

RX510

L1/L2 GPS+GLONASS RECEIVER AND ANTENNA

Thank you for choosing TeeJet Technologies' RX510 as your GPS solution. The information and instructions provided are available to enhance or expand the performance of the RX510. Contact your local dealer for more information or visit www.teejet.com.

Integrated GNSS Design

The RX510 provides an integrated L1/L2 GPS+GLONASS receiver and antenna in a single compact enclosure. Designed to meet or exceed stringent MIL-STD-810G specifications, the RX510's rugged metal housing ensures high performance even in the most challenging work environments.

Precision Performance

The RX510 features 14 channels for each of L1 and L2 GPS and 12 channels for each of L1 and L2 GLONASS code and phase tracking. An additional two channels are dedicated for Satellite-Based Augmentation System (SBAS: WAAS, EGNOS and MSAS) signals as well as one channel for L-band (OmniStar).

Multiple Interfaces Deliver Maximum Flexibility

Three NMEA 0183 compatible RS-232 serial ports, one NMEA2000 compatible CAN port and built-in Bluetooth ensure the RX510 delivers maximum flexibility. An Emulated Radar ground speed output, a one pulse per second output (1 PPS) and an event mark input are also provided. Three daylight readable status LEDs simplify infield diagnoses.

Smooth, Pass-to-Pass Accuracy with ClearPath® Technology

ClearPath technology is integrated into every RX510 antenna. ClearPath uses the very accurate carrier phase calculations to provide ultra smooth positions and excellent pass-to-pass accuracy for agricultural applications. ClearPath functions autonomously and with most available corrections services. It will also bridge through short periods of poor satellite availability. ClearPath's steady, smooth output is especially well suited for manual guidance and autosteer installations.



RX510 Options

Part #	Description
90-02755	Kit, RX510 GPS Receiver, GPS/GLONASS/WAAS/ClearPath
78-50192	RX510, GPS Receiver, GPS/GLONASS/WAAS/ClearPath
90-02703	Kit, RX510 GPS Receiver, GPS/GLONASS/OmniStar XP/HP
78-50184	RX510 GPS Receiver, GPS/GLONASS/OmniStar XP/HP
90-02744	Kit, Quick Release Mount for RX510
45-05808	Cable, Antenna, Power to Serial w/Pins

BENEFITS

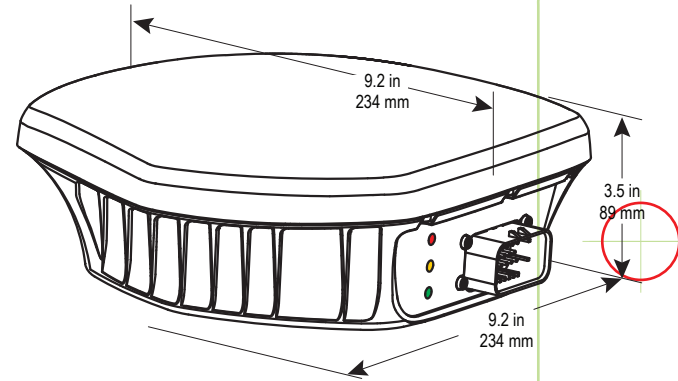
- Scalable dual-constellation, dual-frequency performance
- Smooth, consistent positions for pass-to-pass accuracy
- Rugged design for on-machine applications

FEATURES

- GPS and GLONASS satellite capability
- ClearPath® and AdVance® RTK positioning
- Robust power handling for 12 V to 24 V vehicle power

GETTING STARTED

This guide provides the information you need to set up and begin using your new RX510, a combined L1+L2 GNSS receiver and antenna, with L-band support and Emulated Radar (ER) output.



Additional NMEA outputs are available, please contact TeeJet Technical Support for details.

RX510 LEDs

LEDs on the front of the RX510 provide basic receiver status information. The operation of the LEDs on the RX510 is summarized in the following table:

Red	Yellow	Green	Condition
Off	Off	Off	Power is not available. (Red indicator may also not be lit if a boot failure has occurred.)
On	Off	Off	Power available but no satellites are being tracked
On	Flashing	Off	Tracking at least one satellite but not a valid position
On	On	Off	Position valid in basic autonomous mode
On	On	Flashing	SBAS tracking, but not enough data for enhanced solution
On	On	On	Position valid in an enhanced accuracy mode* (WAAS/EGNOS/MSAS/DGPS, OmniSTAR VBS/XP/HP, or RTK)
On	Flashing	Flashing	Fixed position with bad integrity

* When acting as a reference receiver, all lights on solid indicates a good fixed position.

OMNISTAR® SUBSCRIPTION

To subscribe to OmniSTAR XP or HP:

1. Power on the RX510.
2. Before you call OmniSTAR, find a clear view of the sky towards the equator that will be available before and approximately 45 minutes after completing the subscription purchase from OmniSTAR.
3. Before you call OmniSTAR, find the 6-digit OmniSTAR Serial Number (OSN) on the RX510 shipping box.
4. Call OmniSTAR Customer Service (1-888-883-8476 in North, Central and South America) to start the subscription.
 - Pricing information is available at: <http://omnistar.com/pricing.html>
 - If you intend to use GLONASS together with GPS, you will need to specify the G2 subscription.
 - OmniSTAR will require a credit card number for subscription charges.
 - OmniSTAR will ask for the OmniSTAR Serial Number, and when they ask for the Manufacturer, tell them "Manufacturer ID 007"

Depending on your location, the OmniSTAR service you subscribed to, and the satellite information reported by the device you are connected to, you may see the Station ID number (PRN number) change to somewhere in the range of 1000 to 1021 once the subscription is received and the convergence process begins. It may take up to 45 minutes for complete OmniSTAR XP/HP convergence to take place and the GGA Quality Indicator to transition to a value of "5", during which time the Station ID number (PRN number) may change several times.

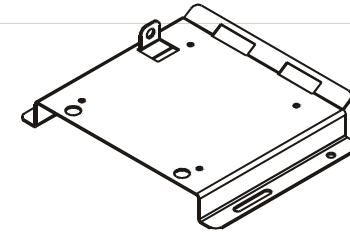
MOUNTING INSTRUCTIONS

Intermediate Mounting Plate Template

A template for the intermediate mounting plate has been drawn in the background of this user guide.

- Red lines indicate holes where attachment will occur.
- Green lines indicate the outline of the mount and other holes for attaching the release plate.

Figure 1-1: Intermediate Mounting Plate



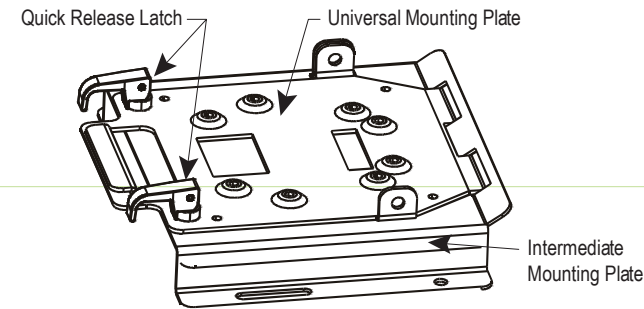
The universal mounting plate can be used in several configurations:

- Stand-alone plate that is hard-mounted onto the implement
- Hard-mounted onto an intermediate plate
- As part of the quick-release kit

The mounting holes in the RX510 will align with the dimple locations in the universal mounting plate. You can use Metric or Imperial Countersunk head bolts as follows:

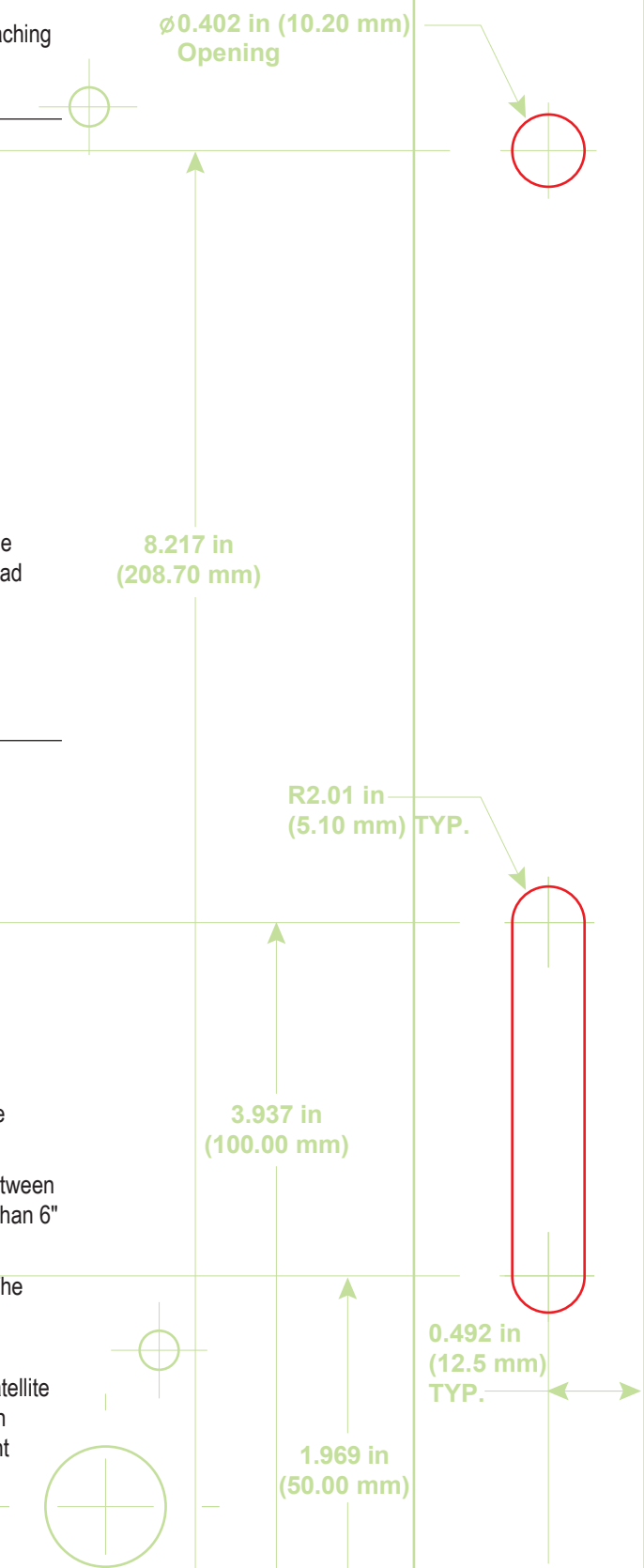
- Metric..... Quantity 4 M6x 1.0mm bolts no longer than 15mm
- Imperial..... Quantity 4 1/4-20 bolts no longer than 1/2"

Figure 1-2: Complete Mounting Kit



Mounting Considerations

- Choose a location that has a clear view of the sky so that each satellite above the horizon can be tracked without obstruction.
- When mounting the RX510 Receiver, a space of at least 6" (15 cm) between the receiver and any bend in the cable is required. Any length shorter than 6" puts undue stress on the cable and the enclosure for the RX510.
- The receiver should not be mounted where water can pool around it. The receiver housing is designed to withstand rain and splashing, but not submersion in liquids for sustained periods of time.
- Mount the receiver above all other metal objects to avoid multipath. Satellite signals received by the GPS receiver by a reflection from an object can decrease positioning accuracy. For example, roof racks, large headlight enclosures, etc., can cause multipath that may result in a jump in GPS position.



SPECIFICATIONS

Performance

Channel Configuration

14 GPS L1, 14 GPS L2
 12 GLONASS L1, 12 GLONASS L2 (optional)
 2 SBAS¹
 1 L-band

Horizontal Position Accuracy (RMS)²

Autonomous (L1).....	1.5 m
Autonomous (L1/L2).....	1.2 m
SBAS	0.6 m
CDGPS	0.6 m
DGPS	0.4 m
OmniSTAR VBS	0.6 m
OmniSTAR XP	0.15 m
OmniSTAR HP 0.1m RT-20 ⁸³ (optional)	0.2 m
RT-2 ^{TM3} (optional)	1 cm+1ppm

Measurement Precision

	GPS	GLONASS
L1 C/A Code	4.0 cm	15.0 cm
L1 Carrier Phase	0.5 mm	1.5 mm
L2 P(Y) Code.....	8.0 cm	8.0 cm
L2 Carrier Phase	1.0 mm	1.5 mm

Maximum Data Rate

Measurements1Hz, 5Hz, 10Hz, 20Hz⁴
 Position1Hz, 5Hz, 10Hz, 20Hz⁴

Time to First Fix

Cold Start⁵65 s
 Hot Start⁶35 s

Signal Reacquisition

L10.5 s (typical)
 L21.0 s (typical)

Accuracy

Time Accuracy⁷.....20 ns RMS
 Velocity Accuracy⁸0.03 m/s RMS

Physical and Electrical

Dimensions9.2" x 9.2" x 3.5" (H)
233 mm x 232 mm x 89 mm (H)
 Weight4.19 lbs, 1.9 kg
 Input Voltage+9 to +36 VDC
 Power Consumption3.7 W (typical)
 Connector.....23-pin Tyco Ampseal
 Mounting.....1/4 NC and M6 mounting holes

1 Satellite Based Augmentation Systems (SBAS) include WAAS (North America), EGNOS (Europe) and MSAS (Japan).

2 Typical values. Performance specifications subject to GPS system characteristics, US DOD operational degradation, ionospheric and tropospheric conditions, satellite geometry, baseline length, multipath effects and the presence of intentional or unintentional interference sources.

3 Expected accuracy after convergence. RT-20 and RT-2 are independent of ClearPath.

4 Contact TeeJet Technologies for 20Hz operation.

5 Typical value. No almanac or ephemerides and no approximate position or time.

6 Typical value. Almanac and recent ephemerides saved and approximate time entered.

7 Relative time accuracy does not include biases due to RF or antenna delay.

8 Export licensing restricts operation to a maximum velocity of 515 meters per second.

9 Fixed CAN messages in firmware.

Communication Ports

3 RS-232 serial ports
 One port configurable to RS-422
 Default NMEA messages
 Com Port 119200 baud rate,
5 Hz GGA, ZDA 5 sec.
 1 CAN Bus NMEA 2000⁹
 1 Bluetooth
 Emulated Radar
 Default operation frequency36.11 Hz/km/h
 1 PPS
 Event mark input

Environmental

Temperature

Operating-40°F to +158°F, -40°C to +70°C
 Storage-67°F to +194°F, -55°C to +90°C

Humidity95% non-condensing

Vibration

RandomMIL-STD-202G
 SinusoidalASAE EP455
 ShockMIL-STD-810G, 516.6

ImmersionMIL-STD-810G, 512.5

Blowing RainMIL-STD-810G, 506.5

Water JetsIEC 60529 IPX6

Object Ingress and Immersion

.....IEC 60529 IP67
 Aggravated CycleMIL-STD-810G, 507.5

Compliance

EmissionsFCC, CE, Industry Canada, BT SIG
 ImmunityCE

Vehicular Standards

ISO 7637: Compliance ensures product's ability to operate through vehicular electrical system surges (including inductive load switching transients, crank cycle and load dump)

ISO 15003: Compliance ensures product's ability to withstand vehicular electrical system abnormal conditions (short circuits to battery or ground, overvoltage reverse polarity and abnormal power voltage)

Warranty

1 Year From Date of Purchase

Electrical Connection

Connector's Pin-outs

1.....	Power +
2.....	Power -
3.....	CAN1 -
4.....	CAN1 +
5.....	TXD 2
6.....	RXD 2
7.....	TXD1/TXD1 +*
8.....	RTS1/AUXTX/TXD1 -*
9.....	Signal Ground 2
10.....	Reserved
11.....	Reserved
12.....	Reserved
13.....	Reserved
14.....	Chassis Ground
15.....	Signal Ground 1
16.....	MKI
17.....	PPS
18.....	ER
19.....	MODE
20.....	Reserved
21.....	Reserved
22.....	CTS1/AUXRX/RXD1 -*
23.....	RXD1/RXD! +*

* The RX510 is RS-232/RS-422-selectable through pin 19



TeeJet Technologies
 1801 Business Park Drive
 Springfield, Illinois 62703 USA
 Tel: (217) 747-0235 • Fax: (217) 753-8426
www.teejet.com