

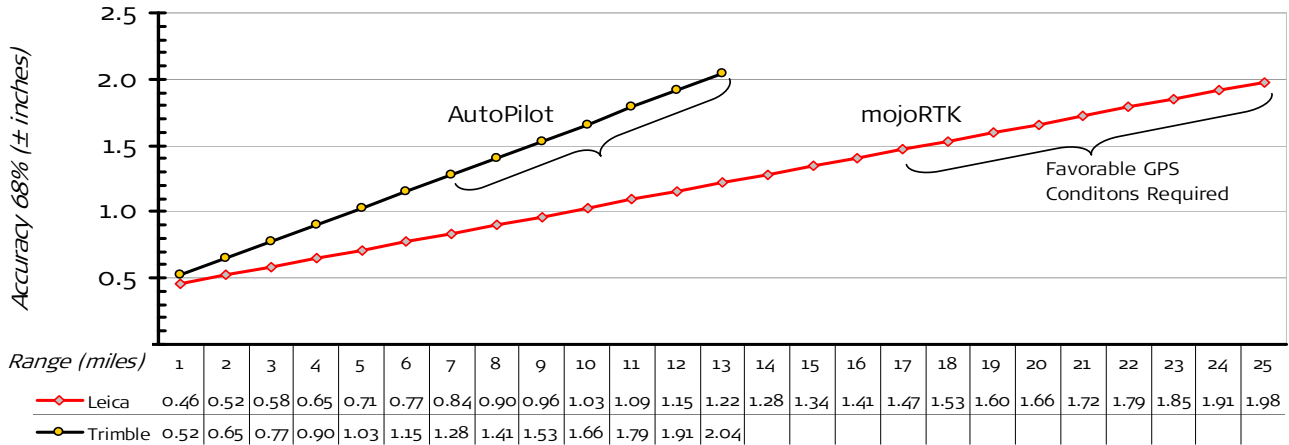
Leica mojoRTK GPS Engine Accuracy Comparison

Manufacturers' Datasheet Summary

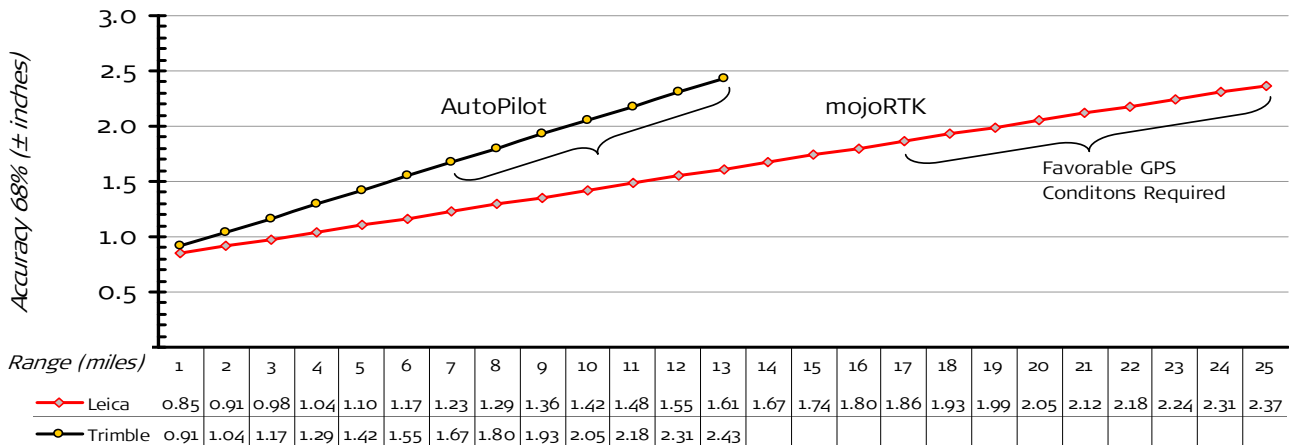
Dynamic RTK "Moving Mode" Spec.	Leica 1200 Engine (mojoRTK)	Trimble 214/750 (AutoPilot)
Horizontal Accuracy rms (68%)*	±0.4" + 1ppm (±10mm + 1ppm)	±0.4" + 2ppm (±10mm + 2ppm)
Vertical Accuracy rms (68%)*	±0.8" + 1ppm (±20mm + 1ppm)	±0.8" + 2ppm (±20mm + 2ppm)
Maximum GPS Range from Base*	25mi (40km)	13mi (20km)
Satellite Reacquisition*	< 8 sec typical	< 30 sec typical
Position Rate*	20 per second (Hz)	10 per second (Hz) (20Hz optnl)
Glonass Satellites	Yes	No

* Data from company datasheets downloadable from respective websites. GPS Range data assumes line-of-sight radio link.

Comparative Horizontal Accuracies at Range from Base



Comparative Vertical Accuracies at Range from Base



Note the mojoRTK overall 'system' accuracy is specified as ±2.0" (99%) at 4 miles range and is not based on its GPS engine accuracy alone. Please read the Leica document titled "Two Inches is Enough" to learn more about mojoRTK system accuracy specifications and how to decipher accuracy datasheets.

The charts are derived using the formula ~ Accuracy = error + (ppm error x distance)
Trimble receiver specifications were obtained from their website in April 2007. This may be subject to change, upgrades or new product announcements by Trimble. Other receivers may be available for the AutoPilot so please check with Trimble for Specifications.

- when it has to be **right**



Accuracy (rms) with real-time/RTK

	ATX1230 GG / ATX1230 / GX1230 GG / GX1230	GX1220	GX1210
RTK capability	Yes, standard	No	No
Rapid static (phase), Static mode after initialization	Horiz: 5mm + 0.5ppm Vertical: 10mm + 0.5ppm		
Kinematic (phase), moving mode after initialization	Horiz: 10mm + 1ppm Vertical: 20mm + 1ppm		
Code only	Typically 25cm		

Accuracy (rms) with DGPS/RTCM

	ATX1230 GG / ATX1230 / GX1230 GG / GX1230	GX1220	GX1210
DGPS/RTCM	DGPS/RTCM standard Typically 25cm (rms)	DGPS/RTCM optional Typically 25cm (rms)	DGPS/RTCM optional Typically 30cm (rms)

Accuracy (rms) in single receiver navigation mode

	ATX1230 GG / ATX1230 / GX1230 GG / GX1230	GX1220	GX1210
Navigation accuracy	5-10m rms for each coordinate	5-10m rms for each coordinate	5-10m rms for each coordinate
Degradation effect	Degradation possible due to SA	Degradation possible due to SA	Degradation possible due to SA

On-the-Fly (OTF) initialisation

	ATX1230 GG / ATX1230 / GX1230 GG / GX1230	GX1220	GX1210
OTF Capability	Real time and post processing	Post processing only	No OTF
Reliability of OTF initialisation	Better than 99.99%	Not applicable	Not applicable
Time for OTF initialisation	Typically 8secs, with 5 or more satellites on L1 and L2	Not applicable	Not applicable
OTF Range*	Typically up to 30km in normal conditions Up to 40km in favorable conditions	Not applicable Not applicable	Not applicable

*Assuming reliable data-link is available in RTK case

Position update and latency

	ATX1230 GG / ATX1230 / GX1230 GG / GX1230	GX1220	GX1210
	RTK and DGPS standard	DGPS optional	DGPS optional
Position update rate	Selectable: 0.05 sec (20Hz) to 60 secs	Selectable: 0.05 sec (20Hz) to 60 secs	Selectable: 0.05 sec (20Hz) to 60 secs
Position latency	0.03 sec or less	0.03 sec or less	0.03 sec or less

AgGPS AUTOPILOT TECHNICAL SPECIFICATIONS

Trimble Components:

- AgGPS® 214 RTK Rover Receiver and antenna
- Steering Position Sensor (Wheeled tractors only)
- Navigation Controller
- Hydraulic Valve (Mechanical steering only)
- Autopilot Display
- AgGPS 70 RDL Keypad and Data Logger
- AgGPS Lightbar
- TRIMCOMM 900M Rover Radio and antenna
- Mounting Brackets

Also required:

- AgGPS 214 Base Station System with TRIMCOMM 900M Base Station Radio

Standard Features:

AgGPS 214

- Centimeter accuracy
- Real-Time Kinematic processing
- 9 channel L1/L2 full cycle carrier
- CMR & RTCM correction input
- RTK Fixed, RTK Float, and DGPS modes
- Three programmable RS-232 ports
- 1PPS output

Navigation controller

- +/- 90 degree Tilt/Roll compensated
- Internal data storage
- Water proof
- Externally mounted
- Fully integrated design
- Attitude sensors
- Embedded controller (no moving parts)

Autopilot display

- 31 keys with 10 digit numeric keypad
- 6 inch high resolution LCD display
- Water Proof

AgGPS 70 RDL Keypad and Data Logger

- Compact Flash Memory card
- Splash proof
- 2 x 16 line character display
- Two Programmable RS-232 ports
- CAN 2.0B (J1939) Port
- 9 volt battery for data integrity
- A-B line logging
- Coverage Logging
- 3-D position or Topo logging
- Job download/upload

Performance Characteristics:

AgGPS 214 Receiver

General	Dual 12 channel dual frequency Carrier phase receiver
Update Rate	10 Hz Standard; 20 Hz Optional With MS750 upgrade package
Carrier Phase	
Position Accuracy	1 cm+ 2ppm baseline distance - Horizontal 2cm+2ppm baseline distance - Vertical
Time to Fix	<30 sec, typical



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MS750

Dual Frequency RTK Receiver for Precise Dynamic Positioning

STANDARD FEATURES

- Centimeter accuracy, real-time positioning
- 20 Hz position updates
- < 20 ms position latency
- Front panel display & keypad
- User-defined local coordinates direct from receiver
- 3 serial I/O ports
- 2 CAN ports
- 1 PPS Output
- Trimble CMR Input/Output
- RTCM Input/Output
- One year hardware warranty
- Compact, easy mounting design
- Synchronized 5 Hz position updates

OPTIONS AND ACCESSORIES

- Moving Base RTK
- Rugged L1/L2 machine mount antenna
- Micro-Centered Antenna
- 5 m, 7.5 m, 10 m, 24 m & 30 m antenna cables
- Data extension cable
- Extended hardware warranty
- Firmware and Software update service

ORDERING INFORMATION

MS750 Part Number **36577-00**

Includes MS750 receiver, Configuration Toolbox software, operating manual, power/data cable, data/1 PPS cable

PHYSICAL CHARACTERISTICS

Size	14.5cmW × 5.1cmH × 23.9cmD (5.7 ² W × 2.0 ² H × 9.4 ² D)
Weight	1.0 kg (2.25 lbs)
Power	12VDC/24VDC, 9 Watts

ENVIRONMENTAL CHARACTERISTICS

Operating temp	-20°C to +60°C
Storage temp	-30°C to +80°C
Humidity	MIL 810 E, Meth. 507.3 Proc III, Aggravated, 100% condensing
Vibration	MIL 810 D, Tailored Random 3gRMS Operating Random 6.2gRMS Survival
Mechanical Shock	MIL 810 D ± 40 g Operating ± 75 g Survival
EMC	
Radiated Emissions	CISPR 12
Conducted Emissions	SAE J1113/41
Radiated Immunity	ISO/DIS 13766, 30V/m
ESD	±15KV
Input Voltage Transients	ISO 7637-2

TECHNICAL SPECIFICATIONS

Tracking	9 channels L1 C/A code, L1/L2 full cycle carrier Fully operational during P-code encryption Supertrak Multibit Technology Everest Multipath Suppression		
Signal processing			
Positioning mode	Accuracy¹	Latency²	Max Rate
Synchronized RTK	1cm+ 2ppm Horizontal 2cm+ 2 ppm Vertical	300ms ³	5 Hz Std
Low Latency	2cm+ 2ppm Horizontal ⁴ 3cm+ 2 ppm Vertical	< 20ms	20Hz
DGPS	< 1m	< 20ms	20Hz

¹ 1 sigma level

² At maximum output rate

³ Dependent on data link throughput

⁴ Assumes 1 second data link delay

Initialization	Automatic OTF (on-the-fly) while moving Typically < 1 minute
Time required	
Range	Up to 20 km from base for RTK
Start-up	< 90 seconds from power on to positioning < 30 seconds with recent ephemeris
Communications	3 × RS-232 ports. Baud rates up to 115,200 2 × CAN/J1939
Configuration	Via front panel display & keypad, Configuration Toolbox Software or user definable application files
Output Formats	NMEA-0183: GKG, GGA, ZDA, VTG, GST, PJT and PJK Trimble Binary Streamed Output

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