

MAWS201M Tactical Meteorological Observation system

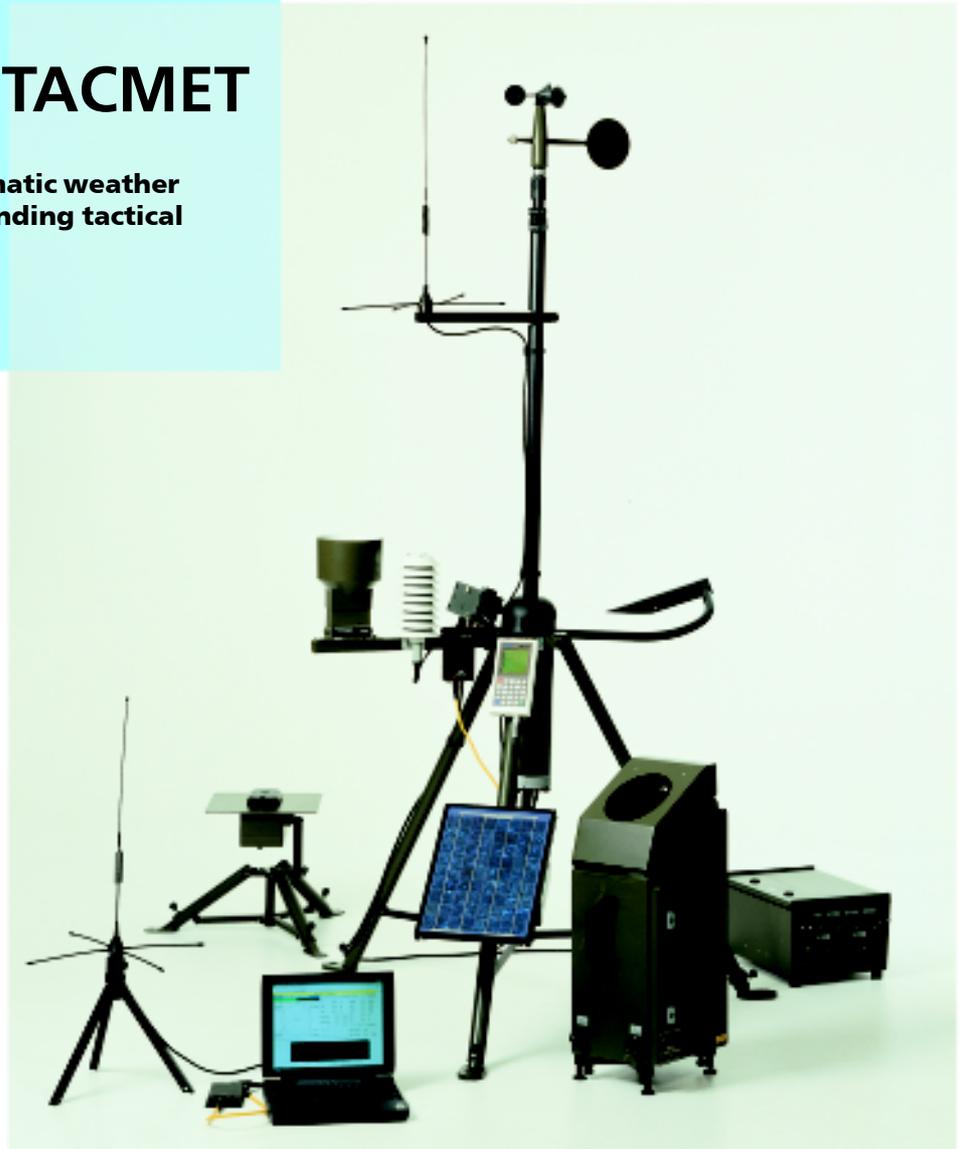


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MAWS201M -TACMET

A commercial, versatile automatic weather observation system for demanding tactical military needs

- **Broad sensor capability with full aviation support**
- **Automatic METAR/SPECI formatting**
- **Multi-purpose system for quick-deployment**
- **Multiple communication options**
- **Compact and light-weight**
- **Broad environmental specifications**
- **Commercial-Off-The-Shelf (COTS) production**



Defence Forces around the world have identified the need for a quick-deployment, automatic weather station in support of various types of field operations. At the same time, there is a growing need to use Commercial-off-the shelf (COTS) equipment. The challenge is to provide a COTS system that can be easily shipped, installed, and upgraded in the field. Field-upgradation should be executed with a broad range of sensors, including full aviation support capability in METAR format. Vaisala's MAWS201M new-generation Tactical Meteorological (TACMET) Observation System offers all of these capabilities, along with being a genuinely COTS product.

BROAD SENSOR CAPABILITY

The MAWS201M TACMET System is a field-deployable, compact weather station, capable of monitoring two general types of environmental parameters: meteorological parameters (wind, air temperature, humidity, pressure, precipitation accumulation) and aviation support parameters (cloud height and coverage, visibility/precipitation type, thunderstorm/lightning). The system is designed to be portable, capable of quick deployment worldwide, and operative in tactical situations under various environments.

FULL AVIATION SUPPORT

The Basic System is easily enhanced with the sensors needed to support aviation; cloud height and coverage, visibility, present weather and lightning detection. The additional sensors are all powered by mains power. In case of mains power loss, the back-up battery supply (with an in-built charger) will support operation in limited mode for 24 hours.



THE BASIC SYSTEM

The MAWS201M Basic System offers high performance in a very compact package, integrated upon a steady tripod design. The system is powered either by mains (AC) power or by an integrated solar panel when no mains power is available. Back-up batteries are available, providing a minimum of 7 days of operation without recharging.

The MAWS201M interfaces with the basic sensor set of wind speed and direction, barometric pressure, air temperature, relative humidity and precipitation. In addition to the basic functions of powering and measuring the sensors, MAWS201M also processes statistical calculations, performs data quality control, logs data into Flash memory, and formats data for output in application-specific formats.

Modular design and efficient Built-In-Test (BIT) diagnostics allow quick identification, removal and replacement of a defective LRU (Lowest Replaceable Unit) in the field.

MAWS201M uses a 32-bit Motorola CPU, 16-bit A/D conversion, and advanced software to ensure continuous accuracy of the measured data. Built-in quality control software validates sensor data against user-set climatological limits and step changes between successive measurements.

MAWS201M interfaces with intelligent sensors such as those used in the Enhancement configuration, and transmits data to users via landline cable and/or VHF or UHF radio modem.

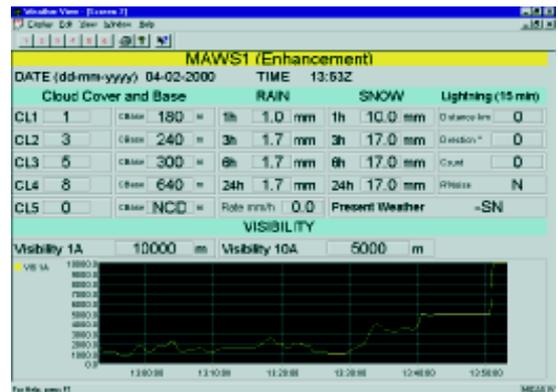
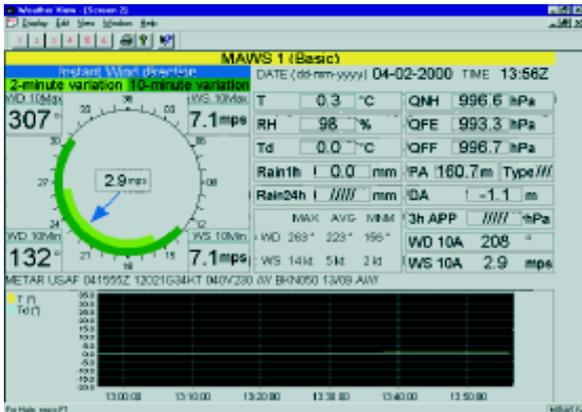


QMD101M is a lightweight, rugged and easy-to-read handheld display device for viewing measured and calculated parameters and systems alarms, as well as for setting station-specific parameters.

COMPACT AND LIGHTWEIGHT

The TACMET system is designed for maximum portability and ease of use. The mechanical parts are made of lightweight but robust anodized aluminium and durable plastic. All cables, made of polyurethane, are fitted with quick-release connectors, which makes installation and unpacking quick and easy even under the most difficult conditions. The carrying cases are made of cellular polypropylene (EPP). This is a lightweight but very rugged material, providing excellent cushioning during transport. The cases are equipped with handles, hinges and latches for which padlocks can be used. All necessary accessories, such as a hammer, ground sticks and a compass are included.





WORKSTATION SOFTWARE UNDER WINDOWS ENVIRONMENT

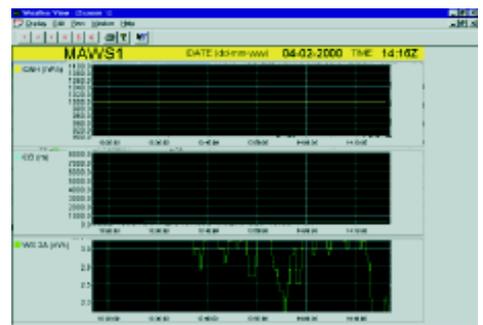
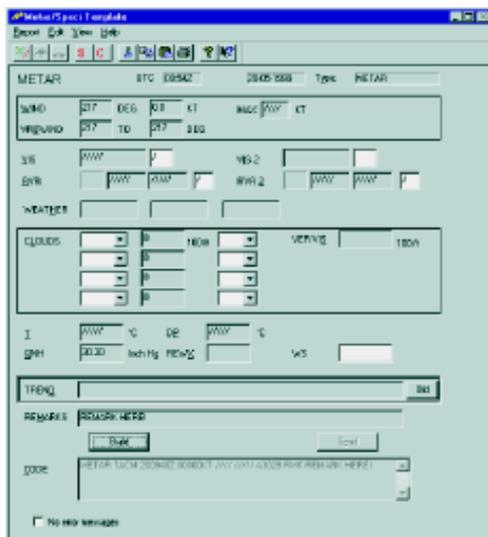
Installed in a laptop PC, the workstation software operates in a 32-bit Windows NT system, providing a multi-tasking operation and connectivity. Two MAWS201M systems can be connected to one workstation via hardware and/or radio modems. The workstation handles displaying numerical and graphical data, coding METAR/SPECI aviation weather reports, as well as archiving and transmitting data for further processing. The Windows environment is user-friendly and provides great flexibility. Using the standard user

interface and features, the software is straightforward and easy to learn.

The workstation software facilitates editing METAR/SPECI reports by easy-to-use templates. Aviation special weather reports (SPECI) are generated automatically whenever selected criteria are met, or at any time initiated by the operator. Report transmission is also fully automated, if necessary.

In addition, the software provides real-time- graphical data display in multiple windows. Both Basic and Enhanced Systems have their own display windows. Stored data can be viewed in ASCII format. The Event Monitor allows the operator to monitor system performance and sensor alarms.

Data is archived for 30 days on hard disk and also distributed further to other systems via serial port or as an FTP transfer via LAN.



CEILOMETER WITH CLOUD COVERAGE ALGORITHM

Cloud height and coverage are detected by the CT25KAM, which is a portable version of Vaisala's FAA approved ceilometer CT25K.

CT25KAM has a unique single lens design making it lighter, more reliable and easier to maintain. The heater/blower window conditioner assures full performance in specified environmental conditions, and in all precipitation types. It also significantly reduces the need for operator maintenance in the field.



A special tilt sensor is provided as standard for automatically compensating uneven terrain. Installation is made easier and faster when no exact leveling is required. The cloud coverage algorithm in the CT25KAM is a further development of the algorithm specified by FAA. Cloud coverage (amount) is reported in 0 to 8 octas, according to WMO regulations.

VISIBILITY WITH PRESENT WEATHER

The PWD11A Visibility and Present weather sensor evaluates Meteorological Optical Range (MOR) by measuring the intensity of infrared light scattered at an angle of 45°. The scatter measurement is converted to visibility after a careful analysis of the signal properties. Special processing is used in case of precipitation.

Present Weather is also measured with the same instrument. The PWD11A software detects precipitation droplets from rapid changes in the scatter signal. Droplet data is used in estimating precipitation intensity and amount. In addition to the optical signal, a capacitive rain detector is used in estimating precipitation intensity and type. The output of the capacitive rain detector is



proportional to the amount of water on the capacitive sensing surfaces, while optical intensity is proportional to the volume of reflecting particles.

The PWD11A is a lightweight instrument designed to operate continuously with minimum maintenance. Lens heating reduces condensation, allowing for better performance in all conditions. The PWD11A is quickly installed on the tripod of the Basic System. No tools are required.

UNIQUE THUNDERSTORM DETECTION

The SA20M detects lightning occurring in clouds, between clouds and between cloud and ground. The ability to detect inter-cloud activity allows the SA20M to report lightning during the building stages of a thunderstorm, before sufficient charge build-up has occurred that would generate a ground strike. Consequently, the SA20M provides early warnings of potentially fatal single-event ground strikes.



The data output consists of a 15-minute 'moving window' of all reported lightning activity. Output messages are generated at ten (10) second intervals for the operator terminal display or the hand-held test set. The data includes the distance and direction of the closest lightning and a total count of lightning activity during the previous 15 minutes.

Technical Information

GENERAL

Processor	32-bit Motorola
A/D conversion	16-bit
Accuracy	
Resistance measurements (Pt-100)	Better than ± 0.05 % F.S.
Voltage measurements	Better than ± 0.2 % F.S.
Data logging memory	1.7 MB flash
Inputs	10 analog inputs (diff.) 2 counter/frequency inputs.
Serial communication	Internal channel for pressure sensor One RS-232 for maintenance 2 pcs RS-232 for handheld display and laptop PC (max. length 70 m) 2 pcs RS-485 for smart sensors and remote displays (max. distance 2.5 km)
Speed	300 ... 19,200 bps

POWERING, BASIC SYSTEM

Mains power	85 - 264 VAC, 47 - 440 Hz, max. 100VA
Solar panel	12 W, 7 Ah back-up btry for continuous operation w/o mains supply

POWERING, ENHANCEMENT

Mains power	85 - 264 VAC, 47 - 440 Hz, max. 200VA
Back up time for Enh. sensors	Min. 24 h with 48 Ah btry

ENVIRONMENTAL

Temperature	-40 deg C to +55 deg C	
Humidity	5 to 100 %	
Wind	0 to 35 m/s (0 kts to 70 kts)	
EMI and ESD protection		
Emissions	CISPR 22 class B	
Immunity	RF immunity	IEC 61000-4-3
	EFT immunity	IEC 61000-4-3
	ESD immunity	IEC 61000-4-2
Electromagnetic compatibility	IEC-801-4	
MTBF	> 12,500 h (MIL-HNDB217F)	
Set-up time	Basic System	Less than 15 min.
	With Enhancement	30 min.
Mast height	Max. height adjustable from 1.8 m to 3.6 m (6 ft - 12 ft)	
Total weight	Basic System	In two carry cases, total 46 kgs with all accessories
	Enhancement	64 kgs with carry cases

WIND DIRECTION & SPEED WMS302M

	Anemometer	Wind Vane
Measured range	0.5 - 60 m/s	0 - 360 °
Accuracy	± 0.3 m/s (<10 m/s) < 2 % (> 10 m/s)	< ± 3 °
Threshold	< 1.0 m/s	< 1.0 m/s
Distance constant	2 m	



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Delay distance	0.6
Operating temperature range	-40 to +55°
Dimensions (h x w)	265 x 360 mm
Weight	360 g

RELATIVE HUMIDITY AND TEMPERATURE SENSOR QMH101M

	T	RH
Range	-40 to +60° C	0 to 100 %
Accuracy	< ± 0.3 ° C	± 2 %, 0 to 90 % ± 3 %, 90 to 100%

PRESSURE SENSOR PMT16A

Accuracy	± 0.3 hPa incl. one year drift (with factory calibration)
Pressure range	600 - 1100 hPa
Temperature range	- 40 ° to + 60 ° C

LIQUID PRECIPITATION SENSOR QMR102M

Funnel diameter	159.6 mm
Orifice	200 cm ²
Sensitivity	0.2 mm
Capacity	144 mm/h
Accuracy	< ± 5 %, < 24 mm/h < ± 10 %, < 120 mm/h

CEILOMETER CT25KAM

Range	0 ...25,000 ft (0...7.5 km)
Accuracy	± 2 % $\pm 1/2$ x (resolution)
Resolution	50 ft
No of layers	Up to 5
Cloud cover algorithm	Included
Lens heater/blower	Included
Tilt correction sensor	Correction 0 - 60 degrees

VISIBILITY SENSOR PWD11A

Range	10 ... 20,000 m
Accuracy	± 10 % (up to 10,000 m) ± 15 % (10,000 ...20,000 m)
Operating principle	Forward scatter at an angle of 45°
Light source	Near-infrared LED Peak wavelength 875 nm
Lens heating	Included

PRESENT WEATHER DETECTOR PWD11A

PW identification	Drizzle, rain, snow, rain and snow, ice pellets, freezing rain, freezing drizzle Fog, mist, haze
Precip. detection sensitivity	0.05 mm/h

LIGHTNING DETECTOR SA20M

Types of strikes detected	Cloud to cloud Cloud to ground
Range	50 nm radius
Ranging accuracy	± 0.5 nm (0-15 nm) ± 1 km (0-28 km) ± 1.3 nm (15-30 nm) ± 2.4 km (28-55 km) (per FAA TSO C110a test strike)
Directional accuracy	± 5 deg.

ACCESSORIES:

All included, hammer, ground sticks, compass etc.