AgGPS® 114 Receiver
User Guide
Agriculture Division
Trimble Navigation Limited
Agriculture Division
9290 Bond Street, Suite 102
Overland Park, KS 66214
U.S.A.
www.trimble.com
Phone: 1-913-495-2700
E-mail: precision_ag@trimble.com

Copyright and Trademarks
© 2000-2003, Trimble Navigation Limited. All rights reserved.
The Sextant logo with Trimble, Trimble, and Ag GPS are trademarks of Trimble Navigation Limited, registered in the United States Patent and Trademark.
All other trademarks are the property of their respective owners.
Printed in the United States of America. Printed on recycled paper.

Release Notice
This is the <Month> 2002 release (Revision **) of the Ag GPS 114 Receiver User Guide, part number 38201-10-ENG. It applies to version 1.70 of the Ag GPS 114 receiver firmware.
The following limited warranties give you specific legal rights. You may have others, which vary from state/jurisdiction to state/jurisdiction.

Hardware Limited Warranty
Trimble Navigation Limited warrants that this hardware product (the “Product”) will perform substantially in accordance with published specifications and be substantially free of defects in material and workmanship for a period of one (1) year starting from the date of delivery. The warranty set forth in this paragraph shall not apply to software products.

Software License, Limited Warranty
This Trimble software product, whether provided as a stand-alone computer software product, built into hardware circuitry as firmware, embedded in flash memory, or stored on magnetic or other media, the “Software”) is licensed and not sold, and its use is governed by the terms of the relevant End User License Agreement (“EULA”) included with the Software. In the absence of a separate EULA included with the Software providing different limited warranty terms, exclusions and limitations, the following terms and conditions shall apply. Trimble warrants that this Trimble Software product will substantially conform to Trimble’s applicable published specifications for the Software for a period of ninety (90) days, starting from the date of delivery.

Warranty Remedies
Trimble’s sole liability and your exclusive remedy under the warranties set forth above shall be, at Trimble’s option, to repair or replace any Product or Software that fails to conform to such warranty (“Nonconforming Product”) or refund the purchase price paid by you for any such Nonconforming Product, upon your return of any Nonconforming Product to Trimble in accordance with Trimble’s standard return material authorization procedures.

Warranty Exclusions and Disclaimer
These warranties shall be applied only in the event and to the extent that the Products and Software are properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Trimble’s relevant operator’s manual and specifications, and; (ii) the Products and Software are not modified or misused. The preceding warranties shall not apply to, and Trimble shall not be responsible for defects or performance problems resulting from (i) the combination or utilization of the Product or Software with hardware or software products, information, data, systems, interfacing or devices not made, supplied or specified by Trimble; (ii) the operation of the Product or Software under any specification other than, or in addition to, Trimble’s standard specifications for its products; (iii) the unauthorized modification or use of the Product or Software; (iv) damage caused by accident, lightning or other electrical discharge, fresh or salt water immersion or spray; or (v) normal wear and tear on consumable parts (e.g., batteries). Trimble does not warrant or guarantee the results obtained through the use of the Product.

THE WARRANTIES ABOVE STATE TRIMBLE’S ENTIRE LIABILITY, AND YOUR EXCLUSIVE REMEDIES, RELATING TO PERFORMANCE OF THE PRODUCTS AND SOFTWARE. EXCEPT AS OTHERWISE EXPRESSLY PROVIDED HEREIN, THE PRODUCTS, SOFTWARE, AND ACCOMPANYING DOCUMENTATION AND MATERIALS ARE PROVIDED “AS IS” AND WITHOUT EXPRESS OR IMPLIED WARRANTY OF ANY KIND BY EITHER TRIMBLE NAVIGATION LIMITED OR ANYONE WHO HAS BEEN INVOLVED IN ITS CREATION, PRODUCTION, INSTALLATION, OR DISTRIBUTION INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, TITLE, AND NONINFRINGEMENT. THE STATED EXPRESS WARRANTIES ARE IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF TRIMBLE ARISING OUT OF, OR IN CONNECTION WITH, ANY PRODUCTS OR SOFTWARE. SOME STATES AND JURISDICTIONS
DO NOT ALLOW LIMITATIONS ON DURATION OR THE EXCLUSION OF AN IMPLIED WARRANTY, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. TRIMBLE NAVIGATION LIMITED IS NOT RESPONSIBLE FOR THE OPERATION OR FAILURE OF OPERATION OF GPS SATELLITES OR THE AVAILABILITY OF GPS SATELLITE SIGNALS.

Limitation of Liability
TRIMBLE’S ENTIRE LIABILITY UNDER ANY PROVISION HEREIN SHALL BE LIMITED TO THE AMOUNT PAID BY YOU FOR THE PRODUCT OR SOFTWARE LICENSE. TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, IN NO EVENT SHALL TRIMBLE OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHATSOEVER UNDER ANY CIRCUMSTANCE OR LEGAL THEORY RELATING IN ANY WAY TO THE PRODUCTS, SOFTWARE AND ACCOMPANYING DOCUMENTATION AND MATERIALS, (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION, OR ANY OTHER PECUNIARY LOSS), REGARDLESS WHETHER TRIMBLE HAS BEEN ADVISED OF THE POSSIBILITY OF ANY SUCH LOSS AND REGARDLESS OF THE COURSE OF DEALING WHICH DEVELOPS OR HAS DEVELOPED BETWEEN YOU AND TRIMBLE. BECAUSE SOME STATES AND JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

NOT WITHSTANDING THE ABOVE, IF YOU PURCHASED THIS PRODUCT OR SOFTWARE IN THE EUROPEAN UNION, THE ABOVE WARRANTY PROVISIONS MAY NOT APPLY. PLEASE CONTACT YOUR DEALER FOR APPLICABLE WARRANTY INFORMATION.

Notices
Class B Statement – Notice to Users. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
– Reorient or relocate the receiving antenna.
– Increase the separation between the equipment and the receiver.
– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
– Consult the dealer or an experienced radio/TV technician for help.
Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.
## Contents

**About This Manual**

1 **Overview**
   - Introduction ........................................... 2
   - The AgGPS 114 Receiver .............................. 2
     - Standard features ..................................... 3
     - Receiver enhancements ............................... 5
     - Application options ................................. 7
     - Receiver input / output ......................... 8
   - Differential GPS (DGPS) .............................. 9
     - Sources of GPS error ............................... 10
     - DGPS accuracy ....................................... 11
     - Receiving satellite DGPS ....................... 13

2 **Installing the Receiver**
   - System Components ................................. 16
     - Optional extras (if ordered) ................... 16
   - Mounting the Receiver ............................ 18
     - Choosing a location ............................. 18
     - Environmental conditions ...................... 20
     - Electrical interference ......................... 20
   - Connecting to an External Device .............. 21
     - Customized connections ......................... 23
   - CASE-IH ........................................... 26
     - Connecting the optional power/data cable .... 26
     - CASE-IH combines ................................. 27
### Contents

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>John Deere GreenStar</td>
<td>30</td>
</tr>
<tr>
<td>Connecting the receiver</td>
<td>30</td>
</tr>
<tr>
<td>John Deere combines (00 and 10 Series)</td>
<td>30</td>
</tr>
<tr>
<td>John Deere combines (50 Series)</td>
<td>34</td>
</tr>
<tr>
<td>Ag Leader</td>
<td>39</td>
</tr>
<tr>
<td>Connecting the optional data cable</td>
<td>39</td>
</tr>
<tr>
<td>Ag Leader PF3000 Pro.</td>
<td>40</td>
</tr>
<tr>
<td>AGCO FieldStar</td>
<td>42</td>
</tr>
<tr>
<td>Locating the FieldStar ComUnit</td>
<td>42</td>
</tr>
<tr>
<td>Connecting the receiver</td>
<td>42</td>
</tr>
<tr>
<td>Configuring the receiver</td>
<td>43</td>
</tr>
<tr>
<td>Configuring the FieldStar ComUnit</td>
<td>43</td>
</tr>
<tr>
<td>RDS Ceres Yield Monitor</td>
<td>45</td>
</tr>
<tr>
<td>RDS Pro Series 8000 Yield Monitor</td>
<td>45</td>
</tr>
<tr>
<td>Laptop Computer</td>
<td>46</td>
</tr>
<tr>
<td>Windows CE Palmtop</td>
<td>47</td>
</tr>
<tr>
<td>Windows Handheld Computer</td>
<td>48</td>
</tr>
<tr>
<td>Micro-Trak Yield Monitor</td>
<td>49</td>
</tr>
</tbody>
</table>

### 3 Getting Started

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>52</td>
</tr>
<tr>
<td>Installing AgRemote</td>
<td>53</td>
</tr>
<tr>
<td>The AgRemote Menu System</td>
<td>56</td>
</tr>
<tr>
<td>Using AgRemote</td>
<td>56</td>
</tr>
<tr>
<td>The AgRemote keys</td>
<td>57</td>
</tr>
<tr>
<td>Navigating the Menus and Screens</td>
<td>58</td>
</tr>
<tr>
<td>Menu System Fields</td>
<td>60</td>
</tr>
<tr>
<td>Display-only fields</td>
<td>60</td>
</tr>
<tr>
<td>Multiple-choice fields</td>
<td>60</td>
</tr>
<tr>
<td>Alpha, numeric, and alphanumeric fields</td>
<td>61</td>
</tr>
<tr>
<td>The Home Screen</td>
<td>63</td>
</tr>
<tr>
<td>Satellite and WAAS/EGNOS DGPS mode</td>
<td>63</td>
</tr>
<tr>
<td>Updating the Firmware</td>
<td>66</td>
</tr>
</tbody>
</table>
# B Cables and Connectors

- Introduction ............................................. 134
- Port A and Port B Connectors .......................... 135
- AgGPS PSO Plus Power/Data Cable ...................... 136
- Ag Leader Yield Monitor Interface Cable ............... 137
- Case AFS Dual Data Interface Cable .................. 138
- John Deere GreenStar Data Cable ...................... 139
- RDS Ceres Yield Monitor Power/Data Cable ............ 140

# C NMEA-0183 Messages

- Introduction ............................................. 142
- NMEA-0183 Message Structure ......................... 143
  - Symbols and delimiters ................................ 145
  - Checksum values ..................................... 145
  - Field formats ....................................... 145
  - Null fields .......................................... 145
  - Talker ID codes .................................... 146
  - Latitude and longitude values ...................... 146
  - Time values ........................................ 146
  - Reading NMEA string format ......................... 146
- NMEA Message Summary .................................. 147
  - GGA (GPS Fix Data) ................................ 149
  - GLL (Position Data) ................................ 150
  - GRS (GPS Range Residuals) ........................ 151
  - GSA (GPS DOP and Active Satellites) ............... 152
  - GST (GPS PRN) ...................................... 153
  - GSV (GPS Satellites in View) ....................... 154
  - MSS (Beacon Receiver Signal Status) ............... 155
  - RMC (Recommended Minimum Specific GPS Data) ..... 156
  - VTG (Course Over Ground and Ground Speed) ....... 158
  - XTE (Cross-Track Error) ............................ 159
  - ZDA (Time and Date) ................................ 160
About This Manual

Welcome to the AgGPS 114 Receiver User Guide. This manual describes how to install and configure the AgGPS® 114 receiver. It provides guidelines for using the AgRemote utility to view and configure receiver DGPS and communication operating parameters. The manual also provides guidelines for connecting the receiver to a variety of external devices, information about NMEA messages supported by the receiver, and pin-out diagrams for data cable connections.

Even if you have used other Global Positioning System (GPS) products before, Trimble recommends that you spend some time reading this manual to learn about the special features of this product.

If you are not familiar with GPS, go to the Trimble website (www.trimble.com) for an interactive look at Trimble and GPS.

Related Information

Other sources of related information are:

- Release notes – the release notes describe new features of the product, information that is not included in the manuals, and any changes to the manuals. You can download release notes from the Trimble website.
Technical Assistance

If you have a problem and cannot find the information you need in the product documentation, contact your local Trimble Reseller.

Your Comments

Your feedback about the supporting documentation helps us to improve it with each revision. To forward your comments, do one of the following:

- Send an e-mail to ReaderFeedback@trimble.com.
- Complete the Reader Comment Form at the back of this manual and mail it according to the instructions at the bottom of the form.

If the reader comment form is not available, send comments and suggestions to the address in the front of this manual. Please mark it Attention: Technical Publications Group.

Document Conventions

The document conventions are as follows:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Italics</em></td>
<td>Identifies software menus, menu commands, dialog boxes, and the dialog box fields.</td>
</tr>
<tr>
<td>Helvetica Narrow</td>
<td>Represents messages printed on the screen.</td>
</tr>
<tr>
<td><strong>Helvetica Bold</strong></td>
<td>Identifies a software command button, or represents information that you must type in a software screen or window.</td>
</tr>
<tr>
<td>🕵️‍♀️</td>
<td>Is an example of a hardware key (hard key) that you must press on the AgGPS 70 RDL keypad.</td>
</tr>
<tr>
<td>Convention</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>“Select Italics / Italics”</td>
<td>Identifies the sequence of menus, commands, or dialog boxes that you must choose in order to reach a given screen.</td>
</tr>
<tr>
<td>Ctrl</td>
<td>Is an example of a hardware function key that you must press on an office computer (PC). If you must press more than one of these at the same time, this is represented by a plus sign, for example, Ctrl + C.</td>
</tr>
<tr>
<td>Screen Font</td>
<td>Represents information on the display screen for your receiver.</td>
</tr>
<tr>
<td></td>
<td>Represents buttons on the AgRemote screen.</td>
</tr>
</tbody>
</table>
Overview

In this chapter:

- Introduction
- The AgGPS 114 receiver
- Differential GPS (DGPS)
Introduction

This chapter describes the AgGPS 114 receiver and gives an overview of GPS, DGPS, and related information. For details of the receiver physical specifications, see Appendix F, Specifications.

The AgGPS 114 Receiver

The AgGPS 114 receiver is a combined GPS receiver and antenna. It provides Differential GPS capability, in a lightweight, durable, and waterproof housing. See Figure 1.1.

The receiver contains The Choice™ technology, which enables WAAS/EGNOS, OmniSTAR, or Thales real-time differential corrections. For more information on DGPS options, see Configuring Differential GPS, page 78.

Figure 1.1 AgGPS 114 receiver
As part of a Precision Agriculture System, the receiver provides submeter (less than 3.28 ft) static HRMS accuracy. To achieve this, the receiver uses NMEA-0183 and TSIP (Trimble Standard Interface Protocol) messages. The dynamic pass-to-pass accuracy is better than the static accuracy. You can also use a 1 PPS (pulse per second) strobe signal to synchronize time for logging event markers when you are using external instruments.

You can use the receiver with a variety of farming equipment, including yield monitors, parallel swathing guidance systems, variable-rate planters, spray application controllers, and portable field computers for field mapping and soil sampling.

**Standard features**

A standard AgGPS 114 system provides the following features:

- Combined GPS/DGPS receiver and antenna
- 12 GPS L1 1575.42 MHz (C/A-code) parallel tracking channels, carrier-phase filtering
- Submeter static HRMS DGPS accuracy (with WAAS/EGNOS, Thales, or OmniSTAR differential correction)
- 10 Hz (10 positions per second) output rate (Only in receivers manufactured after 2001)
- AgRemote software program. This simulates a receiver LCD screen interface to configure and view AgGPS 114 receiver settings.
- Magnetic antenna mount
- Power/data cable
- Two RS-232 serial ports. These provide:
  - NMEA-0183 output: GGA, GLL, GRS, GST, GSA, GSV, MSS, RMC, VTG, ZDA, XTE
  - Trimble Proprietary NMEA messages: PTNLDG, PTNLEV, PTNL, GGK, PTNLI D, PTNLSM
Overview

- RTCM SC-104 input
- TSIP (Trimble Standard Interface Protocol) input and output
- 1 PPS (pulse per second) strobe signal output
- Baud Rate: 2400-38400

- Two J1939 (CAN 2.0B) compatible ports

- Compatibility with:
  - AgGPS 170 Field Computer
  - AgGPS 160 Field Computer
  - AgGPS 70 Remote Display and Logger
  - AgGPS 23 Exterior Lightbar
  - AgGPS 21 Internal Lightbar
  - AgGPS EZ-Map on an iPaq
### Receiver enhancements

Table 1.1 lists the receiver options that you can purchase with the AgGPS 114 receiver.

<table>
<thead>
<tr>
<th>Option (PN)</th>
<th>Description</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Rate (33176-10)</td>
<td>Output position data up to 10 times per second.</td>
<td>Provides parallel swathing (PSO) and variable rate applications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activated when the Trimble PSO Lightbar is physically connected.</td>
</tr>
<tr>
<td>Differential Base Station (33176-30)</td>
<td>Outputs RTCM differential corrections.</td>
<td>If a radio link is attached, enables the receiver to broadcast corrections for use by other DGPS receivers. This provides submeter positioning.</td>
</tr>
<tr>
<td>EVEREST™ Technology (33176-40)</td>
<td>Reduces multipath interference</td>
<td>Improves DGPS receiver accuracy. Activated when the lightbar is connected.</td>
</tr>
</tbody>
</table>
### Table 1.1 Receiver enhancement options (Continued)

<table>
<thead>
<tr>
<th>Option (PN)</th>
<th>Description</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTS/CTS Flow Control Negotiation (33176-50)</td>
<td>Provides hardware flow control</td>
<td>When attached to third-party modems, provides RTS/CTS flow control for correct operation.</td>
</tr>
<tr>
<td>Point/Line/Area (33176-80)</td>
<td>Makes it possible to add point, line, and area data logging</td>
<td>Enables you to record points, lines, and areas. The software writes ESRI Shape files to the CompactFlash card of an attached AgGPS 70 RDL. You can then view the Shapefiles using software such as ESRI’s ArcView or Delta Data System’s AGIS.</td>
</tr>
<tr>
<td></td>
<td>Makes it possible to add, store, delete, and navigate to waypoints.</td>
<td>Enables you to:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– store up to 20 waypoints in the receiver memory.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– use the lightbar to navigate to waypoints</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– read from a user-defined list on the CompactFlash card of an attached AgGPS 70 RDL</td>
</tr>
</tbody>
</table>
Application options

Table 1.2 lists the application options that you can purchase with the AgGPS 114 receiver.

<table>
<thead>
<tr>
<th>Option (PN)</th>
<th>Description</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag GPS Parallel Swathing Option (34623-20)</td>
<td>Lightbar</td>
<td>Indicates off-swath distance error. This minimizes redundant applications and skipped areas, and maximizes field coverage.</td>
</tr>
<tr>
<td></td>
<td>Independent data ports</td>
<td>Enables you to simultaneously control the lightbar and output data to a variable rate controller or mapping software program.</td>
</tr>
<tr>
<td>Ag GPS PSO Plus for the Ag GPS 114 (34623-40)</td>
<td>Standard PSO, plus: Handheld Ag GPS 70 Remote Display and Logger</td>
<td>Use this option to record a swath coverage map. Actual field area covered, and the quality and date of application is shown. Use with the Point/Line/Area option.</td>
</tr>
<tr>
<td>Ag GPS Field Pack (32294-xx)</td>
<td>Backpack (rigid frame or lumbar pack), antenna poles, batteries, and cables.</td>
<td>Provides hands-free receiver operation. Useful for crop scouting and field mapping when on foot, for example.</td>
</tr>
</tbody>
</table>
Receiver input / output

The AgGPS 114 standard power/data cable (PN 40947-18) connects to the single receiver connector to supply power. It also enables the following data exchanges:

- **ASCII, TSIP, and RTCM input from an external device.**
  The receiver is able to receive ASCII data from an external device, convert this data into an NMEA message, and export that message to another device. TSIP command packets configure and monitor GPS and DGPS parameters. The receiver is also able to accept RTCM data from an external device, such as a pager.

- **TSIP and NMEA output to an external device.**
  The receiver is able to output RTCM in base station mode. When you are using an external radio, it can also receive DGPS corrections. TSIP is input/output when communicating with AgRemote. NMEA is output when the receiver is exporting GPS position information to an external device, such as a yield monitor or to a mapping software program.

For more information on the NMEA (National Marine Electronics Association) and RTCM (Radio Technical Commission for Maritime Services) communication standard for GPS receivers, go to the following websites:

- www.nmea.org
- www.rtcn.org

- **Lightbar protocol**
  LBAR is a Trimble proprietary protocol for communication between AgGPS receivers and lightbars in guidance applications.
Overview

- 1 PPS output
  To synchronize timing between external instruments and the receiver’s internal clock, the connection port outputs a strobe signal at 1 PPS (pulse per second). To output this signal, the receiver must be tracking satellites and computing GPS positions.

- J1939 (CAN) serial bus
  Both serial ports support the J1939 CAN (Controller Area Network) bus protocol. This protocol standardizes the way multiple microprocessor-based electronic control units (ECUs) communicate with each other over the same pair of wires. It is used in off-highway machines, such as those used in agriculture, construction, and forestry.
  For more information, visit the SAE International website (www.sae.org/servlets/index)

Differential GPS (DGPS)

The AgGPS 114 receiver uses DGPS to achieve high accuracy. One receiver (this is called the reference or base station) is located at a known point. This receiver is used to determine GPS signal measurement errors. One or more mobile receivers (called rovers) collect data at unknown locations, while remaining within range of the reference station. The reference station broadcasts correction values, which are applied to the receiver positions. In this way, errors common to the reference and rover receivers are corrected.

For more information about DGPS and the different DGPS signals available, visit the Trimble website (www.trimble.com/gps/dgps.html).
Sources of GPS error

Autonomous (GPS only) horizontal accuracy for Trimble AgGPS receivers ranges from approximately 3–9 meters (about 10–30 ft).

The errors that cause this reduced accuracy are produced mainly by atmospheric conditions, multipath, (GPS signals bouncing off objects before reaching the antenna), and electronic or GPS frequency noise interference.

DGPS removes most of the errors caused by atmospheric conditions, errors which are further minimized by the advanced design of the AgGPS 114 receiver. For more information, see the section on Error Correction on the Trimble website at www.trimble.com/gps/errors1.html
Submeter accuracy from the AgGPS 114 receiver utilizing differential correction is best achieved under the conditions described in Table 1.3.

Table 1.3 DGPS accuracy

<table>
<thead>
<tr>
<th>Condition</th>
<th>Optimum Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of satellites used</td>
<td>&gt; 5</td>
<td>To calculate a 3D position (latitude and longitude, altitude, and time), four or more satellites must be visible. To calculate a 2D position (latitude and longitude, and time), three or more satellites must be visible. The number of visible satellites constantly changes and is typically in the range 5–9. AgGPS receivers can track up to 12 satellites simultaneously.</td>
</tr>
<tr>
<td>Maximum PDOP</td>
<td>&lt; 4</td>
<td>Position Dilution of Precision (PDOP) is a unitless, computed measurement of the geometry of satellites above the receiver’s current location.</td>
</tr>
<tr>
<td>Signal to Noise Ratio</td>
<td>&gt; 6</td>
<td>Signal-to-Noise ratio (SNR) is a measure of the satellite signal strength against electrical background noise. A high SNR gives better accuracy.</td>
</tr>
<tr>
<td>Minimum Elevation</td>
<td>&gt; 7.5</td>
<td>Satellite that are low on the horizon typically produce weak and noisy signals and are more difficult for the receiver to track. Satellites below the minimum elevation angle are not tracked.</td>
</tr>
<tr>
<td>Multipath environment</td>
<td>Low</td>
<td>Multipath errors are caused when GPS signals are reflected off nearby objects and reach the receiver by two or more different paths. The receiver incorporates the EVEREST multipath reduction option.</td>
</tr>
<tr>
<td>RTCM-compatible corrections</td>
<td></td>
<td>These corrections are broadcast from a Trimble 4000RSI™ or equivalent reference station.</td>
</tr>
</tbody>
</table>
**Position Output**

Geographic data obtained from different sources must be referenced to the same datum, ellipsoid, and coordinate format. Different formats provide different coordinate values for any geographic location. In North America, the datums NAD-27 and NAD-83 are commonly used in GIS mapping applications.

The AgGPS 114 receiver outputs position coordinates in several datums and ellipsoids depending on the source of DGPS being used. See Table 1.4.

**Table 1.4 DGPS source**

<table>
<thead>
<tr>
<th>Differential Source</th>
<th>Datum</th>
<th>Ellipsoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>None – Autonomous mode</td>
<td>WGS-84(^1)</td>
<td>WGS-84</td>
</tr>
<tr>
<td>OmniSTAR 3 North American Beams</td>
<td>NAD-83(^2)</td>
<td>–</td>
</tr>
<tr>
<td>OmniSTAR Rest of World Beams</td>
<td>ITRF(^3)</td>
<td>GRS-80</td>
</tr>
<tr>
<td>Thales Beams</td>
<td>ITRF</td>
<td>GRS-80</td>
</tr>
<tr>
<td>WAAS Beams</td>
<td>WGS-84</td>
<td>WGS-84</td>
</tr>
</tbody>
</table>

\(^1\)World Geodetic System 1984. Datum and ellipsoid.

\(^2\)North American Datum 1983. Equivalent to WGS-84.

\(^3\)International Terrestrial Reference Frame. Contact the DGPS provider for details.

For more information, go to the National Geodetic Survey website: [www.ngs.noaa.gov/faq.shtml#WhatDatum](http://www.ngs.noaa.gov/faq.shtml#WhatDatum).

Note – To convert GPS positions in the NAD-83 datum to background maps for the old NAD-27 datum, use the conversion program Corpscon. This is available free from the Topographic Engineering Center ([http://crunch.tec.army.mil/software/corpscon/corpscon.html](http://crunch.tec.army.mil/software/corpscon/corpscon.html)).
Position Output Format

The AgGPS receiver outputs positions in Degrees, Minutes, and Decimal Minutes (DDD°MM.m'). This is the NMEA (National Marine Electronic Association) standard format and is commonly used worldwide for data transfer between electronic equipment.

Receiving satellite DGPS

The AgGPS 114 receiver supports subscription-based OmniSTAR, and Thales, satellite differential technology. Contact the service provider for service activation or an encrypted activation passcode. In addition, the WAAS/EGNOS service is available free in North America and Europe. For more information, see Configuring Differential GPS, page 78, or go to the following websites:

- OmniSTAR (www.omnistar.com)
- Thales (www.landstar-dgps.com)
- WAAS (http://gps.faa.gov/Programs/WAAS/waas.htm)
CHAPTER 2

Installing the Receiver

In this chapter:

■ System components
■ Mounting the receiver
■ Connecting to an external device
■ CASE-IH
■ John Deere GreenStar
■ Ag Leader
■ AGCO FieldStar
■ RDS Ceres yield monitor
■ RDS Pro Series 8000 yield monitor
■ Laptop computer
■ Windows CE palmtop
■ Windows handheld computer
■ Micro-Trak yield monitor
System Components

Check that you have received all the appropriate components for the AgGPS system that you have purchased. If any containers or components are damaged, immediately notify the shipping carrier, or Trimble Agricultural Division at the address given in the front of this manual. Components for each system are listed in the following tables.

Table 2.1  AgGPS 114 Receiver (PN 38200-00)

<table>
<thead>
<tr>
<th>Qty</th>
<th>PN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38198-00</td>
<td>AgGPS 114 Receiver</td>
</tr>
<tr>
<td>1</td>
<td>12920-00</td>
<td>Magnetic Mount for Antenna</td>
</tr>
<tr>
<td>1</td>
<td>40947-18</td>
<td>Power/data Cable</td>
</tr>
<tr>
<td>1</td>
<td>38201-10-ENG</td>
<td>AgGPS 114 Receiver User Guide</td>
</tr>
<tr>
<td>1</td>
<td>25110-00</td>
<td>Warranty Activation Card</td>
</tr>
</tbody>
</table>

Optional extras (if ordered)

Table 2.2  Receiver options

<table>
<thead>
<tr>
<th>Qty</th>
<th>P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33176-10</td>
<td>Fast Rate Capability</td>
</tr>
<tr>
<td>1</td>
<td>33176-30</td>
<td>DGPS Reference Station (Base Station Capability)</td>
</tr>
<tr>
<td></td>
<td>33176-40</td>
<td>EVEREST Multipath Reduction Technology</td>
</tr>
</tbody>
</table>

Table 2.3  Application options

<table>
<thead>
<tr>
<th>Qty</th>
<th>P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34623-00</td>
<td>AgGPS Parallel Swathing Option</td>
</tr>
<tr>
<td>1</td>
<td>34623-20</td>
<td>Parallel Swathing Option Plus for AgGPS 114 Receiver and AgGPS 70 RDL</td>
</tr>
</tbody>
</table>
### Table 2.3 Application options (continued)

<table>
<thead>
<tr>
<th>Qty</th>
<th>P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34623-40</td>
<td>AgGPS 21 PSO Plus for AgGPS 114 Receiver</td>
</tr>
<tr>
<td>1</td>
<td>39600-00</td>
<td>AgGPS 70 Remote Display and Logger</td>
</tr>
</tbody>
</table>

### Table 2.4 Accessory options

<table>
<thead>
<tr>
<th>Qty</th>
<th>P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>32294-00</td>
<td>AgGPS Lumbar Field Pack 120 volts</td>
</tr>
<tr>
<td>1</td>
<td>32294-10</td>
<td>AgGPS Lumbar Field Pack 240 volts</td>
</tr>
<tr>
<td>1</td>
<td>32294-40</td>
<td>AgGPS Rigid Frame Field Pack 120 volts</td>
</tr>
<tr>
<td>1</td>
<td>32294-50</td>
<td>AgGPS Rigid Frame Field Pack 240 volts</td>
</tr>
</tbody>
</table>

### Table 2.5 Component options

<table>
<thead>
<tr>
<th>Qty</th>
<th>P/N</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>39903</td>
<td>Ag Leader Yield Monitor Power/Data Cable</td>
</tr>
<tr>
<td>1</td>
<td>32609</td>
<td>CASE AFS Power/Data Cable</td>
</tr>
<tr>
<td>1</td>
<td>34189</td>
<td>John Deere GreenStar Data Cable</td>
</tr>
<tr>
<td>1</td>
<td>35142</td>
<td>RDS Yield Monitor Power/Data Cable</td>
</tr>
<tr>
<td>1</td>
<td>40572</td>
<td>Null Modem Adaptor</td>
</tr>
</tbody>
</table>
Mounting the Receiver

To mount the receiver, secure the round magnetic base to a flat metal surface. To fasten the receiver to the surface, thread machine screws into the three M5 x 0.8 (5mm with 0.8mm pitch) metal inserts on the bottom of the receiver. The inserts are 10 mm (.39 inch) deep.

Choosing a location

When choosing a location, consider the following:

**Do** mount the receiver:

- on a flat surface along the centerline of the vehicle or machine applicator boom.
- in any convenient location within 5.5 meters (18 feet) of the external instrument port. If necessary, use the optional extension cable to connect the receiver and external device.
- at the highest point of the vehicle with no metal surfaces blocking its view of the sky. Trimble recommends that you position the receiver on the top of a mast or pole.
- in such a way that it is not damaged when you drive the machine into a shed or storage area.

**Do not** mount the receiver:

- close to stays, electrical cables, metal masts, CB radio antennas, cellular phone antennas, air-conditioning units (machine cab blower fan), or machine accessory lights.
- near transmitting antennas, radar arrays, or satellite communication equipment.
- near areas that experience high vibration, excessive heat, electrical interference, and strong magnetic fields.

*Note – A metal combine grain tank extension can block satellites.*
Figure 2.1 shows the recommended location for sprayer boom applications.

![Diagram](image)

Figure 2.1  AgGPS 114 receiver mounting for ground sprayer boom applications
Environmental conditions

Although the receiver has a waterproof housing, you should install it in a dry location. To improve the receiver’s performance and long-term reliability, avoid exposure to extreme environmental conditions, including:

- water
- excessive heat (> 65°C or 149°F)
- excessive cold (< –20°C or –4°F)
- high vibration
- corrosive fluids and gases

Electrical interference

As far as possible, when you install the receiver, you should avoid placing it near sources of electrical and magnetic noise, such as:

- gasoline engines (spark plugs)
- PC monitor screens
- alternators, generators, or magnetos
- electric motors (blower fans)
- equipment with DC-to-AC converters
- switching power supplies
- radio speakers
- high-voltage power lines
- CB radio antennas
- cellular phone antennas
- machine accessory lights
Connecting to an External Device

After installing the receiver, connect and route the power/data cable (PN 40947-18). The receiver can be powered by a vehicle or by a customer-supplied 10–32 VDC power source.

Figure 2.2 shows how to connect the receiver to an external device using the 5.5 m (18 ft) standard power/data cable.

![Diagram showing connections for the AgGPS 114 receiver]

Figure 2.2 Standard power/data cable connections

Plug the:

- right-angle connector into the single port on the bottom of the receiver
- straight 9-pin connector (Port A) into one external device
- round 12-pin connector (Port B) into another external device

See Figure 2.3

When routing the cable from the receiver to the external device, avoid:

- sharp objects
- kinks in the cable
- hot surfaces (exhaust manifolds or stacks)
- rotating or moving machinery parts
Installing the Receiver

- sharp or abrasive surfaces
- door and window jams
- corrosive fluids or gases

When the cable is safely routed and connected to the receiver, use tie-wraps to secure it at several points, particularly near the base of the receiver to prevent straining the connection. Coil any slack cable, secure it with a tie-wrap and tuck it into a safe place.
Customized connections

This section shows how to connect the AgGPS PSO (lightbar) and AgGPS PSO Plus (lightbar and AgGPS 70 RDL) to other elements, according to the optional extras in your system.

AgGPS Parallel Swathing Option

The AgGPS PSO cable (PN 35204) connects the AgGPS 21A Lightbar to the AgGPS 114. See Figure 2.3.

Note – Connect the red power lead of the power/data cable (PN 40947-18) to +12 or +24 VDC power. Connect the black power lead to ground. Do not connect the lightbar to power.

![Diagram of AgGPS 114 to AgGPS PSO connection](image)
**AgGPS Parallel Swathing Option Plus**

The AgGPS 114 Parallel Swathing Option Plus cable (PN 39350-18) connects the AgGPS 21A Lightbar to the AgGPS 114 and to the AgGPS 70 Remote Display and Logger. See Figure 2.4.

*Note – Connect the red power lead of the power/data cable (PN 40947-18) to +12 VDC power. Connect the black power lead to ground.*

![Diagram of AgGPS 114 Receiver and AgGPS 21A Lightbar connection](image)

**Figure 2.4** Connecting the AgGPS 114 to the AgGPS PSO Plus and the AgGPS 70 RDL
Installing the Receiver

**AgGPS 170 Field Computer and AgGPS PSO**

The power/data cable (PN 40947-18) connects the AgGPS 114 to the AgGPS 170 Field Computer. See Figure 2.5.

*Figure 2.5 Connecting the AgGPS 114 to the AgGPS 170 Field Computer*
CASE-IH

This section describes how to connect the receiver to a CASE-IH combine.

Connecting the optional power/data cable

The 1 m (3 ft) CASE AFS power/data cable (PN 32609) connects the receiver to a CASE AFS Yield Monitor or Universal Display through the combine’s wiring harness. See Figure 2.6.
CASE-IH combines

Warning – Do not connect the red and black power leads on the power/data cable to machine power. The CASE AFS wiring harness supplies 12 VDC power to the receiver through the cable (PN 32609).

Combines manufactured before 2000

To connect the receiver to the combine:

1. Locate the CASE wiring harness connection. This harness is outside and behind the right-hand cab door. Pull open the access door to expose the machine wiring. See Figure 2.7.

Figure 2.7 CASE wiring harness access door
2. Attach the flat, gray 5-pin connector on the CASE AFS power/data cable to the matched female AFS connector (see Figure 2.8).

![CASE power/data cable connection](image)

Figure 2.8 CASE power/data cable connection

3. Configure the receiver Port B output for NMEA 4800-8-N-1. For more information, see Chapter 3, Getting Started.
Combines manufactured in or after 2000

To connect the receiver to the combine:

1. Locate the CASE wiring harness. This harness is under the right-hand seat console. Lift the access lid to expose the machine wiring under the operator’s seat. See Figure 2.9 and Figure 2.10.

![Figure 2.9 CASE wiring harness access lid](image1)

![Figure 2.10 CASE wiring harness under seat console](image2)
2. Connect the flat, gray 5-pin connector on the CASE AFS power/data cable to the matched female AFS connector. See Figure 2.8 on page 28.

3. Configure the receiver Port B output for NMEA 4800-8-N-1. For more information, see Chapter 3, Getting Started.

John Deere GreenStar

This section describes how to connect the receiver to the John Deere GreenStar system.

Connecting the receiver

Before you install the receiver, disconnect any other GPS receiver from the wiring harness of the GreenStar system. The harness must be available for the GreenStar RS-232 port. The GreenStar GPS receiver is mounted above the machine cab and bolted to the grain tank. Disconnect the harness from the GreenStar receiver at the antenna base.

To connect the receiver to a John Deere GreenStar system, use the optional 1 m (3 ft) John Deere GreenStar data cable (PN 34189).

John Deere combines (00 and 10 Series)

Note – John Deere offers a retrofit kit that enables you to install the newer 50 Series GreenStar yield monitor into 00 and 10 Series combines that do not have yield monitors. If the 50 Series GreenStar yield monitor system is installed, the yield monitor PC card slot is in the back of the GreenStar display. In this case, follow the installation instructions for a 50 Series combine. See page 34.
Figure 2.12 on page 33 shows how to connect the receiver to the GreenStar system on a 00 or 10 Series John Deere combine.

1. Locate the wiring harness on the bottom of the GreenStar mapping processor (see Figure 2.11). This processor is on the right side of the cab, behind the operator’s seat.

![GreenStar mapping processor](image)

2. From the point where the wire bundle enters the mapping processor, connect the wires as follows:
   a. Gently pull the two 46 cm (18 in) wires from the black plastic casing. Strip back approximately 6.5 mm (1/4 in) of insulation from the end of each wire and crimp on a supplied round connector pin.
   b. Identify the wire labeled CC967. Insert the end into slot A of the 3-slot black Weatherpack tower connector.
c. Identify the wire labeled CC20. Insert the end into slot C of the 3-slot black Weatherpack tower connector.

3. Connect the Trimble GreenStar cable (PN 34189) to the 3-pin end of the Weatherpack tower connector.

4. Connect the receiver power/data cable (PN 40947-18) to the GreenStar Data cable 9-pin serial connector.

5. Connect the receiver power/data cable to the receiver.

6. Attach the power leads of the power/data cable to switched +12 or +24 VDC power. Connect the red wire to positive and the black wire to negative (ground).
Figure 2.12  GreenStar connection on John Deere 00 and 10 Series combines
Checking the mapping processor version

To check which version of the GreenStar mapping processor software is installed on the GreenStar display, do the following:

1. Press Setup.
2. Press Yield Mapping.
3. Press PAGE four times.

The SETUP – YIELD MAP-PAGE 4 screen appears. It shows the current version number.

Configuring the receiver

Configure the receiver as follows:

<table>
<thead>
<tr>
<th>GreenStar version</th>
<th>Port A NMEA output</th>
<th>NMEA messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3P</td>
<td>9600-8-N-1</td>
<td>GGA, GSA, and RMC</td>
</tr>
<tr>
<td>5.3R</td>
<td>4800-8-N-1</td>
<td></td>
</tr>
</tbody>
</table>

For more information, see Appendix C, NMEA-0183 Messages.

John Deere combines (50 Series)

*Note* – John Deere offers a retrofit kit that enables you to install the newer 50 Series GreenStar yield monitor into 00 and 10 Series combines that do not have yield monitors. If the 50 Series GreenStar yield monitor system is installed, the yield monitor PC card slot is in the back of the GreenStar display. In this case, install the receiver for a Series 00 or 10 combine according to the following instructions.
Installing the Receiver

Figure 2.14 on page 37 shows how to connect the receiver to GreenStar system on a 50 Series John Deere combine.

1. Locate the mobile processor on the back of the GreenStar Display. The Display is mounted on the right-hand cab post.

2. Disconnect the gray connector from the 10-slot MetriPak connector on the back of the mobile processor (see Figure 2.13).

![Figure 2.13 Mobile processor connector](image)

3. Prepare two 15 cm (6 in) lengths of 14-gauge stranded wire. To do this, strip 65 mm (1/4 in) of insulation from both ends of each wire.

4. Locate Slot C on the 10-slot MetriPak connector. Slot C has a connecting black wire:

5. Connect the first prepared 14-gauge wire:
   a. Insert one end into the splice connector. Squeeze the splice connector onto the insulated black wire of Slot C.
   b. Crimp the supplied round connector pin onto the other end of the same wire.
c. Insert the round connector pin into Slot C of the supplied 3-slot black Weatherpack tower connector.

6. Connect the second prepared 14-gauge wire:
   a. Crimp the square female connector pin (John Deere PN R104846) onto one end.
   b. Insert the square connector into Slot F of the 10-slot MetriPak connector.
      Alternatively, seal the connector pin in the MetriPak connector with the optional grommet (John Deere PN 57M7258).
   c. Crimp the supplied round connector pin onto the other end of the same wire.
   d. Insert the round connector pin into Slot A of the supplied 3-slot black Weatherpack tower connector.

7. Connect the Trimble GreenStar cable (PN 34189) to the 3-pin end of the black Weatherpack tower connector.

8. Connect the receiver power/data cable (PN 40947-18) to the GreenStar data cable 9-pin serial connector.

9. Attach the receiver power/data cable to the receiver.

10. Attach the power leads of the receiver power/data cable to switched +12 or +24 VDC power. Connect the red wire to positive and the black wire to negative (ground).
Installing the Receiver

Figure 2.14  GreenStar connection on John Deere 50 Series combines
**Configuring the receiver**

Use AgRemote to configure the receiver as follows:

- Port A output: NMEA 4800-8-N-1
- NMEA messages: GGA, GSA, and RMC

For more information, see Appendix C, NMEA-0183 Messages.
**Ag Leader**

This section describes how to connect the receiver to an Ag Leader yield monitor.

**Connecting the optional data cable**

To connect the receiver to the Ag Leader Yield Monitor 2000 or PS3000, use the optional 3.6 m (12 ft) Ag Leader power/data cable (PN 39903) as shown in Figure 2.15 and Figure 2.16.

*Note – Connect the power/data cable (PN 40947-18) red power lead to +12 or +24 VDC power. Connect the black power lead to ground. Do not connect the red and black leads from cable PN 39903 to machine power.*

![Figure 2.15 Connecting the receiver to the Ag Leader YM2000](image-url)
2.6.2 Ag Leader PF3000 Pro

To connect the receiver to an Ag Leader PF3000 Pro monitor without internal GPS, you must purchase a 9-pin to 15 adaptor cable (PN 2000985) from Ag Leader Technology. See Figure 2.17

Note – Connect the receiver power/data cable red power lead to the +12 or +24 VDC. Connect the black power lead to ground. Do not connect the red and black power leads to machine power.
Figure 2.17  Connecting the receiver to the Ag Leader PF3000 Pro
2.7 AGCO FieldStar

This section deals with the AGCO FieldStar System on Gleaner and Massey Ferguson combines. It describes how to set up and configure the components to receive GPS position information.

For more information, visit the AGCO website (www.fieldstar.agcocorp.com).

2.7.1 Locating the FieldStar ComUnit

Gleaner series combines

Look in the overhead upper right corner of the cab. Remove the four screws that attach the front headliner. The screws are along the upper windshield area. Power for the DGPS receiver is supplied through a 2-way MetriPak connector, where A = 12V, and B = Ground.

Massey Ferguson series combines

For models before 2001, look in the storage area behind the seat. For later models (8780XP), look on the floor to the right side of the seat base and attached to it. Power for the DGPS receiver is supplied through a 2-way MetriPak connector, where A = 12V, and B = Ground.

Connecting the receiver

Gleaner and Massey Ferguson combines (manufactured before 2001)

The 9-pin connector on the ComUnit is male. Connect the receiver power/data cable to cable PN 39903. Use a null modem adaptor to plug the 9-pin male connector of cable 39903 into the ComUnit.
Gleaner and Massey Ferguson combines (manufactured in or after 2001)

The 9-pin connector on the ComUnit is female. Connect the receiver power/data cable to cable PN 39903. Plug the 9-pin male connector of cable 39903 into the ComUnit.

Configuring the receiver

Gleaner and Massey Ferguson combines (manufactured before 2001)

Configure the receiver as follows:

- Port A output: NMEA 4800-8-N-1
- NMEA messages: GGA, VTG, GSV, and GSA

Gleaner and Massey Ferguson combines (manufactured in or after 2001)

Configure the receiver as follows:

- Port B output: NMEA 4800-8-N-1
- NMEA messages: GGA, VTG, GSV, and GSA

Configuring the FieldStar ComUnit

To configure FieldStar on a Gleaner combine that is running FieldStar software version 4.30 and later:

1. Check which version of the software is installed. On the FieldStar display, go to the System Information screen.

   Note – Version 4.30 software can handle 4800 and 9600 baud rates and 1 Hz or 5 Hz input rates.
2. To change the settings, press the keys in the following order:
   - Main Menu
   - Basic Settings
   - Next
   - GPS source
   - GPS via Comunit

3. Press Up or Down to highlight External NMEA.

4. Press Enter.
Installing the Receiver

2.8 RDS Ceres Yield Monitor

To connect the receiver to an RDS Ceres yield monitor, use the optional 3.6 m (12 ft) RDS yield monitor power/data cable (PN 35142):

1. Plug the 12-pin CONXALL connector into the receiver.
2. Plug the 9-pin RS 232 connector into the RDS Ceres yield monitor.
3. Configure the receiver Port B for NMEA 4800–8–N–1. For more information, see Chapter 3, Getting Started.

2.9 RDS Pro Series 8000 Yield Monitor

Figure 2.18 shows how to connect the receiver power/data cable to the RDS Pro Series 8000 yield monitor.

Figure 2.18 Connecting the receiver to the RDS Pro Series 8000

AgGPS 114 Receiver User Guide 45
Laptop Computer

Figure 2.19 shows how to connect the receiver power/data cable to a laptop computer.
Windows CE Palmtop

Figure 2.20 shows how to connect the receiver power/data cable to a Windows CE palmtop computer.

Note – Attach the null modem adaptor 9-pin RS 232 connector to the 9-pin female connector of the Windows CE computer.
Windows Handheld Computer

Figure 2.21 shows how to connect the receiver power/data cable to a Windows CE handheld computer.

*Note* – To connect the receiver to a Compaq I-Paq handheld computer, you require a RS232 9-pin serial cable (PN 236251-B21). This cable is available from Compaq.

![Figure 2.21](image)

Figure 2.21 Connecting the receiver to a Windows CE handheld computer
Micro-Trak Yield Monitor

Figure 2.22 shows how to connect the receiver power/data cable to a Micro-Trak yield monitor.

Figure 2.22  Connecting the receiver to a Micro-Trak yield monitor
2 Installing the Receiver
Getting Started

In this chapter:

- Introduction
- Front panel
- The AgRemote menu system
- Using AgRemote
- Navigating the menus and screens
- Menu system fields
- The Home screen
- Updating the firmware
Introduction

This chapter describes how to set up and begin using the AgGPS 114 receiver. It includes an overview of the AgGPS Menu system.

Because the AgGPS 114 receiver does not include a physical display or keypad, you must connect the receiver to the AgRemote utility to configure the receiver settings and view its status. The AgRemote front panel displays the AgGPS menu system, which is the interface for receiver operations. You can also access the menu system using the AgGPS 70 RDL. See Figure 3.1. To view the entire AgGPS menu system, see Appendix D, Navigation Maps.

Figure 3.1 shows the AgGPS 70 RDL keypad.
3.1.1 Installing AgRemote

AgRemote requires Microsoft Windows 95, 98, ME, 2000, or XP.

To install the latest version of AgRemote:

2. Follow the prompts provided by the File Download wizard:
   a. Select *Save this program to disk.*
   b. Click **OK.**

   Save the AgRemote file to *My Documents,* or to another folder of your choice on the hard drive of your computer. Click **Save.**

   The download takes 5–20 minutes, depending on your Internet connection speed.
3. Select the folder where you saved the AgRemote file.
4. Double-click the downloaded file to start installing AgRemote.
5. In the *InstallShield* dialog, click **Yes.**
6. Follow the instructions provided by the installation wizard. When completed, click **Finish.**
To use AgRemote:

1. Connect the receiver to the serial port of the office computer, as shown in Figure 3.2.

![Connecting the receiver to an office computer](image)

Figure 3.2 Connecting the receiver to an office computer
2. From the [Start] menu, select Programs / AgRemote / AgRemote.

3. When the program starts, select File / Connect.

AgRemote establishes communication with the receiver and displays the Home screen of the AgGPS menu system, as shown in Figure 3.3.

![Figure 3.3 AgRemote window and navigation keys.](image)

4. Navigate to the required screen. Use the display to configure the communication ports, differential correction source, and/or Trimble AgGPS lightbar communication settings. For a map showing the full menu system, see Appendix D, Navigation Maps. For more information, see Chapter 4, Configuring the Receiver.
The AgRemote Menu System

Use the commands provided by the AgGPS menu system to:

- monitor the receiver status
- change the receiver configuration
- control the receiver utility/guidance functions

This section describes the menu system and the setting display options. Chapter 4, Configuring the Receiver, describes how to configure the receiver using the menu system.

For information about the AgGPS 70 RDL, refer to the AgGPS 70 RDL Operation Manual. To download that manual, go to: www.trimble.com/aggps70_ts.asp?Nav=Collection-4366

Using AgRemote

To configure and monitor the receiver:

1. Connect the receiver to the office computer running AgRemote. See page 54.
2. Switch on the receiver.
3. Click AgRemote, then select Programs / AgRemote / AgRemote.

When the Home screen appears, you can press ▲ or ▼ to access other screens in the AgGPS menu system.

Tip – Use the navigation maps in Appendix D, Navigation Maps as a reference when navigating the AgGPS menu system.
The **AgRemote keys**

The actions of the AgRemote keys depend on whether a menu or screen is displayed. Table 3.1 describes the key actions.

<table>
<thead>
<tr>
<th>Key</th>
<th>Action if menu displayed</th>
<th>Action if screen displayed</th>
</tr>
</thead>
<tbody>
<tr>
<td>←</td>
<td>Return to the top of the menu when an Exit screen appears after the last screen in a menu.</td>
<td>From the Home screen, change Satellite DGPS source mode. From the Lock Display Cfg screen, display the Enter Password screen. From other screens, perform an action associated with that screen.</td>
</tr>
<tr>
<td>▼</td>
<td>Move down a menu level. Display the first screen from a lower level menu.</td>
<td>Move downward through the screens in a menu. Move downward through the list of options in multiple-choice fields.</td>
</tr>
<tr>
<td>▲</td>
<td>Move up a menu level.</td>
<td>Move upward through the screens in a menu. Move upward through the list of options in multiple-choice fields.</td>
</tr>
<tr>
<td>▶</td>
<td>Move horizontally through the upper- and lower-level menus. Move from the last upper-level menu to the Home screen.</td>
<td>Select the next alphanumeric or multiple-choice field on a screen. When alphanumeric or multiple-choice fields are available, the ▼ symbol appears in the corner of the screen. Move to the next letter or digit of a field.</td>
</tr>
<tr>
<td>▼</td>
<td>Move up one menu level. Ultimately, return to the Home screen.</td>
<td>Move from a screen to the screen’s menu. Press again to return to the previous level. Press again to return to the Home screen.</td>
</tr>
</tbody>
</table>
Navigating the Menus and Screens

*Note* – *Use a menu to navigate to screens or other menus. Use a screen to view the receiver status or to change a configuration setting.*

The top level of the AgRemote menu system consists of the *Home*, *Field Operations*, *Status*, and *Configuration* menus. Each of these has one or more lower level menus (sub-menu) which you can use to access screens for selecting options, viewing status information, and entering data. For a map showing the full menu system, see Appendix D, Navigation Maps.
Figure 3.4 shows the structure of a typical sub-menu, for example *Display Options*.

**Figure 3.4 Typical menu structure**

Press ▼ or ▲ to move between screens. Within screens, select options, view receiver status, or enter data. When 4! appears in a screen, press ← to perform the action specified for that screen.
Menu System Fields

Fields in a screen contain status information or configuration settings. The information or settings appear in fields that are:

- display-only
- multiple-choice
- alpha, numeric, or alphanumeric

Display-only fields

A display-only field shows status information and other data that is automatically generated by the receiver or acquired from satellite signals. You cannot edit this field. Examples include fields that display the DGPS data on the Home screen and the fields in the screen in Figure 3.5, which show details of the current receiver options.

![Figure 3.5 Example of a display-only field](image)

Multiple-choice fields

In a multiple-choice field, you select one option from a list. Only one option can appear in the field at one time. Press → to select a multiple-choice field, the press → or ← to move through the list. When the required option appears, press → to select it and save the changes.

Examples include the two multiple-choice fields that appear in the EZ Sat DGPS Configuration screen (see Figure 3.6). These are the fields which list available satellite providers, and satellite coverage beams.
Figure 3.6 Example of a multiple-choice field

**Alpha, numeric, and alphanumeric fields**

In these fields, you can enter only letters (alpha screens), only numbers (numeric screens), or a combination of the two (alphanumeric screens):

1. Press the arrow button to select the field and activate the cursor on the first letter or number.
2. Press the arrow button again or down to move through the list of letters or numbers until the required letter or number appears.
3. Press the arrow button to move to the next place in the field.
4. Repeat steps 2 and 3 to enter all required characters.
5. Press the back button to save the changes.
One example of a numeric field appears in the *Satellite Freq* screen. You manually enter the broadcast frequency of a satellite service provider. See Figure 3.7.

![Satellite Frequency field](image)

Figure 3.7  Example of a numeric field
The Home Screen

When you start AgRemote, or access the receiver using the AgGPS 70 RDL, the Home screen appears. See Figure 3.8.

![Figure 3.8 Home screen](image)

You can leave this screen running during operation. It enables you to monitor the receiver status. To return to the Home screen after viewing other receiver menus and screens, press one or more times.

Satellite and WAAS/EGNOS DGPS mode

The AgGPS 114 can receive WAAS/EGNOS DGPS signals. The Home screen indicates which mode the receiver is in for differential correction.

Figure 3.9 explains the GPS status indicators that can appear on the first line of the Home screen display.

![Figure 3.9 GPS status](image)
Table 3.2 explains the indicators that can appear in the *Position Type* field.

### Table 3.2 Position types

<table>
<thead>
<tr>
<th>Display</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRCH</td>
<td>Searching for satellites.</td>
</tr>
<tr>
<td>TRCK</td>
<td>Tracking satellites.</td>
</tr>
<tr>
<td>G/2D</td>
<td>Outputting 2-dimensional autonomous positions.</td>
</tr>
<tr>
<td>G/3D</td>
<td>Outputting 3-dimensional autonomous positions.</td>
</tr>
<tr>
<td>D/2D</td>
<td>Outputting 2-dimensional differential positions.</td>
</tr>
<tr>
<td>D/3D</td>
<td>Outputting 3-dimensional differential positions.</td>
</tr>
</tbody>
</table>

*Note* – The “/” symbol in the position type spins when the receiver is operating correctly.

### Satellite DGPS mode status indicators

When the receiver is in Satellite mode, the second line of the *Home* screen displays the status indicators shown in Figure 3.10.

![Satellite DGPS mode status indicators](image-url)

**Figure 3.10** Satellite DGPS mode status indicators
Table 3.3 shows the possible satellite differential mode indicators.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S ####.### S/N ##</td>
<td>Operating in Satellite Differential mode.</td>
</tr>
<tr>
<td>S SRCH ####.##</td>
<td>Searching for Satellite Differential signal.</td>
</tr>
<tr>
<td>S TRCK ####.##</td>
<td>Tracking satellite without acquiring signal lock.</td>
</tr>
</tbody>
</table>

Table 3.4 explains the signal-to-noise ratio values for both Satellite and WAAS/EGNOS DGPS modes.

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 4</td>
<td>Unusable</td>
</tr>
<tr>
<td>4–8</td>
<td>Fair</td>
</tr>
<tr>
<td>&gt;8</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

**WAAS/EGNOS DGPS mode status indicators**

When the receiver is in WAAS/EGNOS DGPS mode, the second line of the Home screen displays the status indicators shown in Figure 3.11.

![Figure 3.11 WAAS DGPS mode status indicators](image-url)
Updating the Firmware

To ensure that the receiver and office computer connect, when you are ready to update the firmware, do one of the following:

- If you use a Windows CE or pocket PC device with the computer, make sure that Microsoft Active Sync is disabled from using the COM port on the computer.
- If you use a Palm Pilot with the computer, make sure that the Palm Synchronization program is disabled from using the COM port on the computer.

To update the receiver firmware when a new version is released:

1. Download the upgrade files.
2. Install the FlashLoader100 utility.
3. Connect the receiver to an office computer.
4. Upgrade the firmware from the office computer, using the upgrade files.

For full details of how to do this, refer to the Release Notes provided with your receiver firmware.

If you have problems when you update the firmware, see Appendix A, Troubleshooting. For further assistance, contact your local Trimble Reseller.
Configuring the Receiver

In this chapter:

- Introduction
- Display options
- Configuring the communication ports
- Configuring Differential GPS
- Paid subscription services
- WAAS/EGNOS
- Using an AgGPS 70 RDL to activate the lightbar
4  Configuring the Receiver

Introduction

The Display Options, Satellite Differential Source, and Port Communication parameters need to be specific to your particular use, so are not preset. For the receiver to operate correctly after installation, use AgRemote or the AgGPS 70 RDL to configure the receiver. You only need to do this once, as the settings you choose are saved to permanent memory.

Tip – Refer to Appendix D, Navigation Maps while navigating the AgGPS menu system.

To change the receiver configuration settings, connect the receiver to AgRemote or to the AgGPS 70 RDL. For more information:

- see Getting Started, page 51
- refer to “Autoconnecting to an AgGPS receiver” in the AgGPS 70 RDL Operation Manual. To download this manual, go to www.trimble.com/aggps70_ts.asp?Nav=Collection-4366

The following sections describe how to change the receiver settings.

Display Options

Use the Display Options menu to control how information is displayed in the screens that you can access from the Field Operations, Status and Configuration menus.

To view the Display Options menu:

- From the Home screen (see page 58), press 

  Display Options
  Press v to Enter
Setting the language

To change the language displayed:

1. Navigate to the Language screen:

   ![Language Screen]

   2. Press ▶️ to select the Language field.
   3. Press ↑️ or ↓️ until the required language is displayed.
   4. Press ←️ to select it and save the changes.
   5. Press ESC to return to the Display Options menu.

   The screen automatically displays the selected language.

Setting the units

The Units screen displays U.S., Metric, or Nautical units in the screens that you access from the Field Operation, Status, and Configuration menus.

Note – This setting does not affect GPS position data output.

1. Navigate to the Units screen:

   ![Units Screen]

   2. Press ▶️ to select the Units field.
   3. Press ↑️ or ↓️ until the required unit is displayed.
   4. Press ←️ to select it and save the changes.
   5. Press ESC to return to the Display Options menu.
   6. Press ESC again to return to the Home screen.
Setting the display contrast

Adjusting the contrast may make the display easier to read in some conditions.

To change the contrast:

1. Navigate to the *Contrast* screen:

   ![Contrast Screen]

2. Press \( \triangleright \) to activate the cursor.
3. Press \( \downarrow \) to decrease the contrast. Press \( \uparrow \) to increase the contrast.
4. Press \( \leftarrow \) to save the changes.

Locking the Configuration menus

To prevent unauthorized changes to the configuration, you can lock the Configuration menus:

1. Navigate to the *Lock Display Cfg* screen.
2. Press \( \leftarrow \) to display the *Enter Password* screen. The cursor is active on the first digit:

   ![Enter Password Screen]

3. Use the last five numbers of the receiver serial number as the password (“passcode”).
   Press \( \uparrow \) or \( \downarrow \) until the first digit of the serial number appears.
4. Press \( \rightarrow \) to select the next digit. Repeat step 3 until all five digits are entered.
5. Press \( \rightarrow \) to save the changes.
The **Valid Password** message appears, and the Configuration menus are no longer displayed when you navigate the menus.

If the message **Invalid Password** appears, enter the password again.

**Tip** – When the Configuration menus are locked, you can view most Configuration menu settings from the Status menus.

To unlock the Configuration menus, repeat the above procedure.

**Clearing battery-backed RAM**

**Warning** – When you select the Clear BB Ram option, any changes that you have made in the Configuration menus are deleted and cannot be restored.

Use the **Clear BB RAM** screen to remove all configuration settings in the receiver memory (RAM) and return the receiver to its factory default configuration settings:

To delete battery-backed memory:

1. Navigate to the **Clear BB RAM** screen:
2. Press ➤ to activate the cursor.
3. Press ▲ or ▼ to select **Yes**.
4. Press ← to clear the configuration settings.
Configuring the Communication Ports

The AgGPS 114 receiver has one connector. Through this connector, the receiver can communicate with two devices simultaneously. To do this, it uses the two ports (RS-232 and CANBUS) of the standard power/data cable (PN 40947-18).

Configure the communication ports to ensure that the receiver outputs the correct GPS position data type, for the hardware device or software program that is connected to the receiver.

*Note – As both ports are configured identically, this section describes only Port A.*

For more information, see Customized connections, page 23.

To display the *Port A Config* menu:

1. From the *Home* screen, press > until the *Configuration* menu appears.
2. Press > to display the *Guidance Config* menu.
3. Press > until the *Port A Config* menu appears:

   ![Port A Config Press v to Enter](image)

4. Press > to move through the screens as required.

The following section describes how to configure the appropriate *Port A Config* screens. The menu for Port B is identical. Figure 4.1 shows the menu that you use to access the configuration screens.
Note – The Port A Out RTS/CTS screen is not available on the AgGPS 114 receiver.
Configuring input / output communication

Configure the Port Input/Output communication settings for communicating with the AgGPS Lightbar, other external hardware devices, and software programs. Table 4.1 describes the input settings.

Table 4.1 Port input settings

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Inputs nothing to the receiver.</td>
</tr>
<tr>
<td>TEXTB</td>
<td>The receiver can accept ASCII data from an external device, such as a chlorophyll meter, on Port A, merge it with NMEA GPS data, and output the combined data on Port B. The incoming data must be limited to 66 ASCII characters and must be terminated by a carriage return and line feed (hex characters 0x0D 0x0A). The NMEA string outputs as $PTNLAG001,&lt;up to 66 ASCII characters&gt;*&lt;2 digit checksum&gt;&lt;CR&gt;&lt;LF&gt;. For the receiver to output the combined NMEA string, NMEA must be selected as the output protocol on Port B.</td>
</tr>
<tr>
<td>TEXTA</td>
<td>See the description for the TEXTB setting. TEXTA outputs on Port A, not Port B.</td>
</tr>
<tr>
<td>RTCM</td>
<td>The receiver can accept RTCM data from an external DGPS device, such as an FM pager.</td>
</tr>
<tr>
<td>TSIP</td>
<td>The receiver can accept or output TSIP data packets from the port when using the optional AgRemote program or using the AgGPS 70 RDL.</td>
</tr>
<tr>
<td>LBAR</td>
<td>The receiver can accept or output data from the AgGPS Lightbar. You must select this setting when you use the AgGPS Parallel Swathing Option.</td>
</tr>
</tbody>
</table>

The default values for the other port settings are:

<table>
<thead>
<tr>
<th>Baud rate</th>
<th>Port A</th>
<th>Port B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In</td>
<td>Out</td>
</tr>
<tr>
<td>RTCM</td>
<td>9600</td>
<td>4800</td>
</tr>
<tr>
<td>LBAR</td>
<td>38.4 K</td>
<td>38.4 K</td>
</tr>
<tr>
<td>Data bits</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Parity</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
When setting the baud rate, note the following:

- If you are using 19.2 k or 38.4 k, the input rate must match the output rate.
- If Port A is operating at 19.2 k, Port B can operate at 1200, 2400, 9600, or 19.2 k (not 38.4 k).
- If Port B is operating at 38.4 k, Port A can operate at 1200, 2400, 9600 and 38.4 k (not 19.2 k).

To change the input or output settings:

1. From the Port A Config screen, press until the Port-A Input/Output screen appears:

```
  I RTCM 9600
  8N1 0 NMEA 4800
```

2. Press to activate the cursor.
3. Press or to change the value.
4. Press to save the changes.
5. Repeat steps 3 and 4 until you have set all the required values.
6. Press to move to the next screen.
Selecting NMEA messages for output

Use this screen to select the NMEA messages output from the current port. Only upper-case NMEA message types are output. The default messages are GGA, GSA, VTG, and RMC.

To select the NMEA messages for output:

1. From the Port A Config menu, press \( \checkmark \) until the NMEA1 screen appears:

   ![NMEA1 Screen]

2. Press \( \triangleright \) to activate the cursor on the first NMEA message type.
3. Press \( \uparrow \) or \( \downarrow \) until the NMEA message type appears in upper case.
4. Press \( \triangleright \) to select the next message type.
5. Repeat steps 4 and 5 until all the message types that you want to output appear in upper-case.
6. Press \( \leftarrow \) to save the changes.
7. Repeat this operation as required in the other NMEA screens.

For detailed information about the content and structure of NMEA messages, see Appendix C, NMEA-0183 Messages.

Port output rate

Use the Message Rate screen to vary the NMEA and TSIP output rate. For example, if the AgGPS Parallel Swathing Option is connected, AgGPS Lightbar data is output 5 times per second (5 Hz). At the same time, on the other port, NMEA or TSIP data can be output to a computer software package, yield monitor, variable rate controller, or other equipment. That data can be output at the same rate, or at a slower rate than the lightbar data.
The default setting is 01 (1 Hz, or 1 position per second).

If you require an output rate of 2, 5, or 10 positions per second, you must have the Fast Rate Option installed in the receiver. For more information, see page 90.

*Note – Select ASAP if you want the output rate to be the same as the output rate selected on the Position Rate screen under the GPS Config menu.*

To set the NMEA / TSIP message output rate:

1. From the Port A Config menu, press \( \checkmark \) until the Message Rate screen appears:

   ![NMEA out 01 s TSIP out 01 s](image)

2. To set the NMEA output rate, press \( \rightarrow \) twice to place the active cursor on the second digit of the NMEA line.

3. Press:
   a. \( \checkmark \) to set the output rate to ASAP
   b. \( \uparrow \) to increase the output rate by one second. Press this key as often as necessary, to a maximum of 99 seconds.

4. To set the TSIP output rate, press \( \rightarrow \) twice to move the cursor to the second digit of the TSIP line. Repeat step 3.

5. Press \( \leftarrow \) to save the changes.
Configuring Differential GPS

For the receiver to output GPS position coordinates of submeter accuracy, you must first select a differential signal from one of the following sources:

- **WAAS/EGNOS** – free service, limited availability
  The Wide Area Augmentation System (WAAS) augments GPS with additional signals for increasing the reliability, integrity, accuracy, and availability of GPS in the United States. EGNOS (European Geostationary Navigation Overlay System) is the European equivalent of WAAS.

- **OmniSTAR** – paid subscription, available worldwide
  Thales – paid subscription, available worldwide

You can use one of these paid services as an alternative to WAAS/EGNOS. They both provide over-the-air DGPS activation.

For more information, see Differential GPS (DGPS), page 9.

To use the differential signal from the selected provider:
1. Configure the receiver.
2. Activate the receiver.
3. Enable the receiver.

For details, see the following sections.

To configure the receiver to receive signals from any provider:
1. Navigate to the **DGPS Config** menu:

   ![DGPS Config](image)

2. Press ▼ to Enter.

   ![Press ▼ to Enter](image)
3. Follow the steps in the appropriate section below. Each section describes how to configure, activate, and enable the receiver for a particular provider.

### Paid Subscription Services

When you obtain a paid satellite subscription, contact the service provider for the correct satellite coverage beam for your geographic location.

In the U.S. and Canada, contact:

- OmniSTAR at 1-888-883-8476
  
  www.omnistar.com
- Thales-LandStar at 1-888-434-7757
  
  www.landstar-dgps.com/

You will need to provide a serial number and user code:

1. Navigate to the *Serial number* screen.
   
   Note the serial number here:

2. Navigate to the *Omni* or *Thales Srv Info* screen.
   
   Note the user code here:

To configure the *DGPS Source* for the subscription service:

1. Navigate to the *DGPS Source* screen.
2. Press 3 to activate the cursor.
3. Press \( \checkmark \) until Satellite Only appears:

```
DGPS Source
Satellite Only
```

4. Press \( \leftarrow \) to save the changes.

5. Press \( \text{ESC} \) to return to the DGPS Config menu.

To configure the provider name and the correct satellite coverage beam:

1. From the DGPS Config menu, press \( \checkmark \) until the EZ Sat screen appears.

   **Note** – The EZ Sat screen includes the Coverage Beam field and the Geographic Location field.

2. Press \( \rightarrow \) to activate the cursor.

3. Press \( \checkmark \) until the required provider appears (Omni* or Thales).

```
EZ Sat: Omni*
AMSC Central Nam
```

4. Press \( \rightarrow \) to move to the next field.

5. Press \( \checkmark \) until the coverage beam for your location appears.

6. Press \( \leftarrow \) to save the changes.

7. Press \( \text{ESC} \) to return to the DGPS Config menu.
OmniSTAR

To activate OmniSTAR DGPS:

1. Switch on the receiver and make sure it is configured for the correct satellite coverage beam.
   
   If you do not know the coverage beam for your location, contact OmniSTAR, see Paid Subscription Services, page 79.

2. Contact OmniSTAR on 1-888-883-8476 (USA or Canada). Provide OmniSTAR with:
   – your billing information
   – user code
   – satellite beam name

   OmniSTAR will activate the receiver. Activation can take 5–30 minutes.

3. Once the receiver is activated, the Home screen displays “D/3D”:

   ![Example Screen]

   If automatic activation fails, try to activate OmniSTAR DGPS manually, as described below. If you cannot activate the OmniSTAR differential service, contact your local Trimble Reseller.
Activating OmniSTAR manually

Note – *If the receiver is activated automatically, this option is not available.*

If over-the-air activation fails, or if you want to activate the OmniSTAR differential service manually, obtain an activation code from OmniSTAR:

1. Contact OmniSTAR for the activation code and satellite coverage beam for your location. See Paid Subscription Services, page 79. You will need to provide a serial number.
   
   Note the activation number here:

   _______________________
   _______________________
   _______________________

   Note the satellite coverage beam here:

   _______________________
   _______________________
   _______________________

2. From the *DGPS Config* screen, press *v* until the *Omni* screen appears:

   ![Press 4 for Omni* Activation]

3. Press *<*> twice. In the screen that appears, the active cursor highlights the first digit.

4. Press *A* or *v* to change the number.

5. Press *➡* to select the next digit.

6. Repeat steps Step 4 and Step 5 to enter all 24 numbers.

7. Press *<*> to save the changes.

8. Press *Esc* to return to the *DGPS Config* menu.

Note – *If you enter an incorrect code, try again using the correct numbers. An incorrect code has no effect on receiver operation.*
Thales

To activate Thales DGPS:

1. Switch on the receiver and make sure it is configured for the correct satellite coverage beam.

   If you do not know the coverage beam for your location, contact Thales, see Paid Subscription Services, page 79.

2. Contact Thales at 1-888-434-7757 (USA or Canada). Provide Thales with:
   - your billing information
   - user code
   - satellite beam name

   Thales will activate the receiver. Activation can take 5–60 minutes.

3. Once the receiver is activated, the Home screen displays “D/3D”:

   ![D/3D 07 DOP03 S 1556.2550 δ10]

Thales reference stations

To manually select a Thales network reference station:

1. From the DGPS Config screen, press ✔ until the Thales Stn screen appears:

   ![Thales Stns Use Network Stn]

2. Press ✔ to activate the cursor.

4. Press ← to save the changes.
5. Press ▼ until Thales Man Stns appears:

```
Thales Man Stn
565 No access
```

6. Press → to activate the cursor.
7. Press ▼ until the correct station appears for the satellite beam you are using. Trimble strongly recommends the stations listed below.

| If you are using the satellite beam ... | with this frequency ... | select this reference station ...
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>North American West</td>
<td>1556.255</td>
<td>565</td>
</tr>
<tr>
<td>North American Mountain</td>
<td>1554.350</td>
<td>555</td>
</tr>
<tr>
<td>North American East</td>
<td>1553.345</td>
<td>555</td>
</tr>
</tbody>
</table>

**Note** – Before you can select a reference station, you must have a current subscription to the Thales DGPS service.

8. Press ← to save the changes.

**WAAS/EGNOS**

WAAS/EGNOS is a free satellite-based DGPS service that is available only in North America (WAAS) or Europe (EGNOS). To use the WAAS/EGNOS DGPS signal, you must first configure the receiver.

To configure the receiver to use WAAS/EGNOS DGPS:

1. From the DGPS Config menu, press ▼ until the DGPS Source screen appears.
2. Press → to activate the cursor.
3. Press ▼ until WAAS/EGNOS ONLY appears:

![Display showing WAAS/EGNOS ONLY]

4. Press □ to save the changes.

To enable the WAAS/EGNOS DGPS signal:

1. Press ▼ until the WAAS/EGNOS T2 Remap screen appears.
2. Press ▼ to activate the cursor.
3. Press ▼ until On appears:

![Display showing T2 Remap On]

4. Press □ to save the changes.

To enable WAAS reception in the field:

1. Take the receiver outside. Make sure that it has a clear southeast and southwest view of the sky.
2. Switch on the receiver.
   WAAS activation can take two or more minutes.
3. Once activation succeeds, the Home screen displays “D/3D”:

![Display showing D/3D, 07, DOP03, WAAS, 122, 04]
Using an AgGPS 70 RDL to Activate the Lightbar

When you connect the AgGPS 21 Lightbar to the receiver, the lightbar should automatically be activated. If it is not, use the AgGPS 70 RDL to activate the lightbar manually.

Do the following:

1. Make sure that you have selected LBAR in the Port B Config (or Port A Config) menu. Otherwise the lightbar will not operate and Guidance Config screens will not be available.

2. Navigate to the Port B Config (or Port A Config) menu:

   - Press 2 until the Port B In/Out screen appears.
   - Press 3 to activate the cursor.
   - Press 2 until LBAR appears in the top line:
   - Press 3 several times to move the cursor to the third field of the second line.
   - Press 2 until LBAR appears:
   - Press ← to save the changes.
Activating Firmware Options

In this chapter:

■ Introduction
■ Installing an option
■ Using an option
5 Activating Firmware Options

Introduction

This chapter describes how to activate and use the firmware options that you can purchase with the AgGPS 114 receiver (see Table 5.1).

Table 5.1 Firmware options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>33176-30</td>
<td>Differential Base Station</td>
</tr>
<tr>
<td>33176-40</td>
<td>EVEREST Multipath Rejection</td>
</tr>
<tr>
<td>33176-10</td>
<td>Fast Rate Position Output</td>
</tr>
<tr>
<td>33176-80</td>
<td>Point/Line/Area</td>
</tr>
<tr>
<td>33176-50</td>
<td>RTS/CTS Flow Control Negotiation</td>
</tr>
</tbody>
</table>

For more information, see Receiver enhancements, page 5.

Installing an Option

To install and activate an option, use one of the following methods:

- Enter a password
- Use Flashloader100

Enter a password

When you purchase an option, your Trimble Reseller provides the necessary password. Once entered, the password is stored in permanent memory and remains even when the receiver is switched off.

Use the Update receiver screen of the AgGPS menu system to enter the password directly into the receiver and activate the option for immediate field use.
1. Do one of the following:
   – Connect the receiver to an AgGPS 70 RDL using the AgGPS PSO Plus cable.
   – If you are using AgRemote, connect the receiver to an office computer.
2. Navigate to the *Update receiver* screen. Press →.
   The active cursor highlights the first digit.
3. Press ▲ or ▼ to enter the first number of the password.
4. Press → to move to the next digit.
5. Repeat steps 3 and 4 until all numbers are entered.
6. Press ← to save changes.

   The screen displays the selected option as enabled.

   If an error message appears, enter the password again. If you are still unsuccessful, contact your local Trimble Reseller for assistance.

### FlashLoader100

If you have not yet done so, install the latest version of FlashLoader 100 on the office computer. See page 66. Use FlashLoader100 to enter one or more passwords:

1. On the office computer, click Start, then select *Programs / Flashloader100*.
2. In the dialog that appears, select the *Update receiver with password* check box. Click Proceed.
3. The *Flash Progress* dialog appears while FlashLoader100 attempts to find the receiver. When FlashLoader100 finds the receiver, the *Enter Passwords* dialog appears.

   If FlashLoader100 cannot find the receiver, check that the cables are properly connected and try again.
4. In the *Enter Passwords* dialog, enter the 10-digit password into the first blank line. If you have more than one option, enter each password on a separate line. Click **OK**.

   The process takes a few seconds and a message appears when completed.

5. In the dialog that appears, click **Yes** to continue.

6. When the successful operation message appears, click **OK**.

   The option is successfully installed.

If any password operation fails, FlashLoader100 displays a message that identifies the failed option. Disconnect the receiver, then reconnect it and try again. For more information, see FlashLoader100, page 121. If you are still unsuccessful, contact your local Trimble Reseller for assistance.

### Using an Option

This section describes how to use AgRemote to configure the receiver for each option.

In each case, first connect to the receiver and start AgRemote.

### Fast Rate Output

To configure the receiver:

1. Navigate to the *Configuration / GPS Config / Position Rate* screen.
2. Press ▶ to activate the cursor.
3. Press ▲ or ▼ to set the output rate (1, 2, 5, or 10 Hz).
4. Press ← to save the settings.
5. Press ◄ several times to return to the *Home* screen.
To configure the communication port:

1. Navigate to the Port A Config (or Port B Config) NMEA out screen.
2. Press 3 to activate the cursor in the top line.
3. Press 3 to move the cursor to the second digit.
4. Press 2 until ASAP appears.
5. Press 4 to save the settings.
6. Press 5 several times to return to the Home screen.

Base Station

You may need this option when working in a remote location where satellite differential correction and/or beacon tower differential correction is not available.

If you have not yet done so, install the latest version of FlashLoader 100 on the office computer. See page 66.

To install the Base Station option:

1. Use the power/data cable to connect the receiver to the serial port on the office computer (this is usually COM1 or COM2).
2. On the office computer, click [Start] and then select Programs / FlashLoader100.
3. Click Find Device.

FlashLoader100 detects the receiver and automatically selects the correct port. A message appears identifying the port which is connected to the receiver. Click OK.

4. Enter the password. For more information, see Step 2 through Step 6 on page 89.
To configure the communication port:

1. Navigate to the Config Port B (or Config Port A) menu.
2. Press \( \checkmark \). The Port Input/Output screen appears:

```
I TSIP 9600
801 0 TSIP 9600
```

3. Press \( \rightarrow \) to activate the cursor.
4. Press \( \rightarrow \) until the cursor highlights the third item on the second line.
5. Press \( \checkmark \) until RTCMI appears:

```
I TSIP 9600
801 0 RTCMI 9600
```

6. Press \( \leftarrow \) to save the settings.
7. Press \( \leftarrow \) several times to return to the Home screen.
8. If necessary, change the baud rate and parity to match the settings used by your base station radio. For more information, see Configuring input / output communication, page 74.

**Configure base station output settings**

*Note – The Base Sm Config menu is available only when the Base Station option is installed and a communication port is configured correctly for it.*

In Base Station mode, the receiver outputs RTCM (GPS correction) data. The RTCM data can be transmitted to an external radio, which then broadcasts the RTCM information to other AgGPS 114 “rover” receivers in the field that are within radio range. Generally, all rover units are equipped with an identical radio which enables them to receive the RTCM data from the base station radio.
The AgGPS 114 receiver has real-time capabilities, so a submeter reference position can be created in seconds. Set the receiver antenna over a known surveyed location, or allow the receiver to compute the reference location. Once the reference position is supplied, the receiver can begin computing PseudoRange correction information. The information is converted to RTCM output data format. This information is used to correct the rover’s final output position, and so provides submeter accuracy.

**Base location**

You can use the *Base Location* screen to view the current location of the receiver antenna. You can also use this screen to change the setting for the location of the antenna. The screen provides the following options:

- View location, see below
- Set from here, page 94
- Edit base position, page 94
- Set from averaged positions, page 95

**View location**

To view the current location of the receiver antenna:

1. Navigate to the *Configuration / Base Stn Config / Base Location* screen:

   ![Base Location Screen](image)

2. Press one or more times to view the current computed reference position, latitude, longitude, and altitude.
**Note** – The reference position coordinates are in latitude/longitude; the datum is WGS-84; altitude is referenced to Mean Sea Level (MSL).

**Set from here**

To set the receiver antenna location, select the current computed GPS position as follows:

1. Navigate to the *Base Location* screen.
2. Press ➤ to activate the cursor.
3. Press ▲ or ▼ until *Set From Here* is displayed.
4. Press ➤. The receiver displays three screens in succession, showing the current latitude, longitude, and altitude:
   - To save the current coordinate value, press ➤.
   - To change the reference coordinate value, press ▲ or ▼. Press ➤ to move between characters. Press ➤ to save the changes.
5. When you press ➤ to accept the altitude, the receiver asks whether you want to accept the new reference position or not:
   - Press ➤ to accept the new reference position.
   - Press ▲ or ▼ to reject the new reference position. Press ➤ to finish.

**Edit base position**

Set the receiver antenna to a particular location. Do this when the antenna is on a surveyed location with known coordinates:

1. Navigate to the *Base Location* screen.
2. Press ➤ to activate the cursor.
3. Press ▲ or ▼ until *Edit Base Pos* is displayed.
4. Press \[4\]. The receiver displays three screens in succession, showing the current latitude, longitude, and altitude:
   - To save the current coordinate value, press \[4\].
   - To change the reference coordinate value, press \[A\] or \[V\].
     Press \[>\] to move between characters. Press \[<\] to save the changes.

5. Once you press \[4\] to accept the altitude, the receiver asks whether or you want to accept the new reference position or not:
   - Press \[4\] to accept the new reference position.
   - Press \[1\] or \[2\] to reject the new reference position. Press \[4\] to finish.

Set from averaged positions

To determine the location of the receiver antenna, you can configure the receiver to average the computed position over a period of time:

1. Navigate to the \textit{Base Location} screen.
2. Press \[3\] to activate the cursor.
3. Press \[A\] or \[V\] until \textit{Set From Ave} is displayed.
4. Press \[>\] to move the cursor to the right.
5. Press \[A\] or \[V\] to select the number of positions required to determine the average current location.
6. Press \[\downarrow\].
   The receiver begins to average positions.
7. Do one of the following:
   - When all calculated positions are collected, press \[\Rightarrow\] to accept the averaged position.
   - Press \[\Rightarrow\] to cancel.
Setting the base station mode

To operate the receiver as a base station, set the base position, then select Base Station mode:

1. Navigate to the Base Stn Config menu.
2. Press ▶ until the Base Station Mode screen appears.
3. Press ▶ to activate the cursor.
4. Press ▲ or ▼ to select ON.
5. Press ▶ to save the change.

Setting the PRC mode

Use the PRC Interval screen (PseudoRange Correction) to set the calculation interval. PseudoRange Correction is applied to the rover receiver’s computed GPS position to correct the final position output:

1. Navigate to the Base Stn Config menu.
2. Press ▶ until the PRC Interval screen appears:

   ![PRC Interval Screen]

3. Press ▶ to activate the cursor.
4. Press ▲ or ▼ to change the PRC interval.
5. Press ▶ to save the changes.
Waypoints option

*Note – To use the Waypoints option, you must have:*

- the Points/Lines/Areas option on an AgGPS receiver
- an AgGPS 70 RDL attached to the receiver
- an AgGPS 21 or AgGPS 23 Lightbar attached to the receiver

For more information, see Receiver enhancements, page 5.

A waypoint is a marked location that is stored as GPS position. When you create a waypoint, give it a meaningful name so that you can later select it and navigate back to it. Figure 5.5 on page 102 shows how to navigate to a waypoint.

You can record waypoints in the field, using an AgGPS receiver with an AgGPS 70 RDL attached, or you can enter known locations (GPS positions) manually into a text file, using a text editor. The receiver can store up to 20 waypoints. You select these waypoints from the *Nav Waypnt* screen.

The *Waypoint Ops* menu includes screens for adding and deleting waypoints, viewing waypoint names, and loading a waypoint file list into the AgGPS receiver memory.

Waypoints that are recorded in the field are added to the receiver memory, and they are automatically recorded to a Waypoint.txt file on the CompactFlash card that is in the AgGPS 70 RDL.

Waypoints that you enter manually are also saved to the CompactFlash card that is in the AgGPS 70 RDL.

Waypoints text file

You can download a sample waypoint text file from the Trimble website. To do this:

1. Go to www.trimble.com/aggps70_ts.asp?Nav=Collection-4369
2. Click RDLSample_Files.zip.
3. Select the Save this file to disk option. Click OK.
4. Save the sample.zip file to a folder on the office computer.
5. Extract the waypoint.txt file from the zip file on the office computer. Save the waypoint.txt file to the CompactFlash card on the AgGPS 70 RDL.

The waypoint.txt file is similar to the example in Figure 5.1.

| wp01, N 38 57 37.858, W 94 43 11.240, 1,  |
| wp01, N 38 57 37.845, W 94 43 11.246, 1,  |
| wp01, N 38 57 37.877, W 94 43 11.229, 1,  |

Figure 5.1  Sample waypoints.txt file

Each line in the file is a single waypoint. The format used is:

Waypoint Name, N Latitude, W Longitude, 1,

Note – Substitute S for N in the southern hemisphere (south of equator), and E for W in the eastern hemisphere (east of Greenwich meridian, 0 Longitude – Greenwich, England).

If you add new waypoints:

- end each text line with a “1,”
- limit each name to a maximum of 16 characters
- enter latitude and longitude as degrees, minutes, seconds, and decimal seconds (DD MM SS.SSS)

For more information, refer to the AgGPS 70 RDL Operation Manual.
Waypoint Ops menu

Figure 5.2 shows the Waypoint Ops menu. Press the keys shown to view individual screens.
Adding waypoints

Use the Add Waypoint screen to add waypoints to the list or to replace an existing waypoint with another one. Figure 5.3 shows the fields in this screen.

![Waypoint Number field and Waypoint Name field]

To add a new waypoint:

1. Navigate to the Add Waypoint screen. See Figure 5.2 on page 99.
2. Press \( \rightarrow \) to activate the cursor in the Waypoint Name field.
3. To enter a name, press \( \uparrow \) or \( \downarrow \) to change each character. Press \( \rightarrow \) to move to the next character.
4. Press \( \rightarrow \) to record the waypoint location. The screen displays the message Updating Waypoints List, then the message Waypoints Stored.
5. The waypoint number is automatically incremented, ready for the next name and location to be recorded.
Navigating to waypoints

Use the Navigate to Waypoint screen to select a name from the waypoints list and navigate back to the waypoint.

To navigate to a waypoint:

1. Navigate to the Navigate to Waypoint screen. See Figure 5.2 on page 99.
2. Press ⏯️ to activate the cursor on the Waypoint Name field.
3. Press ▲ or ▼ until the required name appears.
   The corresponding number appears in the Waypoint Number field.
4. Press ⏯️ to navigate to the waypoint. The message Guiding to Wpt appears. For more information, see Figure 5.5.
5. When you reach the waypoint, press ⏯️ to stop navigating.
Figure 5.5 illustrates how to steer to a waypoint.
Deleting waypoints

Use the Delete Waypoints screen to delete all stored waypoints.

*Note – This also deletes the Waypoint.txt file.*

![Figure 5.6 Delete Waypoint screen](image)

**Figure 5.6 Delete Waypoint screen**

To delete all waypoints:

1. Navigate to the *Delete Waypoints* screen. See Figure 5.2 on page 99.
2. Press ▶️ to activate the cursor on the *Delete Waypoints* field.
3. Press ▲ or ▼ to select *Yes, Delete All*.
4. Press ←. The message Deleting Waypoints List appears.
**Reading the waypoints list**

Use the *Read Waypoints List* screen to load the Waypoint.txt file from the CompactFlash card in the AgGPS 70 RDL to the receiver’s memory:

![Figure 5.7 Read Waypoints List Screen](image)

**Figure 5.7 Read Waypoints List Screen**

The *Read Waypoints List* screen is set to automatically transfer the Waypoint.txt file from the CompactFlash card into the receiver whenever you open the *Waypoints Ops* menu. You can then select the names from a list when adding or navigating to a waypoint.

If you modify the waypoint.txt field using a PC, and then reinsert the CompactFlash card into the AgGPS 70 RDL without switching off the receiver, you must manually transfer the new waypoint file:

1. Switch off the receiver then switch it on again.
2. Navigate to the *Read Waypoints List* screen.
3. Press ▶ to activate the cursor.
4. Press ◀ to select *Read Files Now*.
5. Press ◁ to read the new waypoints file. The message *Checking for Waypoints List* appears.
**Viewing the waypoint list**

Use the *Waypoints List* screen to view a list of all waypoints that are currently stored in the receiver:

![Waypoint List screen](image)

**Figure 5.8  Waypoint List screen**

To view the waypoint list:

1. Navigate to the *Waypoints List* screen. See Figure 5.2 on page 99.
2. Press repeatedly to display the latitude and longitude (GPS position) for each waypoint in turn:

![Waypoint coordinates](image)
Error message

An error message similar to that shown below appears during any waypoint operation if any of the following conditions occur:

- The AgGPS 70 RDL is not connected to a receiver.
- The AgGPS 70 RDL does not contain a CompactFlash card.
- The CompactFlash card does not contain a waypoint file.
- There is an error in the waypoint file.

Point/Line/Area option

*Note – This option is appears under the Field Ops menu. The option is only available when you are using an AgGPS 70 RDL.*

When you install this option the Point/Line/Area menu becomes available. The menu contains screens for creating point, line, and area files on the CompactFlash card in the AgGPS 70 RDL. It also contains screens for loading a list of point/line/area names into the receiver memory:

Point, line, and area features are stored as Shape files, which consist of the file types, *.shp, *.shx, and *.dbf.

To create a list of point/line/area names on the AgGPS 70 RDL CompactFlash card use any spreadsheet program.

The lists are called POINTS.DBF, LINES.DBF, and AREAS.DBF files. Select these names later in the Add Point, Add Line, and Add Area screens when you need to record a point, line, or area feature.
Alternatively, you can download these files and save them directly to the CompactFlash card. Go to http://www.trimble.com/aggps70_ts.asp

*Note* – *The AgGPS 70 RDL must be connected to an AgGPS receiver before you can use it to record point, line, or area shape files or to select feature names.*

**Working with .dbf files**

A DBF file contains user-defined feature attribute names that you can use to record point, line, and area shape files using the AgGPS 70 RDL. Each DBF file is a list of feature attribute names that you can select in the appropriate screen. An AgGPS receiver can store a total of 60 names (20 each for point, line, and area).

You can create a list of point, line, and area names on the AgGPS 70 RDL CompactFlash card by using one of the following spreadsheet programs. However, you must save the file as .dbf (*not* as the spreadsheet format):

- Microsoft Excel
- Microsoft Works
- Lotus 1-2-3
- Quattro Pro

Save the files directly to a CompactFlash card for use in the AgGPS 70 RDL. When you access the *Point/Line/Area* menu, the receiver automatically reads the .dbf files into memory.

If there are no DBF files on the CompactFlash card that is in the AgGPS 70 RDL, you can select a name from a list of default names in the receiver memory.

Each .dbf file must contain an *ID*, *NAME*, and *CLASS* column. These columns must have the following values.

- **ID** – Unique identifier, numbered sequentially starting at 1
- **NAME** – Attribute name, up to 16 characters long
- **CLASS** – 1
Figure 5.9 shows an example of a .dbf file.

<table>
<thead>
<tr>
<th>ID</th>
<th>NAME</th>
<th>CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pond</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Rocks</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Clover</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Alfalfa</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Weed 1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Weed 2</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Broadleaf weed</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Mustard Weed</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Crabgrass</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Pigweed</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Slough</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Grassed Waterway</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Roundup Rdy</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Non-Rndup Rdy</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Sink Hole</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Watermelon</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Organic grown</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>CRP</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Timber</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>GM</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 5.9 Sample .dbf file (Area.dbf)
**Point/Line/Area menu**

Figure 5.10 shows the *Point/Line/Area* menu. Press the keys shown to view individual screens.

![Diagram of Point/Line/Area menu](image)
Viewing line and area status

Use the Point/Line/Area screen to view the status of line and area logging.

Figure 5.11  Point/Line/Area screen

Upper case letters in the bottom line indicate that a line or area is currently being recorded to the AgGPS 70 RDL’s CompactFlash card. Lower case letters indicate that no line or area is being recorded.

Table 3.2 on page 64 lists information that can appear in the GPS Status field, which is in the upper-right corner of screen. GPS must be in D/3D mode to record a point, line, or area.

Open point/line/area logging

Use the Point/Line/Area Logging screen to open or close point, line, and area shape files on the AgGPS 70 RDL’s CompactFlash card.

Figure 5.12  Point/Line/Area On/Off screen
When you set the Logging screen to Open, three empty Shape files are automatically created on the CompactFlash card in the AgGPS 70 RDL. A file is created for points, another for lines, and another for areas. Data is automatically recorded to each of these separate files at the same time.

When you set the Logging screen to Close, any empty Shape files are deleted from the CompactFlash card. Only Shape files that contain recorded information remain.

To set the Logging screen to Open:
1. Navigate to the Point/Line/Area Logging screen.
2. Press \( \rightarrow \) to select the Open/Close field.
3. Press \( \uparrow \) or \( \downarrow \) to select Open.
4. Press \( \leftarrow \) to save the changes.

Adding a point

Figure 5.13 shows the Add Point screen.

Note – You can record point, line, and area shape files simultaneously. The Add Line and Add Area screens contain the same fields as those shown here.

Use the Add Point screen to record a point to the CompactFlash card. When you open the Add Point screen, the name of the last point defined appears briefly.

To add a point called “section corner”:
1. Set *Logging* to Open. See page 110.

2. Navigate to the *Add Point* screen.

3. Press ▶ to select the *Point List* field.

4. Press ▲ or ▼ to select the name from the list.
   Alternatively, to enter a name manually (for example “section corner”), press ▶, then press ▲ or ▼ to change each character. Press ▶ to move the cursor to the next character.

5. Press ◄ to save the changes.

6. Navigate your vehicle to the point to be recorded.

7. When prompted, press ◄ to store the current GPS position for the point named “section corner” in the POINT.DBF Shape file. The *Add Point* screen briefly displays the message *Defining Pt.* The screen then displays the message *Point Stored.*

**Adding a line**

Use the *Add Line* screen to record a line to the CompactFlash card.

To add a line called “fence”:

1. Follow Step 1 through Step 5 in the *Adding a point* section. Use the *Add Line* screen instead of the *Add Point* screen described there.

2. Navigate your vehicle to the start of the line to be recorded.

3. When prompted, press ◄ to start recording the current GPS position for the line named “fence”. The *Add Line* screen displays the message *Defining Line.*

4. Navigate your vehicle to the end of the line. Press ◄ to stop recording. The *Add Line* screen displays the message *Line Stored.*

**Adding an area**

Use the *Add Area* screen is used to record an area (such as a pond) to the CompactFlash card.
To add an area called “pond”:

1. Follow Step 1 through Step 5 in the Adding a point section. Use the Add Area screen instead of the Add Point screen described there.

2. Navigate the vehicle to the start of the area to be recorded. When prompted, press \( \text{4} \) to start recording the current GPS position for the area named “pond”. The Add Area screen displays the message Defining Area.

3. Navigate the vehicle to the end of the area. Press \( \text{4} \) to stop recording. The Add Area screen displays the message Area Stored.

To view recorded points, lines, and areas later, use a GIS software program such as ESRI’s ArcExplorer.

**Reading the Point/Line/Area list**

The Read Point/Line/Area screen is set to automatically transfer point, line, and area names from the .dbf files on the CompactFlash card to the receiver whenever you open the Point/Line/Area menu. This enables you to select a name from a list when adding a point, line, or area.

![Point/Line/Area screen](image)

Figure 5.14 Point/Line/Area screen

If you modify .dbf files using an office computer, and then reinsert the CompactFlash card into the AgGPS 70 RDL, and you do not switch off the receiver, you must manually transfer the new .dbf files to the receiver:
1. Navigate to the Point/Line/Area Read Files screen.
2. Press \( \nabla \) to activate the cursor.
3. Press \( \Box \) to select Read Files Now.
4. Press \( \downarrow \) to read the new *.DBF files.

If the receiver successfully reads the new files, the message Files Read OK appears.
Otherwise, the message Using Defaults appears.

**Error message**

The error message No Card Or Error appears in any point, line, or area operation if:

- The AgGPS 70 RDL is not connected to a receiver
- The AgGPS 70 RDL does not contain a CompactFlash card
- The CompactFlash card does not contain any .dbf files
- There is an error in a .dbf file
Troubleshooting

In this appendix:

- Introduction
- GPS
- Interference
- Receiver
- FlashLoader100
- AgRemote
- Troubleshooting guides
**Introduction**

This appendix describes some issues or problems that can occur and explains how to solve them. It also contains a series of flowcharts to help in problem solving.

<table>
<thead>
<tr>
<th>Problem / issue</th>
<th>Possible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GPS</strong></td>
<td></td>
</tr>
<tr>
<td>Poor accuracy</td>
<td>Change some or all of the following GPS settings: Minimum elevation – Increase the setting (the default is 8°). Minimum Signal Strength – Increase the System Mask AMU setting (the default is 3). Maximum PDOP – Decrease the setting (the default is 13). GPS Mode – Change to Manual 3D (the default is Auto 2D/3D). DGPS Mode – Change to DGPS (the default is DGPS Auto/On/Off).</td>
</tr>
<tr>
<td>GPS signals are reflecting off nearby trees and/or metal buildings and horizontal surfaces.</td>
<td>To reduce multipath noise, mount the GPS receiver so that it has a clear view of the sky. The receiver must be away from trees and large metal objects.</td>
</tr>
<tr>
<td>Intermittent loss of lock</td>
<td>Check that all cable connections are secure and free of moisture. If necessary, disconnect the cables and allow them to dry. Then reconnect the cables. Make sure that the receiver is mounted on the highest point of the vehicle, and is clear of metal surfaces. Try traveling in a different direction. Check Maximum PDOP and Minimum Signal Strength settings (see Poor accuracy above).</td>
</tr>
</tbody>
</table>
### Troubleshooting

<table>
<thead>
<tr>
<th>Problem / issue</th>
<th>Possible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intermittent DGPS signal</strong></td>
<td>The correction signal strength can be reduced to unusable levels. Causes include tree canopy cover between the receiver and the differential satellite, radar sets, and microwave transmitters. Make sure that the receiver is mounted away from overhead trees and sources of electromagnetic interference.</td>
</tr>
</tbody>
</table>
| **Tracking but not receiving a differential signal** | The receiver is tracking satellites and tracking an OmniSTAR or Thales satellite beam, but is not receiving DGPS signals. You need to check that your DGPS service subscription is still current and enabled. For OmniSTAR service:  
1. Navigate to the *Omni Srv Info* screen and press ← until *Stop Date* appears.  
2. If the message *Access Unknown* appears, contact OmniSTAR to reactivate your subscription.  
For Thales service:  
1. Navigate to the *Thales Srv Info* screen and press ← once.  
2. If the message *Access Unknown* appears, contact Thales to reactivate your subscription. For more information, see Paid Subscription Services, page 79. The receiver must be switched on and configured to track the correct satellite coverage beam before it can be reactivated. When a satellite subscription is activated the *Home* screen displays *D/3D*. |
No GPS position output from the receiver after connecting to AgRemote

When the receiver is connected to AgRemote, the port communication settings are automatically reset to TSIP 8-O-1 for both input and output. However, most devices and software programs accept NMEA 4800-8-N-1 output as standard. Connect AgRemote. Then reset the port communication settings to NMEA output. For more information, see Configuring the Communication Ports, page 72.

### Interference

#### Strong magnetic fields

Strong magnetic fields have no effect on GPS or satellite DGPS signals. However, some computers and other electric equipment radiate electromagnetic energy that can interfere with a GPS receiver. If you suspect interference from a local magnetic field, move the receiver away from, or turn off the suspect electronics while observing the GPS receiver’s number of satellites being tracked or satellite’s signal-to-noise ratio.

#### FM 2-way radios

Transmitting FM 2-way radios can interfere with OmniSTAR, Racal, WAAS and GPS signal reception. Make sure that there is at least 1 m (3 ft) between the FM 2-way radio antenna and the receiver.

#### Engine Noise

An unshielded ignition system can cause enough noise to block reception of a beacon signal. Use resistor spark plug wires on the vehicle ignition system.
<table>
<thead>
<tr>
<th>Problem / issue</th>
<th>Possible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>An alternator can cause noise that interferes with a beacon signal.</td>
<td>Use bypass capacitors, commonly available in automotive stores for cleaning up interference to CB and other radios. If the problem persists, shield engine components with aluminum foil. Relocate the antenna on the machine. Determine the optimal antenna location by watching the signal-to-noise ratio (SNR) value on the AgRemote Home screen. When using a beacon differential correction signal, aim for a value of 10 or higher.</td>
</tr>
<tr>
<td>Note – Before replacing engine parts in an attempt to solve this problem, make sure that the problem is not caused by a computer or power source near the receiver. Some office computers and their power sources cause noise that is disruptive to the GPS and satellite DGPS signals.</td>
<td></td>
</tr>
</tbody>
</table>

### Receiver

**Mounting location**

- The receiver is not picking up a clear signal.
  - Mount the receiver on the centerline of the vehicle, away from any sources of interference and with a clear view of the sky (see page 18).

### Cables

- One of the cables seems faulty.
  - Use an ohmmeter to check the cable. The resistance of a good cable between connector pins at each end of the cable is zero.

  - If the cable is sound, but the problem persists, try exchanging the cable with one that you know is working.

  - If the cable is defective, contact your local Trimble Reseller for an RMA number (if the Trimble product is still under warranty), or to purchase a replacement cable.
### Troubleshooting

<table>
<thead>
<tr>
<th>Problem / issue</th>
<th>Possible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Configuration settings</strong></td>
<td>Contact your local Trimble reseller for replacement batteries.</td>
</tr>
<tr>
<td>The receiver configuration settings are stored in RAM, which is supported by a lithium-ion battery that has a life of 10 years. If the battery fails, custom configuration settings are lost. <strong>Note – When this happens, the receiver starts to use the default configuration settings.</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Factory defaults</strong></th>
<th>To restore receiver factory default settings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>You need to restore the receiver factory defaults.</td>
<td>1. Connect the receiver to an office computer and switch it on.</td>
</tr>
<tr>
<td></td>
<td>2. Run <em>AgRemote</em>.</td>
</tr>
<tr>
<td></td>
<td>3. Navigate to the <em>Clear BB RAM</em> screen.</td>
</tr>
<tr>
<td></td>
<td>4. Press until <em>Yes</em> appears.</td>
</tr>
<tr>
<td></td>
<td>5. Press .</td>
</tr>
<tr>
<td>The factory default settings are restored. The DGPS service subscription is not lost. See page 79.</td>
<td></td>
</tr>
</tbody>
</table>

120  *AgGPS 114 Receiver User Guide*
## Troubleshooting

<table>
<thead>
<tr>
<th>Problem / issue</th>
<th>Possible solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FlashLoader100</strong></td>
<td>Make sure that:</td>
</tr>
<tr>
<td>The FlashLoader100 upgrade utility cannot detect the receiver or download the firmware.</td>
<td>• the receiver is using the latest firmware version</td>
</tr>
<tr>
<td></td>
<td>• the receiver is connected to a 12–32 VDC power source</td>
</tr>
<tr>
<td></td>
<td>• all cables are connected correctly between the device and the office computer</td>
</tr>
<tr>
<td></td>
<td>• FlashLoader100 is attempting to connect to the correct device. (From the FlashLoader100 menu, select Options / Settings. Then select the Receiver check box).</td>
</tr>
<tr>
<td></td>
<td>• the receiver is connected to the correct office computer COM port. (From the FlashLoader100 menu, select Options / Settings. Then select the check box for the required COM port.)</td>
</tr>
<tr>
<td></td>
<td>• other programs are not using the same COM port as the office computer</td>
</tr>
<tr>
<td></td>
<td>Once you have checked this, switch off the receiver, then switch it on again. Try again to connect FlashLoader100.</td>
</tr>
<tr>
<td><strong>AgRemote</strong></td>
<td>Make sure that the receiver is connected to a 12–32 VDC power source.</td>
</tr>
<tr>
<td>AgRemote cannot to communicate with the receiver (all you see is a blank screen).</td>
<td>• Check all cable connections between the receiver and the office computer.</td>
</tr>
<tr>
<td></td>
<td>• Make sure that you are using the correct COM port.</td>
</tr>
<tr>
<td></td>
<td>Once you have checked this, switch off the receiver, then switch it on again. Select File / Connect.</td>
</tr>
</tbody>
</table>
Troubleshooting Guides

This section contains flowcharts for troubleshooting the following areas:

- System hardware and power
- GPS reception (with no Yield Monitor attached to the receiver)
- GPS reception (with a Yield Monitor attached to the receiver)
- OmniSTAR
- Thales

As you proceed through these guides, you may need to view the receiver status or change values in some fields. For information on how to do this, see Menu System Fields, page 60.

In addition, you may find it useful to review Chapter 2, Installing the Receiver.
System Hardware and Power Troubleshooting Guide

START HERE

1. Is the receiver or AgRemote screen light on? Yes → Continue
   No → Is the data/power cable securely connected to the receiver antenna? Yes → Continue
   No → Connect the red and black power leads of the data/power cable to machine 10-32 VDC power.

2. There may be a fault with the machine power. Contact your local farm implement dealer.

3. Can you turn on the machine (combine or tractor)? Yes → Recheck the data/power cable connections. If the problem persists, contact your local Trimble Reseller.
   No → Continue

4. The receiver is connected and has sufficient power for operation.

5. Is the text visible on the receiver or AgRemote screen? Yes → Check the screen contrast. Is the text now visible? Yes → Continue
   No → Check the battery power. Is the battery voltage between 10-32 volts? Yes → Continue
   No → The receiver has insufficient power. Contact your local Trimble Reseller.

6. Is the text visible on the receiver or AgRemote screen? Yes → Is automatic gain control (AGC) 1 or less? Yes → Continue
   No → Check the cable connection to the antenna. Is the coax tape securely fastened at the antenna connection? Yes → Continue
   No → The antenna cable connection is vulnerable to water. Complete the remaining checks with the understanding that there may be moisture in the cable. Blow out the antenna connections with compressed air.

7. Make sure that there is no excess antenna cable wrapped around the antenna base. Use a tie strap to secure any excess cable away from the receiver/antenna.

8. The antenna cable may be faulty. Contact your local Trimble Reseller.

9. Was the coax cable securely fastened when you checked earlier? Yes → Recheck the system voltage. Is the AGC 1 or less? Yes → Continue
   No → Disconnect the antenna cable and allow it to dry in the air. This may take several hours. When the cable is dry, reconnect it and secure it with coax tape. If the problem persists, contact your local Trimble Reseller.
   No → Continue

10. The receiver cable may be faulty. Contact your local Trimble Reseller.

11. The coax cable is faulty. Contact your local Trimble Reseller.
GPS Reception (No Yield Monitor) Troubleshooting Guide

START HERE

Is the receiver or AgRemote screen light on?

Yes

See the System Hardware and Power Check Guide. When GPS satellite reception is resolved, return to this guide.

No

Is the screen text visible?

Yes

Check the Home screen for GPS reception. Is the receiver tracking at least 4 satellites?

No

Check the screen contrast. Is the screen text visible?

No

Contact your local Trimble Reseller.

Yes

After checking the screen contrast, return to this guide.

Is the screen text visible?

Yes

Check the Home screen for GPS reception. Is the receiver tracking at least 4 satellites?

No

Make sure that the receiver/antenna is located with a clear view of the sky. Are you receiving satellites now?

No

Is the receiver or AgRemote screen light on?

Yes

Check the screen contrast. Is the screen text visible?

No

Continue

Restore GPS default values.

Yes

The GPS reception appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

The problem may be caused by excessive engine noise. For information on reducing engine noise, see Chapter 2. If the problem persists, contact your local Trimble Reseller.

No

Turn off the machine engine (combine or tractor) but maintain power to the GPS receiver. Return to the Home screen and check GPS reception. Is the receiver tracking at least 4 satellites?

Yes

Turn on the machine engine and check the Home screen. Do the satellites disappear?

No

Return to the Home screen and check GPS reception. Is the receiver tracking at least 4 satellites?

No

Restore GPS default values.

Yes

The GPS reception appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

The problem is unresolved. Contact your local Trimble Reseller.

Is the screen text visible?

No

Make sure that the receiver/antenna is located with a clear view of the sky. Are you receiving satellites now?

Yes

Turn off the machine engine (combine or tractor) but maintain power to the GPS receiver. Return to the Home screen and check GPS reception. Is the receiver tracking at least 4 satellites?

No

The problem is unresolved. Contact your local Trimble Reseller.

Yes

The GPS reception appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

The problem may be caused by excessive engine noise. For information on reducing engine noise, see Chapter 2. If the problem persists, contact your local Trimble Reseller.

Yes

See the System Hardware and Power Check Guide. When GPS satellite reception is resolved, return to this guide.

Is the receiver or AgRemote screen light on?

No

Is the screen text visible?

No

The problem is unresolved. Contact your local Trimble Reseller.

Yes

The GPS reception appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

The problem may be caused by excessive engine noise. For information on reducing engine noise, see Chapter 2. If the problem persists, contact your local Trimble Reseller.
GPS Reception (With Yield Monitor) Troubleshooting Guide

START HERE

Is the receiver or AgRemote screen light on?

Yes

See the System Hardware and Power Check Guide. When the GPS reception is resolved, return to this guide.

No

Is the text visible on the receiver or AgRemote screen?

Yes

Check the screen contrast. Is the screen text visible?

No

Contact your local Trimble Reseller.

Yes

Check the Home screen for GPS reception. Is the receiver tracking at least 4 satellites?

No

Make sure that the receiver or antenna is located with a clear view of the sky. Is the receiver now tracking at least 4 satellites?

No

Continue

Yes

Return to the Home screen and check GPS reception. Are you receiving at least 4 satellites?

No

Restore GPS default values.

Yes

Continue

No

Turn off the machine engine (combine or tractor) but maintain power to the GPS receiver. Wait five minutes. Return to the Home screen and check GPS reception. Is the receiver tracking at least 4 satellites?

No

Contact your local Trimble Reseller.

Yes

The problem is unresolved. Contact your local Trimble Reseller.

No

The problem may be caused by excessive engine noise. For information on reducing engine noise, see Chapter 2. If the problem persists, contact your local Trimble Reseller.

Is the receiver or antenna located with a clear view of the sky?

Yes

Continue

No

The data/power cable may be faulty. Contact your local Trimble Reseller.

Is applicable, does the yield monitor display DG for a 3D position?

No

Check that the yield monitor is securely connected to the yield monitor to the receiver.

Yes

Continue

Is the receiver now tracking at least 4 satellites?

No

Turn on the machine engine and check the Home screen. Do the satellites disappear?

Yes

Your GPS reception appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

Your GPS reception appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

Check that the receiver is configured correctly for input/output communications.

Yes

Does the receiver Home screen display D3D?

No

See the OmniSTAR or Thales Troubleshooting guide. If the problem persists, contact your local Trimble Reseller.

Yes

The problem may be caused by excessive engine noise. For information on reducing engine noise, see Chapter 2. If the problem persists, contact your local Trimble Reseller.
START HERE

Check the receiver or AgRemote Home screen for GPS reception. Is the receiver tracking at least 4 satellites?

Yes

No

Does the receiver or AgRemote Home screen display S for DGPS satellite mode?

Yes

No

Wait one minute. Does the receiver or AgRemote Home screen now display D/3D (3D position)?

Yes

No

Check the Omni* Srv Info screen. Press 4. Is OmniST AR enabled?

Yes

No

Press 4 again to check OmniST AR status. Do you see either of the following messages? Received Data, No Recent Data

Yes

No

The status message is one of the following?

Yes

No

Init Decoder (1-4) Decoder Ready Access Confirmed

Contact your local Trimble Reseller.

The problem may be caused by excessive engine noise. For information on reducing engine noise, see XREF. If the problem persists, contact your local Trimble Reseller.

The OmniSTAR almanac may be out of date. Set up the receiver and track satellites for 1-2 hours to acquire a new almanac. If the problem persists, contact your local Trimble Reseller.

The system appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

Make sure that your OmniSTAR subscription service is current, activated and correctly configured.

Yes

No

Continue

Turn on the machine engine and check the Home screen. Do the satellites disappear?

Yes

No

Something may be interfering with the OmniSTAR satellite signal. Check the Age of DGPS / Age of Synch screen. Is the DGPS age 10 or more? Is the Synch age 3 or less?

Yes

No

The received or old data is not sufficient for good DGPS positioning. Contact OmniSTAR.

Contact your local Trimble Reseller.

The receiver is tracking GPS satellites but not receiving the OmniSTAR signal. Contact your local Trimble Reseller.

The problem is unresolved. Contact your local Trimble Reseller.

Turn off the machine engine (combine or tractor) but maintain power to the GPS receiver. Wait five minutes. Return to the Home screen and check GPS reception. Are you receiving at least 4 satellites?

Yes

No

The receiver or AgRemote Home screen for satellite signal strength. Is the S/N (signal to noise ratio) 6 or more?

Yes

No

Check the Home screen for satellite reception. Is the receiver tracking at least 4 satellites?

Yes

No

See the GPS Reception Troubleshooting Guide. When GPS satellite reception is resolved, return to this guide.

Yes

No

Wait one minute. Does the receiver or AgRemote Home screen now display D/3D (3D position)?

Yes

No

Check the Home screen for satellite signal strength. Is the S/N (signal to noise ratio) 6 or more?

Yes

No

Press 4 until you see Stop and a date. Has the date expired?

Yes

No

The OmniSTAR almanac may be out of date. Set up the receiver and track satellites for 1-2 hours to acquire a new almanac. If the problem persists, contact your local Trimble Reseller.

Continue

If the problem persists, contact your local Trimble Reseller.

See the GPS Reception Troubleshooting Guide. When GPS satellite reception is resolved, return to this guide.

Yes

No

Press 4 until you see Stop and a date. Has the date expired?

Yes

No

The OmniSTAR almanac may be out of date. Set up the receiver and track satellites for 1-2 hours to acquire a new almanac. If the problem persists, contact your local Trimble Reseller.

Continue

If the problem persists, contact your local Trimble Reseller.

Check the Home screen for satellite signal strength. Is the S/N (signal to noise ratio) 6 or more?

Yes

No

Press 4 again to check OmniST AR status. Do you see either of the following messages? Received Data, No Recent Data

Yes

No

The status message is one of the following?

Yes

No

Init Decoder (1-4) Decoder Ready Access Confirmed

Contact your local Trimble Reseller.

The problem may be caused by excessive engine noise. For information on reducing engine noise, see XREF. If the problem persists, contact your local Trimble Reseller.

The OmniSTAR almanac may be out of date. Set up the receiver and track satellites for 1-2 hours to acquire a new almanac. If the problem persists, contact your local Trimble Reseller.

The problem is unresolved. Contact your local Trimble Reseller.
Thales Troubleshooting Guide

START HERE

Check the receiver or AgRemote Home screen for GPS reception. Is the receiver tracking at least 4 satellites?

Yes

See the GPS Reception Troubleshooting Guide. When GPS satellite reception is resolved, return to this guide.

No

Check the receiver or AgRemote Home screen for satellite signal strength. Is the S/N (signal to noise ratio) 6 or more?

Yes

Check the Home screen for satellite signal. Is the S/N signal to noise ratio 6 or more?

No

The Thales signal is good but the receiver may be on the edge of geographic coverage. The system appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

Check the Thales Srv Info screen. Does it display User Enabled?

Yes

Press [4] until Merit Figure appears. Is Merit Figure greater than 90%?

No

Navigate to the Thales Srv Info screen. Does the screen display Access Confirmed Received Data?

Yes


No

Press [4] one or more times to view each satellite in turn. Is the receiver tracking least 4 satellites with corrections?

Yes

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

Set up and switch on the receiver. Wait 45 minutes for communication from Thales. If the problem persists, contact your local Trimble Reseller.

No

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

The Thales signal is good but the receiver may be on the edge of geographic coverage. The system appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

Check the Home screen for satellite signal. Is the S/N signal to noise ratio 6 or more?

No

Press [4] until Merit Figure appears. Is Merit Figure greater than 90%?

Yes

Navigate to the Thales Srv Info screen. Does the screen display Access Confirmed Received Data?

No

Press [4] one or more times to view each satellite in turn. Is the receiver tracking least 4 satellites with corrections?

Yes

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

Set up and switch on the receiver. Wait 45 minutes for communication from Thales. If the problem persists, contact your local Trimble Reseller.

No

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

The Thales signal is good but the receiver may be on the edge of geographic coverage. The system appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

Check the Home screen for satellite signal. Is the S/N signal to noise ratio 6 or more?

No

Press [4] until Merit Figure appears. Is Merit Figure greater than 90%?

Yes

Navigate to the Thales Srv Info screen. Does the screen display Access Confirmed Received Data?

No

Press [4] one or more times to view each satellite in turn. Is the receiver tracking least 4 satellites with corrections?

Yes

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

Set up and switch on the receiver. Wait 45 minutes for communication from Thales. If the problem persists, contact your local Trimble Reseller.

No

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

The Thales signal is good but the receiver may be on the edge of geographic coverage. The system appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

Check the Home screen for satellite signal. Is the S/N signal to noise ratio 6 or more?

No

Press [4] until Merit Figure appears. Is Merit Figure greater than 90%?

Yes

Navigate to the Thales Srv Info screen. Does the screen display Access Confirmed Received Data?

No

Press [4] one or more times to view each satellite in turn. Is the receiver tracking least 4 satellites with corrections?

Yes

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

Set up and switch on the receiver. Wait 45 minutes for communication from Thales. If the problem persists, contact your local Trimble Reseller.

No

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

The Thales signal is good but the receiver may be on the edge of geographic coverage. The system appears to be working correctly. If the problem persists, contact your local Trimble Reseller.

No

Check the Home screen for satellite signal. Is the S/N signal to noise ratio 6 or more?

No

Press [4] until Merit Figure appears. Is Merit Figure greater than 90%?

Yes

Navigate to the Thales Srv Info screen. Does the screen display Access Confirmed Received Data?

No

Press [4] one or more times to view each satellite in turn. Is the receiver tracking least 4 satellites with corrections?

Yes

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

Set up and switch on the receiver. Wait 45 minutes for communication from Thales. If the problem persists, contact your local Trimble Reseller.

No

The receiver does not have enough corrections to compute a position. Navigate to the Thales Stns screen. Change to Use Closest Station. If the problem persists, contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.

No

You are receiving GPS satellite signals but you are not receiving Thales corrections. Contact your local Trimble Reseller.
Cables and Connectors

In this appendix:

- Introduction
- Port A and Port B Connectors
- AgGPS PSO Plus Power/Data Cable
- Ag Leader Yield Monitor Interface Cable
- Case AFS Dual Data Interface Cable
- John Deere GreenStar Data Cable
- RDS Ceres Yield Monitor Power/Data Cable
Introduction

This appendix contains pin-out information for the AgGPS 114 receiver standard and optional cables. Use the information to troubleshoot communication problems with the receiver and devices not supported by the standard and optional cables.
### Port A and Port B Connectors

Table B.1 gives pin-out requirements for the AgGPS 114 power/data cable (PN 40947-18) Port A and Port B connectors.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Port A to computer P2 connector DE-9 (female)</th>
<th>Port B to computer or lightbar P3 connector 12-pin (male)</th>
<th>To DC power cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EVENT IN</td>
<td>← 4 EVENT</td>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>TXA</td>
<td>→ 2 RXA</td>
<td>Yellow</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RXA</td>
<td>← 3 TXA</td>
<td>Orange</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>SIG GND</td>
<td></td>
<td>5¹</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>TXB</td>
<td>→</td>
<td>Green</td>
<td>2</td>
</tr>
<tr>
<td>7²</td>
<td>RXB</td>
<td>←</td>
<td>Blue</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10³</td>
<td>V+</td>
<td>←</td>
<td>Red</td>
<td>10</td>
</tr>
<tr>
<td>11¹</td>
<td>V-¹</td>
<td>← 5 GND</td>
<td>Black</td>
<td>11²</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Pins 5 and 11 of connector P1 are jumpered together
2. Pins 5 and 11 of connector P3 are jumpered together
3. Pins 7 and 10 of connector P1 are jumpered together with a 5k Ohm, 1/8 watt, 5% resistor
### AgGPS PSO Plus Power/Data Cable

Table B.2 gives pin-out information for the AgGPS PSO Plus power/data cable (PN 39350-18).

#### Table B.2  AgGPS 114 PSO Plus power/data cable

<table>
<thead>
<tr>
<th>P1 connector 12-pin (female)</th>
<th>Port B to lightbar</th>
<th>Port A to AgGPS 70</th>
<th>DC power</th>
<th>Alarm/event</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>To receiver</strong></td>
<td>7 cond cable</td>
<td>7 cond cable</td>
<td>2 cond cable</td>
<td>3 cond cable</td>
</tr>
<tr>
<td><strong>Pin</strong></td>
<td><strong>Signal</strong></td>
<td><strong>Color</strong></td>
<td><strong>Pin</strong></td>
<td><strong>Signal</strong></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td>EVENT IN</td>
</tr>
<tr>
<td>2</td>
<td>TXA</td>
<td>Yellow</td>
<td>3</td>
<td>TXA</td>
</tr>
<tr>
<td>3</td>
<td>RXA</td>
<td>Orange</td>
<td>2</td>
<td>RXA</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SIG GND</td>
<td></td>
<td>5</td>
<td>SIG GND</td>
</tr>
<tr>
<td>6</td>
<td>TXB</td>
<td>Green</td>
<td>3</td>
<td>RXB</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>RXB</td>
<td>Blue</td>
<td>2</td>
<td>TXB</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>V+</td>
<td>Red</td>
<td>10</td>
<td>V+</td>
</tr>
<tr>
<td>11</td>
<td>V-</td>
<td>Black</td>
<td>11</td>
<td>V-</td>
</tr>
<tr>
<td>12</td>
<td>Alarm</td>
<td>Blue</td>
<td>12</td>
<td>Alarm</td>
</tr>
</tbody>
</table>

1. Pins 5 and 11 of the P1 connector are jumpered together
2. Pins 5 and 11 of the P2 connector are jumpered together
3. Pins 5 and 11 of the P3 connector are jumpered together
4. Pins 7 and 10 of the P1 connector are jumpered together with a 5 kOhm, 1/8 watt, 5% resistor
## Ag Leader Yield Monitor Interface Cable

Table B.3 gives pin-out information for the Ag Leader Yield Monitor interface cable (PN 39903).

<table>
<thead>
<tr>
<th>To receiver P1 connector 12-pin (Female)</th>
<th>7 conductor cable</th>
<th>To Ag Leader yield monitor P2 connector DE-9 male</th>
<th>To DC power, 2 conductor cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin</td>
<td>Signal</td>
<td>Color</td>
<td>Pin</td>
</tr>
<tr>
<td>-----</td>
<td>--------</td>
<td>-------</td>
<td>-----</td>
</tr>
<tr>
<td>1</td>
<td>EVENT IN</td>
<td>←</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>TX</td>
<td>←</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td>←</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>SIG GND</td>
<td>←</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>7¹</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>10¹</td>
<td>V+ IN</td>
<td>←</td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹Pins 7 and 10 of the P1 connector are jumpered together with a 5 kOhm, 1/8 watt, 5% resistor
Case AFS Dual Data Interface Cable

Table B.4 gives pin-out information for the Case AFS dual data interface cable (PN 32609).

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Color</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TX</td>
<td>Blue</td>
<td>D</td>
<td>RX</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td>Red</td>
<td>B</td>
<td>TX</td>
</tr>
<tr>
<td>5</td>
<td>SIG GND</td>
<td>Clear</td>
<td>C</td>
<td>SIG GND</td>
</tr>
<tr>
<td>10</td>
<td>PWR IN</td>
<td>Green</td>
<td>A</td>
<td>+12 VDC</td>
</tr>
<tr>
<td>11</td>
<td>PWR GND</td>
<td>Black</td>
<td>E</td>
<td>PWR GND</td>
</tr>
</tbody>
</table>

¹Pins 7 and 10 of the P2 connector are jumpered together with 5 kOhm, 1/8 watt, 5% resistor
John Deere GreenStar Data Cable

Table B.5 gives pin-out information for the John Deere GreenStar data cable (PN 34189-00).

Table B.5  John Deere GreenStar data cable

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Color</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TX</td>
<td>Red</td>
<td>A</td>
<td>RX</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td>Black</td>
<td>B</td>
<td>TX</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Blue</td>
<td>C</td>
<td>GND</td>
</tr>
</tbody>
</table>
RDS Ceres Yield Monitor Power/Data Cable

Table B.6 gives pin-out information for the RDS Ceres Yield Monitor power/data cable (PN 35142).

Table B.6  RDS data power cable

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Color</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Event In</td>
<td></td>
<td>2</td>
<td>TX</td>
</tr>
<tr>
<td>2</td>
<td>TX</td>
<td>Orange</td>
<td>3</td>
<td>RX</td>
</tr>
<tr>
<td>3</td>
<td>RX</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>SIG GND</td>
<td>Shield</td>
<td>5</td>
<td>SIG GND</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>7¹</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10¹</td>
<td>V+ IN</td>
<td>Red</td>
<td>8</td>
<td>V+</td>
</tr>
<tr>
<td>11</td>
<td>V– IN</td>
<td>Black</td>
<td>7</td>
<td>PGND</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

¹Pins 7 and 10 of the P1 connector are jumpered together with 1 kOhm, 1/4 watt, 5% resistor.
NMEA-0183 Messages

In this appendix:

- Introduction
- NMEA-0183 message structure
- NMEA message summary
- NMEA messages
Introduction

Trimble AgGPS receivers output NMEA (National Marine Electronic Association) messages for GPS position data transfer between electronics equipment. Information on the NMEA-0183 communication standard for GPS receivers is available at: www.nmea.org

This appendix describes NMEA-0183 standard messages that are configured using TSIP command packets.

Other messages are supported only when specific Trimble options are installed on the receiver. Messages beginning with PTNL are Trimble proprietary messages.
NMEA-0183 Message Structure

NMEA-0183 messages are strings of comma-delimited text. Figure C.1 shows the structure of an NMEA-0183 message.

Each NMEA message includes:

- an identifier to distinguish it from other messages in the data stream
- one or more fields of data, separated by a comma
- a checksum (preceded by \*) to validate the data
Table C.1 explains the fields in the ZDA example shown in Figure C.1.

Table C.1 Fields in an NMEA-0183 message — ZDA

<table>
<thead>
<tr>
<th>Field</th>
<th>Data</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>220320.0</td>
<td>Time in UTC</td>
</tr>
<tr>
<td>2</td>
<td>26</td>
<td>Day (01 to 31)</td>
</tr>
<tr>
<td>3</td>
<td>06</td>
<td>Month (01 to 12)</td>
</tr>
<tr>
<td>4</td>
<td>1997</td>
<td>Year</td>
</tr>
<tr>
<td>5</td>
<td>-5</td>
<td>Local time zone offset from GMT (in hours 00 to ±13 hours)</td>
</tr>
<tr>
<td>6</td>
<td>15</td>
<td>Local time zone offset from GMT (in minutes)</td>
</tr>
</tbody>
</table>

Fields 5 and 6 together give the total offset. Local time is 5 hours and 15 minutes earlier than GMT.
C.2.1 Symbols and delimiters

All messages follow the NMEA-0183 Version 2.1 format, in which symbols and delimiters identify or separate the message data.

NMEA-0183 messages always:

- begin with a dollar sign ($) followed by a talker ID code (for example GP) and a message ID code (for example, ZDA)
- end with a carriage return and line feed

C.2.2 Checksum values

Newer Trimble receivers conform to the NMEA-0183 Version 2.1 format, in which checksums are mandatory for all messages.

The checksum is calculated from all characters in the message, including commas but excluding the “$” and “*” delimiters. The hexadecimal result is converted to two ASCII characters (0–9, A–F), of which the most significant appears first.

C.2.3 Field formats

The data values output by Trimble AgGPS receivers meet the NMEA-0183 Version 2.1 standard.

C.2.4 Null fields

If a message contains a fixed number of fields, null (empty) fields are included if no data is available. These fields are usually reserved for data that is transmitted on a periodic or irregular basis.
C.2.5 Talker ID codes

Talker ID code identifies the source of the data (for example, GPS, Loran C, or Sounder). Table C.2 describes the Talker ID codes that are available for NMEA-0183 output from most Trimble receivers.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>GPS</td>
</tr>
<tr>
<td>LG</td>
<td>Loran C/ GPS</td>
</tr>
<tr>
<td>LC</td>
<td>Loran C</td>
</tr>
<tr>
<td>II</td>
<td>Integrated Instrumentation</td>
</tr>
</tbody>
</table>

C.2.6 Latitude and longitude values

The latitude and longitude values in NMEA-0183 messages are presented in degrees, minutes, and decimal minutes, in a single field:

- latitude (ddmm.mmmm)
- longitude (dddmm.mmmm)

Latitude and longitude direction values are sent in a separate field as N, S, E, or W.

C.2.7 Time values

Time values in Universal Time Coordinated (UTC) are presented in hhmmss.ss format, where hh is hours (00–23), mm is minutes, and ss.ss is seconds and fractions of seconds.

C.2.8 Reading NMEA string format

Be aware that NMEA strings can be of varying length, depending on how the receiver is configured. Comma delimited parsing is recommended.
NMEA Message Summary

Table C.3 describes the NMEA-0183 message set that is supported by the AgGPS receivers.

*Note – Some messages are only supported when specific Trimble options are installed on the receiver.*

Messages beginning with PTNL are Trimble proprietary messages.

Table C.3  NMEA message summary

<table>
<thead>
<tr>
<th>Message</th>
<th>Message Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>GGA (GPS Fix Data)</td>
<td>Time, position, and fix related data</td>
</tr>
<tr>
<td>GLL (Position Data)</td>
<td>Position fix, time of position fix, and status</td>
</tr>
<tr>
<td>GRS (GPS Range Residuals)</td>
<td>GPS range residuals</td>
</tr>
<tr>
<td>GSA (GPS DOP and Active Satellites)</td>
<td>GPS position fix mode, SVs used for navigation and DOP values</td>
</tr>
<tr>
<td>GST (GPS PRN)</td>
<td>GPS Pseudorange Noise (PRN) statistics</td>
</tr>
<tr>
<td>GSV (GPS Satellites in View)</td>
<td>Number of SVs visible, PRN numbers, elevation, azimuth and SNR values</td>
</tr>
<tr>
<td>MSS (Beacon Receiver Signal Status)</td>
<td>Signal strength, signal-to-noise ratio, beacon frequency, and beacon bit rate</td>
</tr>
<tr>
<td>RMC (Recommended Minimum Specific GPS Data)</td>
<td>UTC time, status, latitude, longitude, speed over ground (SOG), date, and magnetic variation of the position fix</td>
</tr>
<tr>
<td>VTG (Course Over Ground and Ground Speed)</td>
<td>Actual track made good and speed over ground</td>
</tr>
<tr>
<td>XTE (Cross-Track Error)</td>
<td>Cross-track error</td>
</tr>
<tr>
<td>ZDA (Time and Date)</td>
<td>UTC time, day, month, and year, local zone number and local zone minutes</td>
</tr>
<tr>
<td>PTNL DGPS Proprietary (Trimble DGPS Receiver Status)</td>
<td>Beacon channel strength, channel SNR, channel frequency, channel bit rate, channel number, channel tracking status, RTCM source, and channel performance indicator</td>
</tr>
</tbody>
</table>
All messages in this appendix are presented in the format shown in Table C.1. In each example, the structure is shown in the paragraph before the table.

### Table C.3  NMEA message summary (Continued)

<table>
<thead>
<tr>
<th>Message</th>
<th>Message Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTNLEV Proprietary (Event Marker)</td>
<td>Time, event number, and event line state for time-tagging change of state on an event input line</td>
</tr>
<tr>
<td>PTNL,GGK (Time, Position, Position Type, and DOP)</td>
<td>Time, Position, Position Type and DOP values</td>
</tr>
<tr>
<td>PTNLD Proprietary (Trimble Receiver ID)</td>
<td>Receiver machine ID, product ID, major and minor release numbers, and firmware release date</td>
</tr>
<tr>
<td>PTNLSM Proprietary (RTCM Special)</td>
<td>Reference Station Number ID and the contents of the Special Message included in valid RTCM Type 16 records</td>
</tr>
</tbody>
</table>
GGA (GPS Fix Data)

The GGA message contains the time, position, and fix related data.

The GGA message structure is:

$GPGGA,151924,3723.454444,N,12202.269777,W,2,09,1.9,–17.49,M,–25.67,M,1,0000*57

Table C.4 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UTC of position fix in HHMMSS.SS format</td>
</tr>
<tr>
<td>2</td>
<td>Latitude in DD MM,MMMM format (0-7 decimal places)</td>
</tr>
</tbody>
</table>
| 3     | Direction of latitude  
|       | N: North  
|       | S: South |
| 4     | Longitude in DDD MM,MMMM format (0-7 decimal places) |
| 5     | Direction of longitude  
|       | E: East  
|       | W: West |
| 6     | GPS Quality indicator  
|       | 0: fix not valid  
|       | 1: GPS fix  
|       | 2: DGPS fix |
| 7     | Number of SVs in use, 00-12 |
| 8     | HDOP |
| 9     | Antenna height, MSL reference |
| 10    | “M” indicates that the altitude is in meters |
| 11    | Geoidal separation |
| 12    | “M” indicates that the geoidal separation is in meters |
| 13    | Age of differential GPS data record, Type 1; Null when DGPS not used |
| 14    | Base station ID, 0000-1023 |
GLL (Position Data)

The GLL message specifies the position fix, time of position fix, and status.

The GLL message structure is:

$GPGLL,3723.4543,N,12202.2696,W,151933,A*3E$

Table C.5 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Latitude in dd mm,mmmm format (0-7 decimal places)</td>
</tr>
<tr>
<td>2</td>
<td>Direction of latitude</td>
</tr>
<tr>
<td></td>
<td>N: North</td>
</tr>
<tr>
<td></td>
<td>S: South</td>
</tr>
<tr>
<td>3</td>
<td>Longitude in ddd mm,mmmm format (0-7 decimal places)</td>
</tr>
<tr>
<td>4</td>
<td>Direction of longitude</td>
</tr>
<tr>
<td></td>
<td>E: East</td>
</tr>
<tr>
<td></td>
<td>W: West</td>
</tr>
<tr>
<td>5</td>
<td>UTC of position in hhmmss.ss format</td>
</tr>
<tr>
<td>6</td>
<td>Fixed text “A” shows that data is valid</td>
</tr>
</tbody>
</table>
GRS (GPS Range Residuals)

The GRS message is used to support the Receiver Autonomous Integrity Monitoring (RAIM).

The GRS message structure is:

$GPGRS,220320.0,0,-0.8,-0.2,-0.1,-0.2,0.8,0.6,....,*55$

Table C.6 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UTC time of GGA position fix</td>
</tr>
<tr>
<td>2</td>
<td>Residuals</td>
</tr>
<tr>
<td>0</td>
<td>Residuals used to calculate position given in the matching GGA line</td>
</tr>
<tr>
<td>1</td>
<td>Residuals recomputed after the GGA position was computed</td>
</tr>
<tr>
<td>3-14</td>
<td>Range residuals for satellites used in the navigation solution, in meters</td>
</tr>
</tbody>
</table>

Note – Because the contents of this NMEA message do not change significantly during a one-second interval, the receiver outputs this message at a maximum rate of 1 Hz.
GSA (GPS DOP and Active Satellites)

The GSA message identifies the GPS position fix mode, the SVs used for navigation, and the Dilution of Precision values.

The GSA message structure is:

$GPGSA,A,3,19,28,14,18,27,22,31,29,,,,,1.7,1.0,1.3*35$

Table C.7 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mode</td>
</tr>
<tr>
<td></td>
<td>M: Manual, forced to operate in 2D or 3D</td>
</tr>
<tr>
<td></td>
<td>A: Automatic, 3D/2D</td>
</tr>
<tr>
<td>2</td>
<td>Mode</td>
</tr>
<tr>
<td></td>
<td>1: Fix not available</td>
</tr>
<tr>
<td></td>
<td>2: 2D</td>
</tr>
<tr>
<td></td>
<td>3: 3D</td>
</tr>
<tr>
<td>3–14</td>
<td>IDs of SVs used in position fix (null for unused fields)</td>
</tr>
<tr>
<td>15</td>
<td>PDOP</td>
</tr>
<tr>
<td>16</td>
<td>HDOP</td>
</tr>
<tr>
<td>17</td>
<td>VDOP</td>
</tr>
</tbody>
</table>
GST (GPS PRN)

The GST message is used to support Receiver Autonomous Integrity Monitoring (RAIM).

The GST message structure is:

$GPGST,220320.0,1.3,0.8,0.5,166.1,0.8,0.5,1.6,*4F

Table C.8 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UTC time of GGA fix</td>
</tr>
<tr>
<td>2</td>
<td>RMS value of the standard deviation of the range inputs to the navigation process (range inputs include pseudoranges and DGPS corrections)</td>
</tr>
<tr>
<td>3</td>
<td>Standard deviation of semi-major axis of error ellipse, in meters</td>
</tr>
<tr>
<td>4</td>
<td>Standard deviation of semi-minor axis of error ellipse, in meters</td>
</tr>
<tr>
<td>5</td>
<td>Orientation of semi-major axis of error ellipse, in degrees from true north</td>
</tr>
<tr>
<td>6</td>
<td>Standard deviation of latitude error, in meters</td>
</tr>
<tr>
<td>7</td>
<td>Standard deviation of longitude error, in meters</td>
</tr>
<tr>
<td>8</td>
<td>Standard deviation of altitude error, in meters</td>
</tr>
</tbody>
</table>

Note – Because the contents of this NMEA message do not change significantly during a one-second interval, the receiver outputs this message at a maximum rate of 1 Hz.
GSV (GPS Satellites in View)

The GSV message identifies the number of SVs in view, the PRN numbers, elevation, azimuth and SNR values.

The GSV message structure is:

$GPGSV,4,1,13,02,02,213,,03,-3,000,,11,00,121,,14,13,172,05*67$

Table C.9 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Total number of messages of this type in this cycle</td>
</tr>
<tr>
<td>2</td>
<td>Message number</td>
</tr>
<tr>
<td>3</td>
<td>Total number of SVs visible</td>
</tr>
<tr>
<td>4</td>
<td>SV PRN number</td>
</tr>
<tr>
<td>5</td>
<td>Elevation in degrees, 90° maximum</td>
</tr>
<tr>
<td>6</td>
<td>Azimuth, degrees from true north, 000° to 359°</td>
</tr>
<tr>
<td>7</td>
<td>SNR, 00-99 dB (null when not tracking)</td>
</tr>
<tr>
<td>8–11</td>
<td>Information about second SV, same format as fields 4–7</td>
</tr>
<tr>
<td>12–15</td>
<td>Information about third SV, same format as fields 4–7</td>
</tr>
<tr>
<td>16–19</td>
<td>Information about fourth SV, same format as fields 4–7</td>
</tr>
</tbody>
</table>

*Note – Because the contents of this NMEA message do not change significantly during a one-second interval, the receiver outputs this message at a maximum rate of 1 Hz.*
MSS (Beacon Receiver Signal Status)

The MSS message identifies the status of the beacon signal, including the beacon signal strength, beacon signal-to-noise ratio (SNR), beacon frequency, and beacon bit rate.

The MSS message structure is:
$GPMSS,52.5,23.7,287.0,100*4C$

Table C.10 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal strength (SS), dB ref: 1 μV/m</td>
</tr>
<tr>
<td>2</td>
<td>Signal-to-Noise Ratio (SNR), dB</td>
</tr>
<tr>
<td>3</td>
<td>Beacon frequency, 283.5–325.0 kHz</td>
</tr>
<tr>
<td>4</td>
<td>Beacon bit rate (25, 50, 100, 200), bits per second</td>
</tr>
<tr>
<td>5</td>
<td>Channel number</td>
</tr>
</tbody>
</table>

Note – Because the contents of this NMEA message do not change significantly during a one-second interval, the receiver outputs this message at a maximum rate of 1 Hz.
RMC (Recommended Minimum Specific GPS Data)

The RMC message identifies the UTC time, status, latitude, longitude, speed over ground (SOG), date, and magnetic variation of the position fix.

The RMC message structure is:

$GPRMC,184804.00,A,3723.476543,N,
12202.239745,W,000.0,0.0,051196,15.6,E*7C$

Table C.11 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Time: UTC time of the position fix in hhmmss.ss format</td>
</tr>
<tr>
<td>2</td>
<td>Status</td>
</tr>
<tr>
<td></td>
<td>A: Valid</td>
</tr>
<tr>
<td></td>
<td>V: Navigation Receiver Warning (V is output whenever the receiver suspects something is wrong)</td>
</tr>
<tr>
<td>3</td>
<td>Latitude coordinate (the number of decimal places, 0–7, is programmable and determined by the numeric precision selected in TSIP Talker for a RMC message)</td>
</tr>
<tr>
<td>4</td>
<td>Latitude direction</td>
</tr>
<tr>
<td></td>
<td>N = North, S = South</td>
</tr>
<tr>
<td>5</td>
<td>Longitude coordinate (the number of decimal places, 0–7, is programmable and determined by the numeric precision selected in TSIP Talker for a RMC message)</td>
</tr>
<tr>
<td>6</td>
<td>Longitude direction</td>
</tr>
<tr>
<td></td>
<td>W: West</td>
</tr>
<tr>
<td></td>
<td>E: East</td>
</tr>
<tr>
<td>7</td>
<td>Speed Over Ground (SOG) in knots (0–3 decimal places)</td>
</tr>
<tr>
<td>8</td>
<td>Track Made Good, True, in degrees</td>
</tr>
<tr>
<td>9</td>
<td>Date in dd/mm/yy format</td>
</tr>
<tr>
<td>10</td>
<td>Magnetic Variation in degrees</td>
</tr>
</tbody>
</table>
### Table C.11  RMC message fields (Continued)

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| 11    | Direction of magnetic variation  
E: Easterly variation from True course (subtracts from True course)  
W: Westerly variation from True course (adds to True course) |
| 12    | Mode indication  
A: Autonomous  
D: Differential  
N: Data not valid |
VTG (Course Over Ground and Ground Speed)

The VTG (Velocity True Ground) message identifies the actual track made good and speed over ground.

The VTG message structure is:
SGPVTG,0,T,,0.00,N,0.00,K*33

Table C.12 describes these fields.

Table C.12  VTG message fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Track made good</td>
</tr>
<tr>
<td>2</td>
<td>Fixed text “T” shows that track made good is relative to true north</td>
</tr>
<tr>
<td>3</td>
<td>Not used</td>
</tr>
<tr>
<td>4</td>
<td>Not used</td>
</tr>
<tr>
<td>5</td>
<td>Speed over ground in knots (0–3 decimal places)</td>
</tr>
<tr>
<td>6</td>
<td>Fixed text “N” shows that speed over ground is in knots</td>
</tr>
<tr>
<td>7</td>
<td>Speed over ground in kilometers/hour (0–3 decimal places)</td>
</tr>
<tr>
<td>8</td>
<td>Fixed text “K” shows that speed over ground is in kilometers/hour</td>
</tr>
</tbody>
</table>

Note – Because the contents of this NMEA message do not change significantly during a one-second interval, the receiver outputs this message at a maximum rate of 1 Hz.
XTE (Cross-Track Error)

The XTE message reports the vessel’s cross-track error.

The XTE message structure is:

$GPXTE,A,A,0.050,L,N*5E

Table C.13 describes these fields.

Table C.13  XTE message fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A: Valid (fixed)</td>
</tr>
<tr>
<td>2</td>
<td>A: Valid (fixed)</td>
</tr>
<tr>
<td>3</td>
<td>Cross-track error, in nautical miles</td>
</tr>
<tr>
<td>4</td>
<td>Direction to steer</td>
</tr>
<tr>
<td></td>
<td>L: Left</td>
</tr>
<tr>
<td></td>
<td>R: Right</td>
</tr>
<tr>
<td>5</td>
<td>N: Nautical mile units</td>
</tr>
</tbody>
</table>
**ZDA (Time and Date)**

The ZDA message identifies UTC time, day, month, and year, local zone number and local zone minutes.

The ZDA message structure is:

$GPZDA,184830.15,05,11,1996,00,00*66

Table C.14 describes these fields.

**Table C.14  ZDA message fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UTC time</td>
</tr>
<tr>
<td>2</td>
<td>Day</td>
</tr>
<tr>
<td>3</td>
<td>Month</td>
</tr>
<tr>
<td>4</td>
<td>Year</td>
</tr>
<tr>
<td>5</td>
<td>Local zone number (– for East Longitude)</td>
</tr>
<tr>
<td>6</td>
<td>Local zone minutes</td>
</tr>
</tbody>
</table>

*Note – Because the contents of this NMEA message do not change significantly during a one-second interval, the receiver outputs this message at a maximum rate of 1 Hz.*
PTNLEV Proprietary (Event Marker)

The PTNLEV message is a Trimble proprietary message for time-tagging and marking when an event input occurs. If enabled, this event message is output whenever an event is detected.

The PTNLEV message structure is:

$PTNLEV,184804.00,0*XX

Table A-2 describes these fields.

Table C.15 PTNLEV message fields

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Time: UTC time of the position fix in hhmmss.ss format</td>
</tr>
<tr>
<td>2</td>
<td>Event number, starting with event 0</td>
</tr>
</tbody>
</table>
PTNLID Proprietary (Trimble Receiver ID)

The PTNLID message is a Trimble proprietary message for identifying the receiver’s machine ID, product ID, major and minor release numbers, and firmware release date.

The PTNLID message structure is:

$PTNLID.097.01,XXX,XXX,DD/MM/YY*XX

Table C.16 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Machine ID</td>
</tr>
<tr>
<td>2</td>
<td>Product ID</td>
</tr>
<tr>
<td>3</td>
<td>Major firmware release number</td>
</tr>
<tr>
<td>4</td>
<td>Minor firmware release number</td>
</tr>
<tr>
<td>5</td>
<td>Firmware release date, in dd/mm/yy format</td>
</tr>
</tbody>
</table>

The PTNLID message, if enabled, is output every 30 seconds.
PTNLDG Proprietary (Trimble DGPS Receiver Status)

The PTNLDG message is a Trimble proprietary message for identifying the DGPS receiver channel strength, channel SNR, channel frequency, channel bit rate, channel number, channel tracking status, RTCM source, and channel performance indicator for either beacon DGPS or satellite DGPS.

The PTNLDG message structure is:

\$PTNLDG,87.0,5.2,1558510.0,1200,2,4,1,25,,,*01

Table C.17 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Channel signal strength, in 1 dBuV/m. For beacon, this is the electromagnetic field intensity level. For satellite, this is the ADC input voltage level.</td>
</tr>
<tr>
<td>2</td>
<td>Channel signal to noise (SNR) level, in dB</td>
</tr>
<tr>
<td>3</td>
<td>Channel frequency, in kHz</td>
</tr>
<tr>
<td>4</td>
<td>Channel bit rate, in bits per second (bps)</td>
</tr>
<tr>
<td>5</td>
<td>Channel number, 0–99</td>
</tr>
<tr>
<td>6</td>
<td>Channel tracking status</td>
</tr>
<tr>
<td></td>
<td>0: Channel idle</td>
</tr>
<tr>
<td></td>
<td>1: Wideband FFT search</td>
</tr>
<tr>
<td></td>
<td>2: Searching for signal</td>
</tr>
<tr>
<td></td>
<td>3: Channel has acquired signal</td>
</tr>
<tr>
<td></td>
<td>4: Channel has locked on signal</td>
</tr>
<tr>
<td></td>
<td>5: Channel disabled</td>
</tr>
<tr>
<td>7</td>
<td>Specified channel is used as RTCM source</td>
</tr>
<tr>
<td></td>
<td>0: Not used</td>
</tr>
<tr>
<td></td>
<td>1: Used</td>
</tr>
<tr>
<td>8</td>
<td>Channel tracking performance indicator. For beacon, this is the number of errors in the last 255 words. For satellite, this is the time since last sync, in tenths of seconds ranging from 0–255.</td>
</tr>
</tbody>
</table>
The PTNLDG message fields are defined in free format.

The maximum number of characters in each field is indicated above (for example, 25 bps displayed as xxx,25,xxx instead of xxx,00025,xxx).

If a channel is disabled, the channel fields can be null fields (showing commas only). If more than one channel is available, the message should be repeated for each channel.

This message can be enabled using TSIP. If enabled, it is output at the NMEA report rate.

Note – Because the contents of this NMEA message do not change significantly during a one-second interval, the receiver outputs this message at a maximum rate of 1 Hz.
PTNL,GGK (Time, Position, Position Type, and DOP)

The PTNL,GGK message structure is:

```
$PTNL,GGK,172814.00,071296,3723.46587704,N,12202.26957864,W,3,06,1.7,EHT-6.777,M*48
```

Table C.18 describes these fields.

**Table C.18 PTNL,GGK message fields**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UTC of position fix, in hhmmss.ss format</td>
</tr>
<tr>
<td>2</td>
<td>UTC Date of position, in mmddyy format</td>
</tr>
<tr>
<td>3</td>
<td>Latitude, in degrees and decimal minutes (for example, dddmm.mmmmmmm)</td>
</tr>
<tr>
<td>4</td>
<td>Direction of latitude</td>
</tr>
<tr>
<td>N:</td>
<td>North</td>
</tr>
<tr>
<td>S:</td>
<td>South</td>
</tr>
<tr>
<td>5</td>
<td>Longitude, in degrees and decimal minutes (for example, dddmm.mmmmmmm)</td>
</tr>
<tr>
<td>6</td>
<td>Direction of longitude</td>
</tr>
<tr>
<td>E:</td>
<td>East</td>
</tr>
<tr>
<td>W:</td>
<td>West</td>
</tr>
<tr>
<td>7</td>
<td>GPS quality indicator</td>
</tr>
<tr>
<td>0:</td>
<td>Fix not available or invalid</td>
</tr>
<tr>
<td>1:</td>
<td>Autonomous GPS fix</td>
</tr>
<tr>
<td>4:</td>
<td>Differential, code phase only solution (DGPS)</td>
</tr>
<tr>
<td>8</td>
<td>Number of satellites used in GPS solution</td>
</tr>
<tr>
<td>9</td>
<td>DOP of fix</td>
</tr>
<tr>
<td>10</td>
<td>Ellipsoidal height of fix (antenna height above ellipsoid)</td>
</tr>
<tr>
<td>11</td>
<td>M: Ellipsoidal height is measured in meters</td>
</tr>
</tbody>
</table>
PTNLSM Proprietary (RTCM Special)

The PTNLSM message is a Trimble proprietary message for identifying the Reference Station ID and the ASCII Text message that is included in an RTCM Type 16 Special Message. The PTNLSM message is generated anytime an RTCM stream receives a valid Type 16 Special Message.

The PTNLSM message structure is:

$PTNLSM,0022,This is a message,* .XX

Table C.19 describes these fields.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reference station ID number, ranging from 0 to 1023. Leading zeros must be added to fill four-digit field.</td>
</tr>
<tr>
<td>2</td>
<td>ASCII text message contained within the Type 16 RTCM message.</td>
</tr>
</tbody>
</table>
Navigation Maps

In this appendix:

- AgGPS Menu System
- Navigation map AgGPS 114 receiver – Home, Field Operations, and Status menus
- Navigation map AgGPS 114 receiver – Configuration menu
AgGPS Menu System

The figures in this appendix show the navigation maps for the AgGPS Menu System, and relate to firmware version 1.7.

Basic instructions for navigating through the menu system are included in Chapter 3, Getting Started.

Basic instructions for configuring the AgGPS 114 receiver for operation are included in Chapter 4, Configuring the Receiver.
Navigation map for the AgGPS 114 Receiver — Configuration menu

Available only when the Base Station option is enabled and configured

Available only when the lightbar is attached and activated
Third-Party Interface Requirements

In this appendix:

- Third-party software
- Third-party hardware
## Third-Party Software

Table E.1 lists the interface requirements for connecting an AgGPS receiver to third-party software.

### Table E.1 Third-party software interface requirements

<table>
<thead>
<tr>
<th>Software</th>
<th>Company</th>
<th>Protocol</th>
<th>NMEA messages</th>
<th>Baud</th>
<th>Other</th>
<th>Pos rate</th>
<th>Cable PN</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgView</td>
<td>GIS Solutions</td>
<td>NMEA</td>
<td>VTG, GLL</td>
<td>4800</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>FarmGPS</td>
<td>Red Hen</td>
<td>NMEA</td>
<td>GGA, GSA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Field Rover†</td>
<td>SST Dev Group</td>
<td>NMEA</td>
<td>GGA, GSA, GSV, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>FieldLink DOS</td>
<td>Agris</td>
<td>NMEA</td>
<td>GGA, GSA, VTG</td>
<td>4800 or 9600</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>FieldLink Windows</td>
<td>Agris</td>
<td>NMEA</td>
<td>GGA, GSA, VTG</td>
<td>4800 or 9600</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Field Worker Pro</td>
<td>Field Worker</td>
<td>NMEA</td>
<td>GGA, GLL, RMC, VTG</td>
<td>4800 or 9600</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>HGIS</td>
<td>Starpal</td>
<td>NMEA</td>
<td>GGA, RMC</td>
<td>4800 or 9600</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Instant Survey</td>
<td>Agrilogic (Case-IH)</td>
<td>NMEA</td>
<td>GGA, GSA, RMC</td>
<td>4800</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Pocket Survey</td>
<td>Agrilogic (Case-IH)</td>
<td>NMEA</td>
<td>GGA, GSA, RMC</td>
<td>4800</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Sitemate</td>
<td>Farmworks</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
</tbody>
</table>

†Make sure MSS message is not output.
### Third-Party Hardware

Table E.2 lists the interface requirements for connecting an AgGPS receiver to third-party hardware.

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Company</th>
<th>Protocol</th>
<th>NMEA messages</th>
<th>Baud</th>
<th>Other</th>
<th>Pos rate</th>
<th>Cable PN</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMS</td>
<td>Raven</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>9600</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Ag Navigator</td>
<td>Springhill</td>
<td>RTCM</td>
<td></td>
<td>9600</td>
<td>8-N-1</td>
<td>10Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Aim Navigator</td>
<td>Case Tyler</td>
<td>NMEA</td>
<td>GGA</td>
<td>19200</td>
<td>8-N-1</td>
<td>5Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Contour</td>
<td>Position Inc.</td>
<td>NMEA</td>
<td>GGA</td>
<td>19200</td>
<td>8-N-1</td>
<td>5Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Marker</td>
<td>RDS or Position Inc.</td>
<td>NMEA</td>
<td>GGA</td>
<td>19200</td>
<td>8-N-1</td>
<td>5Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Falcon</td>
<td>Ag Chem</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Falcon w/ Track LBAR</td>
<td>Ag Chem</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>19200</td>
<td>8-N-1</td>
<td>10Hz</td>
<td>30945</td>
</tr>
<tr>
<td>Swath Smart or RGL 500</td>
<td>Raven (Starlink manufactured)</td>
<td>NMEA</td>
<td>GGA, VTG or RMC</td>
<td>19200</td>
<td>8-N-1</td>
<td>10Hz</td>
<td>30945</td>
</tr>
<tr>
<td>(LB-5 for Raven)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LB-3, LB-4 &amp; LB-5</td>
<td>Starlink</td>
<td>NMEA</td>
<td>GGA, VTG or RMC</td>
<td>19200</td>
<td>8-N-1</td>
<td>10Hz</td>
<td>30945</td>
</tr>
<tr>
<td>TrimFlight GP400</td>
<td>Trimble</td>
<td>RTCM</td>
<td></td>
<td>9600</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>34903</td>
</tr>
<tr>
<td>TrimFlight TF300</td>
<td>Trimble</td>
<td>RTCM</td>
<td></td>
<td>9600</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>34903</td>
</tr>
<tr>
<td>Del Norte Aerial Guidance</td>
<td>Del Norte</td>
<td>RTCM</td>
<td></td>
<td>9600</td>
<td>8-N-1</td>
<td>1Hz</td>
<td>30945</td>
</tr>
</tbody>
</table>
### Table E.2 Third-party hardware interface requirements (Continued)

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Company</th>
<th>Protocol</th>
<th>NMEA messages</th>
<th>Baud</th>
<th>Other Pos rate</th>
<th>Cable PN</th>
</tr>
</thead>
<tbody>
<tr>
<td>YM2000 Yield Monitor(^3)</td>
<td>Ag Leader</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
<tr>
<td>PF3000 Yield Monitor(^4)</td>
<td>Ag Leader</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
<tr>
<td>PF3000Pro Monitor without internal GPS(^5)</td>
<td>Ag Leader</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
<tr>
<td>AFS Yield Monitor</td>
<td>Case-IH (Ag Leader YM2000)</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
<tr>
<td>AFS Yield Monitor</td>
<td>Case-IH YMIU (yield monitor interface unit) manufactured by Ag Leader for Case-IH</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
<tr>
<td>GreenStar Yield Monitor(^6)</td>
<td>John Deere</td>
<td>NMEA</td>
<td>GGA, GSA, RMC</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
<tr>
<td>New Holland Yield Monitor</td>
<td>New Holland (Ag Leader PF3000)</td>
<td>NMEA</td>
<td>GGA, VTG</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
<tr>
<td>VCD (Vision Display Controller)</td>
<td>Rockwell</td>
<td>NMEA</td>
<td>GGA, GLL, VTG, ZDA</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
<tr>
<td>Swath XL</td>
<td>Midtech</td>
<td>NMEA</td>
<td>GGA</td>
<td>19200</td>
<td>8-N-1</td>
<td>5 Hz</td>
</tr>
<tr>
<td>Caterpillar Ceabis Yield Monitor</td>
<td>Claus</td>
<td>NMEA</td>
<td>GGA</td>
<td>4800 or 9600</td>
<td>8-N-1</td>
<td>1 Hz</td>
</tr>
</tbody>
</table>
### Third-party hardware interface requirements (Continued)

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Company</th>
<th>Protocol</th>
<th>NMEA messages</th>
<th>Baud</th>
<th>Other</th>
<th>Pos rate</th>
<th>Cable PN</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGCO FieldStar Yield Monitor&lt;sup&gt;7&lt;/sup&gt;</td>
<td>AGCO</td>
<td>NMEA</td>
<td>GGA, VTG, GSV, GSA</td>
<td>4800</td>
<td>8-N-1</td>
<td>1 Hz</td>
<td>39903</td>
</tr>
</tbody>
</table>

1. Connect to COM1, make sure that Pin 9 is not connected
2. Also requires null modem adaptor
3. PN 39903 replaced old Ag Leader cable PN 30660
4. PN 39903 replaced old Ag Leader cable PN 30660
5. Connect to Aux port
6. Older GreenStars with version 5.3P mapping processor software require 9600 baud. Older GreenStars with version 5.3R mapping processor software require 4800 baud
7. AGCO unit requires a null modem RS-232 connection. Ag Leader cable PN 39903 is wired correctly for connection
E Third-Party Interface Requirements
Specifications

In this appendix:

- AgGPS 114 Receiver
- GPS channels
- L-band satellite differential correction receiver
- Receiver default settings
Table F.1 lists the physical characteristics of the AgGPS 114 combined GPS/DGPS receiver and antenna.

<table>
<thead>
<tr>
<th><strong>Table F.1</strong></th>
<th><strong>AgGPS 114 Receiver characteristics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
<td>15.24 mm (6 in) diameter x 12.7 mm (5 in) height</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>0.52 kg (22 oz or 1.375 lbs)</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td>3.1 Watts, 9–32 VDC</td>
</tr>
<tr>
<td><strong>Operating temperature</strong></td>
<td>−30°C to +60°C</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>−40°C to +80°C</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>100% condensing, unit fully sealed</td>
</tr>
<tr>
<td><strong>Casing</strong></td>
<td>UV-resistant plastic, dust-proof, waterproof, shock resistant</td>
</tr>
<tr>
<td><strong>Mount thread size</strong></td>
<td>5/8 in, 11 threads/inch</td>
</tr>
<tr>
<td><strong>Compliance</strong></td>
<td>FCC Class B</td>
</tr>
</tbody>
</table>
## Specifications

### GPS Channels

Table F.2 lists the performance characteristics of GPS channels.

<table>
<thead>
<tr>
<th>General</th>
<th>12-channel, parallel tracking L1 1571.42 MHz C/A code and carrier phase filtered measurements and multi-bit digitizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update rate</td>
<td>1 Hz standard; 10 Hz optional (selectable 1, 2, 5 or 10 Hz output rate&lt;sup&gt;1&lt;/sup&gt;)</td>
</tr>
<tr>
<td>Differential speed accuracy</td>
<td>0.16 kph (0.1 mph)</td>
</tr>
<tr>
<td>Differential position accuracy</td>
<td>Less than 1 m horizontal RMS if all the following criteria are met; At least 5 satellites, PDOP &lt; 4, RTCM SC-104 Standard format broadcast from a Trimble 4000RSi or equivalent reference station</td>
</tr>
<tr>
<td>Time to first fix</td>
<td>&lt; 30 seconds, typical</td>
</tr>
<tr>
<td>NMEA messages</td>
<td>GGA,&lt;sup&gt;2&lt;/sup&gt; GLL, GSA,&lt;sup&gt;2&lt;/sup&gt; GST, GSV, GST, MSS, PTNLDG, PTNL, PTNLEV, PTNLID, PTNLSM, RMC,&lt;sup&gt;2&lt;/sup&gt;, VTG,&lt;sup&gt;2&lt;/sup&gt;, XTE, ZDA</td>
</tr>
</tbody>
</table>

<sup>1</sup>With 10 Hz firmware option installed

<sup>2</sup>By default, the receiver is configured to output GGA, GSA, RMC, and VTG messages at an 1 Hz (1 position/second) update rate.
L-Band Satellite Differential Correction Receiver

Table F.3 lists the characteristics of the L-band satellite differential correction receiver with multiple vendor support.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit error rate</td>
<td>$10^{-5}$ for $\text{Eb/N}$ of $&gt;5.5$ dB</td>
</tr>
<tr>
<td>Acquisition and reacquisition time</td>
<td>&lt;5 seconds, typical</td>
</tr>
<tr>
<td>Frequency band</td>
<td>1525–1560 MHz</td>
</tr>
<tr>
<td>Channel spacing</td>
<td>.5 kHz</td>
</tr>
</tbody>
</table>
Receiver Default Settings

Table F.4 lists the receiver default settings.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DGPS Source</strong></td>
<td>WAAS/EGNOS</td>
</tr>
<tr>
<td><strong>Dynamics</strong></td>
<td>Land</td>
</tr>
<tr>
<td><strong>Minimum elevation</strong></td>
<td>8°</td>
</tr>
<tr>
<td><strong>AMU mask</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>PDOP Mask</strong></td>
<td>13°</td>
</tr>
<tr>
<td><strong>PDOP 2D/3D switch</strong></td>
<td>11</td>
</tr>
<tr>
<td><strong>PV Filter</strong></td>
<td>D&amp;S (Dynamic and Static mode)</td>
</tr>
<tr>
<td><strong>C.C. Filter</strong></td>
<td>Enhanced</td>
</tr>
<tr>
<td><strong>DGPS mode</strong></td>
<td>Auto On/Off</td>
</tr>
<tr>
<td><strong>DGPS correction age limit</strong></td>
<td>30 seconds</td>
</tr>
<tr>
<td><strong>Pos fix rate</strong></td>
<td>1 Hz</td>
</tr>
</tbody>
</table>
application options
   AgGPS PSO Plus for the AgGPS 114 7
   Field pack 7
application options available 7
ArcView 6

B
Base Location screen 93
base station 9
   editing position 94
   mode 96
   PRC mode 96
   Set From Here 94
   setting from averaged positions 95
Base Station mode screen 96
Base Station option 91
Base Station Option firmware 91
Base Stn Config menu 92, 96
Base Stn Config screen 93, 96

C
cable
   CASE AFS Power/Data 26
   CONXALL 45
   RDS 45
   standard power/data 24
   Windows CE 46, 47, 48, 49
   Windows CE with cigarette power adaptor 46
CAN Bus 9
Case AFS dual data interface cable pin-out 138
CASE AFS power/data cable 17
Caterpillar Cebis Yield Monitor 176
characteristics, L-band receiver 182
clearing battery-backed RAM 71
COM port 121

D
D/2D position type 64
D/3D position type 64
datum, WGS-84 94
Del Norte Aerial Guidance 175
Delete Waypoints screen 103
DGPS 9
   satellite 13
DGPS Config menu 78, 84
DGPS Config screen 80, 82, 83
DGPS configuration 78
DGPS mode 116
DGPS Source screen 84
differential base station 5
differential base station option 88
differential GPS see DGPS
Display Options 59, 68
   Clear BB RAM screen 71
<table>
<thead>
<tr>
<th>Category</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contrast screen</td>
<td>70</td>
</tr>
<tr>
<td>DPGS, accuracy of</td>
<td>11</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td></td>
</tr>
<tr>
<td>Edit Base Pos</td>
<td>94</td>
</tr>
<tr>
<td>electrical interference</td>
<td>20</td>
</tr>
<tr>
<td>electrical interference, sources of</td>
<td>20</td>
</tr>
<tr>
<td>elevation</td>
<td>11</td>
</tr>
<tr>
<td>Elevation mask</td>
<td>116</td>
</tr>
<tr>
<td>enhancements</td>
<td>16</td>
</tr>
<tr>
<td>environmental conditions for receiver</td>
<td>20</td>
</tr>
<tr>
<td>ephemeris (satellite history) file</td>
<td>11</td>
</tr>
<tr>
<td>EVEREST multipath rejection technology</td>
<td>5, 88</td>
</tr>
<tr>
<td>EZ Sat DGPS Configuration screen</td>
<td>60</td>
</tr>
<tr>
<td>EZ Sat screen</td>
<td>80</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td></td>
</tr>
<tr>
<td>Falcon</td>
<td>175</td>
</tr>
<tr>
<td>Falcon with Falcon Track LBAR</td>
<td>175</td>
</tr>
<tr>
<td>FarmGPS</td>
<td>174</td>
</tr>
<tr>
<td>fast rate capability</td>
<td>16</td>
</tr>
<tr>
<td>Fast Rate Output option</td>
<td>90</td>
</tr>
<tr>
<td>Field Operations menu</td>
<td>68</td>
</tr>
<tr>
<td>Field pack</td>
<td>7</td>
</tr>
<tr>
<td>Field Rover</td>
<td>174</td>
</tr>
<tr>
<td>Field Worker Pro</td>
<td>174</td>
</tr>
<tr>
<td>FieldLink DOS</td>
<td>174</td>
</tr>
<tr>
<td>FieldLink Windows</td>
<td>174</td>
</tr>
<tr>
<td>firmware</td>
<td></td>
</tr>
<tr>
<td><strong>G</strong></td>
<td></td>
</tr>
<tr>
<td>G/2D position type</td>
<td>64</td>
</tr>
<tr>
<td>G/3D position type</td>
<td>64</td>
</tr>
<tr>
<td>GGA message</td>
<td>149</td>
</tr>
<tr>
<td>GLL sentence</td>
<td>150</td>
</tr>
<tr>
<td>GP Talker ID</td>
<td>146</td>
</tr>
<tr>
<td>GPS, source of errors</td>
<td>10</td>
</tr>
<tr>
<td>GPS Config menu</td>
<td>77</td>
</tr>
<tr>
<td>GPS error, sources of</td>
<td>10</td>
</tr>
<tr>
<td>GPS Mode</td>
<td>116</td>
</tr>
<tr>
<td>GPS positions</td>
<td></td>
</tr>
<tr>
<td>output format</td>
<td>13</td>
</tr>
<tr>
<td>output of</td>
<td>12</td>
</tr>
<tr>
<td>GreenStar Yield Monitor</td>
<td>176</td>
</tr>
<tr>
<td>GRS message</td>
<td>151</td>
</tr>
<tr>
<td>GSA message</td>
<td>152</td>
</tr>
<tr>
<td>GST message</td>
<td>153</td>
</tr>
<tr>
<td>GSV message</td>
<td>154</td>
</tr>
<tr>
<td><strong>H</strong></td>
<td></td>
</tr>
<tr>
<td>hardware</td>
<td>175</td>
</tr>
<tr>
<td>HGIS</td>
<td>174</td>
</tr>
<tr>
<td>Home screen</td>
<td>81</td>
</tr>
<tr>
<td><strong>I</strong></td>
<td></td>
</tr>
<tr>
<td>II Talker ID</td>
<td>146</td>
</tr>
<tr>
<td>input, ASCII, RTCM, TSIP</td>
<td>8</td>
</tr>
<tr>
<td>installing the receiver/antenna environmental conditions</td>
<td>20</td>
</tr>
<tr>
<td>Instant Survey</td>
<td>174</td>
</tr>
</tbody>
</table>

*see also* software

additional options available 88

Base Station Option 91

Fast Rate Output 90

password for 88

Point/Line/Area option 106

Waypoints Option 97

Flash Progress dialog 89

FlashLoader 100 software 89

FM 2-way radios 118
Index

J

J1939 (CAN) Serial Bus 9
John Deere GreenStar data cable
connecting 17
pin-out 139

K

keypad, key actions 57

L

Language screen 69
latitude 11
LB-3 175
LB-4 175
LB-5 175
LBAR 8
LBAR option 86
LC Talker ID 146
LG Talker ID 146
lightbar protocol 8
location of antenna 18
location of receiver 18
locking Configuration menus 70
longitude 11

M

magnetic mount for antenna 16
Marker 175
menu system, AgGPS 168
Message Rate screen 77
MetriPak 31
Microsoft Active Sync 66
Micro-Trak yield monitor 49
multipath 10, 11

N

National Geodetic Survey website 12
National Marine Electronic Association
(NMEA) 142
Navigate to Waypoint screen 101
navigation maps 168
New Holland Yield Monitor 176
NMEA out screen 91
NMEA website 8
NMEA-0183 messages 142
checksum values 145
description 141
field formats 145
GGA 149
GLL 150
GRS 151
GSA 152
GST 153
GSV 154
latitude and longitude values 146
null fields 145
output 3
PTNL,GGK 165
PTNLDG 163
PTNLEV 161
PTNLID 162
PTNLSM 166
reading NMEA string format 146
RMC 156
sample structure 144
selecting for output 76
structure 143
summary 147
symbols and delimiters 145
Talker ID Codes 146
time values 146
VTG 158
XTE 159
ZDA 143, 160

188  AgGPS 124/132 User Guide
NMEA1 screen 76
null modem adapter 17

O
Omni*
activation screen 82
Srv Info screen 79, 117
OmniSTAR
activating 81
configuring 79
contacting 79
manual service activation 82
satellite beam 117
OmniSTAR website 13
output
1 pps 9
outputting
2D autonomous positions 64
2D differential positions 64
3D autonomous positions 64
3D differential positions 64

Palm Pilot 66
Parallel Swathing Option Plus for AgGPS 114 and AgGPS 70 RDL 16
password
for firmware 88
for FlashLoader 100 90
PDOP 11
PDOP Mask 116
performance characteristics, GPS
channels 181
PF3000 Yield Monitor 176
physical characteristics, AgGPS 114
receiver 180, 183
pin-out diagrams, tables 133
pocket PC 66
Pocket Survey 174
Point/Line/Area
On/Off screen 110
Option 6
Status screen 110
Point/Line/Area menu 110
Add Area screen 112
Add Line screen 112
navigation map 109
Point/Line/Area option 88
Port A Config menu 72, 76, 77
Port A Config screen 91
Port A Input/Output screen 75
Port B Config menu 86
Port B Config screen 91
Port Input/Output screen 92
port output rate, configuration 76
Position Rate screen 77
position types 64
positions see GPS positions
PRC Interval screen 96
PRC mode, setting 96
PTNL 142
PTNL, GGK message 165
PTNLDRG message 163
PTNLEV message 161
PTNLID message 162
PTNLSDM message 166
radio, base station 92
RAIM
GAST sentence 153
GRS output sentence 151
RDS Ceres yield monitor 45
RDS power/data cable, pin-out 140
RDS Pro Series 8000 45
RDS yield monitor power/data cable 17
Read Waypoints List screen 104

AgGPS 124/132 User Guide 189
receiver
accuracy of 3
additional options available 5
components of 16
electrical interference 20
environmental conditions for 20
inputs 8
location of 18
outputs 8
position output formats 13
position outputs 12
receiver connections 8
receiver enhancements 5, 16
  Differential Base Station 5
  EVEREST technology 5
  Point/Line/Area 6
  RTS/CTS Flow Control Negotiation 6
receiving DGPS satellite 13
reference position coordinates 94
reference station 9
RF3000Pro Monitor without internal GPS
  third party hardware 176
RGL 500 (LB-5 for Raven) 175
RMC message 156
rover 9, 92
RRDS data power cable 140
RTCM website 8
RTS/CTS Flow Control Negotiation 6, 88

s
SAE International website 9
satellite DGPS 13
status information 64
satellite differential signal
  OmniStar subscription service 13
  Thales subscription service 13
satellite history (ephemeris) file 11
satellites
  numbers used 11
  searching 64
  tracking 64
screens 58
  configuration, Base Station Mode 96
  configuration, PRC Interval screen 96
  Home 63
searching, for satellites 64
selecting, NMEA messages for output 76
Set From Averages 95
Set From Here 94
shapefiles 106
Signal Strength Mask 116
signal-to-noise ratio (SNR) 11, 65, 119
Sitemate 174
software
  FlashLoader100 89
  third-party 174
sources of electrical interference 20
sources of GPS error 10
Special Message 166
specifications 179
SRCH position type 64
standard features 3
status
  satellite DGPS 64
  WAAS/EGNOS DGPS 65
Status menu 68
Swath Smart 175
Swath XL 176

T
technical assistance xii
Thales
  activating 83
  configuring 79
  contact 79
  selecting a reference station manually 83
Index

Srv Info screen 117
Thales website 13
third-party hardware 175
third-party software 174
time 11
Time, Position, Position Type, and DOP Values 165
Topographic Engineering Center website 12
tracking satellites 64
TRCK position type 64
Trimble 4000RSi 11
Trimble proprietary messages 142
TrimFlight GP400 175
TrimFlight TF300 175
troubleshooting 115

U
Units screen 69
upgrade options
activating 87
method
AgGPS 70 RDL 88
AgRemote software 88
Flashloader 100 88
UTC
GRS sentence 151
GST sentence 153

V
Valid Password message 71
Vision Display Controller 176
VTG sentence 158

W
WAAS website 13
WAAS/EGNOS DGPS status information 65
WAAS/EGNOS DGPS configuration 84
WAAS/EGNOS T2 Remap screen 85
Waypoint Ops menu
Add Waypoint screen 100
Delete Waypoints screen 103
Navigate to Waypoint screen 101
Read Waypoints List screen 104
Waypoint List screen 105
Waypoint.txt file 97
Waypoints Option firmware 97
website xi
websites
AGCO 42
National Geodetic Survey 12
NMEA 8
OmniSTAR 13
RTCM 8
SAE International 9
Thales 13
Topographic Engineering Center 12
WAAS 13
Windows CE computer 47, 66

X
XTE message 159

Y
YM2000 Yield Monitor 176
Index
We appreciate your comments and suggestions for improving this publication.

Which Trimble product do you use? _____________________________________________
What do you use your Trimble product for? _______________________________________

Please circle a response for each of the statements below:

1 = strongly agree  2 = agree  3 = neutral  4 = disagree  5 = strongly disagree

The manual is well organized.  1  2  3  4  5
I can find the information I want.  1  2  3  4  5
The information in the manual is accurate.  1  2  3  4  5
I can easily understand the instructions.  1  2  3  4  5
The manual contains enough examples.  1  2  3  4  5
The examples are appropriate and helpful.  1  2  3  4  5
The layout and format are attractive and useful.  1  2  3  4  5
The illustrations are clear and helpful.  1  2  3  4  5
The manual is: too long just right too short

Please answer the following questions:

Which sections do you use the most? ____________________________________________
What do you like best about the manual? _________________________________________

What do you like least about the manual? ________________________________________

Optional:

Name _____________________________________________________________________
Company __________________________________________________________________
Address ___________________________________________________________________
Telephone ___________________________ Fax

Please mail to Trimble Navigation Limited, 11 Birmingham Drive, P.O. Box 8729, Riccarton, Christchurch, New Zealand, Attn: Technical Publications group. Alternatively, e-mail your comments and suggestions to ReaderFeedback@trimble.com. All comments and suggestions become the property of Trimble Navigation Limited.