

TRIMBLE M7 GPS SURVEY (GPS-S) SYSTEM

KEY FEATURES

Precise Positioning Service capable GPS receiver for surveying

Trimble Access field software designed for Military use

Field tested, ruggedized Survey System built to Military standards

Compatible with conventional (optical) equipment and construction machine control systems

Power office software used for processing and adjustment of both GPS and conventional data

Support both Military and Trimble data radios

Designed for tough conditions anywhere in the world, the Trimble® M7 GPS-Survey System provides a complete, light-weight yet rugged solution for military surveying and positioning requirements.

The M7 GPS-S system is a turn-key solution for the precise positioning and orientation of artillery weapon systems and for geodetic and construction survey applications. At the heart of the system is Trimble's M7 GPS-S Receiver with SGE-41 24 Channel SAASM GPS Engine, capable of Precise Positioning Service (PPS) surveying; accurate to 5 mm (postprocessed) and 10 mm (real-time). The brain of the system is the Trimble TSC3 Handheld Data Collector. The TSC3 is capable of supporting both GPS and conventional (optical) surveying, to include full interoperability with existing Trimble military surveying and construction machine control systems. The TSC3's simple Graphical User Interface (GUI) is tailored to support any military survey mission.

REAL TIME AND POSTPROCESSED PERFORMANCE

Reduce the duration of survey missions while accessing outstanding positioning results in real-time and through postprocessing applications. Initialization time is typically less than 8 seconds with a 99.9% reliability performance.

The Trimble TSC3 handheld data collector is loaded with Trimble Access™ Surveying software for performance in the field, and Trimble Business Center software is provided for postprocessing. This software provides

a streamlined interface with a simplified setup, collection, postprocessing, and adjustment system. The TSC3 handheld collects all field data and measurements, to include RTK vector data for use in least squares adjustment. Upload GPS data files or RINEX files without the need for conversion.

This system supports the use of military map standard coordinates systems (UTM/UPS and MGRS/USNG), along with all other defined coordinate systems throughout the world, and supports the use of local and worldwide geoid models.

FIELD TESTED RUGGED FOR MILITARY USE

This system is designed for rugged field operation. The receiver, handheld, and other hardware components are fully sealed and environmentally tested under MIL-STD-810G guidelines.

The system is designed to be both man-portable and vehicle mounted. Using the supplied brackets, quick release and magnetic mount, the GPS receiver, handheld and radio can remain in the vehicle, while the range pole and GPS antenna are the only items outside the vehicle.

Long life battery support includes two rechargeable, removable lithium ion batteries in the receiver, which also includes a 10-year memory battery; and a rechargeable, 34-hour battery in the handheld data collector. The Trimble M7 GPS-S receiver has been granted Security Approval by the GPS Directorate.



TRIMBLE M7 GPS SURVEY (GPS-S) SYSTEM

SYSTEM COMPONENTS

- Trimble M7 GPS-S Receiver with SGE-41 24 Channel SAASM GPS Engine capable of Precise Positioning Service (PPS) tracking (Receiver Part Number 100010-XX)
- Trimble TSC3 Handheld Data Collector with Trimble Access Surveying Software
- Trimble Zephyr™ 2 GPS Micro-centered Antenna
- Trimble Business Center Office Software package for post processing of Survey data
- Capability with Military Radios¹
 - AN/PRC-117
 - AN/PRC-152
- Mounts on Range Pole with Handheld and GPS Antenna
- Kit includes all components required to deploy as a base station or rover receiver
- Walk around weight of Rover System (without Radio) is less than 6.8 kgs (15 lbs)
- Complete system fits in one transport case²

TECHNICAL SPECIFICATIONS

Physical

| | |
|----------|---|
| Receiver | 18.5 cm W x 6.7 cm D x 18.0 cm H (7.3 in W x 2.6 in D x 7.1 in H) 2.2 kg (4.4 lb) with batteries |
| Handheld | 14.1 cm W x 6.4 cm D x 27.8 cm H (5.6 in W x 2.5 in D x 10.9 in H) 1.04 kg (2.3 lb) |
| Antenna | 16.5 cm diameter x 7.6 cm (6.5 in x 3.95 in) height 0.64 kg (1.4 lb) |

Electrical

Receiver

- 2 Rechargeable, removable 7.4 V, 2.4 Ah Lithium-Ion battery in internal battery compartments
- Power consumption is 3.2 W in base or rover mode
- Operating times on internal battery is 4 hours each (8 hours total)
- Internal 10 year memory battery
- Ruggedized all aluminum housing
- Supports CMR+, RTCM type 1 and 2 messages (base / rover), RTCM type 9 messages (rover)
- Complies with a requirements with GPU-03-105

Antenna

- Low voltage, low power consumption with an operating range of 3.5 V DC to 20 V DC input, 125 mA maximum current
- 13 dB amplifier margin supports cable runs of over 60 m without special coaxial cable or in-line amplifiers
- 50 dB signal gain for reliable tracking in difficult environments
- Integral advanced LNA (low noise amplifier) to reduce jamming by high power out-of-band transmitters
- 5/8" x 11 female threaded stainless steel mount point

Handheld

- Processor: Texas Instrument Sitara™ 3715 series ARM® Cortex™—A8 Processor (800 MHz)
- 8 GB non-volatile NAND Flash onboard for data storage
- SDHC memory slot for expanded storage
- 11.1 V, 2.6 Ah, 28.9 Wh Li-Ion rechargeable pack
- Battery life of 34 hours under normal operating conditions³
- Display: 4.2 in (107 mm) landscape VGA display, 640 x 480 pixels; Sunlight-readable color TFT with LED backlight, resistive touchscreen
- I/O: USB Host (full speed), USB Client (high speed), DC power port, 9-pin serial RS-232
- Optional I/O: Bluetooth®, Wifi and 2.4 GHz radio can be added to the handheld, as per military requirements.
- Supports all datums listed in NIMA Technical Report (TR) 8350.2 and user-defined datums
- Supports the use of military map standard coordinate systems (UTM/UPS and MGRS/USNG), along with all defined coordinate systems and datums listed in National Imagery and Mapping Agency (NIMA) Technical Report (TR) 8350.2
- Supports the use of worldwide geoid models and local geoid models

Environmentals

Meets or exceeds

| | |
|-----------------------|--|
| Operating Temperature | −22 °F (−30 °C) to +120 °F (+49 °C) IAW MIL-STD-810G, Low Temp Operation (Method 502.5, Procedure II) High Temp Operation (Method 501.5, Procedure II) |
| Storage Temperature | −40 °F (−40 °C) to +158 °F (70 °C) IAW MIL-STD-810G, Low Temp Operation (Method 502.5, Procedure I) High Temp Operation (Method 501.5, Procedure I) |
| Humidity | 100% RH temp cycle −20 °C/60 °C (−4 °F/140 °F) MIL-STD-810G, Method 507.5 |

| | |
|---------------------------|--|
| Sand & dust | 12 hour exposure with dust concentrations of 0.3 ± 0.2 grams per cubic foot and air velocity from 300 ft/min (1.5 m/sec) to 1750 ft/min (8.9 m/sec) IAW MIL-STD-810G, Method 510.5, Procedure I |
| Water | .5 minute submersion unprotected in fresh or salt water at a depth of 1 meter (in transit case) IAW MIL-STD-810G, Method 512.5, Procedure I |
| Rain | exposure to rain at a rate not less than 4 in/hr (10 cm/hr) with a wind velocity greater than 40 mph (18 m/sec) IAW MIL-STD-810G, Method 506.5, Procedure II |
| Salt Fog | (in transit case) IAW MIL-STD-810G, Method 509.5 |
| Drop | System on a range pole meets standard 2 meter pole drop onto plywood over concrete and standard free fall drop from desk height 0.76 m (2.5 ft) onto plywood over concrete Shock .26 drops at room temperature from 1.22 m (4 ft) onto plywood over concrete (in transit case). MIL-STD-810G, Method 516.6, Procedure IV |
| Fungus | survives 28 day fungi test outlined in MIL-STD-810G, Method 508.6 |
| Solar Radiation | survives exposure to solar radiation of up to 1120 Watts per square meter. IAW MIL-STD-810G, Method 505.5, Procedure I |
| Vibration | General Minimum Integrity and Loose Cargo test MIL-STD 810G, Method 514.6, Procedures I. MIL-STD 810G, Method 514.6, Procedures II, Cat. 5 |
| Altitude | 4,572 m (15,000 ft) at 23 °C (73 °F) and 12,192m (40,000 ft.) at −30 °C (−22 °F) MIL-STD-810G, Method 500.5, Procedures I, II, III |
| Electromagnetic radiation | conform to the performance specified for RE102 [(2 MHz up to 1 GHz or 10 times the highest intentionally generated frequency within the Equipment Under Test, whichever is greater Measurements beyond 18 GHz are not required.); RE102 limit for ground applications (Navy Mobile & Army)] and RS103 [(2 MHz to 18 GHz); RS103 limit levels for ground platform – Army (50 volts/meter)] when tested in accordance with the test methodologies in MIL-STD-461F IAW MIL-STD-464C, Section 5.3, Table 4 for ground systems IAW the test methodologies for RE102 and RS103 in MIL-STD-461F |

- Complies with comply with applicable sections of 42 United States Code (U.S.C.) 4321-4370d, 40 Code of Federal Regulations (C.F.R.) 1500-1508, MIL-STD-882D, and Executive Order (E.O.) 12114. No hazards above medium.
- Complies with human factors engineering guidance contained in MIL-STD-1472F.
- Complies with Authority to Operate (ATO) in accordance with DoD 8500.

POSITIONING PERFORMANCE⁴

Absolute Survey Positioning (averaged autonomous position)

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|------------|-----------|
| Horizontal | 0.8 m RMS |
| Vertical | 1.2 m RMS |

Local Area DGPS Positioning⁵

| | |
|------------|--------------------|
| Horizontal | 0.25 m + 1 ppm RMS |
| Vertical | 0.50 m + 1 ppm RMS |

Static GPS Surveying

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|------------------------|--------------------|
| Fast Static Horizontal | 5 mm + 0.5 ppm RMS |
| Fast Static Vertical | 5 mm + 1 ppm RMS |

Real Time Kinematic Surveying

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|---|--|
| Single Baseline <30 km Horizontal | 10 mm + 1 ppm RMS |
| Single Baseline <30 km Vertical | 20 mm + 1 ppm RMS |
| Initialization time ⁶ | typically <8 seconds |
| Initialization reliability ⁶ | typically >99.9% |
| Relative azimuth accuracy | typically <0.3 mils at 100 meters or greater |

- Any military radio capable of Asynchronous data transmission using 4800 bps baud rate.
- All items except the Tripod, Range Pole with Bi-pod and Base Station battery fit into the transport case. Fully loaded transport case weighs less than 16.8 kg (37 lb).
- Unit is idle with backlight turned on, moderate temperatures.
- Precision and reliability may be subject to anomalies due to multipath, obstructions, satellite geometry, and atmospheric conditions. The specifications stated recommend the use of stable mounts in an open sky view, EMI and multipath clean environment, optimal GPS constellation configurations, along with the use of survey practices that are generally accepted for performing the highest-order surveys for the applicable application including occupation times appropriate for baseline length.
- Local Area DGPS positioning is only available in SPS mode.
- May be affected by atmospheric conditions, signal multipath, obstructions and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.

Note: U.S. Government policy restricts the sale of Precise Positioning Service (PPS) equipment to those authorized by the U.S. Department of Defense. Non-U.S. authorized users must purchase PPS equipment through the Foreign Military Sales (FMS) process.

Please visit our website at www.trimble.com/defense for sales information. Made in U.S.A.
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Specifications subject to change without notice.



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