHz
	Memory	> 4GB
	HDD	> 256GB SSD
	Communication	> LAN × 2 (2 ch receive operation)
		> USB × 6
		> Serial Port × 1
Display	Size	17 inch
	I/F	Touch panel
Pre-AMP	AMP Gain	> 7.65 dBi
	Filter	Fc = 404.5MHz
	Dimention	300(W)× 120(H) × 400(D) mm
	Weight	7.0 kg
	Power	15 V (coaxial feed system)
Divider	Distribution number	4
	Filter	FC matches the operating freq.
	Dimension	350(W)× 80(H) × 300(D) mm
	Weight	3.0 kg
	Power	AC 100V to 240V

Caution

For safe and correct usage, please read the "Operation Manual" prior to the use of the products.

- The specifications and appearances might be changed without prior notice.
- The specifications shown in the catalog are of our standard products. We are pleased to customize it to meet customer's requirements. For the details, please contact us.
- Please understand in advance that our company cannot assume the responsibility of any claims made by the third party about any monetary damages or any loss of profits arising out from the use of our products.
- The color of the product photography on catalog might be different from that of actual product due to printing.

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