*Ag*GPS 124 / 132

Operation Manual

AgGPS Receiver Firmware Version 1.40, 1.41 and 1.42
Part Number 38747-00-ENG
Revision C
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Trimble

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This is the August 2000 release (Revision C) of the *AgGPS 124/132 Operation Manual*, part number 38747-00-ENG. It applies to versions 1.40, 1.41, and 1.42 of the *Ag*GPS™ Receiver firmware.

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4. Operation outside of the environmental specifications of the product
5. Improper installation, where applicable
6. Lightning or other electrical discharge
7. Fresh or salt water immersion or spray
8. Normal wear and tear on consumable parts (for example, batteries)

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About This Manual

Welcome to the *AgGPS 124/132 Operation Manual*. This manual describes how to install and configure the *Ag*GPS™ 124, 132, and 132 Air receivers. It includes step-by-step instructions for installing the *Ag*GPS receiver and guidelines for using the LCD screen display to view and configure operating parameters. Also included are guidelines for interfacing the receiver to a PC, agricultural yield monitors, information about the selection of NMEA messages supported by the receiver, and connector pin-out diagrams for different data cable connections.

Audience

Even if you have used other Global Positioning System (GPS) products before, we recommend that you spend some time reading this manual to learn about the special features of this product. If you are not familiar with GPS:

- Read the booklet *GPS, A Guide to the Next Utility* (available from Trimble).
- www.trimble.com – visit our website for an interactive look at Trimble and GPS.

Related Information

This section lists sources that provide other useful information.

Manuals CD

Trimble Precision Agricultural System's products are shipped with the *Ag*GPS Manuals CD. The CD includes current editions of all Precision Agricultural Systems technical manuals, plus a selection of cable diagrams, firmware, and software. Use the CD when you need to interface the *Ag*GPS 124/132/132 Air receivers to other Precision Agricultural System's products.

World Wide Web (WWW) Site

For more information about Trimble, visit our site on the World Wide Web:

www.trimble.com

Use the Trimble World Wide Web Site to receive files such as software patches, utilities, and answers to Frequently Asked Questions (FAQs):

www.trimble.com/support/support.htm

Technical Assistance

If you have a problem and cannot find the information you need in this product manual, ***contact the local dealer*** from whom you purchased your *Ag*GPS Parallel Swathing Option.

If you need further assistance, contact the Overland Park, Kansas office by phone, fax, or e-mail. A support technician can help determine the cause of the problem and provide technical assistance.

Phone:+1-913-495-2700 (International & North America)

(8:00 am to 5:00 pm Central Standard Time)

Fax: +1-913-495-2750

E-mail: precision_ag@trimble.com

When you contact Overland Park, Kansas, provide the following information:

- The Trimble product name, any software or firmware version number(s), and if appropriate, the serial number.
- Your specific question or problem.

  Please have ready detailed background information such as the configuration of your data logger or receiver, and the exact type, make, and configuration of your computer. If you have received error messages, please specify the exact wording.

If you need to send a data file with your inquiry, please compress the file using WINZIP software by Nico Mak Computing, Inc., and name the file with the extension .ZIP. WINZIP software is available from:

HTTP://WWW.WINZIP.COM

To send the file, attach the file to your e-mail inquiry and send it to:

precision_ag@trimble.com

Your Comments

Your feedback about the product 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 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: Documentation Group*.

Document Conventions

Italics identify software menus, menu commands, dialog boxes, and the dialog box fields.

SMALL CAPITALS identify DOS commands, directories, filenames, and filename extensions.

Helvetica Narrow represents data-entry field names or messages appearing on the screen.

Helvetica Narrow Italics represents information that you must type in a *Ag*GPS software screen or the options selected from multiple-choice fields.

Helvetica Bold identifies a software command button.

[Return] or [Ctrl] + [C] identifies a hardware function key or key combination that you must press on a PC.

Screen Font is used to show information displayed on the *Ag*GPS 124/132/132 Air LCD display.

, , , , and are the buttons on the *Ag*Remote software program screen.

Warnings, Cautions, Notes, and Tips

Warnings, cautions, notes, and tips draw attention to important information and indicate its nature and purpose.

Warning – Warnings alert you to situations that could cause personal injury or unrecoverable data loss.

Caution – Cautions alert you to situations that could cause hardware damage or software error.

Note – Notes give additional significant information about the subject to increase your knowledge, or guide your actions.

Tip – Tips indicate a shortcut or other time- or labor-saving hint that can help you make better use of the product.

CHAPTER

1

Overview

In this Chapter:

- Introduction
- Differential GPS Positioning
- Measuring GPS Accuracy
- Standard Features
- Receiver Enhancements
- Application Options
- Receiver Connections

Introduction

The *Ag*GPS 124/132 receivers combine high-performance GPS reception with a DGPS-capable (radio beacon signal) receiver in a single, lightweight, durable, waterproof housing.

Additionally, the *Ag*GPS 132 receiver (see Figure 1.1) contains The Choice™ technology, enabling OmniSTAR, Racal-LandStar or Coast Guard Beacon Tower real-time differential capabilities.

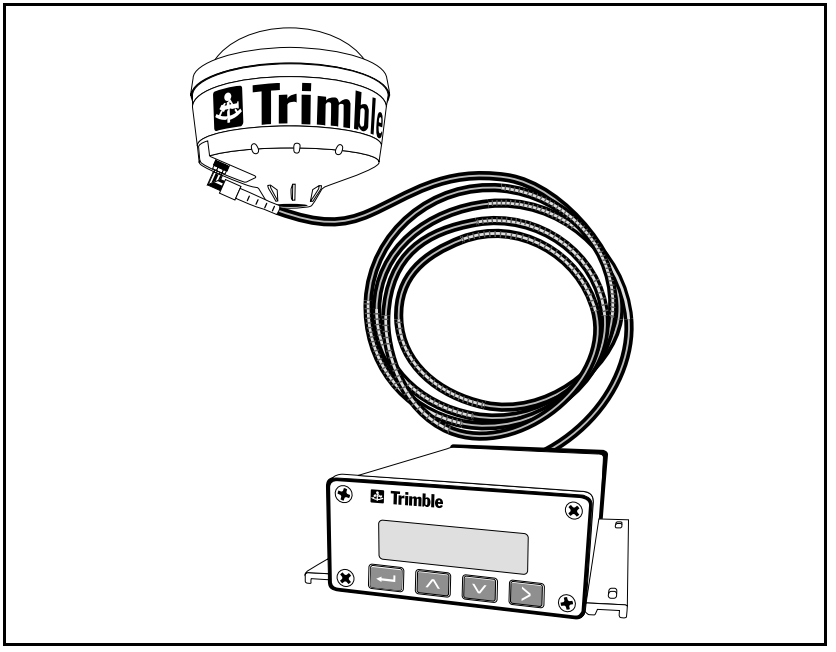


Figure 1.1 *Ag*GPS 124/132 Receiver

As part of a precision agriculture system, the *Ag*GPS 124/132 receiver provides submeter GPS position information for use with a variety of farming equipment including yield monitors, parallel swathing guidance systems, variable-rate planters, spray application and soil sampling software, as well as portable field computers.

The *Ag*GPS 124/132 receivers output real-time positions with submeter location accuracy and 0.16 kph (0.1 mile-per-hour) velocity accuracy through NMEA-0183 and TSIP (Trimble Standard Interface Protocol) messages. A 1 PPS (pulse per second) strobe signal can also be used to synchronize time and log event marker input when using external instruments.

Differential GPS Positioning

The *Ag*GPS 124/132 receivers use differential GPS (DGPS) to achieve submeter (<3.28 feet) accuracy. DGPS requires two or more receivers. One receiver, called the reference or base station, is located at a known point to determine the GPS measurement errors. An unlimited number of mobile *Ag*GPS 124/132 receivers, sometimes called rovers, collect data at unknown locations within the transmission range of the reference station. The reference station broadcasts correction values, which are applied to the *Ag*GPS receiver position. Errors common at both the reference and rover receivers are corrected. For more information about DGPS and the various DGPS signals available, review the *Differential GPS Explained* introductory book available from Trimble.

Sources of GPS Error

The largest source of GPS position error traditionally has been Selective Availability (S/A). S/A has been induced by the U.S. government for the purpose of restricting full GPS accuracy to all except authorized users. The magnitude of S/A combined with other error sources results in autonomous (single receiver) horizontal accuracies of up to 100 meters (328 feet). The U.S. government deactivated S/A in May 2000. With S/A turned off, autonomous GPS horizontal accuracy runs in the range of–15 meters (32.8–49.2 feet).

The remaining 10–15 meters (32.8–49.2 feet) of error is caused in large part by atmospheric conditions (ionosphere slows GPS signal travel time), multipath (GPS signals bouncing off objects before reaching the antenna), and receiver (electronic) noise.

DGPS removes most errors caused by S/A and the atmosphere.

The *Ag*GPS 124/132 receiver uses the latest advancements in receiver design to minimize these errors. For more information about S/A, atmospheric effects, and other sources of error, review the *All About GPS* tutorials document found on the Trimble web site (www.trimble.com).

DGPS Accuracy

Accuracy of the *Ag*GPS 124/132 receiver with differential correction is better than 1 meter RMS (3.2 feet) + 10 ppm times the distance between the reference station and the mobile receiver, given the following conditions:

- Number of satellites used: > 5
- PDOP: < 4
- Signal to Noise Ratio: > 6
- Satellite Elevation Mask: > 7.5
- Low multipath environment
- RTCM-compatible GPS corrections broadcast from a Trimble 4000RSi or equivalent

Number of visible satellites

Four or more satellites must be visible to calculate a three-dimensional position (latitude and longitude, altitude, and time). Three or more satellites must be visible to calculate a two-dimensional position (latitude and longitude, and time).

Position Dilution of Precision (PDOP)

PDOP is a unitless measure indicating the strength of the satellite geometry for providing the most accurate results. When satellites are spread around the sky, the PDOP value is low and the computed position is most accurate. When the satellites are grouped closely together, the PDOP is high and positions are less accurate. You can configure a PDOP Mask to control the point at which the *Ag*GPS receiver stops outputting position reports. For submeter accuracy, the PDOP must be 4 or less.

In some agricultural applications, a PDOP Mask of 12 or more can be used to prevent loss of data. However, accuracy can suffer as PDOP rises. There is a trade-off between optimal GPS accuracy and continuous operation.

Signal-to-Noise Ratio

Signal-to-Noise Ratio (SNR) is a measure of the satellite signal strength. Accuracy improves as the signal strength increases. More signal with less noise equals better accuracy. To compute positions with strong signals, the SNR mask should be set to the default, 6 or more.

Elevation Mask

When a satellite is low on the horizon, the GPS signals must travel a great distance through the atmosphere, delaying reception by the *Ag*GPS 124/132 receiver. You can minimize noisy data by adjusting (tuning) the Elevation Mask. Satellites below the mask are excluded from the position computation. The recommended setting for highest accuracy is 8°. There is a trade-off between accuracy and continuous operation; lowering the mask ensures continuous operation. Raising the Elevation Mask ensures a better position fix. Fewer satellites available may cause loss of a required three-dimensional (3-D) fix when working in area with an obstructed view of the sky.

Multipath

GPS signals are sometimes reflected off nearby objects, particularly metallic objects, creating false or erroneous results. This phenomenon is known as multipath. Severe multipath can induce errors of many meters, while mild multipath may cause small, undetectable errors. Optimal accuracy is obtained by collecting data in an environment that is devoid of large reflective surfaces, such as buildings and trees. The *Ag*GPS 124/132 receiver EVEREST™ multipath reduction option helps reduce the effects of multipath.

Base station receiver

*Ag*GPS 124/132 receiver differential position accuracy is dependent upon the differential correction quality supplied in the RTCM SC-104 message format.

Measuring GPS Accuracy

To measure GPS accuracy you must have some knowledge of coordinates and datums. When comparing geographic data obtained from different sources, the data must be referenced to the same datum and coordinate system. Different datums and coordinate systems provide different coordinate values for any geographic location.

In North America, for example, two different datums, NAD 27 and NAD 83, are commonly used. A particular place on the surface of the earth has different latitude and longitude coordinates in each datum. The *Ag*GPS 124/132 receivers provide coordinates in the WGS-84 datum. Existing background maps for the NAD-27 datum do not register with GPS data based on the NAD-83 datum.

Note – *The North American Datum 1983 (NAD 83) is, for all practical purposes, equivalent to WGS-84 (World Geodetic Survey 1984). GPS data is referenced to the WGS-84 datum.*

Receiving Beacon DGPS

To utilize free radiobeacon differential signals, the *Ag*GPS 124/132 receivers use dual-channel, fully-automatic beacon receiver electronics for tracking broadcasts conforming to the IALA (International Association of Lighthouse Authorities) Standard. When using Beacon DGPS, the default configuration allows the *Ag*GPS 124/132 receiver to determine the ten most powerful radiobeacons in your vicinity. The closest beacon is used. Both Beacon channels are configured to search and track the two nearest radiobeacons in the database.

The receiver can also be configured to search for user-defined station frequencies. The EZ beacon feature enables easy local beacon selection.

The *Ag*GPS 124/132 receivers continuously monitor the integrity of the data received from the differential radiobeacon(s). If excessive errors in the data stream are found, the receiver automatically switches to a different radiobeacon, if one is available.

Radiobeacon signals propagate through ground and sky waves. Hilly and mountainous terrains generally do not affect the beacon reception. Near the beacon transmitter, the signal can be received even in canyons. Canopy has no effect on signal reception.

Beacon signals are greatly effected by natural and human-made noise. Lightning, alternators, electric fan motors, radio speakers and high voltage power lines can be a severe source of noise. In addition, during night hours at longer distances from the beacon station (240–480 Km or 150–300 mi), the sky wave (reflected off the ionosphere) can interfere with the ground wave beacon signal. This self-jamming at night may be a problem with stronger beacon stations. Integrity monitoring of the beacon frequency can be performed with the optional TSIP Talker software.

Note – *A phenomenon called geographic de-correlation, causes radiobeacon signals to become less accurate as the distance from the base station increases. The amount of beacon accuracy degradation depends on the ionosphere and the amount of Selective Availability. Degradation can be as much as 1 meter (3 feet) for every 100 km (60 miles).*

Receiving Satellite DGPS (*Ag*GPS 132 only)

Satellite Differential GPS (Satellite DGPS) signals are sent from a ground station through a satellite transponder to users within view of the satellite. The corrections are sent in a format that allows the construction of a local differential correction applicable to the entire coverage region.

The *Ag*GPS 132 receiver contains both OmniSTAR and Racal-LandStar satellite differential technology. To enable satellite differential capabilities, contact either supplier. Depending on which supplier is involved, the receiver can be activated by an on-the-air signal or an encrypted activation message entered on the receiver front panel.

Satellite DGPS signals provide valid corrections over a large area, but are decoded to provide an accurate correction applicable to any location within the satellite view area. This is accomplished by special software algorithms for generating wide-area differential corrections. These algorithms, called Virtual Reference Station (VRS) and Virtual Base Station (VBS), depending on the vendor, compute differential corrections that a base station would generate if it were at the receiver's location. This correction is constantly updated, so as the receiver moves around, the correction remains accurate.

Satellite DGPS signals are line-of-sight and can be blocked by a mountain, hill, or tree canopy. Wet canopy from a heavy rain further reduces the signals. The same local environmental factors, such as radar and microwave transmitters, that affect the GPS signals can interfere with the satellite signals. Power lines usually have no effect.

For specific information about the providers, visit these World Wide Web sites:

- http://www.omnistar.com
- http://www.racal-landstar.com

Standard Features

The standard *Ag*GPS 124 or 132 system provides the following:

- 12 GPS (C/A-code) tracking channels, carrier-phase filtering
- Submeter differential accuracy (RMS): assumes at least 5 satellites and PDOP less than 4
- Combined GPS/DGPS antenna
- Magnetic antenna mount
- 5-meter ruggedized antenna cable
- Data/Power serial cable
- LCD display with four-button keypad to configure and view system properties
- Two RS-232 serial ports supporting:
  - NMEA-0183 output: GGA, GLL, GRS, GST, GSA, GSV, MSS, RMC, VTG, ZDA, XTE (The default NMEA messages are GGA, GSA, VTG and RMC)
  - Trimble Proprietary NMEA messages: PTNLDG, PTNLEV, PTNL,GGK, PTNLID, PTNLSM
  - RTCM SC-104 output
  - TSIP input and output
  - Outputs 1 PPS (pulse per second) strobe signal on either serial port, allowing an external instrument to synchronize its internal time with the *Ag*GPS 124/132 clock oscillator.
- Two J1939 (CAN 2.0B) compatible ports
- WAAS Differential Correction compatible
- *Ag*GPS 170 Field Computer compatible
- *Ag*GPS 70 Remote Display and Logger compatible
- *Ag*GPS 21 Lightbar compatible

Receiver Enhancements

*Ag*GPS systems contain several purchase options designed to maximize receiver performance. Depending on the system you ordered, the following options may or may not be included.

Fast Rate (P/N 33176-10)

The Fast Rate option enables the *Ag*GPS 124/132 receiver to output position data up to 10 times per second. Fast Rate output is important in parallel swathing and variable rate applications. (A 5 Hz Fast Rate option is included with the *Ag*GPS Parallel Swathing Option.)

Differential Base Station (P/N 33176-30)

The Differential Base Station option enables the *Ag*GPS 124/132 receiver to output RTCM differential corrections. With a radio link, these corrections can be broadcast and used by other DGPS receivers.

EVEREST Technology (P/N 33176-40)

The EVEREST™ multipath reduction option improves DGPS receiver accuracy by filtering reflected GPS signals before they are processed by the DGPS receiver. EVEREST technology provides maximum accuracy near trees, buildings, and reflective surfaces.
(The EVEREST Multipath Reduction option is included with the *Ag*GPS Parallel Swathing Option.)

Application Options

The *Ag*GPS system contains several purchase options that increase the number of applications for which the *Ag*GPS 124/132 receivers can be used.

*Ag*GPS Parallel Swathing Option (P/N 34623-00)

The *Ag*GPS Parallel Swathing Option enhances the *Ag*GPS 124/132 receiver with an easy-to-use, plug-and-play lightbar. The *Ag*GPS 21 Lightbar indicates off-track error, which the operator uses to steer back on-line.

The *Ag*GPS Parallel Swathing Option helps reduce farm expenses by minimizing redundant applications and skipped areas. Efficient field coverage enables maximum ground coverage in the shortest possible time.

Independent data ports enable the *Ag*GPS 124/132 receiver to simultaneously control the lightbar and output GPS position data to a variable rate controller or mapping software program.

*Ag*GPS PSO Plus for *Ag*GPS 124/132 (P/N 34623-30)

The *Ag*GPS Parallel Swathing Option enhances the *Ag*GPS 124/132 receiver with an easy-to-use, plug-and-play lightbar. The *Ag*GPS 21 Lightbar indicates off-track error, which the operator uses to steer back on-line.

The *Ag*GPS Parallel Swathing Option helps reduce farm expenses by minimizing redundant applications and skipped areas. Efficient field coverage enables maximum ground coverage in the shortest possible time. The *Ag*GPS PSO Plus adds the handheld *Ag*GPS 70 Remote Display and Logger capable of recording swath coverage map to show the actual field area covered, quality of application and document the date of application.

Independent data ports enable the *Ag*GPS 70 RDL to simultaneously control the lightbar and output GPS position data to a variable rate controller or other device.

*Ag*GPS 132 FlightBar System (P/N 35406-20)

The *Ag*GPS 132 FlightBar System enhances the *Ag*GPS 132 Air receiver by providing submeter parallel guidance for aircraft. It enables A-B parallel and pattern swathing with the touch of a button. New automatic features like Auto-Turn Detect and Auto-Swath Increment let you focus on the work, not on GPS.

The system is rugged and reliable, as well as compact and lightweight (under 5 pounds). It includes a highly visible lightbar, an Aircraft-Style DGPS antenna, avionic installation harness, and the *Ag*GPS 132 Air receiver.

The *Ag*GPS 132 Air receiver supports submeter DGPS aircraft guidance, choice of differential services, pattern guidance, area computation, pause/resume operation, boundary indicator LED, and programmable remote buttons

*Ag*GPS 70 Remote Display and Logger (P/N 39600-00)

The *Ag*GPS 124/132 receiver combines Trimble *Ag*GPS receiver control, Trimble *Ag*GPS Parallel Swathing Option guidance control and swath coverage logging capability in a single, compact, durable housing.

As a part of a precision agriculture system, the *Ag*GPS 70 RDL (Remote Display and Logger) records the swath coverage location when driving and allows users to input field chemical application information. This information is stored on a removable PC data card for later creation of swath coverage maps and chemical application reports in the office. The RDL also outputs submeter GPS position information (when connected to a Trimble *Ag*GPS receiver) to a variety of precision-farming equipment, including yield monitors, variable-rate controllers, and portable field computers.

When connected to a Trimble *Ag*GPS 124/132 receiver, the *Ag*GPS 70 RDL outputs real-time submeter positions and 0.16 kph (0.1 mile-per-hour) velocity accuracy through NMEA-0183 messages.

*Ag*GPS Field Pack (P/N 32294-xx)

The *Ag*GPS Field Pack includes the backpack, antenna poles, batteries, and cables to keep hands free when operating the *Ag*GPS 124/132 receiver on foot. The Field Pack is available as either a rigid frame or lumbar pack. It is ideal for crop scouting and field mapping applications.

Receiver Connections

Figure 1.2 shows the *Ag*GPS 124/132 receiver back panel and its associated ports.

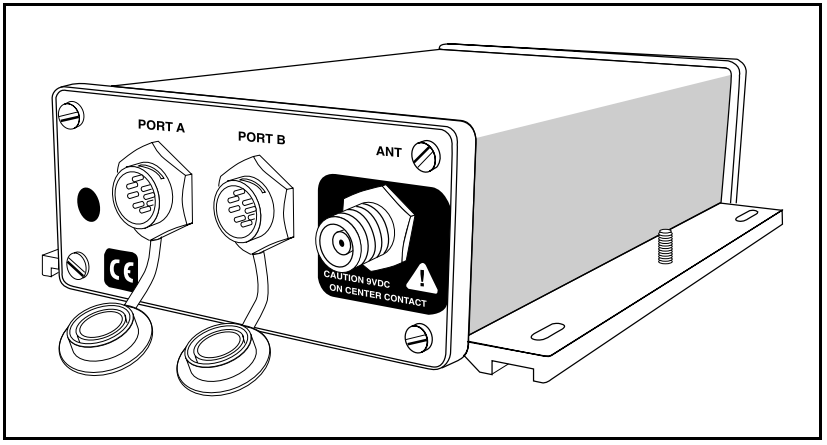


Figure 1.2 Back Panel

Both Port A and Port B can accept power. The standard power/data cable (P/N 30945) supplies power.

ASCII, TSIP, and RTCM Input

Both Port A and Port B are used to input ASCII, TSIP and RTCM data from an external device. ASCII data can be received from an external sensor, converted into a NMEA message, and exported to another device. TSIP command packets are used to set and monitor GPS and Beacon parameters from the optional TSIP Talker or *Ag*Remote software. RTCM data can be input from an external source such as an FM pager.

RTCM, TSIP and NMEA Output

Both Port A and Port B are used to output RTCM, TSIP or NMEA 0183 messages to an interface device. RTCM is output when operating in base mode. TSIP is output when communicating with the optional TSIP Talker or *Ag*Remote software. NMEA is output when exporting GPS position information to an external device, such as a yield monitor or mapping software program.

1 PPS Output

Either port can output a 1 PPS (pulse per second) strobe signal to synchronize the external instruments to the receiver's internal clock.

J1939 (CAN) Serial Bus

Each serial port supports the J1939 Bus protocol. The CAN Bus protocol is an emerging standard for agricultural equipment.

CHAPTER

2

Installing the *Ag*GPS 124/132 Receiver

In this Chapter:

- Unpacking and Inspecting the Shipment
- Installation Guidelines
- Mounting the Receiver
- Mounting the Antenna
- Routing and Connecting the Antenna Cable
- Connecting External Devices

We recommend you read this chapter before attempting to install your *Ag*GPS 124/132 receiver.

Unpacking and Inspecting the Shipment

Inspect the shipping cartons for any signs of damage or mishandling before unpacking the receiver.

Report any damage to the shipping carrier immediately.

Opening the Shipping Carton

The shipment could include one or more cartons, depending on the number of optional accessories ordered. Open the shipping cartons and make sure that all of the applicable components indicated in Table 2.1 through Table 2.3 are included.

Figure 2.1 *Ag*GPS 132 Components

Table 2.1 *Ag*GPS 132 Components (PN 33300-00)

Qty	P/N	Description
1	33302-01	*Ag*GPS 132 Receiver
1	33580-00	*Ag*GPS 132 Antenna
1	12920-00	Magnetic Mount for Antenna
1	32608	5-meter (16-foot) Ruggedized Antenna Cable
1	30945	Data/Power Cable
1	38747-00	*Ag*GPS 124/132/132 Air Operation Manual
1	11093	Coax Tape Seal
1	25110-00	Warranty Activation Card
1	41103-00	*Ag*GPS Manuals CD

Figure 2.2 *Ag*GPS 132 Flightbar System Components

Table 2.2 *Ag*GPS 132 Flightbar System Components (PN 35406-20)

Qty	P/N	Description
1	33302-12	*Ag*GPS 132 Air Receiver
1	40885	*Ag*GPS 132 Aerial Antenna
1	32608	5-meter (16-foot) Ruggedized Antenna Cable
1	35205	AgGPS 132 and Lightbar Data/Power Cable
1	34624-00	*Ag*GPS 21 Lightbar
1	38747-00	*Ag*GPS 124/132/132 Air Operation Manual
1	35408	Aerial Pigtail wire cable
1	11093	Coax Tape Seal
1	25110-00	Warranty Activation Card
1	41103-00	*Ag*GPS Manuals CD

Figure 2.3 *Ag*GPS 124 Components

Table 2.3 *Ag*GPS 124 Only Components (PN 33606-00)

Qty	P/N	Description
1	33606-00	*Ag*GPS 124 Receiver
1	29635-50	*Ag*GPS 124 Antenna
1	12920-00	Magnetic Mount for Antenna
1	32608	5-meter (16-foot) Ruggedized Antenna Cable
1	30945	Data/Power Cable
1	38747-00	*Ag*GPS 124/132/132 Air Operation Manual
1	11093	Coax Tape Seal
1	25110-00	Warranty Activation Card
1	41103-00	*Ag*GPS Manuals CD

Table 2.4 *Ag*GPS 132 Flightbar System Application Options

Qty	P/N	Description
1	39600-10	*Ag*GPS 70 RDL for Air w/ 41130 cable

As shown in Table 2.5, the bill of lading could list one or more of the following factory-installed enhancements.

Table 2.5 *Ag*GPS 124/132 and *Ag*GPS 132 Air Receiver Enhancements

Qty	P/N	Description
1	33176-10	Fast rate capability
1	33176-30	DGPS Base station capability
1	33176-40	EVEREST Multipath Reduction technology
1	33176	WAAS capability

As shown in Table 2.6, the bill of lading could list one or more of the following options.

Table 2.6 *Ag*GPS 124/132 Application Options

Qty	P/N	Description
1	32294-00	*Ag*GPS Lumbar Field Pack 120 volts
1	32294-10	*Ag*GPS Lumbar Field Pack 240 volts
1	32294-40	*Ag*GPS Rigid Frame Field Pack 120 volts
1	32294-50	*Ag*GPS Rigid Frame Field Pack 240 volts
1	34623-00	Parallel Swathing Option
1	34623-40	*Ag*GPS PSO Plus for *Ag*GPS 124/132
1	39600-00	*Ag*GPS 70 Remote Display and Logger

The bill of lading could include one or more of the items listed in Table 2.7 if optional components or accessories are ordered.

Table 2.7 Optional Components

Qty	P/N	Description
1	29510	10-meter (32-foot) Antenna Cable
1	39903	Ag Leader Data/Power Cable
1	32609	CASE AFS Data/Power Cable
1	34189	John Deere GreenStar Data Cable
1	35142	RDS Cable Data/Power Cable
1	38112	Receiver ceiling mounting bracket
1	40572	Null Modem adapter

Reporting Shipping Problems

Report any problems discovered after you unpack the shipping cartons to both Trimble Precision Agricultural Systems and the shipping carrier. The telephone number for Trimble Precision Agricultural Systems is 1-913-495-2700.

Installation Guidelines

*Ag*GPS 124/132 receivers are designed to be mounted on a level, flat surface with the antenna mounted upright. The round magnetic base should be placed on a flat metal surface. For ceiling mounts, ask your local dealer about Trimble's *Ag*GPS receiver ceiling mounting bracket.

Choosing a Location

The *Ag*GPS 124/132 receiver can be installed in any convenient location close to the external device. The location you choose should:

- Be at the highest point of the vehicle with no metal surfaces blocking view of the sky.
- Be within 3.6 meters (12 feet) of the external instrument port. The optional 3.6-meter (12-foot) extension cable can be used to extend the cable connection distance between the receiver and external devices.
- Allow enough clearance between the top of the machine cab and machine shed or storage shed doors for mounting the receiver.

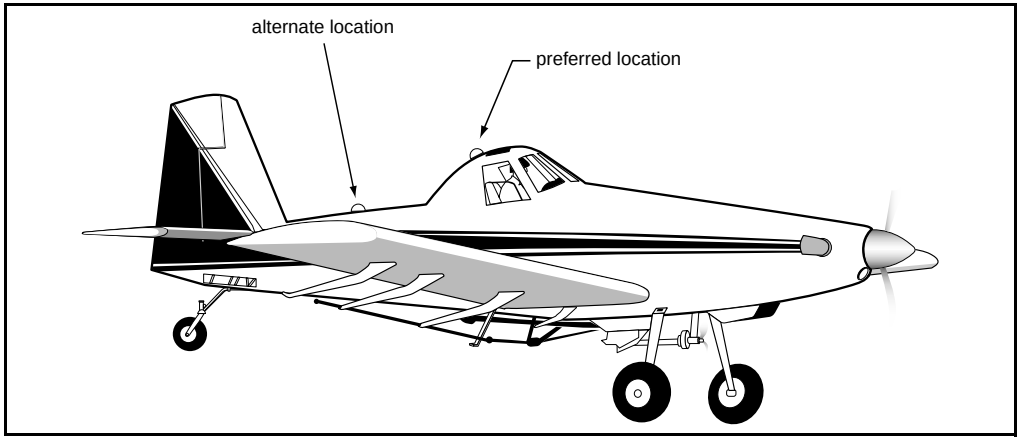


Figure 2.4 *Ag*GPS 132 Antenna Mounting for Airplane

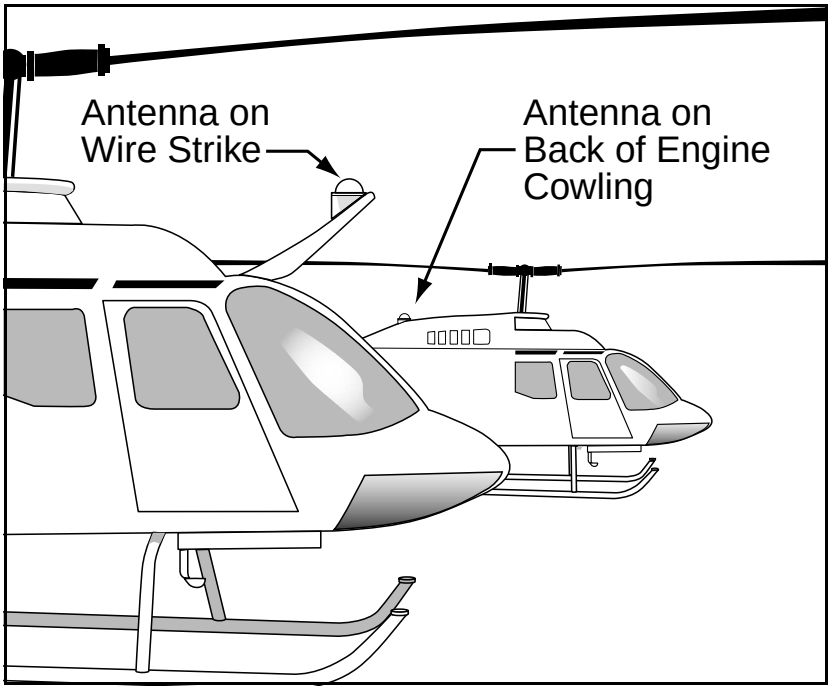


Figure 2.5 *Ag*GPS 132 Antenna Mounting for Rotorcraft

Figure 2.6 Sample Antenna Mount above Cab

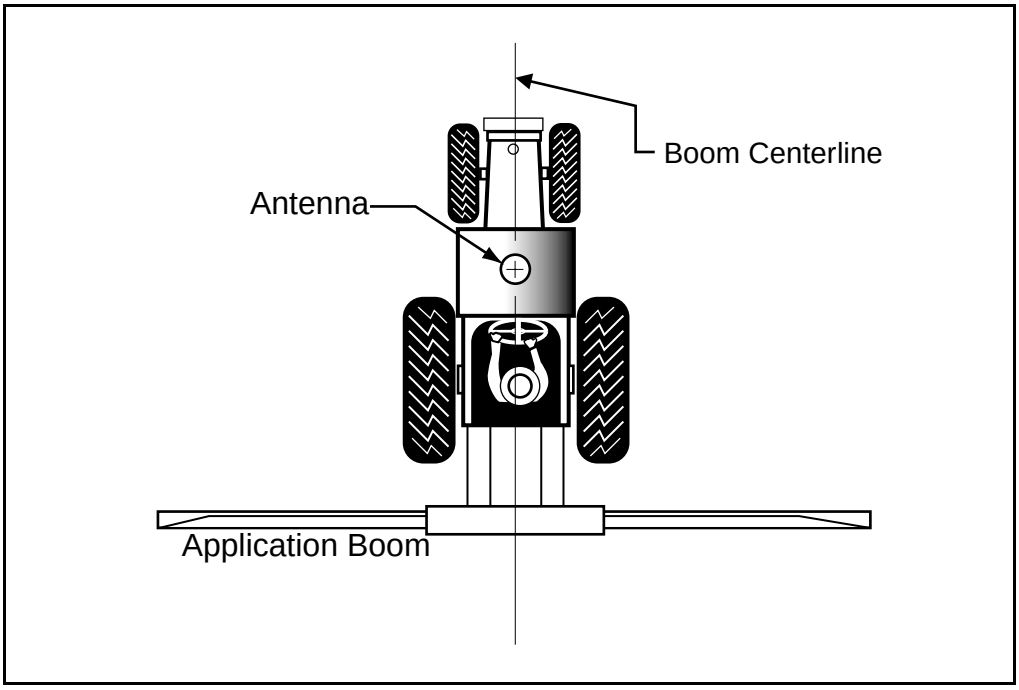


Figure 2.7 *Ag*GPS 124/132 Antenna Mounting for Ground Sprayer Boom Applications

Considering Environmental Conditions

Although the *Ag*GPS 124/132 receiver is located within a waterproof housing, it should be installed in a dry location. 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

Avoiding these conditions improves the receiver's performance and long-term product reliability.

Mounting the Receiver

To mount the receiver:

1. Drill four holes in the mounting surface using the slotted holes in the mounting brackets as a template.

Note – *If machine screws are used, tap the mounting holes to fasten the receiver to the mounting surface. Use 8-32 UNF socket head cap screws to fasten the receiver to the mounting surface. Alternatively, use self-tapping screws to secure the receiver.*

2. Use screws to secure the brackets to the mounting surface.
3. Optionally, ground the receiver. For the *Ag*GPS 132 Air receiver, a ground strap is included with the unit. Use the ground strap to ground the *Ag*GPS 132 Air receiver to airframe ground. A 10-32 UNF threaded post is located on the left mounting bracket of the *Ag*GPS 132 Air receiver for this purpose.

Mounting the Antenna

Choose a location for the antenna that is safe from damage during normal operation. Use the following guidelines when selecting a location:

- Place the antenna on a flat metal surface along the centerline (see Figure 2.7) of the vehicle (or centerline of machine applicator boom) using the magnetic mount.
- Do not mount the antenna close to stays, electrical cables, metal masts, CB radio antennas, cellular phone antennas, air-conditioner units (machine cab blower fan), or machine accessory lights.
- Do not mount the antenna near transmitting antennas, radar arrays, or satellite communication equipment.
- Avoid areas with high vibration, excessive heat, electrical interference, and strong magnetic fields.
- Place antenna at the highest point of the vehicle with no metal surfaces blocking view of the sky.
- Allow enough clearance between the top of the machine cab and machine shed or storage shed doors for mounting the antenna.

Caution – A metal combine grain tank extension may block low elevation satellites.

- For aircraft, avoid mounting the antenna directly under the lead wires used to prevent damage to the aircraft's tail section. Trimble recommends that the antenna be mounted six or more inches to the side of the lead wire. For other guidelines about mounting antennas on aircraft, refer to the *AgGPS 132 FlightBar System Operation Manual*.

Sources of Electrical Interference

Several sources of electrical and magnetic noise are:

- 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

Note – *You can check the antenna installation for locally generated noise by watching the Beacon signal-to-noise (S/N) ratio value on the AgGPS receiver's Home screen. A low signal-to-noise value (less than 10) usually indicates electrical interference. Move the antenna to a different location & watch the signal-to-noise value. A value of 10 or more is acceptable with the machine's engine running. Raising the antenna 1-2 feet may minimize the noise.*

Routing and Connecting the Antenna Cable

A 5-meter (16.5-foot) antenna cable is included with your *Ag*GPS 124/132 receiver (see Figure 2.8). One end of the antenna cable features a right-angle connector. The opposite end features a straight connector. Connect the right-angle connector to the antenna; then route the cable to the receiver.

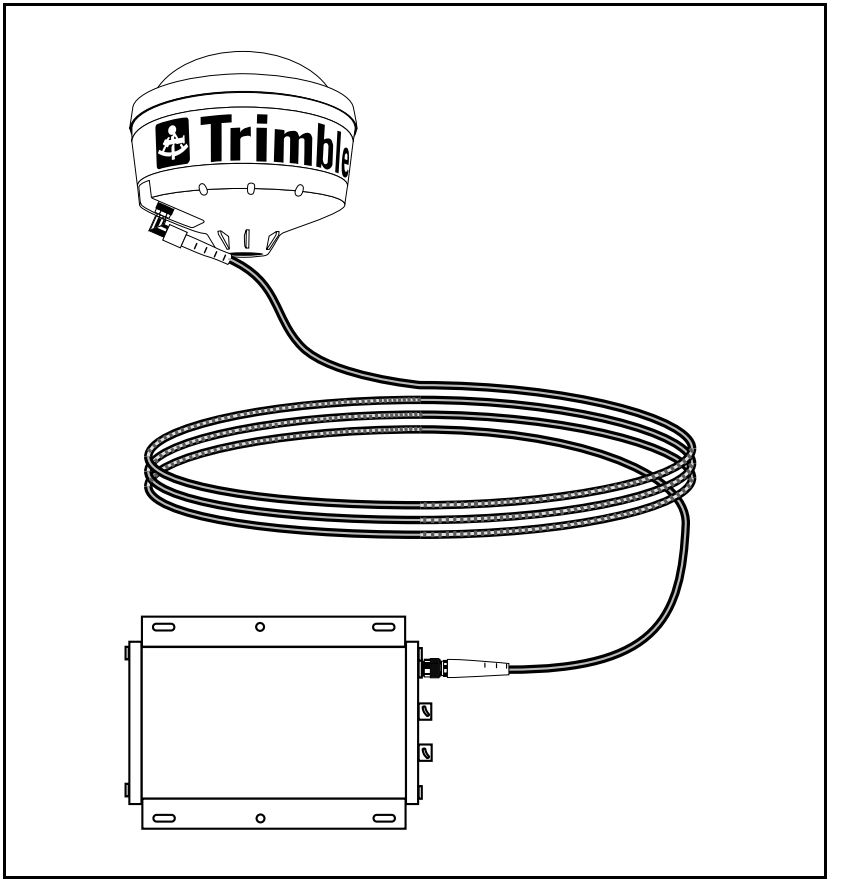


Figure 2.8 Antenna Cable Connections

When routing the antenna cable, avoid the following hazards:

- sharp ends or kinks in the cable
- hot surfaces (exhaust manifolds or stacks)
- rotating or moving machinery parts
- sharp or abrasive surfaces
- door and window jams
- corrosive fluids or gases

After routing the cable, connect it to the *Ag*GPS 124/132 receiver. Use tie-wraps to secure the cable at several points along the route. One tie-wrap is required to secure the cable near the base of the antenna. This provides strain relief for the antenna cable connection.

When the cable is secured, coil any slack. Secure the coil with a tie-wrap and tuck it into a safe place.

Tip – Use the coax seal tape, provided with the antenna, to seal the antenna connector at the antenna. The tape prevents water and moisture from entering the connection.

Connecting External Devices

After installing the antenna and receiver, connect and route the Data/Power cable. The receivers can be powered by a vehicle or a customer-supplied 10–32 VDC switched power source. Once the receiver is installed and powered on, the front panel LCD screen lights up.

The following sections contain installation instructions for different data/power cables. Depending on the cable(s) you own, complete the appropriate installation.

Connecting the Standard Data/Power Cable

The Standard Data/Power Cable (P/N 35204) connects the *Ag*GPS 124/132 receiver to many types of external devices (see Figure 2.9).

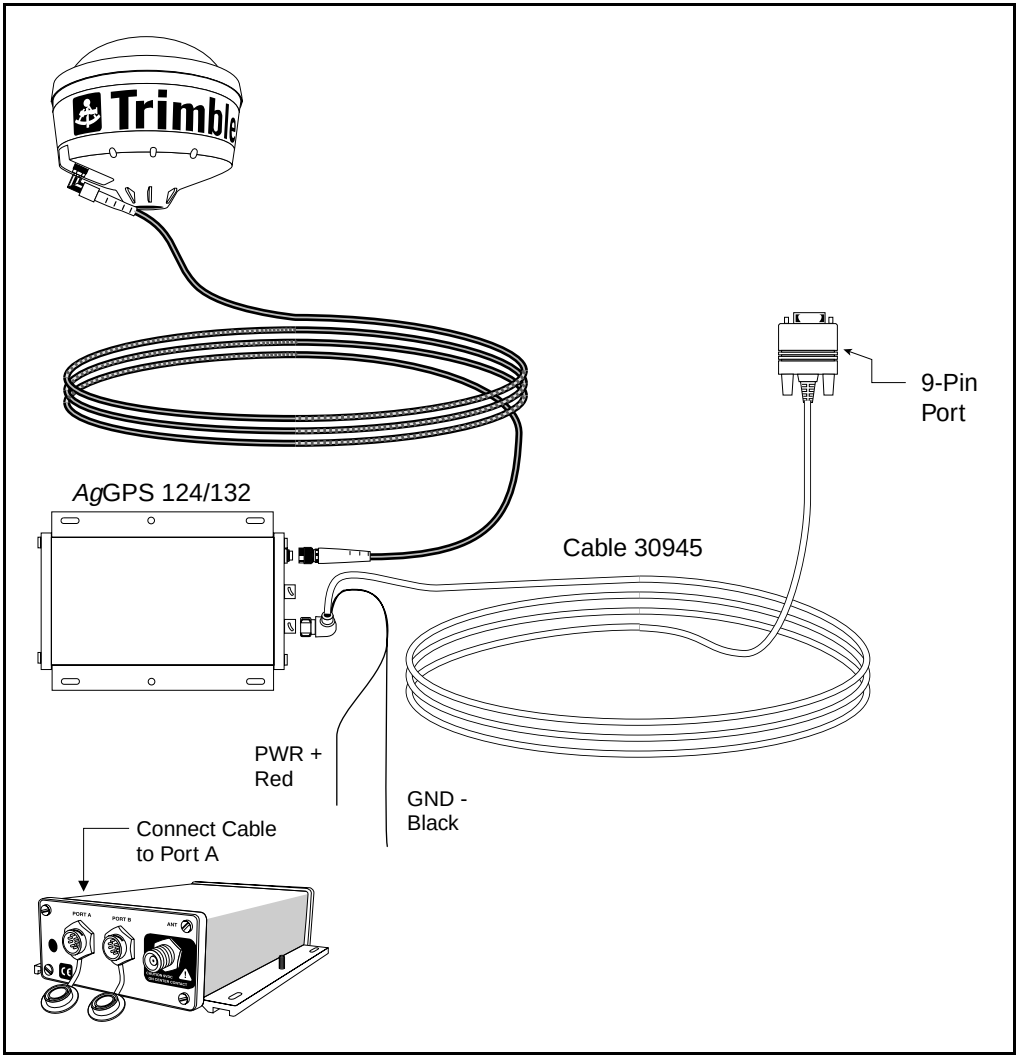


Figure 2.9 External Device Cable Connections

Note – *The red lead must be connected to the +12 VDC and the black lead to Ground.*

Tip – You can install the optional 3.6-meter (12-foot) Extension Cable (P/N 30700) to extend the Standard Data/Power Cable (P/N 30945) to 7.2 meters (24 feet).

Connecting the *Ag*GPS 132 Air Receiver

Figure 2.10 shows the *Ag*GPS 132 Air receiver connected to the *Ag*GPS 132 Flightbar System.

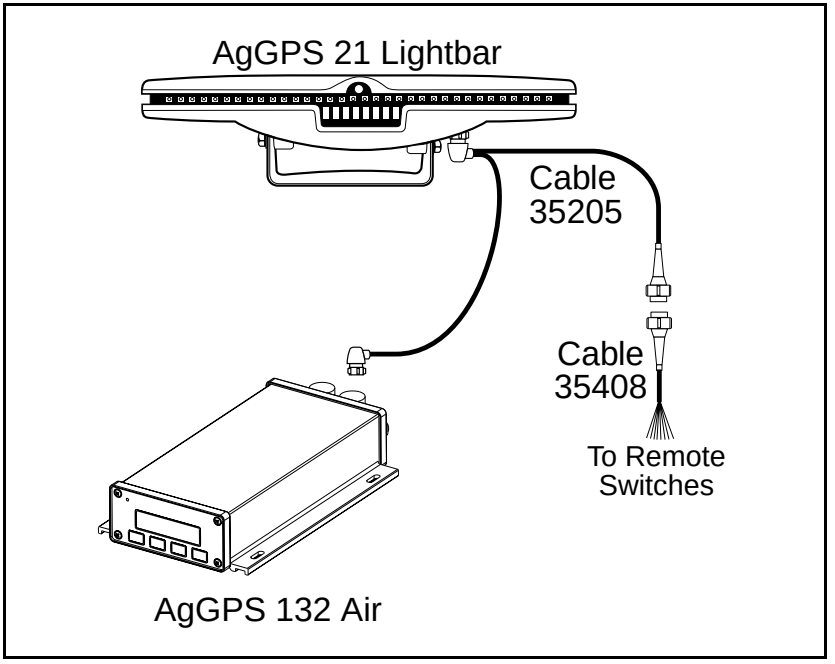


Figure 2.10 *Ag*GPS 132 Air and *Ag*GPS 132 Flightbar System Connections

Connecting the Optional *Ag*GPS Parallel Swathing Option for *Ag*GPS 124/132 Receiver

The *Ag*GPS 124/132 Parallel Swathing Option Cable (P/N 35204) connects the *Ag*GPS 124/132 receiver to the *Ag*GPS 21 Lightbar (see Figure 2.11).

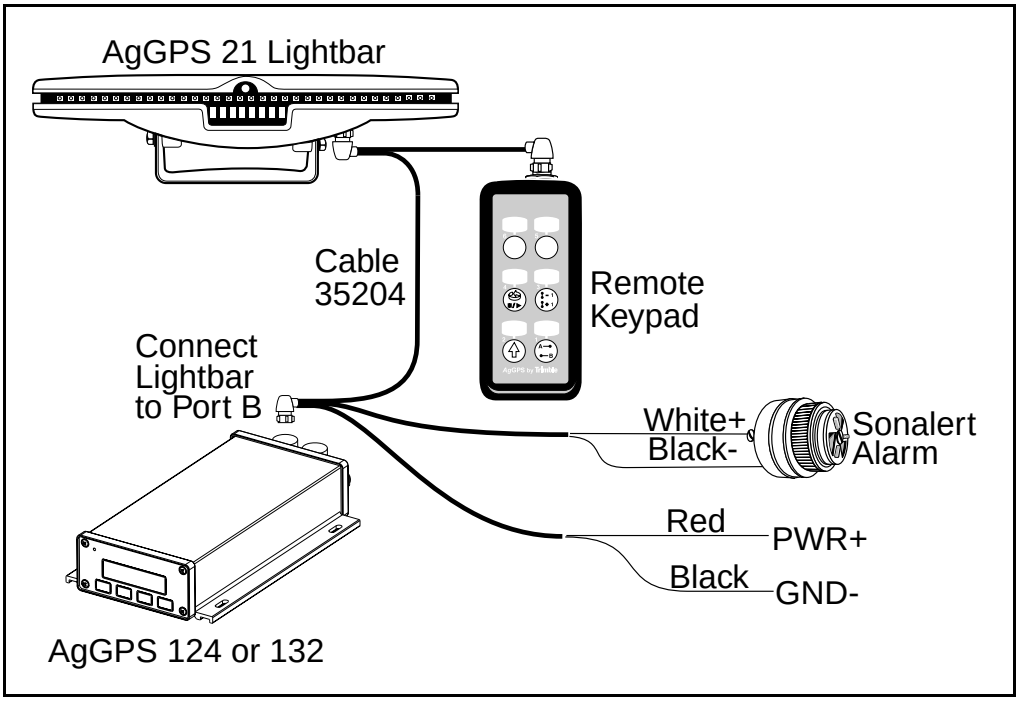


Figure 2.11 Connecting the *Ag*GPS Parallel Swathing Option for *Ag*GPS 124/132 Receiver

Note – *The red power lead must be connected to the +12 VDC, and the black power lead must be connected to ground.*

Connecting the Optional *Ag*GPS Parallel Swathing Option Plus for *Ag*GPS 124/132 Receiver

The *Ag*GPS 124/132 Parallel Swathing Option Cable (P/N 35204) connects the *Ag*GPS 124/132 receiver to the *Ag*GPS 21 Lightbar and *Ag*GPS 70 Remote Display and Logger (see Figure 2.9).

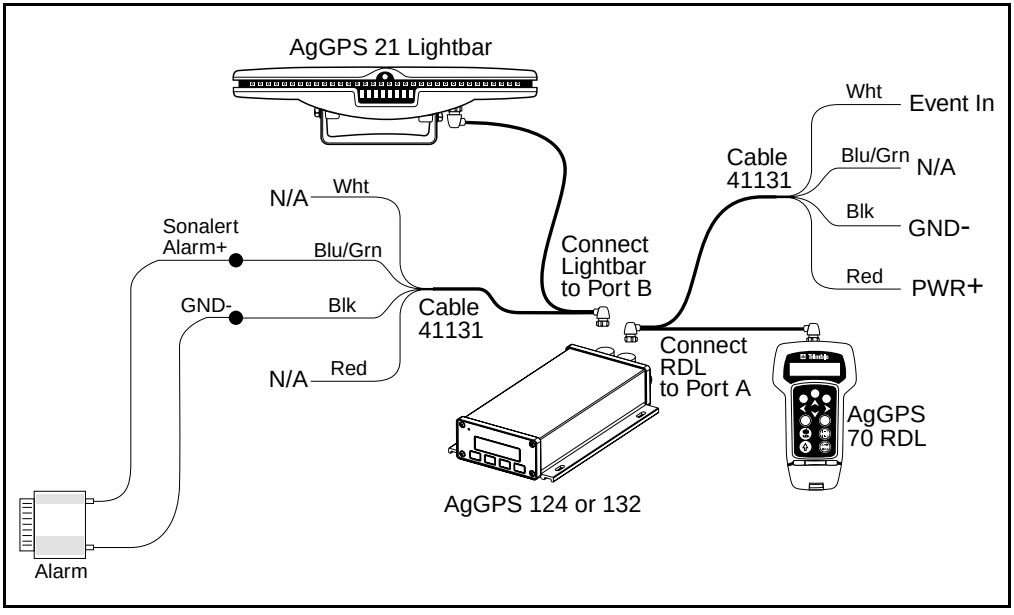


Figure 2.12 Connecting the *Ag*GPS Parallel Swathing Option Plus for *Ag*GPS 124/132 Receiver and *Ag*GPS 70 RDL

Note – *The red power lead on the data/power cable P/N 41131 (for the cable connected to Port A) must be connected to the +12 VDC and the black power lead must be connected to ground.*

Connecting the Optional *Ag*GPS 70 RDL Air to the *Ag*GPS 132 Flightbar System

The *Ag*GPS 70 RDL for Air Cable (P/N 41130) connects the *Ag*GPS 132 Air receiver to the *Ag*GPS 132 Flightbar System (see Figure 2.13).

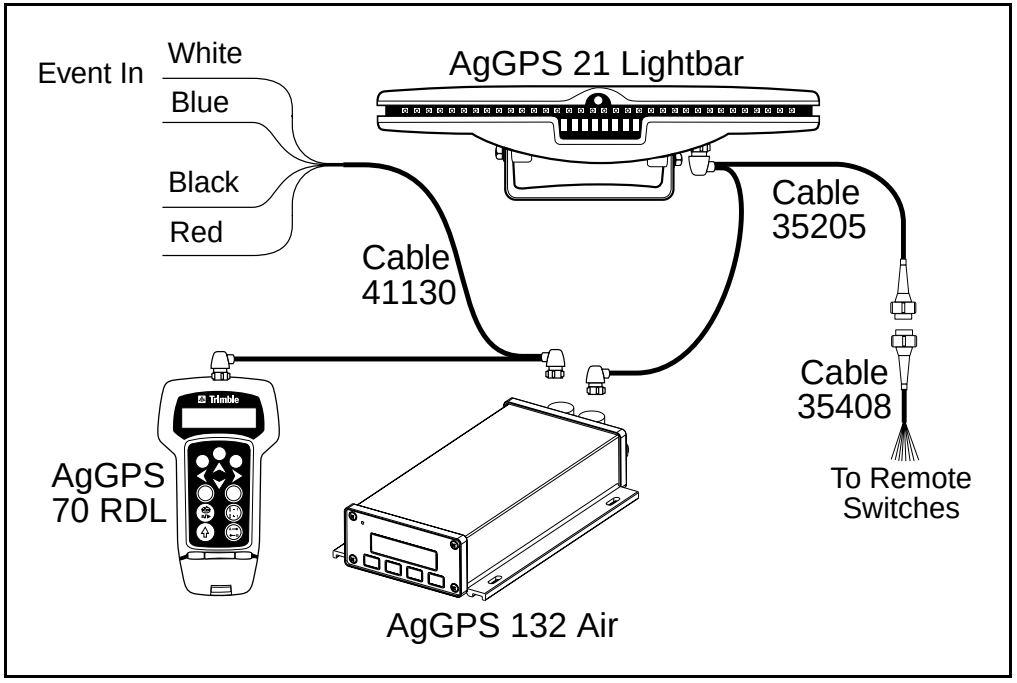


Figure 2.13 Connecting the *Ag*GPS 70 RDL Air to the *Ag*GPS 132 Flightbar System

Note – *The red power lead on the P/N 41130 (for the cable connected to Port A) must be connected to the +12 VDC, and the black power lead must be connected to ground.*

Connecting the Optional *Ag*GPS 170 Field Computer and *Ag*GPS Parallel Swathing Option to the *Ag*GPS 124/132 Receiver

The Standard Data/Power Cable (P/N 30945) connects the *Ag*GPS 124/132 receiver to the *Ag*GPS 170 Field Computer (see Figure 2.14).

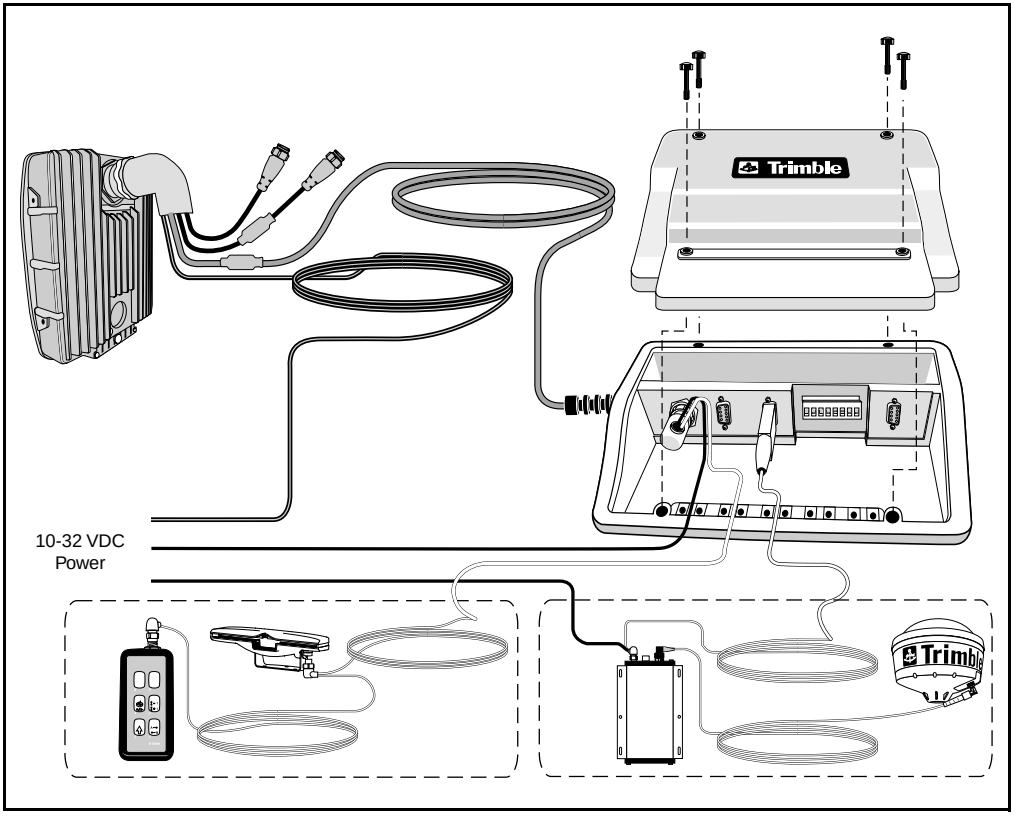


Figure 2.14 Connecting the *Ag*GPS 170 Field Computer to the *Ag*GPS 124/132 Receiver

Connecting the Optional *Ag*GPS TrimFlight 3 System to the *Ag*GPS 132 Air Receiver

The TrimFlight 3 System Cable (P/N 41128) connects the *Ag*GPS 132 Air to the *Ag*GPS 170 Field Computer (see Figure 2.15).

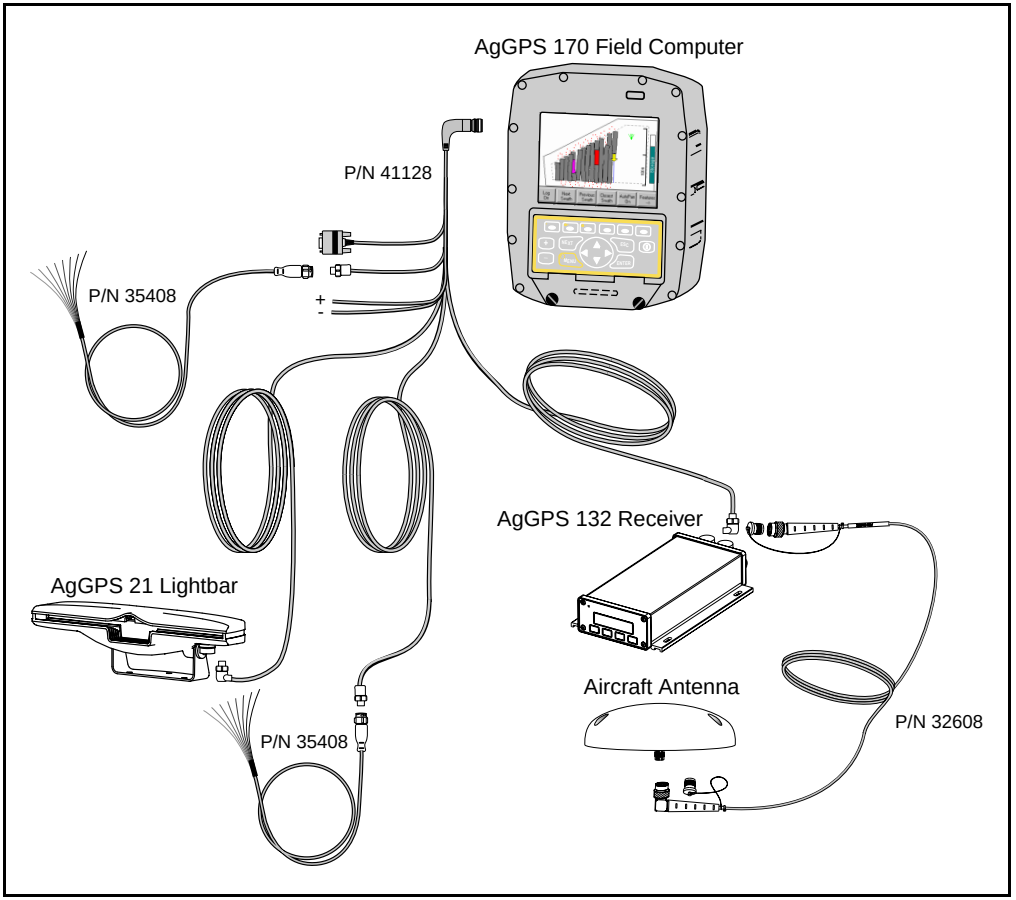


Figure 2.15 Connecting the *Ag*GPS TrimFlight 3 System to the *Ag*GPS 132 Air Receiver

Connecting the Optional CASE AFS Power/Data Cable

The 1-meter (3-foot) CASE AFS Data/Power Cable (P/N 32609) connects the *Ag*GPS 124/132 receiver to a CASE AFS installation (see Figure 2.16).

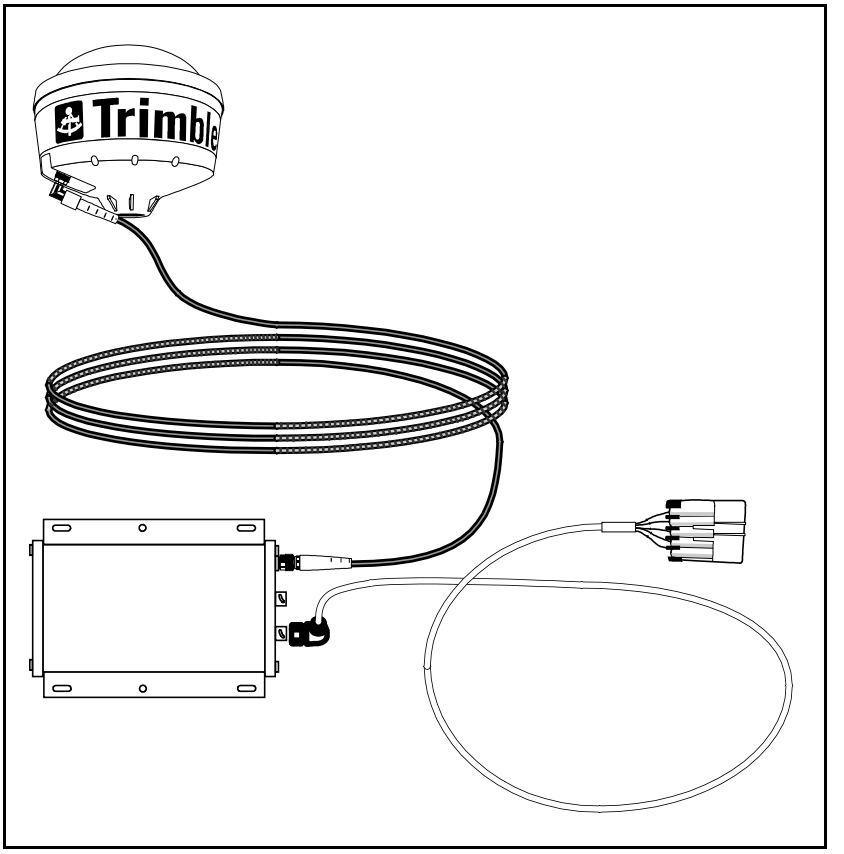


Figure 2.16 CASE AFS Data/Power Cable Connection

Connecting the *Ag*GPS 124/132 Receiver to the CASE AFS Yield Monitor or Universal Display on CASE-IH combines prior to model year 2000

For CASE-IH combines prior to model year 2000:

- The CASE wiring harness connection exists behind the right-hand access door (as you are sitting in the cab), Figure 2.17, outside of the machine cab. The red access door swings forward exposing the machine wiring entering through the right side of the machine cab wall. See Figure 2.18.
- Connect the flat, grey 5-pin connector of the CASE AFS data/power cable to the matched female AFS connector inside the right-hand side access door.

Figure 2.17 Right-Hand Side-Access Door

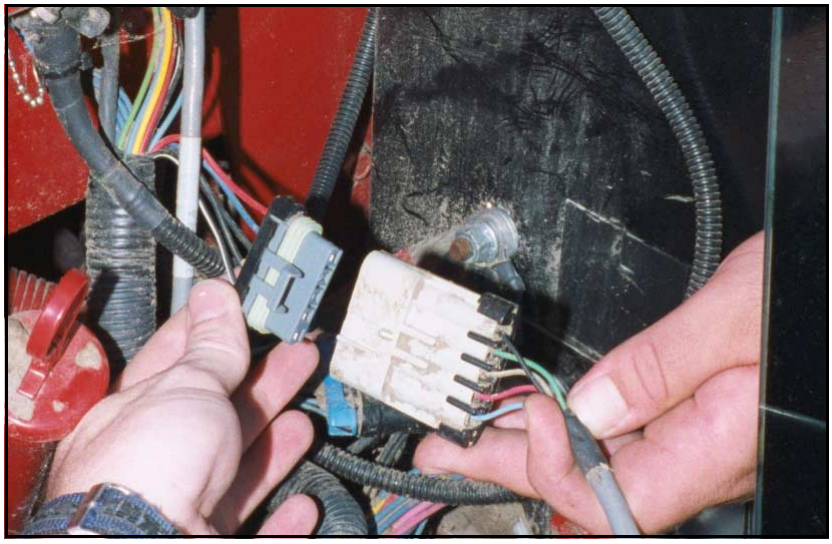


Figure 2.18 Connecting CASE AFS Data Power Cable

Note – *The CASE AFS wiring harness supplies 12 VDC power to the receiver through the cable (P/N 32609).*

Configuring the *Ag*GPS 124/132 Receiver for communication with the CASE AFS Yield Monitor or Universal Display

Configure the *Ag*GPS 124/132 receiver's Port B output for NMEA 4800-8-N-1 using *Ag*Remote software. For more information, see Installing AgRemote Software, page 190, and Configuring Port Communication, page 105.

Connecting the *Ag*GPS 124/132 Receiver to the CASE AFS Yield Monitor or Universal Display on CASE-IH combines model year 2000 and later

For CASE-IH combine model year 2000 and later:

- The CASE wiring harness connection exists under the right-hand seat console. A grey lid can be lifted up, Figure 2.19, exposing the machine wiring under the operator's seat.
- Connect the flat, grey 5-pin connector to the CASE AFS data/power cable to the matched female AFS connector under the operator's seat. See Figure 2.20 and Figure 2.21.

Note – *The CASE AFS wiring harness supplies 12 VDC power to the receiver through the cable (P/N 32609).*

Figure 2.19 Opening the Lid Under the Operators Seat

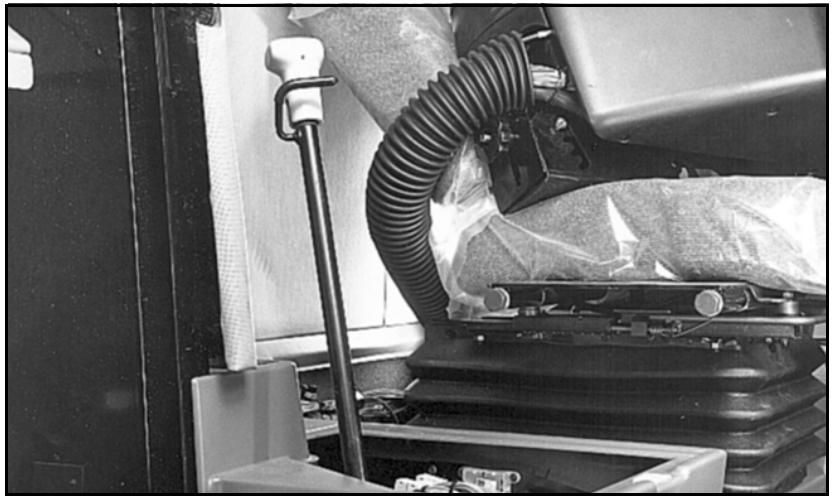


Figure 2.20 CASE-IH Cable Connection Under Seat Console

Figure 2.21 Connecting CASE AFS Data Power Cable

Configuring the *Ag*GPS 124/132 Receiver for Communication with the Case AFS Yield Monitor or Universal Display

Configure the *Ag*GPS 124/132's Port B output for NMEA 4800-8-N-1 using *Ag*Remote software. For more information, see Installing AgRemote Software, page 190, and Configuring Port Communication, page 105.

Connecting the Optional John Deere GreenStar Data Cable (P/N 34189)

The 1-meter (3-foot) John Deere GreenStar Data Cable connects the *Ag*GPS 124/132 receiver to the John Deere GreenStar system (see Figure 2.22).

Before installing the *Ag*GPS 124/132 receiver, you must determine if there is a GPS receiver currently attached to the GreenStar system. Consider these guidelines before proceeding:

- If there is not a GPS receiver attached to the GreenStar system, proceed with step 1.
- If there is a GPS receiver attached to the GreenStar system, disconnect it from the wiring harness. This is required to activate the GreenStar RS-232 port. The harness can be disconnected from the GreenStar GPS receiver at the antenna base. The GreenStar GPS receiver will be mounted above the machine cab and bolted to the grain tank. When the GPS receiver is disconnected, proceed with step 1.

Connecting to factory-installed GreenStar Systems on 00 and 10 series John Deere combines

For the GreenStar system to receive GPS position information, the *Ag*GPS 124/132 receiver has to be wired into the GreenStar wiring harness. You connect the *Ag*GPS 124/132 receiver to 2 wires in the GreenStar wiring harness that send GPS information to the GreenStar Mapping Processor (see Figure 2.22).

SPECIAL NOTE FOR 00 AND 10 SERIES COMBINES: John Deere offers a retrofit kit to install the newer 50 series GreenStar yield monitor into 00 and 10 series combines without yield monitors. To determine if your 00 or 10 series combine has the 50 series GreenStar yield monitor system installed, locate where the PC card is inserted. If the yield monito's PC card inserts into the back of the GreenSar display, then follow the installation instructions on pages 50-54 to connect a Trimble AgGPS 124/132 receiver.

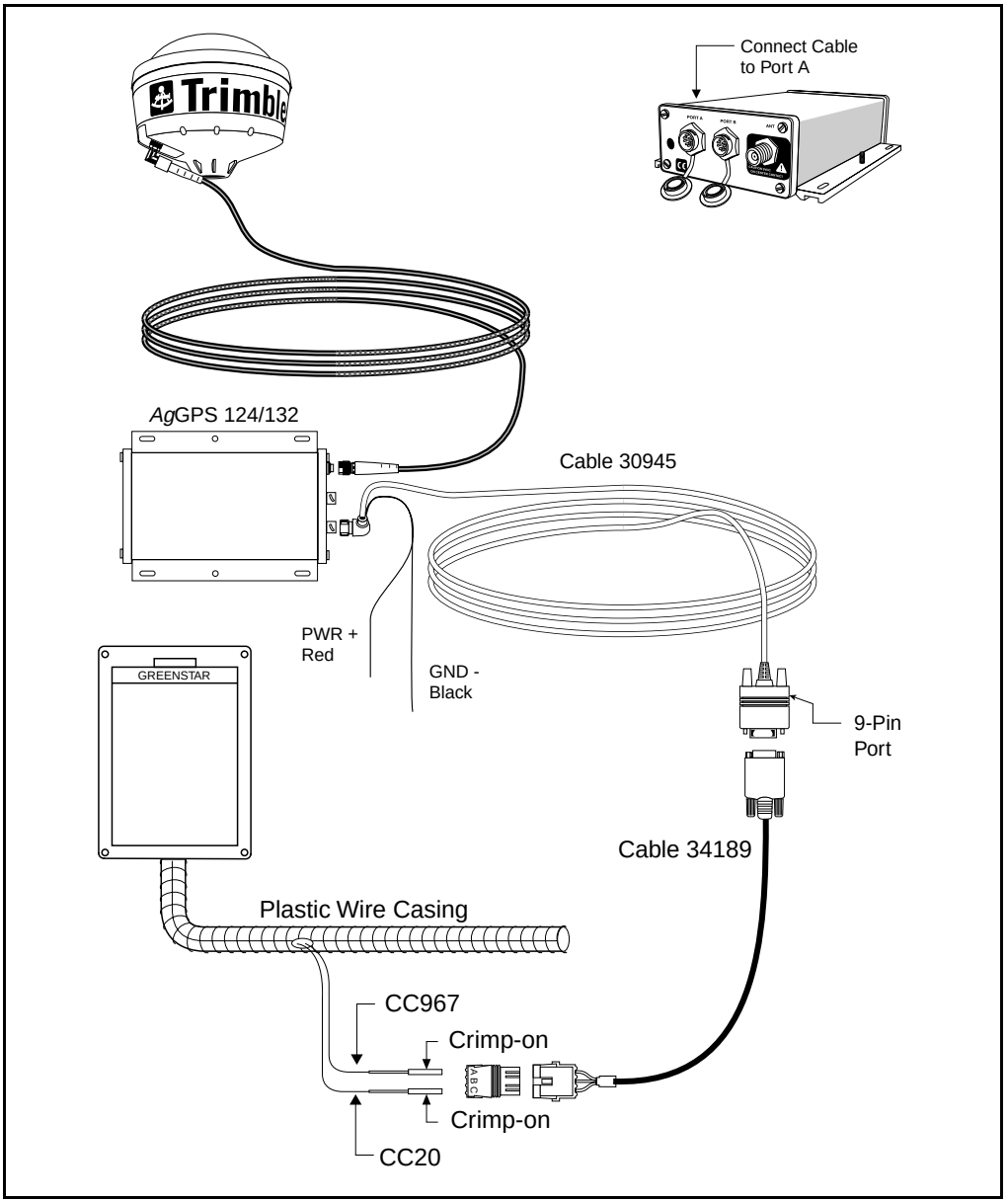


Figure 2.22 *Ag*GPS 124/132 to GreenStar on 00 and 10 Series John Deere Combines

To connect the *Ag*GPS 124/132 receiver to a factory-installed GreenStar system on 00 and 10 series combines:

1. Look inside the machine cab behind the operator's seat on the right-hand side to find the GreenStar Mapping Processor (brown lid that opens where you insert the PC card).
   - Find the connecting wiring harness on the bottom of the unit.
   - Gently pull 2 short wires from the black plastic wire casing. The required 2 wires are approximately 46 cm (18 inches) from the point where the wire bundle enters the bottom of the mapping processor.
2. Find the wire labeled CC967, and strip back the insulation 6.5 mm (1/4 inch) exposing bare wire.
   - Crimp the round connector pin onto the bare wire, and
   - Insert the pin into slot A of the 3-slot black Weatherpack tower connector.
3. Find the wire labeled CC20 and strip back the insulation 6.5 mm (1/4 inch) exposing bare wire.
   - Crimp the round connector pin onto the bare wire, and
   - Insert the pin into slot C of the 3-slot black Weatherpack tower connector.
4. Connect the Trimble GreenStar cable (P/N 34189) to the 3-pin Weatherpack tower connector.
5. Connect the data/power cable (P/N 30945) to the GreenStar Data cable's (P/N 34189) 9-pin serial connector.
6. Attach the data power cable (P/N 30945) to Port A on the back of *Ag*GPS 124/132 receiver.
7. Attach the power leads of the data/power cable (P/N 30945) to switched 12 or 24 VDC power. Connect the red wire to positive and the black wire to negative (ground).

Checking the Mapping Processor for the current software version on factory-installed GreenStar systems on 00 and 10 series combines

To check for the current GreenStar Mapping Processor software version:

1. Press the **Setup** key.
2. Press **YIELD MAPPING**.
3. Press the **PAGE** key 4 times.
4. The *SETUP – YIELD MAP-PAGE 4* screen appears. This screen shows the current Mapping Processor software version.

Configuring *Ag*GPS 124/132 Receiver for communication with the Mapping Processor on factory-installed GreenStar systems on 00 and 10 series combines

Check the GreenStar display for the current software version based on these guidelines:

- If version 5.3P:
  - Configure the *Ag*GPS 124/132's Port A output for NMEA 9600-8-N-1. Configure the *Ag*GPS 124/132 receiver to output the following NMEA messages: GGA, GSA and RMC. For more information, see Configuring Port Communication, page 105.
- If software version 5.3R:
  - Configure the *Ag*GPS 124/132's port A output for NMEA 4800-8-N-1. Configure the *Ag*GPS 124/132 receiver to output the following NMEA messages: GGA, GSA, RMC. For more information, see Configuring Port Communication, page 105-.

Connecting to the GreenStar System on 50 Series John Deere Combines

In order to receive GPS position information on the GreenStar system, the *Ag*GPS 124/132 receiver has to be wired into the GreenStar wiring harness. You connect the *Ag*GPS 124/132 receiver to the GreenStar's Mobile Processor wiring harness connection (see Figure 2.25). This allows the Mobile Processor to receive GPS position information.

SPECIAL NOTE FOR 00 AND 10 SERIES COMBINES: John Deere offers a retrofit kit to install the 50 series GreenStar yield monitor into 00 and 10 series combines. To determine if your 00 or 10 series combine has the 50 series GreenStar yield monitor system installed, locate where the PC card is inserted. If the PC card is inserted into the back of the GreenSar display then follow the installation instructions on pages 50-54 to connect a Trimble AgGPS 124/132 receiver.

Figure 2.23 GreenStar Display on Right-Hand Cab Post

Figure 2.24 Mobile Processor Connector

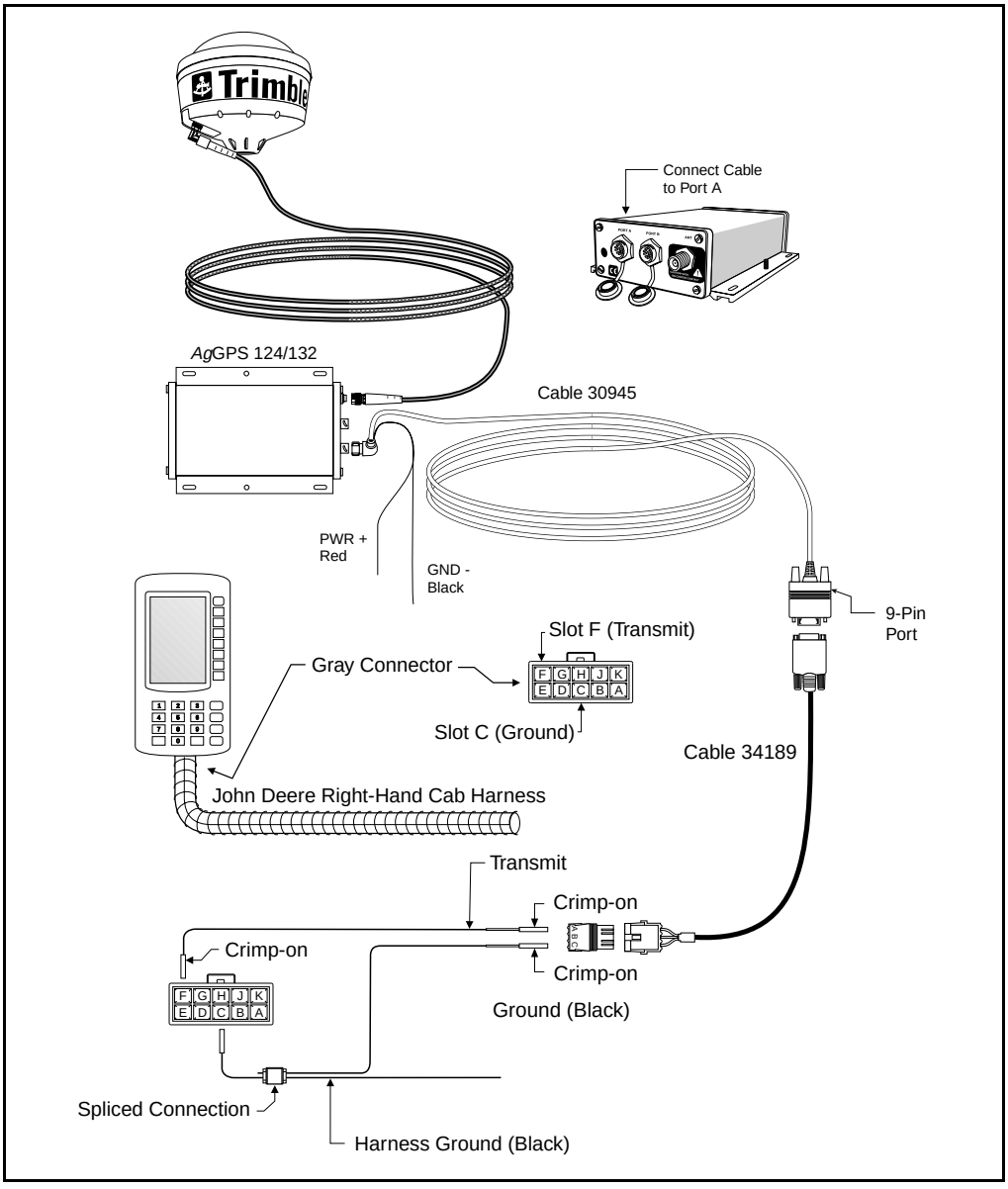


Figure 2.25 *Ag*GPS 124/132 Receiver to GreenStar System on 50 Series John Deere Combines

To connect the *Ag*GPS 124/132 receiver to the John Deere GreenStar system on 50 series combines:

1. Look inside the machine cab for the GreenStar Display mounted on the right-hand cab post, Figure 2.23. Find the Mobile Processor. This is located on the back of the GreenStar Display where you insert the PC card.
   - Find the gray 10-slot Metripack connector on the back of the Mobile Processor and disconnect the gray connector, Figure 2.24.
2. Prepare two 15 cm (six inch) lengths of 14-gauge stranded wire. Strip 65 mm (1/4 inch) of insulation off both ends of each wire.
3. Find slot C on the gray 10-slot Metripack connector. Slot C will have a connecting black wire.
   - Insert one of the 14-gauge wire leads (prepared in step 2) into the splice connector and squeeze the splice connector onto the insulated black wire of slot C of the gray metripack connector. (see Figure 2.25).
   - On the same 14-gauge wire lead, crimp a round connector pin onto the bare wire end.
   - Insert the round connector pin into slot C of the 3-slot black Weatherpack tower connector.
4. Find the second 14-gauge wire lead (prepared in step 2).
   - Crimp the square connector pin (John Deere part number: R78063) onto the bare wire end.
   - Crimp a round connector pin onto the other end of the same wire lead.
   - Insert the round connector pin into slot A of the 3-slot black Weatherpack tower connector.
   - Insert the square pin into slot F of the 10-slot gray Metripack connector.

5. Connect the Trimble GreenStar cable (P/N 34189) to the male 3-slot black Weatherpack connector.
6. Connect the data/power cable (P/N 30945) to the GreenStar Data cable's (P/N 34189) 9-pin serial connector.
7. Attach the data/power cable (P/N 30945) to Port A on the back of *Ag*GPS 124/132 receiver.
8. Attach the power leads of the data/power cable (P/N 30945) to switched 12 or 24 VDC power. Connect the red wire to positive and the black wire to negative (ground).

Configuring the *Ag*GPS 124/132 Receiver for communication with the GreenStar Mapping Processor on 50 Series John Deere Combines

To configure the *Ag*GPS 124/132 receiver:

- Configure the *Ag*GPS 124/132 receiver's Port A output for NMEA 4800-8-N-1. Configure the 124/132 receiver to output the following NMEA messages: GGA, GSA, RMC. For more information, see Configuring Port Communication, page 105.

Connecting the Optional Ag Leader Data/Power Cable (P/N 39903)

The 3.6-meter (12-foot) Ag Leader Yield Monitor Cable connects *Ag*GPS 124/132 receivers to both the Ag Leader Yield Monitor 2000 and PF3000 (see Figure 2.26 and Figure 2.27).

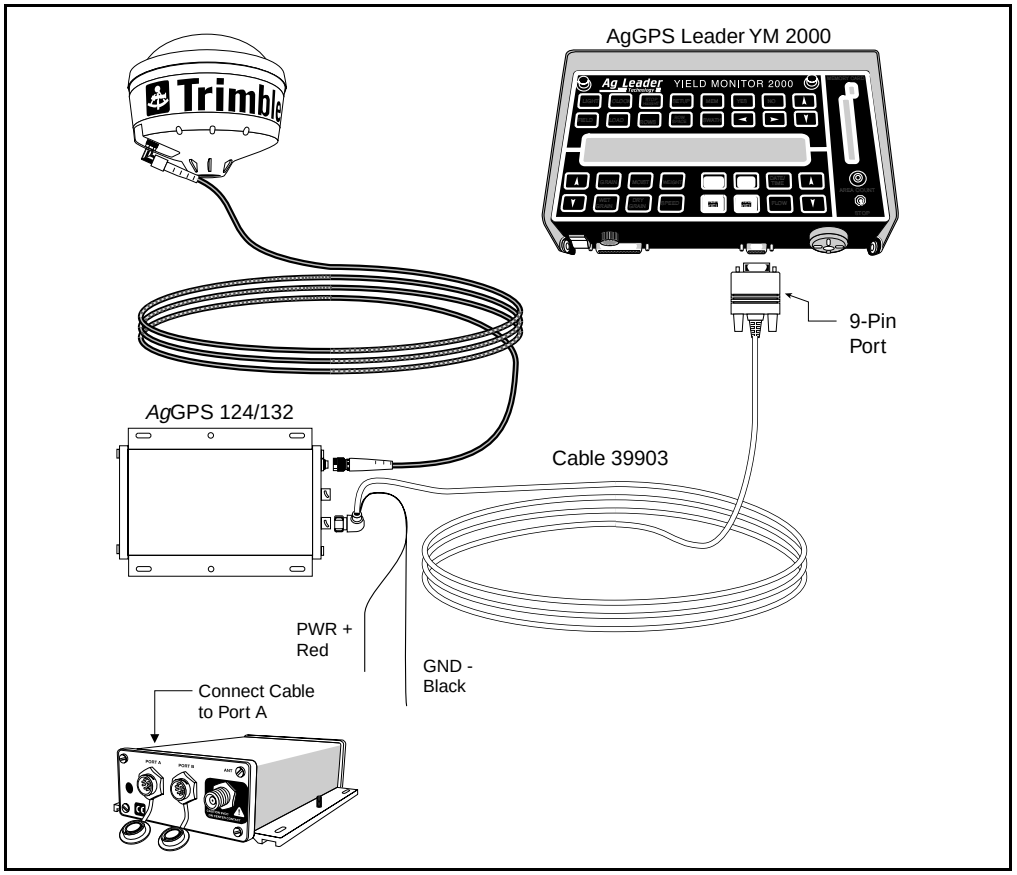


Figure 2.26 Ag Leader Data Cable Connection to YM2000

Note – *The P/N 39903 cable's red power lead must be connected to the +12 VDC and the black power lead to Ground.*

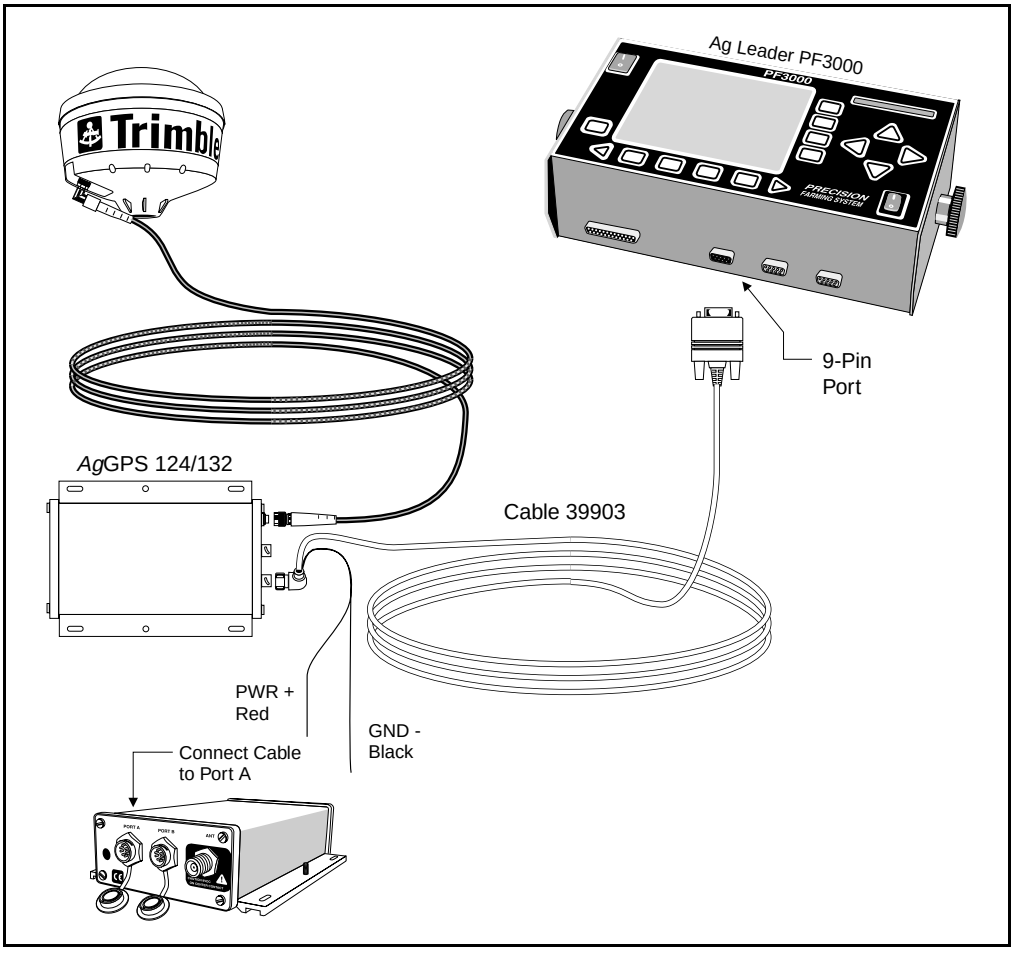


Figure 2.27 Ag Leader Data/Power Cable Connection to PF3000

Note – *The P/N 39903 cable's red power lead must be connected to the +12 VDC and the black power lead to Ground.*

Connecting the Optional RDS Yield Monitor Data/Power Cable

The 3.6 meter (12 foot) RDS Yield Monitor Data/Power Cable (P/N 35142) connects an AgGPS 124/132 receiver to an RDS Ceres Yield Monitor.

To connect the optional RDS cable:

1. Connect the 12-pin CONXALL connector to the bottom of the *Ag*GPS 124/132 receiver.
2. Attach the 9-pin RS 232 Connector to the RDS Ceres Yield Monitor.

Connecting the *Ag*GPS 124/132 Data/Power Cable to the RDS Pro Series 8000

Figure 2.28 shows the *Ag*GPS 124/132 Data/Power cable (P/N 30945) connection to the RDS Pro Series 8000.

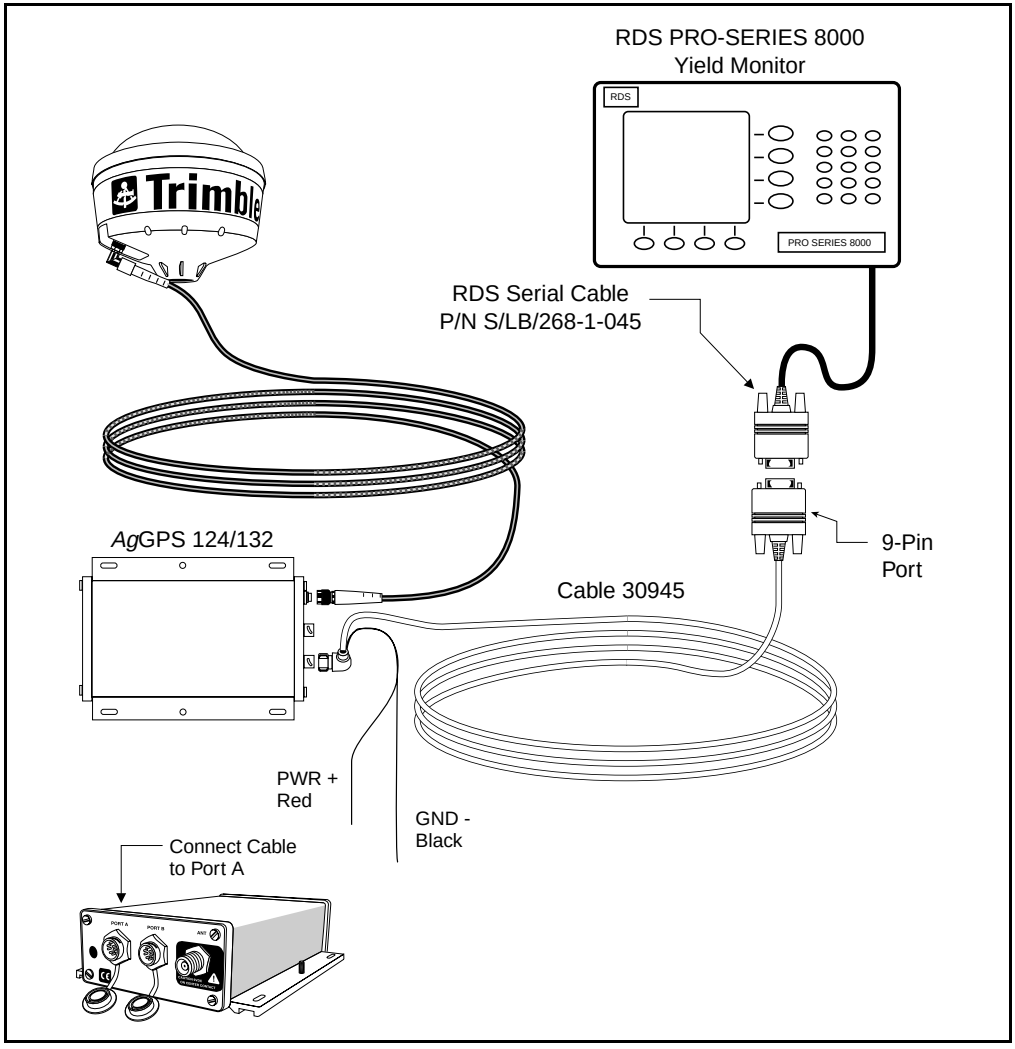


Figure 2.28 *Ag*GPS 124/132 Data/Power Cable to RDS Pro Series 8000

Connecting the *Ag*GPS 124/132 Data/Power Cable to a Laptop Computer

Figure 2.29 shows the *Ag*GPS 124/132 Data/Power Cable (P/N 30945) connected to a Laptop computer.

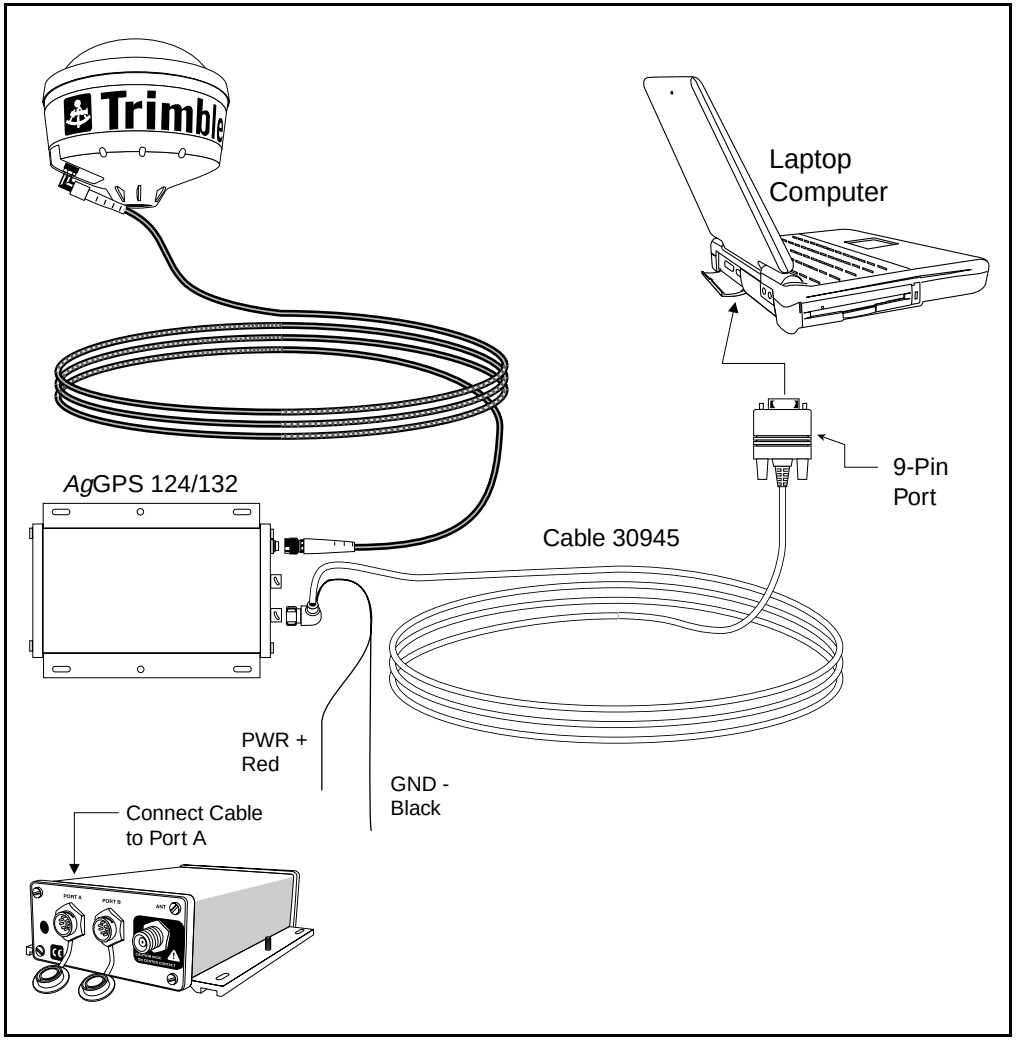


Figure 2.29 *Ag*GPS 124/132 Data/Power Cable to a Laptop Computer

Connecting the Standard Data/Power Cable to a Windows CE Palmtop Computer

Figure 2.30 shows the *Ag*GPS 124/132 receiver connected to a Windows CE computer using the *Ag*GPS 124/132 Data/Power Cable (P/N 30945), a null modem (P/N 40572), and the Windows CE Cable (P/N 40572).

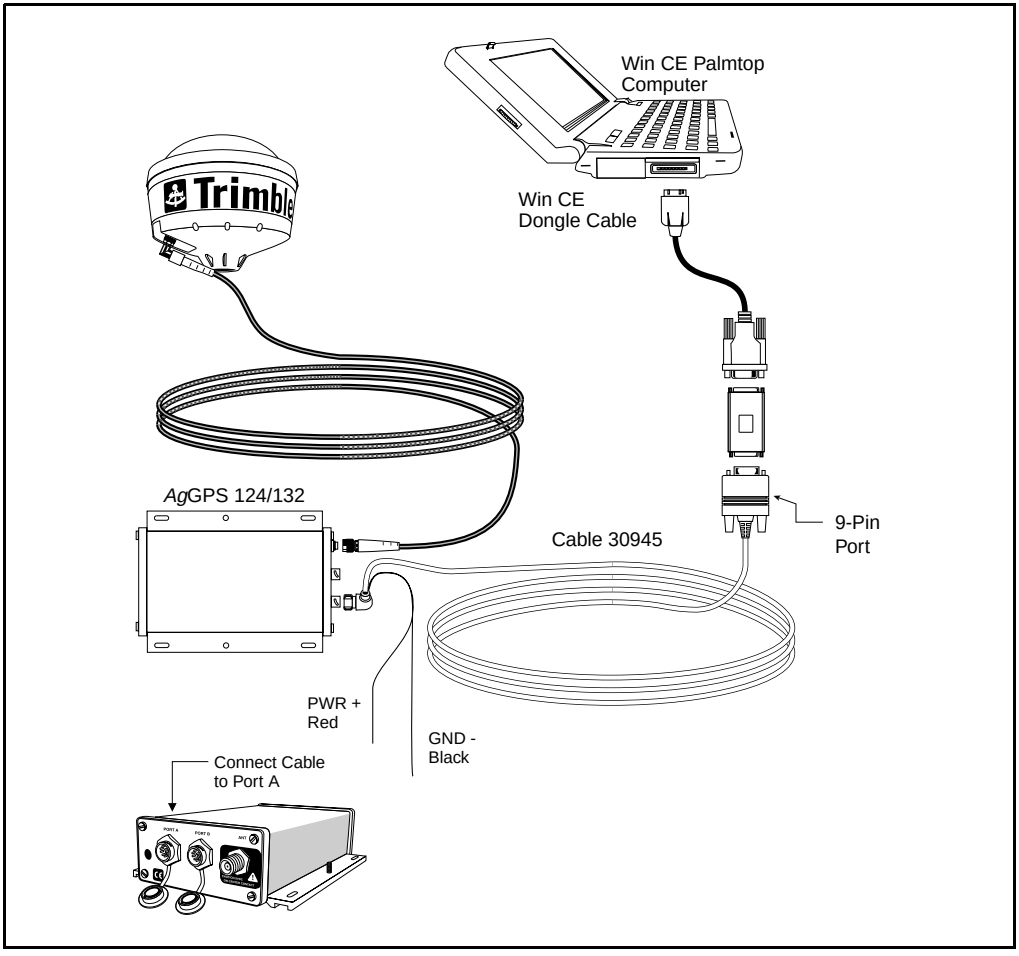


Figure 2.30 *Ag*GPS 124/132 Data/Power Cable and Null Modem to Windows CE Palmtop Computer

Note – *Attach the Null Modem adapter 9-pin RS 232 connector to the Windows CE computer (9-pin female connector).*

Connecting the *Ag*GPS 124/132 Data/Power Cable (P/N 30945) to a Windows CE Handheld Computer

Figure 2.31 shows the *Ag*GPS 124/132 receiver connected to a Windows CE handheld computer using the Data/Power Cable (P/N 40947) and the Windows CE Cable (P/N 40572).

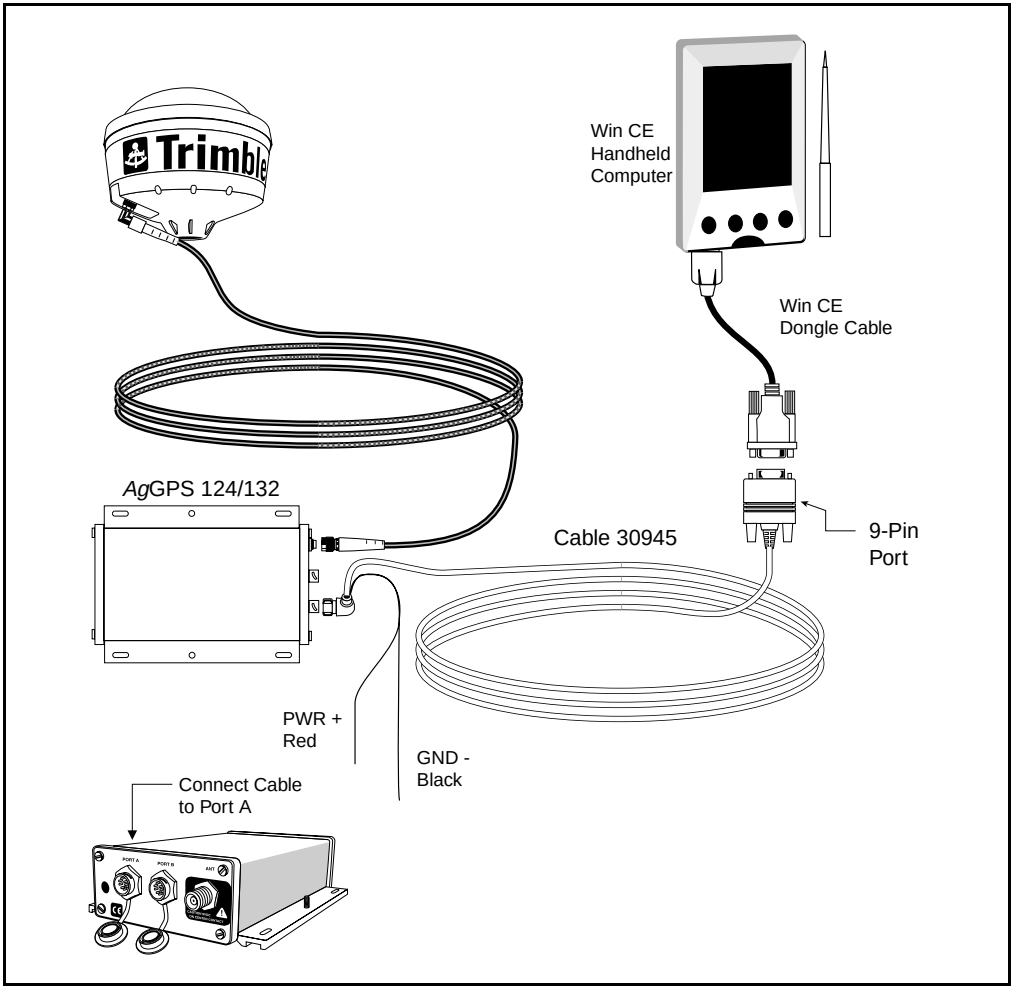


Figure 2.31 *Ag*GPS 124/132 Receiver to Windows CE Handheld Computer

Connecting the *Ag*GPS 124/132 Data/Power Cable (P/N 30945) to a Micro-Trak Yield Monitor

Figure 2.32 shows the *Ag*GPS 124/132 receiver connecting to a Micro-Trak Yield Monitor with the *Ag*GPS 124/132 Data/Power Cable (P/N 30945).

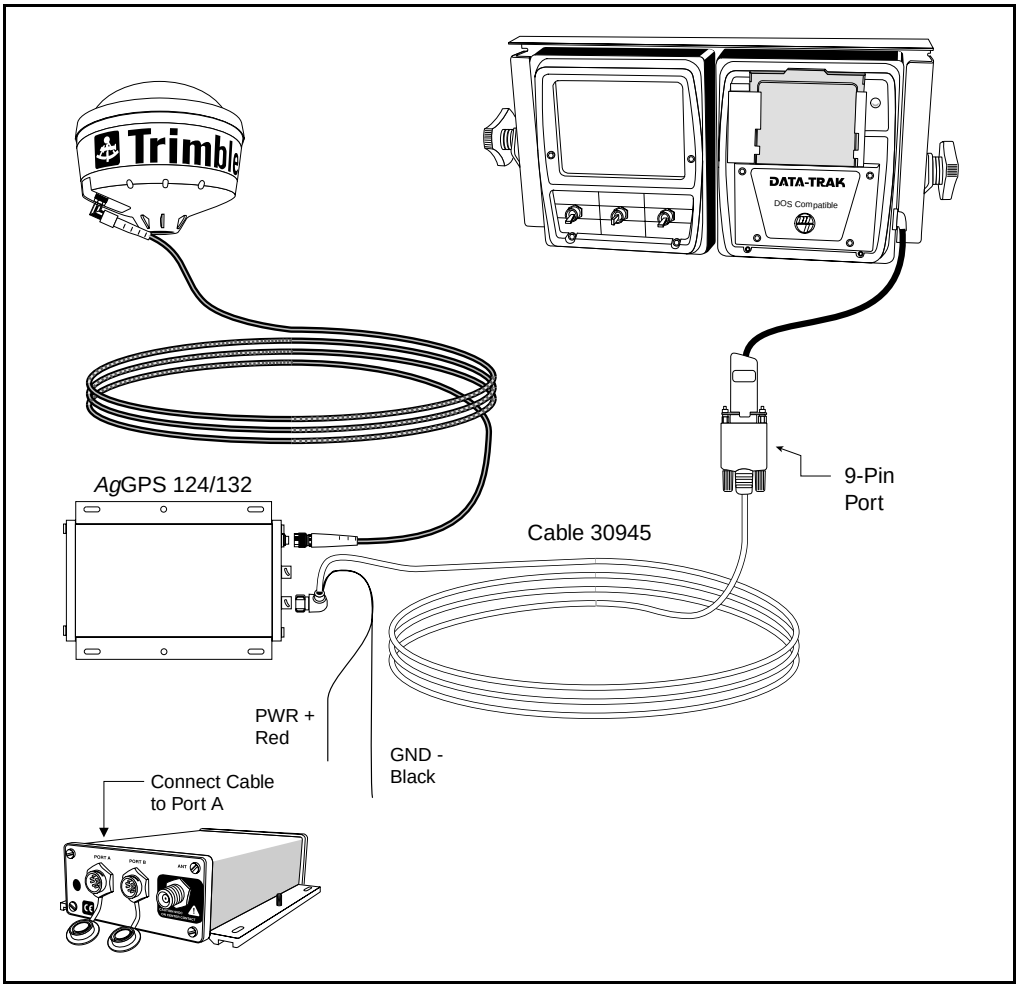


Figure 2.32 *Ag*GPS 124/132 Receiver to Micro-Trak Yield Monitor

CHAPTER

3

Getting Started

In this Chapter:

- Introducing the AgGPS Menu System
- Using the Front Panel and Keypad
- Viewing Status Screens
- The Home Screen
- Navigating Between Menus and Screens
- Working with Keypad Buttons
- Working with Fields
- Returning to the Home Screen
- Setting the Display Options

Introducing the *Ag*GPS Menu System

All *Ag*GPS receivers contain firmware (software on a memory chip). This internal software is the operating system that executes the receiver's operation and provides a viewable user interface for the menu system. The *Ag*GPS menu system is a simple-to-use, menu-driven user interface for:

- monitoring receiver status
- changing the receiver's configuration
- controlling receiver functions

The *Ag*GPS 124/132 receiver includes an integrated display and keypad for accessing the internal *Ag*GPS menu system. In addition, the menu system can be accessed in two other ways:

- using PC software, such as *Ag*Remote
- using a handheld device, such as the *Ag*GPS 70 Remote Display and Logger (RDL)

This chapter gives you basic instructions for using integrated keypad and display or *Ag*Remote software to monitor *Ag*GPS 124/132 receiver status and configure receiver options. For information about interfacing the handheld *Ag*GPS 70 RDL to the *Ag*GPS 124/132 receiver, refer to the *Ag*GPS 70 RDL *Operation Manual*.

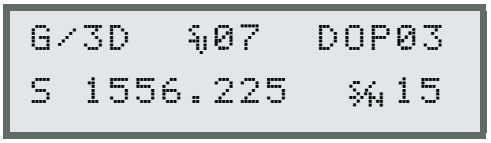
Note – *This manual includes instructions for installing the AgRemote software on a PC and connecting the PC to the AgGPS 124/132 receiver. For more information, see Appendix G, AgRemote Installation.*

The *Ag*GPS *Menu System Reference Manual* is the definitive reference for using and understanding the internal menu system of *Ag*GPS receivers. The latest version of the *Ag*GPS *Menu System Reference Manual* and *Ag*GPS receiver software upgrades (sometimes called firmware upgrades) are always available on the Trimble Precision Agricultural Systems World Wide Web site.

http://www.trimble.com/support/files/index.htm#ag

Using the Front Panel and Keypad

After powering on the *Ag*GPS 124/132 or starting the *Ag*Remote software, the front panel displays the *Home* screen.



From the *Home* screen, press 1 or 3 to access other *Ag*GPS menu system screens. Figure 3.1 shows the LCD Display and Keypad.

Two fold-out navigation maps are included in Appendix H, Navigation Maps. Fold open the navigation maps and use them for reference while navigating through the *Ag*GPS menu system.

The remainder of Chapter 3 gives basic instructions for using the menu system and setting display options. Chapter 4 shows how to configure the *Ag*GPS 124/132 receiver for operation.

Detailed information about the entire *Ag*GPS menu system is included in the *AgGPS Menu System Reference Manual*, also included with the *Ag*GPS 124/132 receiver. Use this manual as a reference guide for learning details about individual *Ag*GPS menu system screens.

Viewing Status Screens

Figure 3.1 shows the integrated keypad and the four keys used to navigate through the *Ag*GPS menu system.

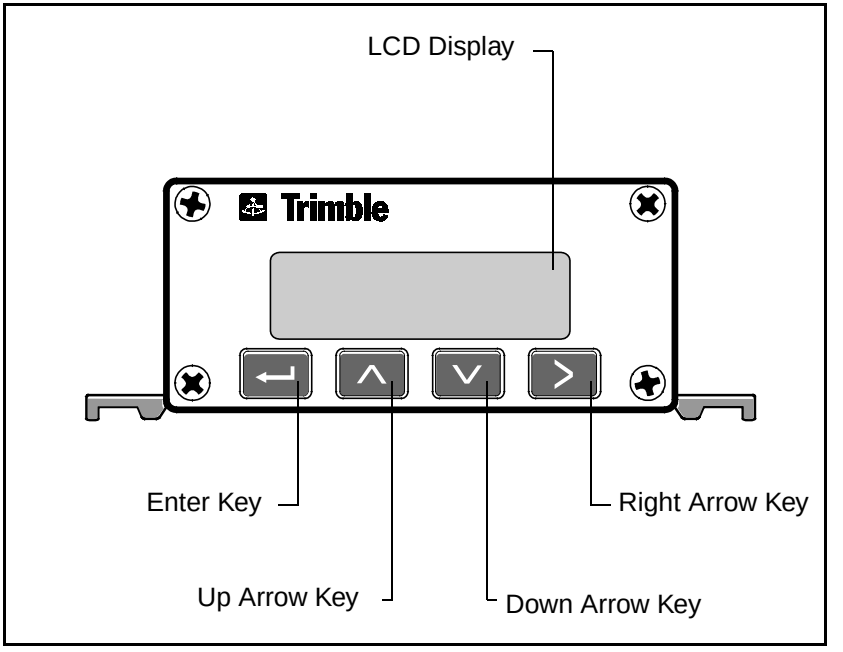


Figure 3.1 *Ag*GPS 124/132 Receiver Front Panel

Figure 3.2 shows the *Ag*Remote window with front screen simulator and the five keys used to navigate through the *Ag*GPS menu system.

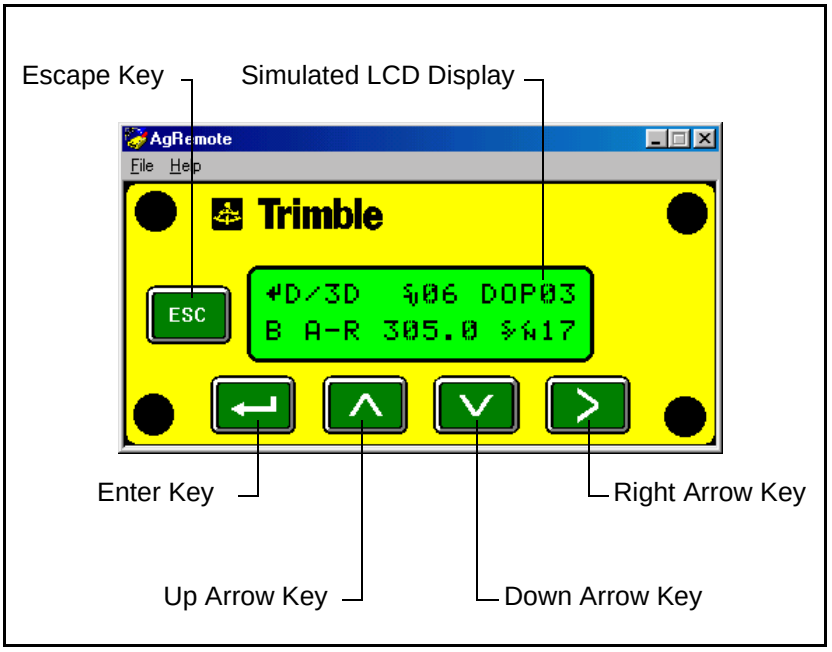


Figure 3.2 *Ag*Remote Window

Figure 3.3 shows the *Ag*GPS 70 Remote Data Logger. The *Ag*GPS 70 Remote Display and Logger (RDL) is a handheld device with integrated display screen. When connected to an *Ag*GPS 124/132 receiver, the RDL's display screen can be used to view status information, configure one or more *Ag*GPS 114, 122, 124, or 132 receivers, and log data collected by the receiver(s). Figure 3.3 shows the *Ag*GPS 70 RDL's display screen and the keypad buttons for navigating through *Ag*GPS menus and screens.

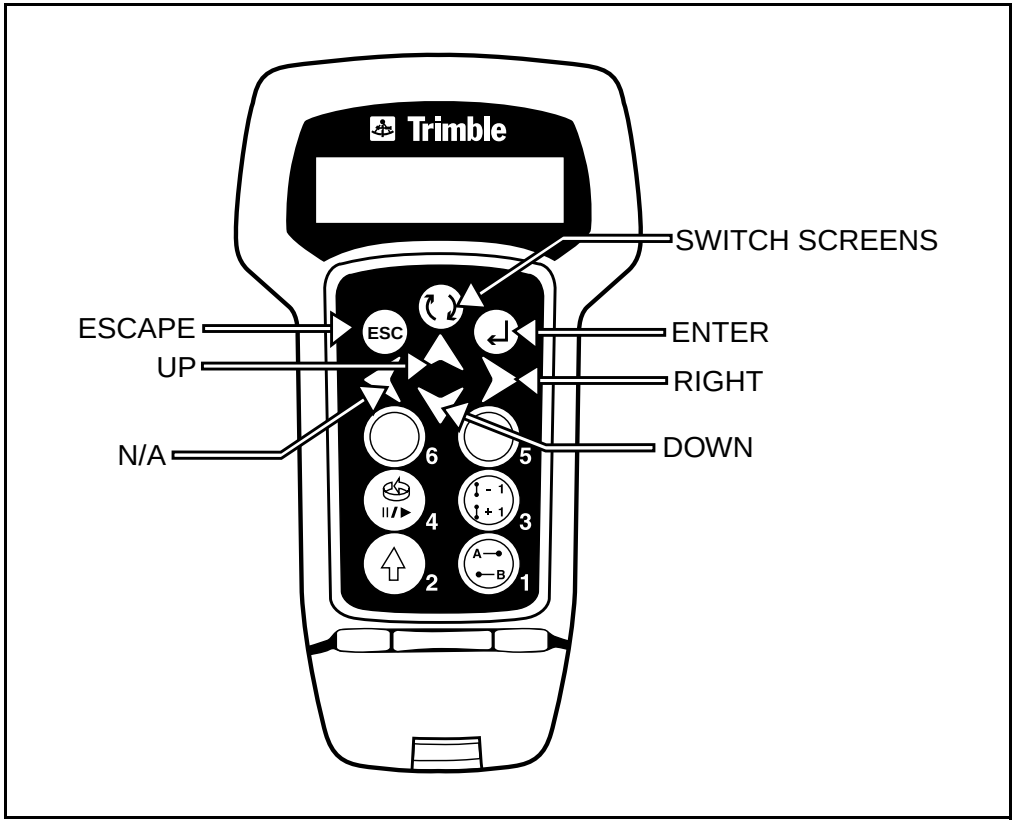
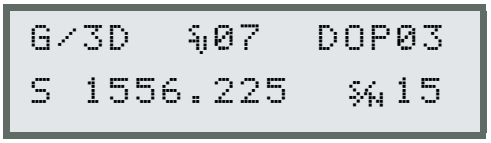


Figure 3.3 *Ag*GPS 70 Remote Display and Logger Keypad

The Home Screen

The *Home* screen is the first screen appearing when you start the *Ag*GPS 124/132 receiver:



When you access the *Ag*GPS 124/132 receiver using the receiver's front display, *Ag*Remote or the handheld *Ag*GPS 70 RDL, you will also see the *Home* screen. When the *Ag*GPS 124/132 receiver is operating, you generally leave the *Home* screen displayed to monitor the operation of the receiver. After viewing other receiver menus and screens, you generally return to the *Home* screen.

The top line of the *Home* screen displays important GPS status indicators, and the bottom line displays important Beacon DGPS or Satellite DGPS indicators.

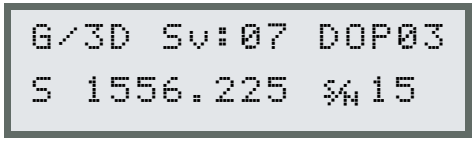
Beacon and Satellite Mode Home Screens

The *Ag*GPS 124 receiver is a Beacon DGPS receiver, and the *Ag*GPS 132 is a combined Beacon and Satellite DGPS receiver. Only the Beacon DGPS version of the *Home* screen appears on the *Ag*GPS 124 display. For the *Ag*GPS 132 receiver, a Beacon and Satellite DGPS version of the *Home* screen can appear on the display.

Note – *References to Satellite DGPS apply only to the AgGPS 132 receiver. When in Beacon DGPS mode, a B, Beacon Searching, Beacon Tracking, or Beacon FFT message appears in the lower-left corner of the screen. To change modes, press* 4 *and hold for 5 seconds. To display satellite differential information, press* 4 *until an* S *appears in the lower-left corner of the screen.*

When Beacon DGPS information appears in the *Home* screen, a **B** appears in the lower-left corner of the screen to indicate that the unit is operating in Beacon DGPS mode. The Beacon DGPS version of the *Home* screen has this appearance:

When Satellite DGPS information appears in the *Home* screen for the *Ag*GPS 132 receiver, an S appears in the lower-left corner of the display to indicate that the unit is operating in Satellite DGPS mode. The Satellite DGPS version of the *Home* screen has this appearance (*Ag*GPS 132 only):



The fields in the upper line of the display are identical for both versions of the *Home* screen. The second line displays either Beacon or Satellite DGPS information.

GPS Status Fields

Figure 3.4 explains the GPS status fields.

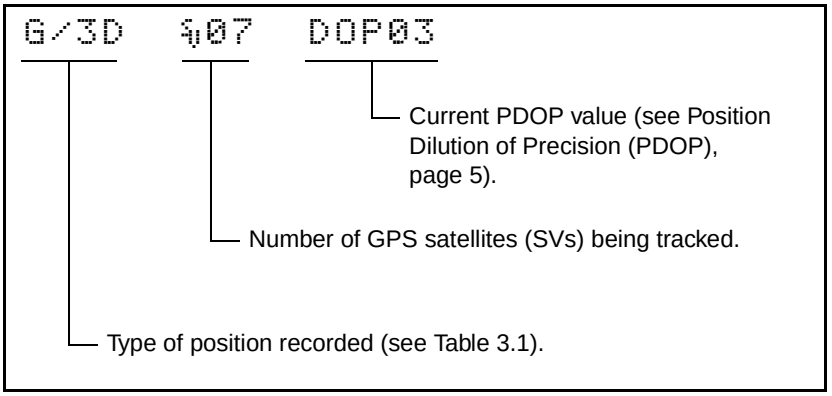


Figure 3.4 GPS Status Fields

Table 3.1 Position Types

Display	Description
SRCH	Searching for satellites.
TRCK	Tracking satellites.
G/2D	Outputting 2-dimensional autonomous positions.
G/3D	Outputting 3-dimensional autonomous positions.
D/2D	Outputting 2-dimensional differential positions.
D/3D	Outputting 3-dimensional differential positions.
Ant?	No antenna connected to receiver.

Note – *The / symbol spins when the receiver is operating properly. When the / symbol is still, an error occurred.*

Beacon DGPS Status Fields

Figure 3.5 explains the Beacon DGPS status fields.

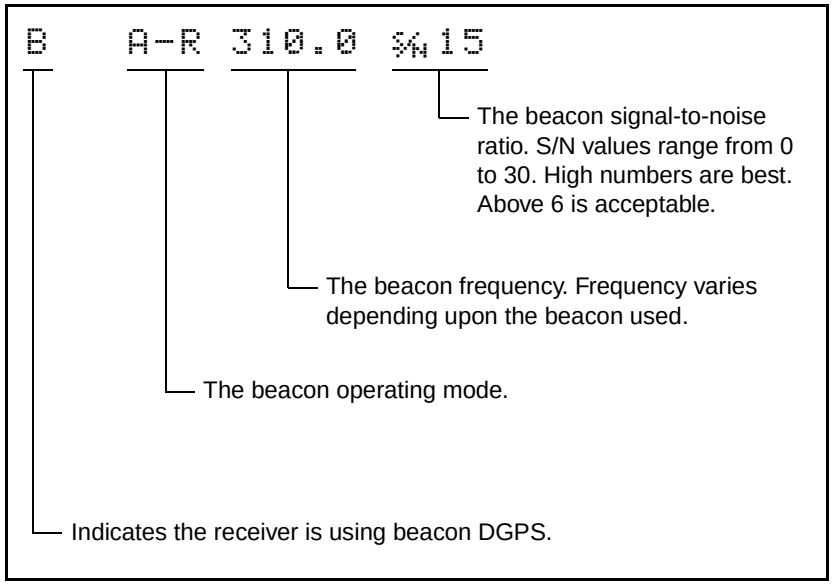


Figure 3.5 Beacon DGPS Status Fields

Table 3.2 describes the Beacon DGPS operating mode messages.

Table 3.2 Beacon DGPS Operating Mode Messages

Message	Description
B	Operating in beacon mode.
Beacon Searching	Searching for beacon signals.
Beacon Tracking	The receiver is tracking beacon signals and is attempting to gain lock.
Beacon Idle	The *Ag*GPS 124/132 beacon receiver is not active.
Beacon FFT	The *Ag*GPS 124/132 receiver is looking for a beacon across the signal spectrum.
Beacon Disabled	Beacon DGPS is disabled. Check configuration settings to enable Beacon DGPS.
External RTCM	Differential corrections are provided by an external source through port A or B.
Battery is Low	Warning replaces DGPS information when input voltage is low.

Satellite DGPS Status Fields

Figure 3.6 explains the satellite DGPS status fields (*Ag*GPS 132 only).

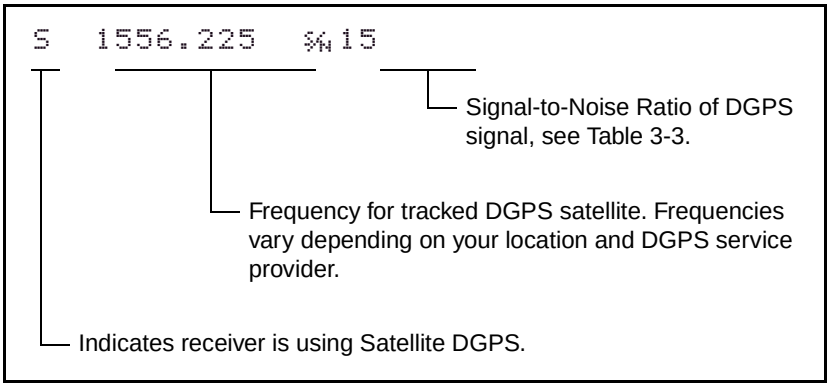


Figure 3.6 Satellite DGPS Status Fields

Table 3.3 explains Signal-to-Noise values.

Table 3.3 DGPS Signal-to-Noise Values

Value	Description
Below 4	Unusable
4–8	Fair
>8	Excellent

Table 3.4 shows the possible Satellite Differential Mode indicators.

Table 3.4 Satellite Differential Mode Status Indicators

Indicator	Description
S ####.### S/N ##	Operating in Satellite Differential mode.
S SRCH ###.##	Searching for Satellite Differential signal.
S TRCK ####.##	Tracking satellite without acquiring signal lock.

Navigating Between Menus and Screens

Figure 3.7 shows the *Home* screen, the screens on the *Display Options* menu, and the top level of the *Field Operations*, *Status,* and *Configuration* menus. The keys shown in the navigation map are pressed to navigate between the menus and screens.

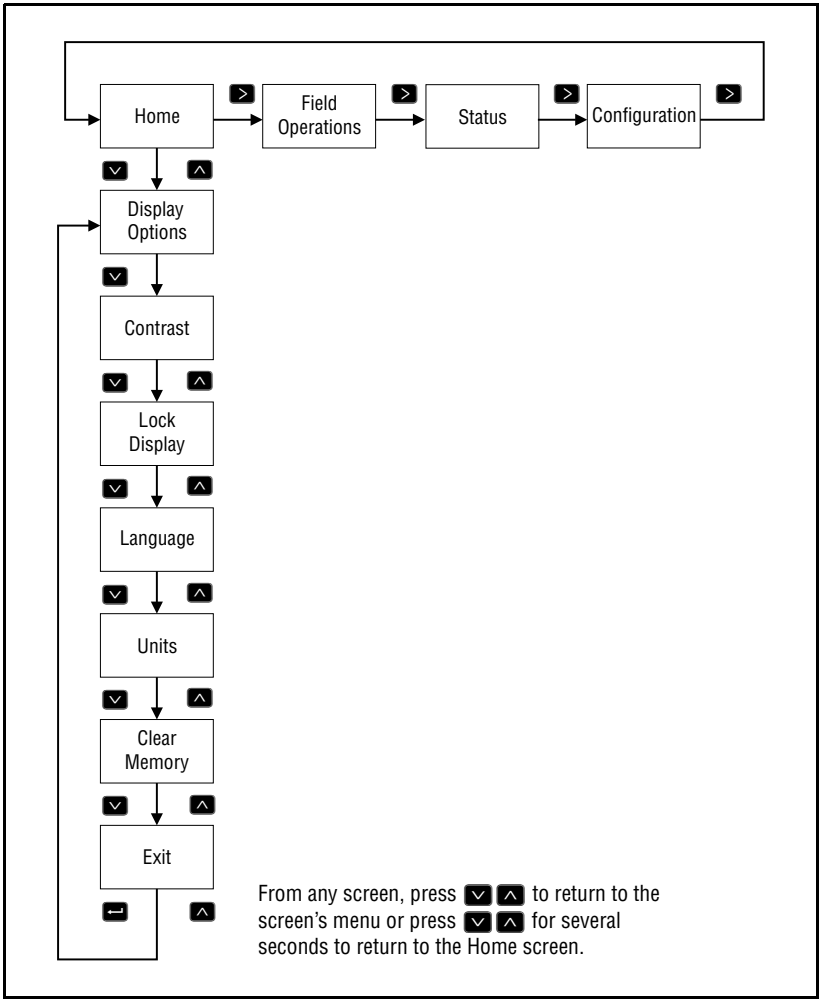


Figure 3.7 Home Screen and Upper-Level Menu Navigation Map

Menu Elements

Two levels of menus exist in the *Ag*GPS menu system. The upper level (see Figure 3.7) includes these menus:

- *Field Operations*
- *Status*
- *Configuration*

Each of these menus includes a second level of menus which access screens for selecting options or entering data. This second level of menus is shown in the navigation maps. For more information, see Appendix H, Navigation Maps.

Note – *Detailed information about each menu and screen in the second level of menus is described in the AgGPS Menu System Reference Manual. Chapter 4 includes brief guidelines for changing configuration settings. You can read the AgGPS Menu System Reference Manual to learn how to monitor or configure other receiver settings.*

You need to understand the difference between menus and screens for two key reasons:

- Menus and screens serve two different purposes—menus are used to navigate to other menus or screens, and screens are used to view receiver status or change configuration settings.
- The actions of the keypad keys are not the same when a menu or screen is displayed (see Figure 3.7).

Figure 3.8 shows the elements of the *Display Options* menu.

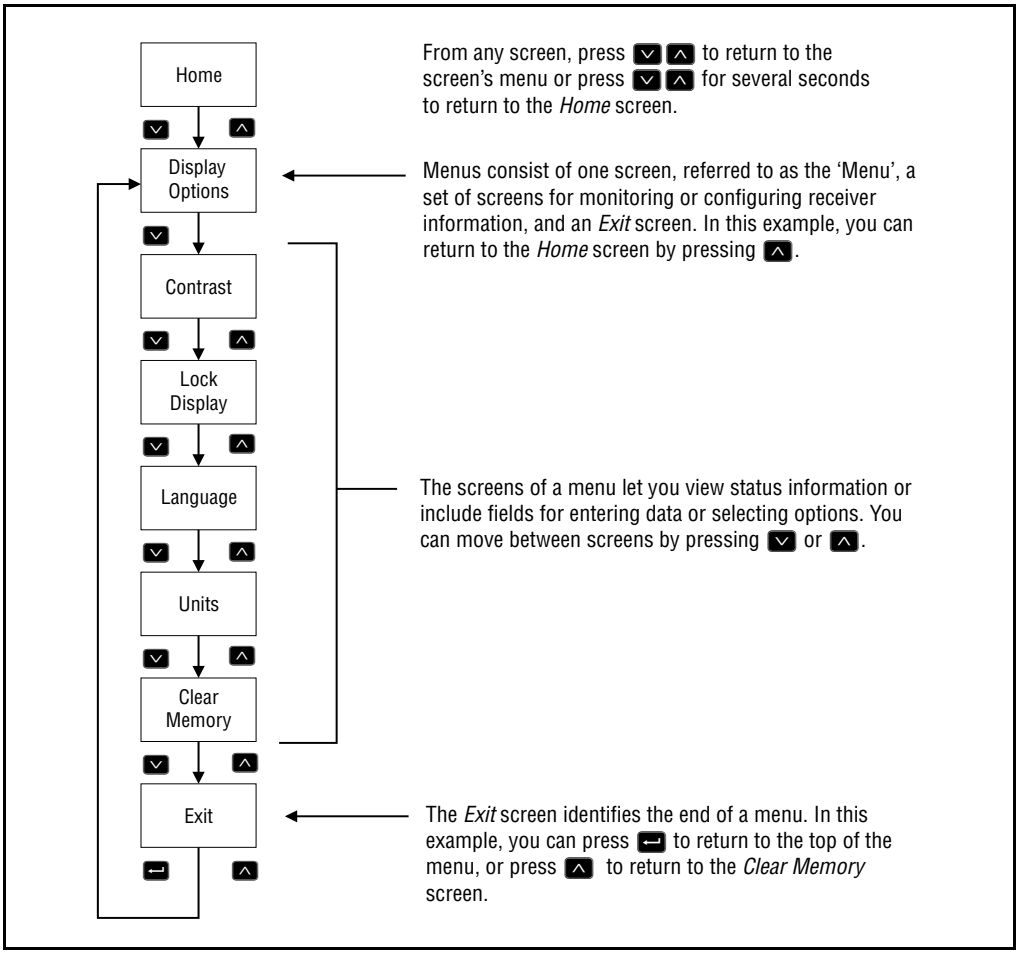


Figure 3.8 Display Options Menu Elements

All lower-level *Ag*GPS menus include the same basic elements. In the case of lower-level menus, you are returned to an upper-level menu—the *Field Operations*, *Status*, or *Configuration* menu (see Figure 3.7). From the upper-level menu, you can press 2 a second time to return to the *Home* screen.

Working with Keypad Buttons

The actions of the 124/132's front display keypad & *Ag*Remote keypad buttons are not the same when a menu or screen is displayed (see Figure 3.7).

Table 3.5 Keypad Button Actions

Button	Menu Actions	Screen Actions
	• Click to return to the top of the menu when a *Return* screen appears after the last screen in a menu.	• Click to change Satellite DGPS source mode from the *Home* screen. • Click from the *Lock Display Cfg* screen to display the *Enter Password* screen. • Click to save your changes after selecting an option from a field.
	• Click to display the next lower menu level. • Click to display the first screen from a lower menu level.	• Click to move downward through the screens in a menu. • Click to move downward through the list of options in Multiple-Choice fields.
	• Click to move from a lower-level menu to higher-level menu.	• Click to move upward through the screens in a menu. • Click to move upward through the list of options in multiple-choice fields.
	• Click to move horizontally through the upper- and lower-level menus. • Click from the last upper-level menu to return to the *Home* screen.	• Click to select an alphanumeric or multiple-choice field appearing on a screen. When alphanumeric or multiple-choice fields are available, the  symbol appears in the upper-right corner of the screen. • Click to move to the next letter or digit of an alpha, numeric or alphanumeric field.

Table 3.5 Keypad Button Actions (Continued)

Button	Menu Actions	Screen Actions
^ v	• For the *Ag*GPS 124/132 only, press both keys simultaneously to move to the previous menu. You can press the keys several times until you eventually return to the Home screen. • For the *Ag*GPS 124/132, hold down both keys for several seconds to jump back to the Home screen.	• For the *Ag*GPS 124/132 only, press both keys simultaneously to move to the previous menu. You can press the keys several times until you eventually return to the Home screen. • For the *Ag*GPS 124/132, hold down both keys for several seconds to jump back to the Home screen.
Esc	• For *Ag*Remote software only, click to move backward one level in *Ag*GPS software menu system. Ultimately, it returns you to the *Home* screen.	• For *Ag*Remote software only, click from a screen to return to the screen's menu. Click again to return to the previous menu level. Click once more to return to the *Home* screen.

Tip – The buttons appearing on the navigation map show you how to move between menus and screens. For more information, see Appendix H, Navigation Maps.

***Note** – Some screens show the ⁞ symbol. When you see this symbol, you can click ↵ to perform an action associated with the screen. The action is usually different for each screen. For more information, refer to the AgGPS Menu System Reference Manual.*

Working with Fields

Fields are areas of a screen containing status information or configuration settings. Three types of fields can appear on *Ag*GPS software system screens:

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

Display-Only Fields

Display-only fields show status information and other data automatically generated by the receiver or data acquired from satellite signals. They are for display-only purposes and cannot be edited. The GPS and DGPS data displayed on the *Home* screen and the fields on the *Status* menus are examples of display-only fields.

For example, the *System Voltages* screen (see Figure 3.9) includes two fields for monitoring receiver voltages.

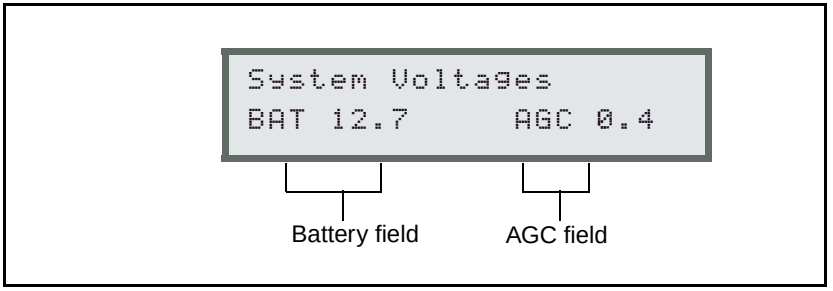


Figure 3.9 System Voltages screen

Multiple-choice Fields

Multiple-choice fields let you select one item from a list of options. Only one item from the list is displayed at one time. After you click > to select a multiple-choice field, click ^ to move downward through the list of options, or click v to move upward through the list of options. When the desired option is displayed, click ↵ to save your changes.

For example, the *EZ Satellite DGPS Configuration* screen (see Figure 3.10) includes two multiple-choice fields—one for selecting the Satellite Provider and another for selecting the satellite provider's Coverage Beam.

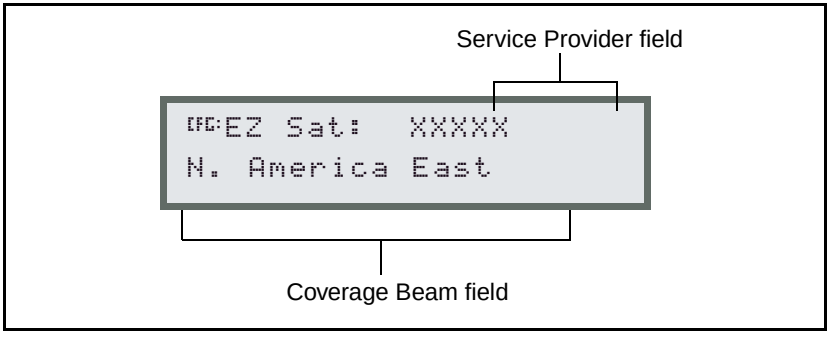


Figure 3.10 Easy Satellite DGPS Configuration screen

Alpha, numeric, and alphanumeric fields

Alpha, numeric, or alphanumeric fields appear on screens to let you enter alphabetical characters, numeric values, or a combination of the two respectively. Alpha screens accept only alphabetic characters, numeric fields accept only numeric values, and alphanumeric screens accept a combination of the two.

The procedure to change data is identical in all three field types. After you click 3 to select an alpha, numeric, or alphanumeric field, the first letter or digit in the field is selected. Click 1 or 2 to cycle through the list of alphabetical characters or numbers until the desired letter or number is displayed; then click 3 to select the next letter or digit in the field. Continue until all the alphabetical or numeric characters are entered.

After selecting the last letter or digit, click 4 to save your changes.

For example, the *Satellite Freq* screen lets you manually enter the broadcast frequency of a satellite service provider in a numeric field (see Figure 3.11).

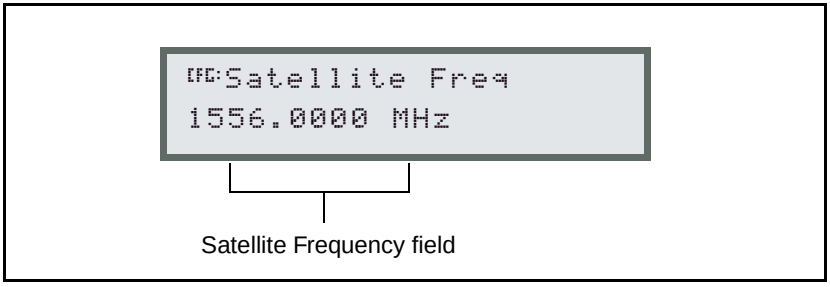


Figure 3.11 Satellite Freq screen

Returning to the Home Screen

You can return to the *Home* screen from other menus and screens in two ways:

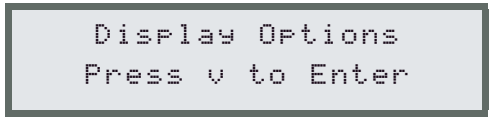
- For the *Ag*GPS 124/132 receiver and from any menu or screen, hold down ^ v at the same time to return to the next higher menu in the navigation map. Press ^ v at the same time for several seconds to immediately jump to the *Home* screen.
- For *Ag*Remote software and from any menu or screen, press Esc to return to the next higher menu in the navigation map. Press Esc one or more times until the *Home* screen appears.
- From the *Exit* screen of any menu, press ↵ to display the top level of the menu, and press v to move to the next higher menu level. You can then press > several times until the *Home* screen appears.

Setting the Display Options

The *Display Options* menu lets you select options which control the information displayed in screens under the *Field Operations*, *Status* and *Configuration* menus.

To view the *Display Options* menu:

1. Display the *Home* screen (page 85).
2. Press ^ to view the *Display Options* menu.



3. Press ^ to display the first screen on the menu.

Setting the Display Contrast

The *Contrast* screen is the first screen on the *Display Options* menu. As lighting conditions change, the LCD display could become difficult to read. You can adjust contrast to make the display easier to read. Lower numbers decrease contrast and higher number increase contract.

To change the contrast:

1. Press ^ one or more times until the *Contrast* screen appears.

2. Press > to select the field.
3. Press ^ to decrease contrast, or press 2 to increase the contrast.
4. Press ↵ to save your changes.

Password Protecting the Configuration Menus

The *Lock Display Cfg* screen provides protection against tampering. To make the configuration screens invisible, enter the last five digits of the receiver serial number. To view the configuration screens again, enter the five-digit number a second time.

Locking the Configuration Menus

To lock the *Configuration* menus:

1. Display the *Display Options* menu (see page 86).
2. Press ^ until the *Lock Display Cfg* screen appears:

3. Press ↵ to display the *Enter Password* screen.

4. Press ^ or v until the first serial number digit appears.
5. Press > to select the next number and repeat the previous step until all five digits are entered.
6. Press ↵ to save your changes.

   When complete, Valid Password message appears, and the *Configuration* menus are no longer displayed when you navigate through the menus. The Invalid Password message appears if you failed to enter the correct five-digit string.

Tip – When the *Configuration* screens are locked out, you can view most *Configuration* menu settings from the *Status* menus. For more information, refer to the *Ag*GPS *Menu System Reference Manual*.

Unlocking the Configuration Menus

To unlock the *Configuration* menus:

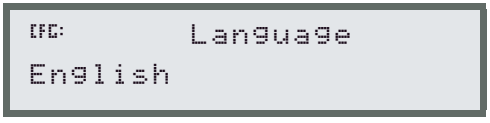
- Repeat the previous procedure to unlock the *Configuration* menus.

Selecting the Displayed Language

The *Language* screen lets you select the language used to display information on menus and screens.

To change the display language:

1. Display the *Display Options* menu (see page 86).
2. Press ^ until the *Language* screen appears:



3. Press > to select the Language field.
4. Press ^ or v to until the desired language appears.
5. Press ↵ to save your changes.

   The screen automatically displays the selected language.

Selecting the Units of Measure

The *Units* screen lets you display either U.S. or Metric units. This setting does not affect GPS position data output. This only affects information displayed on screens under the *Field Operation*, *Status* and *Configuration* menus.

To change the units:

1. Display the *Display Options* menu (see page 86).
2. Press ^ until the *Units* screen appears:

3. Press > to select the Units field.
4. Press ^ to select the appropriate units.
5. Press ↵ to save.

Clearing Battery-Backed RAM

All of the changes you make while configuring your *Ag*GPS receiver are stored in battery-backed memory. You can use the *Clear Memory* screen to clear all changes stored in battery-backed memory and revert to the factory default settings.

Warning – All of your *Configuration* menu settings are permanently cleared and cannot be restored when you select this option.

To clear battery-backed memory:

1. Display the *Display Options* menu (see page 86).
2. Press ^ one or more times until the *Clear Memory* screen appears.
3. Press ^ or v to toggle the field to *Yes*.
4. Press ↵ to clear memory. All configuration settings are cleared from memory.

Exiting the Display Options Menu

The *Exit* screen appears after exiting the last screen on the *Display Options* menu:

You will see a similar screen when you reach the end of any *Field Operations*, *Status*, or *Configuration* menu. You have these options when an *Exit* screen appears.

To exit the *Display Options* menu:

1. Press ↵.
2. Press v to return to the *Home* screen.

To revisit previous *Display Options* screens:

- Press v one or more times.

To return to the first screen in the *Display Options* menu:

- Press ^.

CHAPTER

4

Configuring the *Ag*GPS 124/132 Receiver

In this chapter:

- AgGPS 124/132 Configuration
- Configuring Beacon DGPS
- Activating and Configuring Satellite DGPS
- Manual OmniSTAR Activation
- Racal Differential Correction Solution
- Configuring Port Communication

*Ag*GPS 124/132 Configuration

The Beacon/Satellite Differential GPS operation parameters and Port configuration parameters are not set from the factory. These settings have to be configured to allow the *Ag*GPS 124/132 receiver to be used immediately after installation. You can use the *Ag*GPS 124/132 keypad and display or *Ag*Remote software to change configuration parameters and activate satellite differential service.

Tip – Two fold-out navigation maps are included in Appendix H, Navigation Maps. Fold open the second page of the navigation map and use it for reference while navigating through the *Ag*GPS menu system.

Changing Configuration Settings

For basic instructions, see Getting Started, page 65.

To use a typical *Configuration* screen:

1. Display the *Home* screen (see page 85).
1. Click > three times to display the *Configuration* menu, and click ^ to display the first *Config* menu.
2. Click > several times until the desired *Config* menu appears, and click ^ to display the first *Config* screen.
3. Click ^ or v to navigate through the *Config* screens.
4. When the desired screen appears, click > to select the field. The cursor flashes when the field is selected.
5. Select the field value or edit the field information (see page 82).
6. Click ↵ to save your changes.
7. Click ^ or v one or more times to display another *Config* screen.
8. Return to the *Home* screen (see page 85).

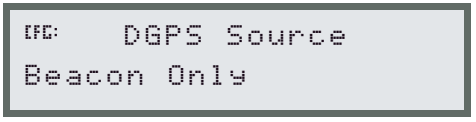
Configuring Beacon DGPS

*Ag*GPS 124/132 receiver the units are factory configured to use Beacon DGPS in Auto Range DGPS Mode. If you need to configure your *Ag*GPS 132 receiver for Satellite DGPS, see Activating and Configuring Satellite DGPS, page 98.

The *Beacon DGPS Config* screens let you select the frequency of the two receiver channels used to receive RTCM SC-104 broadcasts from radiobeacons. Both the *Ag*GPS 124 and *Ag*GPS 132 receiver can be configured for Beacon DGPS.

To configure Beacon DGPS:

1. Display the *Home* screen (see page 71).
2. Press > until the *Configuration* menu appears, and press ^ to display the first configuration menu.
3. Press > until *the DGPS Config* menu appears.
4. Press ^ until *DGPS Source* screen appears:



   Verify that the second line of the screen displays *Beacon Only.* If not, press > to select the Data Source field, and press ^ until *Beacon Only* appears.

5. Press ^ until the *Beacon Mode* screen appears:

6. Press > to select the field, and press ^ until the desired Beacon Mode appears (see Table 4-1).

Table 4-1 Beacon Modes

Mode	Description
Auto Range Mode	Reads the incoming RTCM SC-104 message stream and selects the two closest radiobeacons within range of the *Ag*GPS receiver. The closest radiobeacon is automatically assigned to Beacon DGPS Channel 0, and the second closest is assigned to Channel 1.
Auto Power Mode	Detects the signal strength of the two most powerful radiobeacons within range of the *Ag*GPS receiver. The most powerful radiobeacon is automatically assigned to Beacon DGPS Channel 0, and the second is assigned to Channel 1.
Disabled Mode	Disables DGPS and forces the *Ag*GPS receiver to operate in GPS mode only.
Manual Freq Mode	Disables the automatic selection of radiobeacons and lets you manually select the frequency of radiobeacons for Channel 0 and 1.

7. Before proceeding, do one of the following:
   - If you selected *Auto Range Mode* or *Auto Power Mode*, your configuration is now complete, and you can perform step 8. The *Ag*GPS 124/132 receiver will automatically detect the two closest or two most powerful beacons.
   - If you selected *Manual Freq Mode,* perform the either the procedure for selecting Beacon frequencies using the *EZ Bcn* screens or the procedure for manually selecting Beacon DGPS frequencies. For more information, see Selecting Beacon DGPS Frequencies using the EZ Bcn 0 and EZ Bcn 1 Screens, page 96 or Manually Selecting Beacon DGPS Frequencies, page 97.
   - If you selected *Disabled Mode*, the *Ag*GPS receiver ignores incoming RTCM SC-104 messages and operates as a GPS-only receiver.
8. Return to the *Home* screen (see page 85).

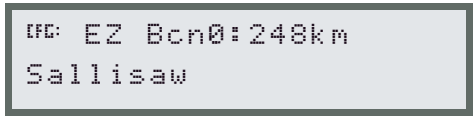
Selecting Beacon DGPS Frequencies using the EZ Bcn 0 and EZ Bcn 1 Screens

Perform the following steps if you set the *DGPS Source* screen to *Manual Freq Mode* and want to use the *EZ Bcn 0* and *EZ Bcn 1* screens to select radiobeacon tower name.

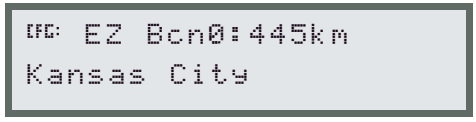
The *EZ Bcn* screens use radiobeacon information in RTCM SC-104 broadcasts to create a list of radiobeacons within range of the *Ag*GPS 124/132 receiver. You can use the *EZ Bcn 0* and *EZ Bcn 1* screens to manually select radiobeacons from this list for Beacon Channels 0 and 1.

To manually select Beacon DGPS radiobeacon frequencies using the *EZ Bcn* screens:

1. Display the *Configuration* menu (see page 92).
2. Press > until *the DGPS Config* menu appears.
3. Press ^ until *EZ Bcn 0* screen appears:



4. Press > to select the field for Beacon Channel 0.
5. Press ^ or v until the desired beacon station appears.
6. Press ↵ to save your change.
7. Press ^ to display the *EZ Bcn 1* screen:



8. Repeat steps 4 through 6 to select the station for Beacon Channel 1.

Manually Selecting Beacon DGPS Frequencies

Before manually entering radiobeacon tower frequencies you set the *DGPS Source* screen to *Manual Freq Mode*, **see** Chapter 4.2, Configuring Beacon DGPS.

Note – *Perform the following steps only if you cannot find the desired radiobeacon name in the tower name list.*

To manually select Beacon DGPS radiobeacon frequencies:

To manually select Beacon DGPS radiobeacon frequencies using the *EZ Bcn* screens:

1. Display the *Configuration* menu (see page 92).
2. Press > until *the DGPS Config* menu appears.
3. Press ^ until *Man Bcn Freqs* screen appears:

4. Press > to select the Beacon Channel 0 field.
5. Enter the frequency of the beacon station, and press ↵ to save your changes. For more information, see Working with Fields, page 82.
6. Press > to select the Beacon Channel 1 field.
7. Repeat step 5.

Activating and Configuring Satellite DGPS

The *DGPS Config* screen lets you select the differential service provider used by the *Ag*GPS 124/132 receiver. When configuring the *Ag*GPS 124/132 receiver, only the *Satellite DGPS* screens shown in the navigations map are available. For more information, see Appendix H, Navigation Maps.

Note – *The AgGPS menu system supports both* Beacon DGPS *and* Satellite DGPS *configuration and status screen sets. The appropriate configuration and status screen set is automatically selected for each receiver product. The AgGPS 132 can use either the Beacon or* Satellite DGPS *configuration and status screen set. If you want to configure your AgGPS 132 for Beacon DGPS, see page 93.*

If you experience problems attempting to configure the AgGPS 132 for your Satellite DGPS service provider, see Appendix E, Activating Satellite DGPS Service.

To display the *DGPS Config* menu:

1. Display the *Home* screen (see page 85).
1. Click > three times until the *Configuration* menu appears.
2. Click ^ to display the first *Config* menu.
3. Click > until *DGPS Config* menu appears.
4. Click ^ until *DGPS Source* screen appears.

The following sections show you how to configure the applicable *DGPS Config* screens.

DGPS Source

When using an *Ag*GPS 124/132 receiver, the DGPS Source setting determines what type of differential corrections are applied the computed GPS position. The *Ag*GPS 124/132 receiver defaults to *Satellite Only* (see below).

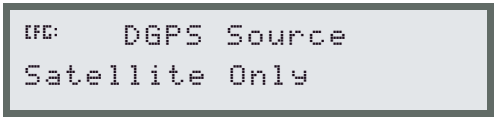


Table 4.2 describes the DGPS source settings.

Table 4.2 DGPS Source Settings

Setting	Description
Satellite Only	Satellite DGPS corrections are used (subscription must be activated to receive data).

Easy Satellite DGPS Configuration

The *Easy Satellite DGPS Configuration* screen lets you select the satellite provider and coverage beam to be used for satellite differential correction service. After selecting the *Coverage Beam Name* (XXXXX), *Ag*GPS 124/132 receiver automatically knows what frequency and baud rate to use.

When you obtain your satellite subscription, the service provider will tell you which satellite coverage beam to choose. The actual satellite coverage beam name depends on your geographic location and differential service provider.

To select the provider name and the desired beam:

1. Click > to select the XXXXX (Coverage Beam) field.
2. Click ^ until your provider is listed (*Omni** or *Racal*)
3. Click > to move to the next field.
4. Click ^ until the geographic location is displayed.
5. Click ↵ to save your changes.

Two differential service providers are available for use with the *Ag*GPS 124/132 receiver:

- In the U.S. and Canada, contact OmniSTAR at: 888-883-8476.
- In the U.S. and Canada, contact Racal-LandStar at: 888-434-7757.

Satellite Frequency

Change the satellite beam frequency *only* when instructed to by the differential service provider. To apply corrections from a satellite differential service, you can manually enter the appropriate satellite beam frequency.

Note – *The Satellite Freq and Satellite Baud screens are only used when the satellite coverage beam name is not found under the Easy Satellite DGPS Configuration screen. This could occur if the DGPS provider changes the beam frequency or baud rate after the release of the current receiver software version.*

To set the differential service satellite frequency:

1. Display the *Satellite Freq* screen:

2. Click > to select the field.

   The first number in the field flashes.

3. Click ^ or v to change the value.
4. Click > to select the next number in the field.
5. Repeat the previous two steps until the proper frequency is entered.
6. Click ↵ to save your changes.

The satellite frequency depends on your geographic location and differential service provider. For a listing of local satellite frequencies, contact your differential service provider.

Two differential service providers are available for use with the *Ag*GPS 124/132 receiver:

- In the U.S. and Canada, contact OmniSTAR at: 888-883-8476.
- In the U.S. and Canada, contact Racal-LandStar at: 888-434-7757.

Satellite Baud

The Satellite Baud must match the baud rate of the satellite beam frequency selected on *Satellite Freq* screen (see page 101*)*. The satellite baud rate is determined by the differential service provider.

Note – *The Satellite Baud screen is used only when the satellite coverage beam name is not found under the Easy Satellite DGPS Configuration screen. This could occur if the DGPS provider changes the beam frequency or baud rate after the release of the current receiver software version.*

The *Satellite Baud* screen is shown below.

Available baud rates are 600, 1200, and 2400.

Manual OmniSTAR Activation

If an over-the-air activation fails or if you prefer to activate OmniSTAR differential service manually, the 24-digit OmniSTAR satellite differential service activation code is entered on this screen.

The *Omni** screen is shown below.

For information about activating the OmniSTAR satellite differential service, see Appendix E, Activating Satellite DGPS Service. Contact OmniSTAR for the 24-digit activation code for your *Ag*GPS 124/132 receiver.

Note – *If a receiver is activated automatically over-the-air, the OmniSTAR activation code is not displayed.*

Note – *If an incorrect number (such as all zeros) is input, retry using the correct activation code. Incorrect codes have no effect on receiver operation.*

Racal Differential Correction Solution

In some geographic locations, Racal network DGPS solutions are not available. In these locations, the corrections can be received from the nearest reference station.

The *Racal Stns* screen is shown below:

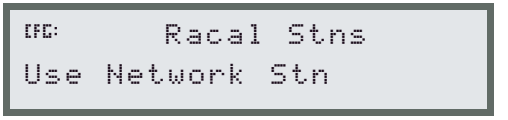


Table 4.3 describes the Racal station settings.

Table 4.3 Racal Station Settings

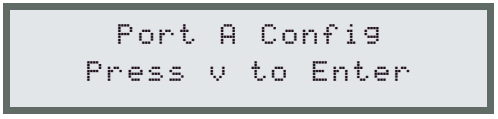
Setting	Description
Use Network Stn	Uses corrections from the Racal network. These corrections are usually more accurate than from a single station.
Use Closest Stn	Uses corrections from the closest reference station. These solutions are necessary if you are located outside the network range.

Configuring Port Communication

Port A and B must be configured to ensure that the proper data type is input to and output from the *Ag*GPS 124/132 receiver. The configuration of Port A and Port B is identical. Only Port A is discussed in this chapter. For more information, see Routing and Connecting the Antenna Cable, page 30.

To display the *Port A Config* menu:

1. From the *Home* screen, click > until the *Configuration* menu appears.
2. Click ^ until *GPS Config* menu appears.
3. Click > until the *Port A Config* menu appears:



4. Click ^ to cycle through the screens.

The *Port A Config* screens are described in the following sections.

Setting the Port Input/Output Parameters

Port Input/Output settings are important when communicating with the *Ag*GPS 21 LightBar and other external devices.

The *Port-A Input/Output* screen is shown below:

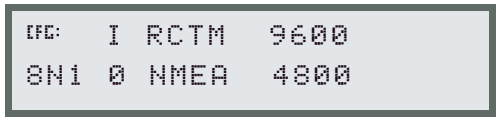


Table 4.4 describes the port input parameter settings.

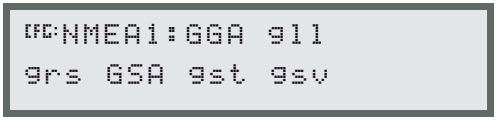
Table 4.4 Port Input Parameter Settings

Setting	Description
None	Nothing is input or output.
TEXTB	ASCII data from an external device, such as a chlorophyl meter, can be input on Port A, merged with NMEA GPS data, and output 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,<up to 66 ASCII characters>*<2 digit checksum><CR><LF>. To output the combined NMEA string, NMEA must be selected as the output protocol on Port B.
TEXTA	See the description for the TEXTB setting. TEXTA inputs on Port A, not Port B.
RTCM	Inputs RTCM data from an external DGPS device, such as an FM pager.
TSIP	Inputs TSIP data packets from the port when using the optional *Ag*Remote software or using the *Ag*GPS 70 Remote Display & Logger.
LBAR	Inputs data from the *Ag*GPS 21 LightBar. This setting is required when using the *Ag*GPS Parallel Swathing Option.

The remaining settings configure baud rate, data bits, stop bits, and parity. The output default settings are 4800, 8-N-1.

NMEA 1 Settings

The *Port A NMEA-1* screen is the first screen of four screens that allow NMEA messages to be selected for output from the current port. Capitalized NMEA message types are output; lower-case messages are not output. The default messages are GGA, GSA, VTG, and RMC. The *Port-A NMEA1* screen is shown below:



To change the NMEA messages output:

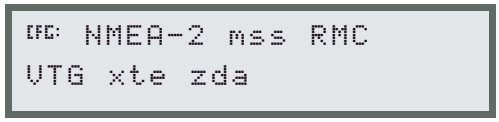
1. Click >. The first three-letter NMEA message type flashes.
2. Click ^ or v to change the capitalization of the NMEA message type.
3. Capitalize the NMEA message(s) to be output, and click ↵ when you are finished.

Note – *More NMEA message types are available on the Port A and Port B NMEA-2, NMEA-3, and NMEA-4 screens.*

NMEA 2 Settings

The *Port A NMEA-2* screen is a continuation of the message options found on the *Port A NMEA-1* screen. Four NMEA screens are required to present all of the NMEA message options. Capitalized NMEA message types are output; lower-case messages are not output.

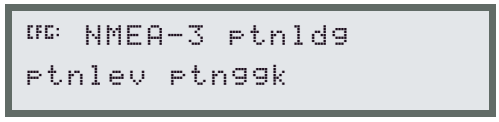
The *Port A NMEA-2* screen is shown below:



NMEA 3 Settings

The *Port A NMEA-3* screen is a continuation of the message options found on the *Port A NMEA-1* and *NMEA-2* screens. Capitalized NMEA message types are output; lower-case messages are not output.

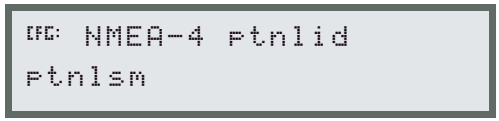
The *Port A NMEA-3* screen is shown below:



NMEA 4 Settings

The *Port A NMEA-3* screen is a continuation of the message options found on the *Port A NMEA-1, NMEA-2, NMEA-3* screens. Capitalized NMEA message types are output; lower-case messages are not output.

The *Port A NMEA-4* screen is shown below:

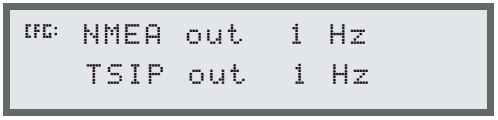


Note – *For detailed information about content and structure of NMEA messages, see Appendix C, NMEA-0183 Messages.*

Port Output Rate

This setting can be used to vary the NMEA and TSIP output rate. For example, if the *Ag*GPS Parallel Swathing Option is connected, *Ag*GPS 21 Lightbar data is output at a rate of 5 times per second (5 Hz). Meanwhile, on the other port, NMEA or TSIP data can be output to a computer software package, yield monitor, variable rate controller, or other equipment at 5 times per second or at a slower rate.

The *Message Rate* screen is shown below:



To modify the port output rate, select the NMEA or TSIP message and choose the required rate. *ASAP* equals the rate selected on the *PV Filter and Position Rate* screen under the *GPS Config* menu. A setting of *1* outputs a position once every 1 second. A setting of *ASAP* outputs positions 5 or 10 times every second. The default (factory) setting is 1 Hz. If a faster position output rate is needed, the Fast Rate Option must be installed into the *Ag*GPS 124/132 receiver. For more information, see Appendix F, Fast Rate Output.

Warning – No messages are output unless the message type is selected in the *Port Output* screen.

CHAPTER

5

Troubleshooting

In this chapter:

- Increasing GPS Accuracy
- Intermittent GPS Loss
- Power Lines and Strong Magnetic Fields
- Choosing a Mounting Location
- Checking for Cable Failure
- Reducing Engine Noise
- Why Satellite DGPS Works in Some Places But Not Others
- Verifying the Unit is Outputting NMEA Messages
- Not Tracking Satellites or Differential Signal
- Tracking Satellites and OmniStar/Racal but no Differential Signal
- Losing Configuration Settings When the Receiver is Powered Off
- Restoring the Receiver to Factory Defaults
- Troubleshooting Guides

This chapter covers frequently asked questions and troubleshooting techniques for the *Ag*GPS 124/132 receiver. Trimble recommends you read through this chapter before calling technical support.

Increasing GPS Accuracy

The *Ag*GPS 124/132 receiver always gives the most accurate position under the current GPS, satellite differential operating conditions. By manipulating various GPS masks, some satellite configurations are locked out, preventing less accurate positions from being computed. However, these changes can prevent positions from being output.

If your GPS application can tolerate occasional outages, then more accuracy is possible by changing the various GPS receiver parameters from their default values.

There are many GPS receiver parameters that affect accuracy:

- Elevation Mask

  The default Elevation Mask is *8°*. Raising this mask prevents the receiver from using some low elevation satellites, often a source of inaccurate positions.

- Signal Strength Mask

  The default Signal Strength Mask is *6*. Increasing the signal strength mask prevents the use of weaker GPS signals that contribute to inaccurate positions.

- PDOP Mask

  The default PDOP Mask is *6*. Lowering this mask ensures the receiver uses only satellite constellations that provide the highest accuracy.

- GPS Mode

  The default GPS position mode is *Auto 2D/3D*. Three-dimensional positions are more accurate than two-dimensional positions, so changing the receiver to *Manual 3D* prevents 2D positions from being computed.

- DGPS Mode

  The DGPS mode default setting is DGPS *Auto/On/Off*. Selecting *DGPS Only*, restricting the receiver to only output differential GPS positions, prevents autonomous (non-differential) positions from being computed.

A relatively uncontrolled source of position inaccuracy is multipath noise, caused by reflections of the GPS signals from nearby buildings and flat surfaces. For greatest accuracy, mount the GPS receiver so it has a clear view of the sky. Accuracy is highest when operating away from buildings and trees.

Intermittent GPS Loss

When GPS lock is intermittent, the data/power cable or antenna cable may have a loose connection. Check that all connections are secured properly. Water may enter the cable connection and cause intermittent loss of signal. Disconnect the cable and let the connection dry. Reconnect the cable.

If the receiver is connected properly, make sure that it is mounted on the highest point of the vehicle, so that no GPS signals are blocked. Depending on the orientation of the vehicle, the satellites and the possible obstruction, one or more satellites may be blocked. Sometimes blocking shows up when traveling in one direction, but not while traveling in other directions.

If the receiver seems fine, check the configuration masks. If the PDOP or SNR Masks are set to extreme levels, the receiver could possibly ignore valid satellite data. The default SNR Mask is 6. The default PDOP Mask is 6.

Power Lines and Strong Magnetic Fields

In North America, the energy from power lines is 60 Hz (50 Hz in Europe). The harmonic energy falls off rapidly as the frequency increases. Thus, power lines have very little effect on the GPS, Beacon DGPS, and Satellite DGPS signals.

Strong magnetic fields have no effect on GPS, Beacon DGPS, and Satellite DGPS signals. 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 it, or turn off the suspect electronics while observing the GPS receiver's number of satellites being tracked or satellite's signal-to-noise ratio.

Choosing a Mounting Location

The receiver must be mounted so that it has a clear view of the sky, on the center line of the vehicle, away from any sources of interference such as electric motors. See Choosing a Location, page 24.

Checking for Cable Failure

To check a cable for a short, use an ohmmeter. The resistance of a good cable, between connector pins at each end of the cable, is zero.

If the cable checks out fine, but you are confident it is the cable causing the errors, swap out the cable with another known working cable (if possible).

If the cable is defective, contact your local Trimble dealer for an RMA # (if your Trimble product is still in warranty) or to purchase a replacement cable.

Reducing Engine Noise

An unshielded ignition system can radiate enough noise to block reception of the beacon signal. To solve this problem, use resistor spark plug wires. Sometimes an alternator generates noise that interferes with the beacon. Use bypass capacitors, commonly available in automotive stores for cleaning up interference to CB and other radios. If the problem persists, engine components can be shielded with aluminum foil. In many instances the antenna must be relocated on the machine. The optimal antenna location can be determined by watching the Signal-to-Noise (S/N) value on the *Ag*GPS 124/132 receiver's front display. Preferably a value of 10 or higher is desired when using a Beacon DGPS signal. For more information, see The Home Screen, page 71.

Before purchasing new engine parts, make sure that there is not a PC computer or power source near the *Ag*GPS 124/132 receiver. Some PCs and their power sources generate noise that is disruptive to the GPS and Satellite DGPS signals.

Why Satellite DGPS Works in Some Places But Not Others

Local canopy cover in the direction of the differential satellite can reduce the correction signal strength to unusable levels. Wet canopy reduces signals even more. The same local environmental factors that affect GPS signals, such as radar sets, microwave transmitters, and the like, can interfere with the differential satellite signals.

Differential satellite signals are line-of-sight. This complicates the use of satellite corrections in mountainous regions, especially at higher latitudes when the satellite view angle is close to the horizon.

Verifying the Unit is Outputting NMEA Messages

Connect the *Ag*GPS 124/132 receiver to a PC with the Standard Data/Power Cable (P/N 30945) and use Windows 95/98's Hyperterminal program to view the NMEA messages input through the computer's serial port. The default Port A parameters are NMEA 4800-N-8-1. Also, you can view the latitude/longitude changes on a yield monitor to verify you are receiving GPS information.

Not Tracking Satellites or Differential Signal

If the *Ag*GPS 124/132 receiver is not tracking satellites (Sv: 00) and constantly searching for a satellite or beacon signal, check the antenna cable connections at the receiver and antenna. If the connections are tight, follow the steps below:

1. Display the *Home* screen (see page 85).
2. Press > until *Status* menu appears.
3. Click ^ once then > two times until *Receiver Status* menu appears.
4. Click ^ until *System Voltages* screen appears.

If the AGC value shows 5.0, then the antenna cable is probably faulty. Swap-out the old cable with a known working cable and recheck the AGC value. If you see AGC = 0.4, then the cable is good and problem solved.

Tracking Satellites and OmniStar/Racal but no Differential Signal

If the *Ag*GPS 124/132 receiver is tracking satellites (Sv: 05-10) and tracking a Omnistar or Racal satellite beam, check to see if your subscription to Omnistar or Racal has expired or not been enabled.

Follow the steps below to check your Omnistar subscription stop date:

1. Display the *Home* screen (see page 85).
2. Press > until *Status* menu appears.
3. Click ^ once then > until *DGPS Status* menu appears.
4. Click ^ until *Omni Srv Info* screen appears.
5. Press ↵ until the *Stop Date* appears.

If you see the 'Access Unknown' message, contact OmniStar to have your satellite subscription activated.

Follow the steps below to check your Racal subscription:

1. Display the *Home* screen (see page 85).
2. Press > until *Status* menu appears.
3. Click ^ once then > until *DGPS Status* menu appears.
4. Click ^ until *Racal Srv Info* screen appears.
5. Press ↵ once. Either *User Enabled* or *Access Unknown* will appear.

If you see the 'Access Unknown' message, contact Racal to have your satellite subscription activated.

Tip – When your satellite subscription is activated the *Ag*GPS 124/132 *Home* screen will show 'D/3D'. The *Ag*GPS 124/132 receiver must be powered On to be activated by either Omnistar or Racal and also configured to track the correct satellite coverage beam.

Losing Configuration Settings When the Receiver is Powered Off

The *Ag*GPS 124/132 receiver configuration parameter settings are stored in battery-backed RAM (random access memory). The lithium battery has a 10-year life span. You can assume the lithium battery has failed when the receiver no longer retains configuration parameter setting changes.

* ***Note –*** *The receiver can continue to use the default configuration parameters, but does not retain any custom changes to the default settings after it is powered off.*

Contact Technical Support (Precision Agricultural Systems) at Trimble Navigation to arrange for replacement of lithium batteries.

Restoring the Receiver to Factory Defaults

To restore the receiver configurations to factory defaults:

1. Display the *Home* screen (see page 85).
2. Press ^ until *Clear BB Ram* screen appears.

   The receiver asks if you want to "Clear BB Ram".
3. Click ^ or v to display *Yes*.
4. Click ↵.

   The receiver returns to factory defaults. The Satellite DGPS service subscription is not lost.

Troubleshooting Guides

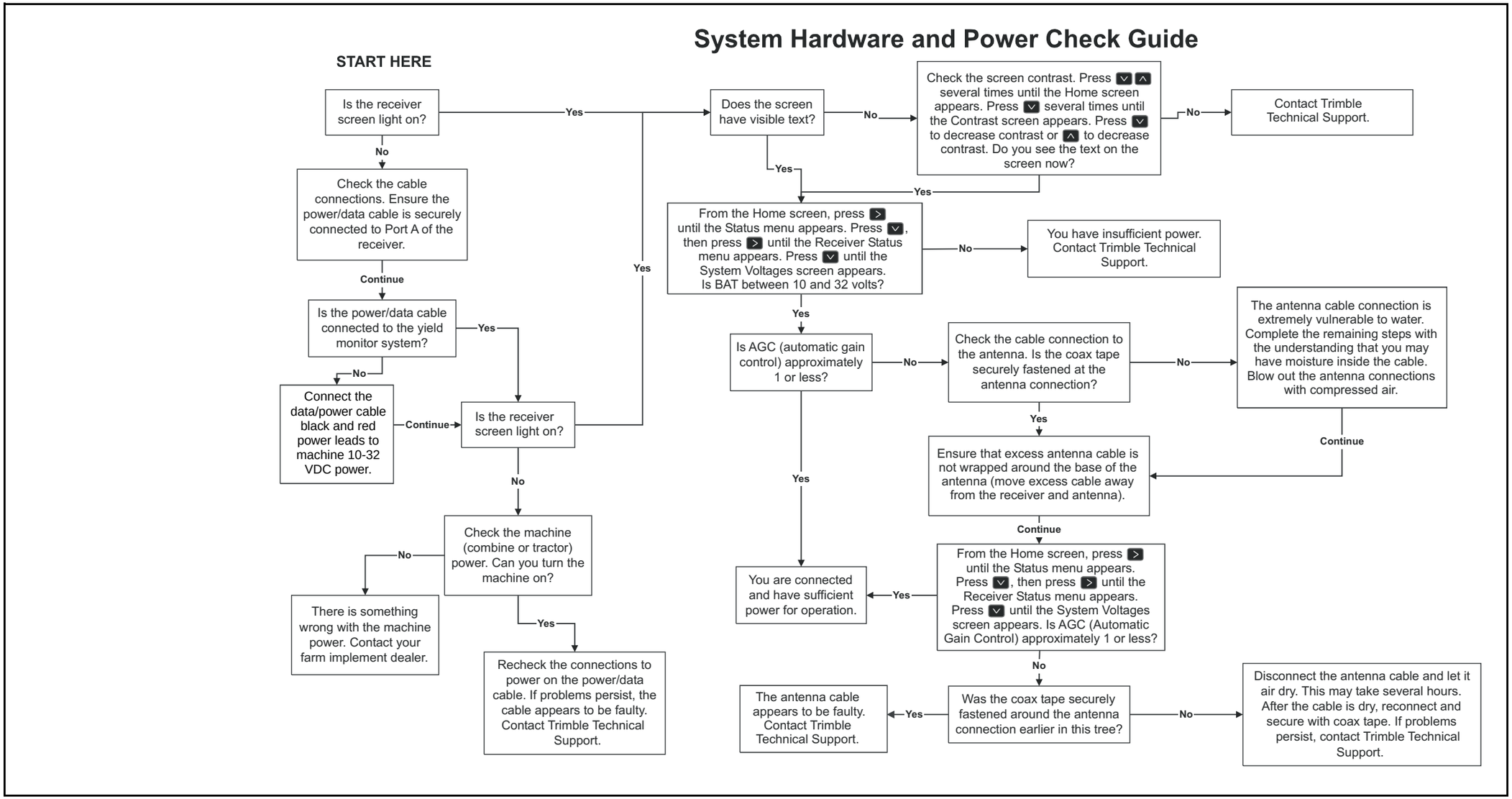


Figure 5.1 System Hardware and Power Check Guide

Troubleshooting Guides

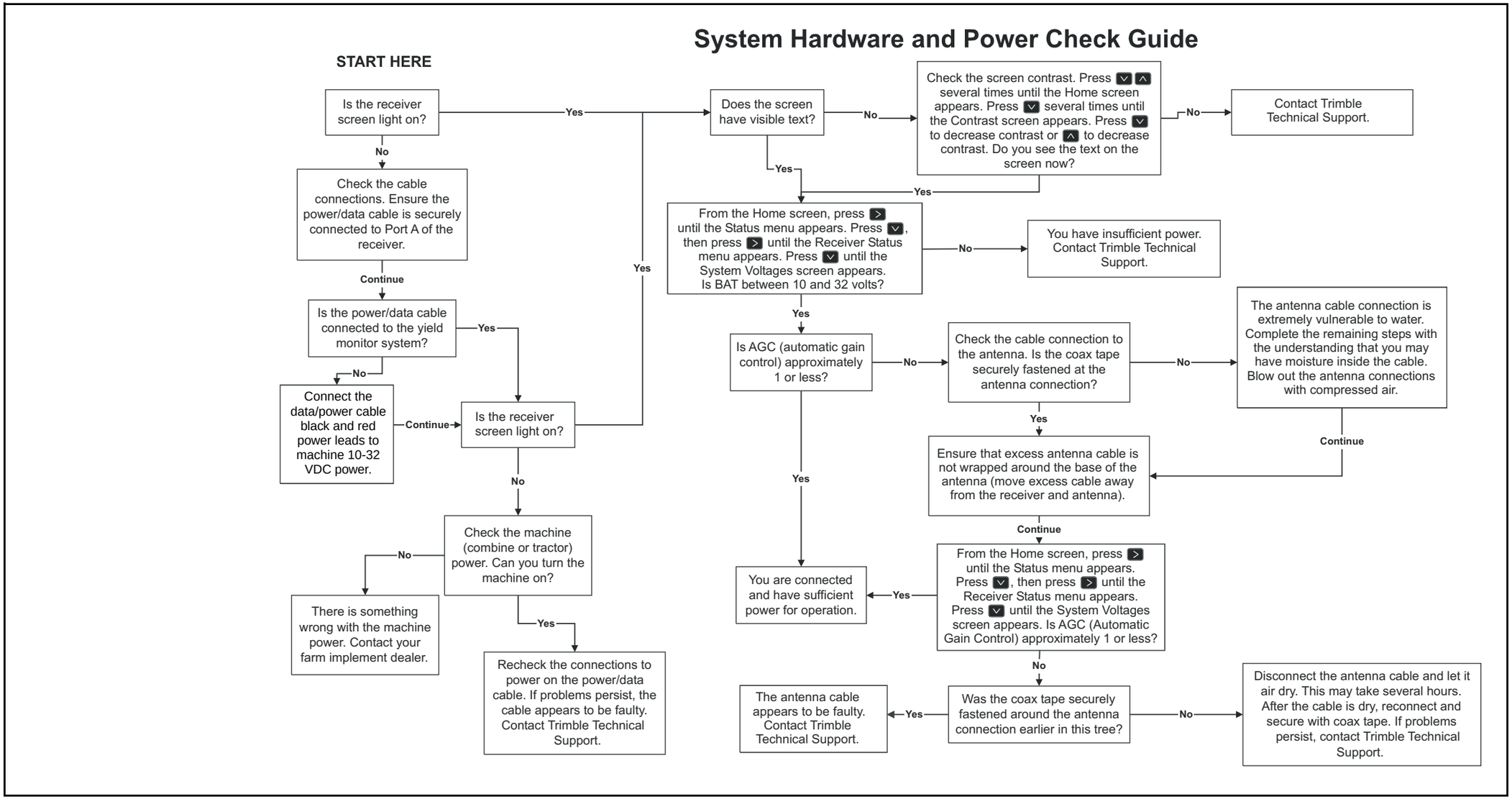


Figure 5.1 System Hardware and Power Check Guide

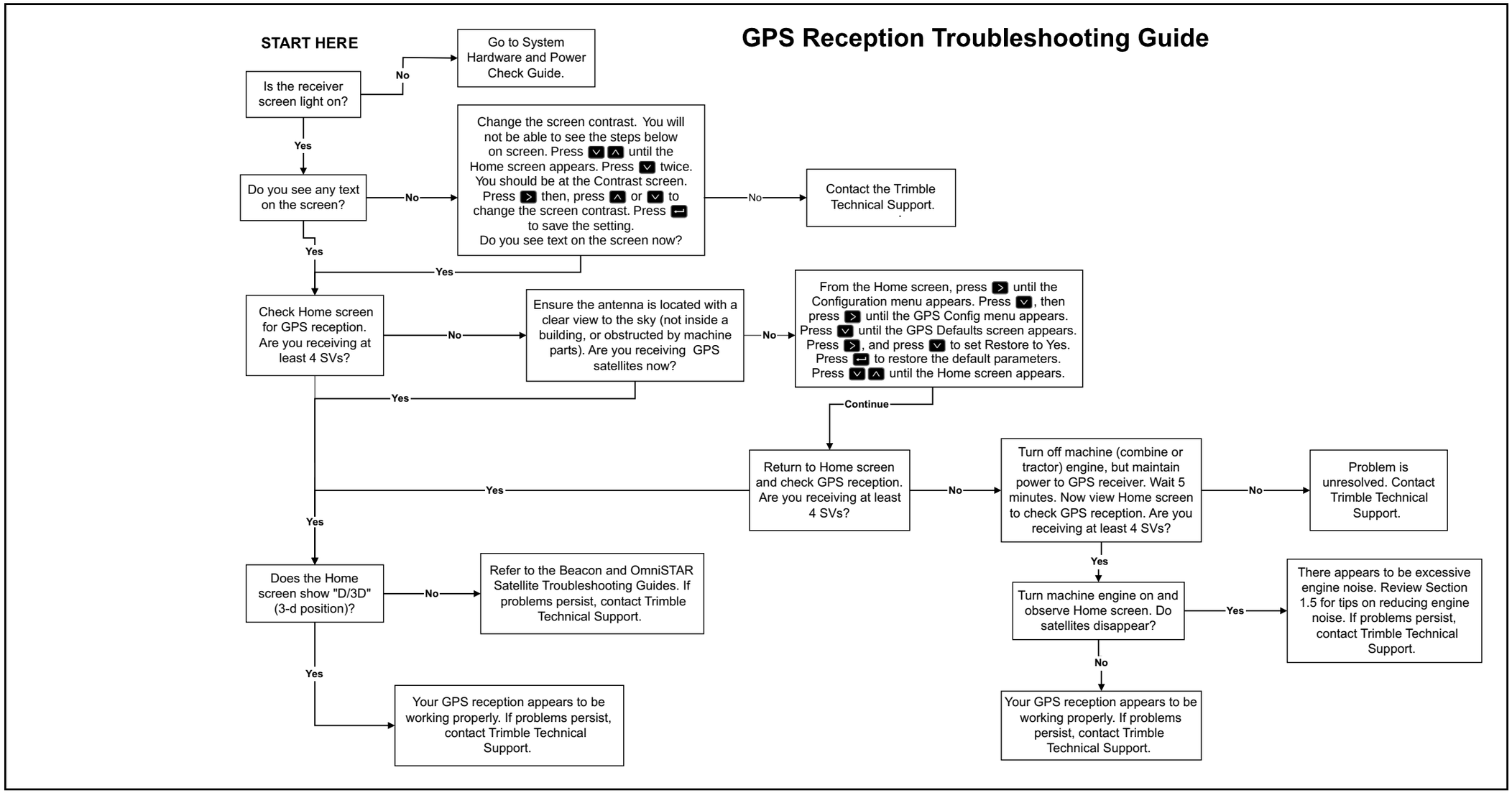


Figure 5.2 GPS Reception Troubleshooting Guide

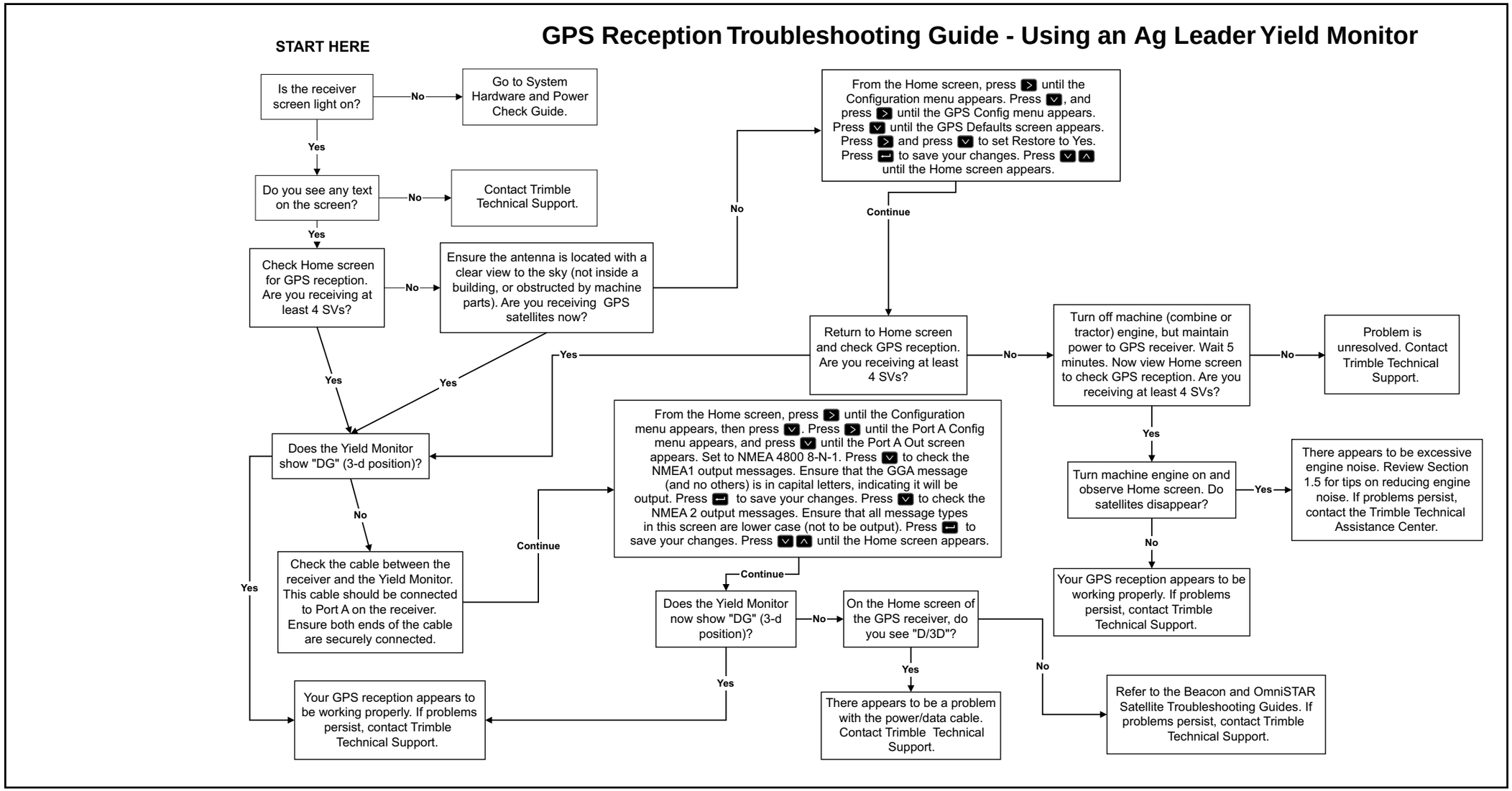


Figure 5.3 GPS Reception Troubleshooting Guide - Using a Yield Monitor

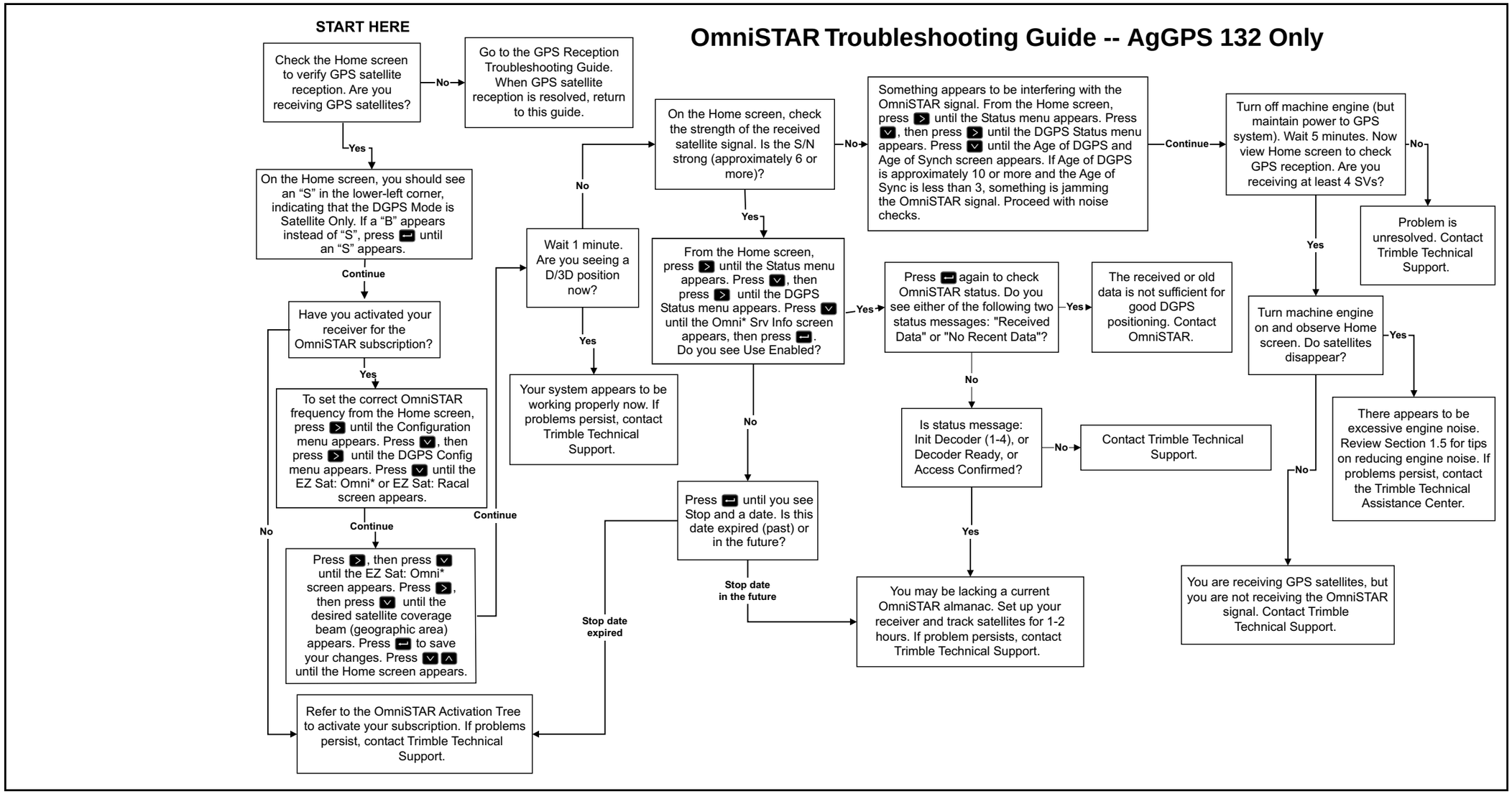


Figure 5.4 OmniSTAR Troubleshooting Guide

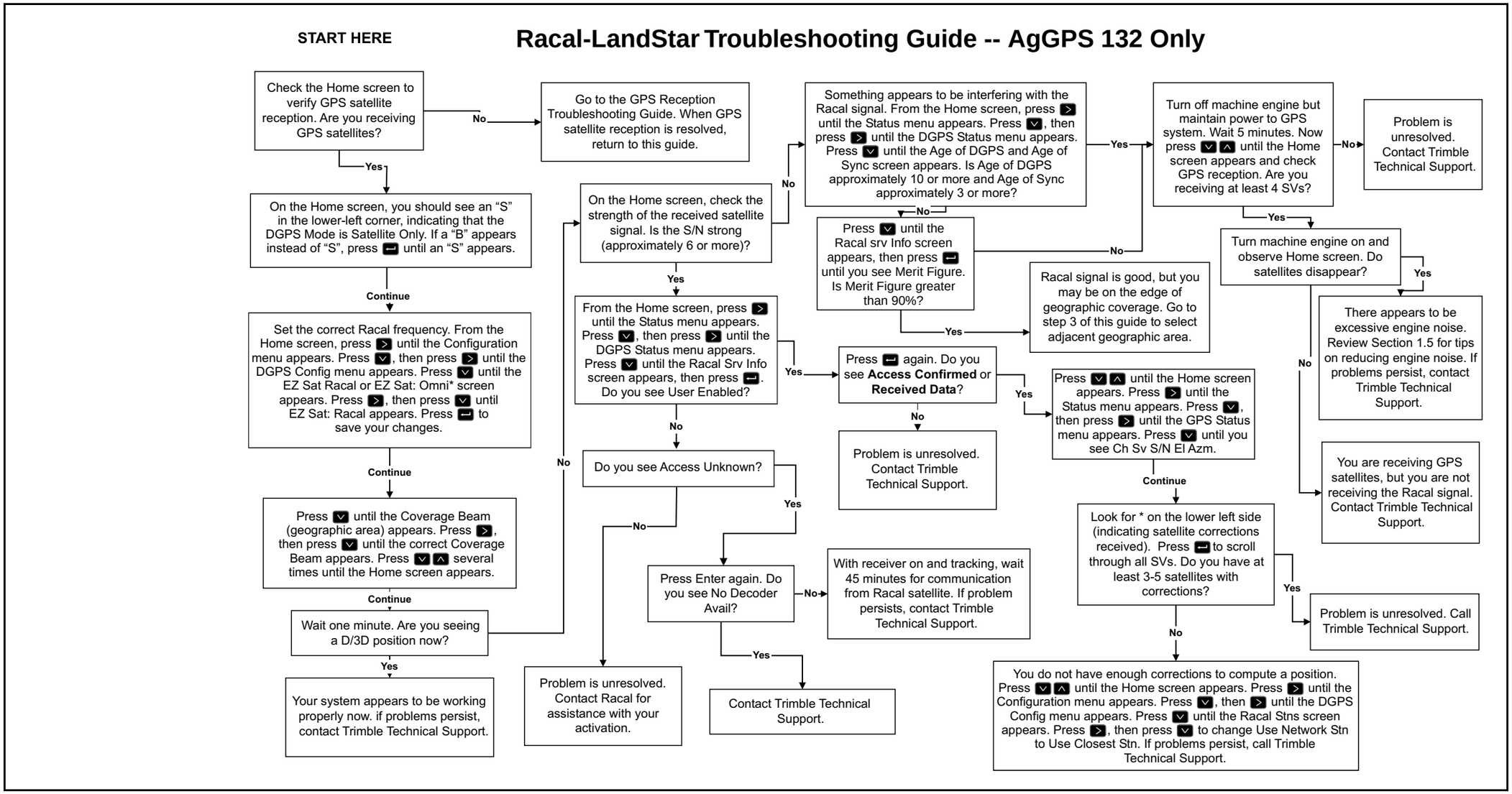


Figure 5.5 Racal-LandStar Troubleshooting Guide

APPENDIX

A

Specifications

In this Appendix:

- AgGPS 124, AgGPS 132 and AgGPS 132 Air Receiver
- Combined Antenna
- GPS Channels
- Beacon Channels
- L-Band Satellite Differential Correction Receiver
- Receiver Defaults

AgGPS 124, AgGPS 132 and AgGPS 132 Air Receiver

Table A.1 *Ag*GPS 124 / 132 / 132 Air Receiver Characteristics

Size	14.5 cm W x 5.1 cm H x 19.5 cm D (5.7 in. W x 2.0 in. H x 7.7 in. D)
Weight	0.76 Kg (1.68 lb.)
Power	7 Watts (max), 10–32 VDC
Operating Temperature	–20°C to +65°C
Storage Temperature	–30°C to +80°C
Humidity	100% condensing, unit fully sealed
Casing	Dust-proof, waterproof, shock resistant

Combined Antenna

Table A.2 Combined Antenna Characteristics

	124	**132**
Size	15.5 cm D x 10.8 cm H (6.1 in. D x 4.3 in. H)	15.5 cm D x 14.0 cm H (6.1 in. D x 5.5 in. H)
Weight	0.49 kg (1.08 lb.)	0.55 Kg (1.2 lb.)
Operating Temperature	–30°C to +65°C	–30°C to +65°C
Storage Temperature	–40°C to +80°C	–40°C to +80°C
Humidity	100% condensing, unit fully sealed	100% condensing, unit fully sealed
Casing	Dust-proof, waterproof, shock resistant	Dust-proof, waterproof, shock resistant

GPS Channels

Table A.3 GPS Channels Performance Characteristics

General	12-channel, parallel tracking L1 C/A code and carrier phase filtered measurements and multi-bit digitizer
Update Rate	1 Hz standard; 10 Hz optional
Differential Speed Accuracy	0.1 MPH (0.16 KPH)
Differential Position Accuracy	Less than 1 meter horizontal RMS At least 5 satellites PDOP < 4 RTCM SC-104 standard format broadcast from Trimble 4000RSi or equivalent reference station
Time to First Fix	< 30 seconds, typical
NMEA Messages	GGA,† GLL, GSA,† GSV, GST, MSS, RMC,† VTG,† ZDA

† By default, the AgGPS 124/132 reciever is configured to output GGA, GSA, VTG, and RMC messages.

Beacon Channels

Table A.4 Beacon Channels

Frequency Range	283.5 kHz to 325.0 kHz
Channel Spacing	500 Hz
Beacon Modulation	50, 100, and 200 bits/second
Signal Strength	10 µV/meter minimum
Dynamic Range	100 dB
Channel Selectivity	70 dB @ > 500 Hz offset
Frequency Offset	17 ppm maximum
3rd Order Intercept	+15 dBm @ RF input (min. AGC setting)
Beacon Acquisition Time	<5 seconds, typical
Operating Modes	Auto Power, Auto Range, and Manual

L-Band Satellite Differential Correction Receiver

Table A.5 L-Band Satellite Differential Correction Receiver with Multiple Vendor Support (*Ag*GPS 132/132 Air only) Characteristics

Bit Error Rate	10^{-5} for Eb/N of >5.5 dB
Acquisition and Re-acquisition Time	<2 seconds, typical
Frequency Band	1525–1560 MHz
Channel Spacing	.5 kHz

Receiver Defaults

Table A.6 lists the default settings for the *Ag*GPS 124/132 reciever.

Table A.6 Receiver Defaults

DGPS Source	Satellite
Dynamics	Land
Elevation Mask	8°
SNR Mask	6
PDOP Mask	12
PDOP Switch	8
DGPS Mode	Auto On/Off
DGPS Age Limit	30 sec
Pos Fix Rate	1 Hz

APPENDIX

B

Cables and Connectors

In this Appendix:

- Port A and Port B Connectors
- Standard Data/Power Cable (P/N 30945)
- Ag Leader Interface Cable (P/N 39903)
- Case AFS Cable (P/N 32609)
- John Deere GreenStar Data Cable (P/N 34189)
- RDS Data Power Cable (P/N 35142)

The tables in this appendix give pin-out information for the AgGPS 124/132/132 Air standard and optional cables. This information can be used to prepare special cables for interfacing the AgGPS 124, AgGPS 132, and AgGPS 132 Air receivers with devices and instruments not supported by the *standard* and optional cables.

Port A and Port B Connectors

Table B.1 gives pin-out requirements for the AgGPS 124/132/132 Air Port A and Port B connectors.

Table B.1 Connector Pin-out for AgGPS 124/132/132 Air/132 Air Port A and Port B

Pin	Port A Connector	Port B Connector
1	Event In	Event In
2	RS-232 B Out	RS-232 A Out
3	RS-232 B In	RS-232 A In
4	CAN Hi	CAN Hi
5	Ground	Ground
6	RTS Out	RTS Out
7	Power On/Off	Power On/Off
8	CTS In	CTS In
9	CAN Low	CAN Low
10	Battery +V	Battery +V
11	Battery –V	Battery –V
12	1 PPS Output	1 PPS Output

Standard Data/Power Cable (P/N 30945)

Table B.2 gives pin-out information for the Standard Data/Power Cable (P/N 30945).

Table B.2 Standard Data/Power Cable Pin-out (P/N 30945)

To Ag GPS 124/B2 P1 Conn 12-Pin (Female)			7 Cond Cable	To Computer P2 Conn DE9 (Female)		To DC Power 2 Cond Cable	
Pin	**Signal**	**Direction**	**Color**	**Pin**	**Signal**	**Color**	**Signal**
1	EVENT IN	←	BLACK	4	DTR		
2	TXD	→	ORANGE	2	RXD		
3	RXD	←	RED	3	TXD		
4							
5	SIG GND	↔	SHIELD	5	SIG GND		
6	RTS	→	YELLOW	8	RTS		
8	CTS	←	GREEN	7	CTS		
9							
7	PWR ON	←					
10	V+ IN	←	RED			RED	V+ IN
11	V– IN	←	BLACK			BLK	V– OUT
12	PPS	→	BLUE	9	PPS		

1 Pins 7 and 10 of the P1 connector are jumpered with a 5 kOhm, 5% resistor.

AgGPS 124/132 PSO Plus Cable (P/N 41131)

Table B.3 gives pin-out information for the AgGPS 124/132 PSO Plus Cable (P/N 41131).

Table B.3 Standard Data/Power Cable Pin-out (P/N 41131)

To AgGPS Lightbar or Ag GPS 70 RDL P1 Conn 12-Pin (Female)			7 Cond Cable	To Ag GPS 124/132 P2 Conn 12-Pin (Female)		4 Cond Pigtail Cable Power/Event/Alarm Leads	
Pin	**Signal**	**Direction**	**Color**	**Pin**	**Signal**	**Color**	**Signal**
1	EVENT IN	←	BROWN			WHITE	EVENT IN
2	TX	→	YELLOW	3	RX		
3	RX	←	ORANGE	2	TX		
4							
5	GND	↔	GREEN	5	GND		
6							
8							
9	CAN-L						
7							
10	V+ IN	←	RED	10	V+	RED	V+ IN
11	V– IN	←	BLACK	11	V-	BLK	V– OUT
12	SONALERT	→	BLUE			GREEN	SONALERT

1 Pins 7 and 10 of the P1 connector are jumpered with a 5 kOhm, 1/8 watt, 5% resistor.

2 Pins 7 and 10 of the P2 connector are jumpered with a 5 kOhm, 1/8 watt, 5% resistor.

Ag Leader Interface Cable (P/N 39903)

Table B.4 gives pin-out information for the Ag Leader Yield Monitor Interface Cable (P/N 39903).

Table B.4 Ag Leader Yield Monitor Cable Pin-out (P/N 39903)

To AgGPS 124/132 P1 Connector 12-pin (Female)			7 Cond Cable	To AgLeader Yield Monitor P2 Connector DE-9 Male		To DC Power 2 Cond Cable
Pin	**Signal**	**Direction**	**Color**	**Pin**	**Signal**	**Wires**
1	EVENT IN	←				
2	TX	→	ORANGE	3	RX	
3	RX	←	BLUE	2	TX	
4						
5	SIG GND	↔	SHIELD	5	SIG GND	
6						
7						
8						
9						
10	V+ IN	←				RED V+
11	V- IN	←				BLACK V-
12						

1 Pins 7 and 10 of the P1 connector are jumpered together with a 5 kOhm, 1/8 watt, 5% resistor.

Case AFS Cable (P/N 32609)

Table B.5 gives pin-out information for the Case AFS Dual Data Interface Cable (P/N 32609).

Table B.5 Case AFS Cable Pin-out (P/N 32609)

To AgGPS 124/132 P2 Conn 12-Pin (Femake)			**5 Cond Cable**	**To Case Combine Wiring Harness P1 Conn 5-Pin MetroPack Conn**	
Pin	**Signal**	**Direction**	**Color**	**Pin**	**Signal**
2	TX	→	BLUE	D	RX
3	RX	←	RED	B	TX
5	SIG GND	↔	CLEAR	C	SIG GND
10	PWR IN	→	GREEN	A	+12 VDC
11	PWR GND	↔	BLACK	E	PWR GND
1 Pins 7 and 10 of the P2 connector are jumpered together with 5 kOhm, 1/8 watt, 5% resistor.					

John Deere GreenStar Data Cable (P/N 34189)

Table B.6 gives pin-out information for the John Deere GreenStar Data Cable (P/N 34189).

Table B.6 John Deere GreenStar Data Cable Pin-out (P/N 34189)

To AgGPS 124/132 P2 Conn DE-9 Male			**3 Cond Cable**	**To GreenStar Yield Monitor Wiring Harness P1 Conn 3-Pin Weatherpack Tower (Male)**	
Pin	**Signal**	**Direction**	**Color**	**Pin**	**Signal**
2	TX	→	RED	A	RX
3	RX	←	BLACK	B	TX
5	GND	↔	BLUE	C	GND

RDS Data Power Cable (P/N 35142)

Table B.7 gives pin-out information for the RDS power data cable (P/N 35142).

Table B.7 RDS Data Power Cable Pin-out (P/N 35142)

To AgGPS 124/132 P1 Conn 12-Pin (Female)			7 Cond Cable	To RDS Ceres Yield Monitor P2 Conn DE-9 Male	
Pin	**Signal**	**Direction**	**Color**	**Pin**	**Signal**
1	EVENT IN	←			
2	TX	→	ORANGE	3	RX
3	RX	←			
4					
5	SIG GND	↔	SHIELD	5	SIG GND
6					
7					
8					
9					
10	V+ IN	←	RED	8	V+
11	V– IN	←	BLACK	7	PGND
12					

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

APPENDIX

C

NMEA-0183 Messages

In this Appendix:

- PTNL,GGK Message
- PTNLSM Proprietary Message

Introduction

Trimble receivers can output a selection of NMEA-0183 messages. NMEA-0183 messages are normally generated and output to Port A, allowing the receiver to interface with external instruments. Only the NMEA-0183 standard and Trimble proprietary messages configured using TSIP command packets are described here. Some Trimble products support additional NMEA-0183 standard messages and Trimble proprietary messages which cannot be configured using TSIP command packets. These are described separately in the receiver's operation manual.

NMEA-0183 Message Structure

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

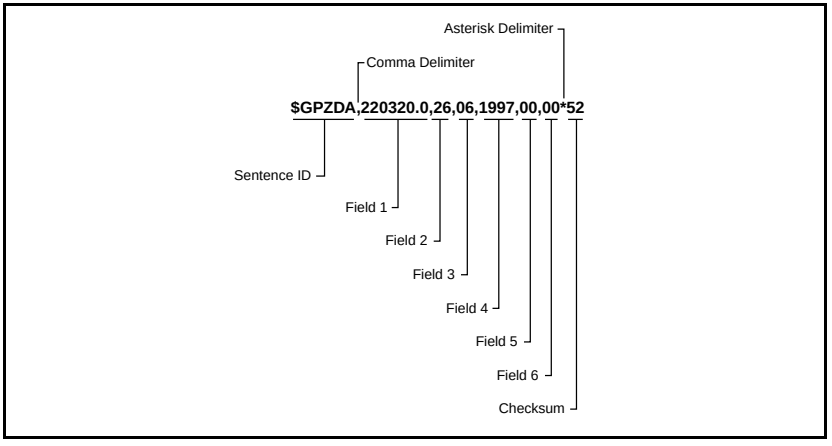


Figure C.1 Sample ZDA Message Structure

Each NMEA message includes a message ID to distinguish the message from other NMEA messages in the data stream. The actual data included in NMEA-0183 messages is placed in fields. An NMEA message contains several fields, and each field is preceded by a comma character. The sample message in Figure C.1 contains six fields. The NMEA messages include a checksum value which is useful for checking the integrity of the data included in the message.

The message structure of the sample ZDA message, shown below and the message fields are described in Table C.1.

$GPZDA,220320.0,26,06,1997,00,00*52

Table C.1 Sample ZDA Message Structure

Field	Description
1	Time, in UTC. (220320.0 in the sample message)
2	Day, 01 to 31. (26 in the sample message)
3	Month, 01 to 12. (06 in the sample message)
4	Year. (1997 in the sample message)
5	Local time zone offset from GMT, 00 to ±13 hours. (00 in the sample message)
6	Local time zone offset from GMT, minutes. Fields 5 and 6, together, yield the total offset. For example, if field 5 is '-5' and field 6 is '15', local time is 5 hours and 15 minutes earlier than GMT. (00 in the sample message)

The NMEA-0183 message examples in this chapter are presented in the format shown in Table C.1. The structure of each sample message is shown in the paragraphs preceding the message structure table.

The numbers in the Field column represent the message fields in left-to-right order. Field 1 is the first field following the first comma delimiter. In the sample message, field 1 contains the UTC Time value (220320.0). The last field in the message is preceded by the last comma in the message (00 in the sample message).

Symbols and Delimiters

All messages conform to the NMEA-0183 Version 2.1 format. Symbols and delimiters are used to identify or separate the various kinds of data included in the message.

NMEA-0183 messages always begin with a dollar sign character ($) followed by a talker ID code and a message ID code. For the sample ZDA message, GP is the Talker ID, and ZDA is the message ID.

The string of comma-delimited text immediately following the message ID code is composed of fields containing data. Each field is followed by a comma character (,). For the sample message, the data fields are shown below:

220320.0,26,06,1997,00,00

The first field contains the UTC time value (220320.0), the second field contains the Day value (26), and so on.

NMEA-0183 messages include a checksum value which is preceded by an asterisk character (*). For more information about checksum values, see Checksum Values, page 148.

NMEA-0183 messages are always terminated with a carriage return and line feed. The carriage return and line feed pair marks the end of the message.

Checksum Values

Newer Trimble receivers conform to NMEA-0183 Version 2.1 which states that checksums are mandatory for all messages. Checksum values are always included in output messages, but are optional for input messages.

Checksum values are used to verify the integrity of the data included in the message. The sample message, shown in Table C.1, includes a checksum value. An asterisk character (*) is used to delimit the last data field from the checksum value (52 in the sample message).

The checksum is the 8-bit exclusive OR of all characters in the message, between but not including the '$' and '*' delimiters. Commas are also included. The hexadecimal result is converted to two ASCII characters (0–9, A–F). The most significant character appears first.

Field Formats

The data values included in fields meet the format specifications established for the NMEA-0183, Version 2.1 standard.

Null Fields

Null fields are included in some NMEA messages when no data is available for a particular field. Null fields are empty and are usually reserved for transmitting data on a periodic or irregular basis. The comma delimiter for the null field is immediately followed by the comma delimiter for the next field in the message string.

The inclusion of null fields in a message is important because many NMEA messages contain a fixed number of fields. NMEA message interpreters (software for processing NMEA messages) expect to find a fixed number of fields in these messages, and specific kinds of data in each field. The message processing software assumes that no data is available for a particular field when a null field is encountered while interpreting a message.

Talker ID Codes

The Talker ID code identifies the source of the data (GPS, Loran C, Sounder, etc.). The NMEA-0183 standard defines 35 Talker ID codes. The Talker ID codes available for NMEA-0183 output from most Trimble receivers are described in Table C.2.

Table C.2 Supported Talker ID Codes

Code	Description
GP	GPS
LG	Loran C/ GPS
LC	Loran C
II	Integrated Instrumentation

Latitude and Longitude Values

The latitude and longitude values included in NMEA messages are presented in degrees, minutes, and decimal minutes. Latitude is presented as ddmm.mmmm in a single field, and longitude is presented as dddmm.mmmm in a single field. Within the field, degree values are in *dd* or *ddd* format, and minutes and fractions of minutes are in *mm.mmmm* format.

Latitude and longitude direction values (north, south, east, or west) are placed in a separate field. Direction is a single character: ‘N’, ‘S’, ‘E’, or ‘W’ for *North, South, East,* or *West.*

Time Values

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

Other Values

The NMEA-0183 standard established the format of the data included in message fields.

Reading NMEA String Format

When using NMEA strings, be aware that the 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 supported by the *Ag*GPS receivers and identifies the page number where you can find detailed information about each message. 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 Supported NMEA-0183 Messages

Message	Message Contents
GGA Message	Time, position, and fix related data
GLL Message	Position fix, time of position fix, and status
GRS Message	GPS Range Residuals
GSA Message	GPS position fix mode, SVs used for navigation and DOP values
GST Message	GPS Pseudorange Noise Statistics
GSV Message	Number of SVs visible, PRN numbers, elevation, azimuth and SNR values
MSS Message	Signal strength, signal-to-noise ratio, beacon frequency, and beacon bit rate
RMC Message	UTC time, status, latitude, longitude, speed over ground (SOG), date, and magnetic variation of the position fix
VTG Message	Actual track made good and speed over ground
XTE Message	Cross-track error
ZDA Message	UTC time, day, month, and year, local zone number and local zone minutes.
PTNLDG Proprietary Message	Beacon channel strength, channel SNR, channel frequency, channel bit rate, channel number, channel tracking status, RTCM source, and channel performance indicator.
PTNLEV Proprietary Message	Time, event number, and event line state for time-tagging change of state on a event input line.

Table C.3 Supported NMEA-0183 Messages (Continued)

Message	Message Contents
PTNL,GGK Message	Time, Position, Position Type and DOP Values
PTNLID Proprietary Message	Receiver machine ID, product ID, major and minor release numbers, and firmware release date.
PTNLSM	Reference Station Number ID and the contents of the Special Message included in valid RTCM Type 16 records.

GGA Message

(GPS Fix Data)

The GGA message contains the time, position, and fix related data. The message structure is shown below:

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

Table C.4 identifies the GGA message fields.

Table C.4 GGA Message Fields

Field	Description
1	UTC of position fix in HHMMSS.SS format
2	Latitude in DD MM,MMMM format (0-7 decimal places)
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

Table C.4 GGA Message Fields (Continued)

Field	Description
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 Message

(Position Data)

The GLL message specifies the position fix, time of position fix, and status. The message structure is shown below:

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

Table C.5 identifies the GLL message fields.

Table C.5 GLL Message Fields

Field	Description
1	Latitude in DD MM,MMMM format (0-7 decimal places)
2	Direction of latitude N: North S: South
3	Longitude in DDD MM,MMMM format (0-7 decimal places)
4	Direction of longitude E: East W: West
5	UTC of position in HHMMSS.SS format
6	Fixed text ‘A’ shows that data is valid

GRS Message

(GPS Range Residuals)

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

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

Table C.6 describes the GRS message fields.

Table C.6 GRS Message Fields

Field	Description
1	UTC time of GGA position fix
2	Residuals 0: Residuals used to calculate position given in the matching GGA line 1: Residuals recomputed after the GGA position was computed
3-14	Range residuals for satellites used in the navigation solution, in meters

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

GSA Message

(GPS DOP and Active Satellites)

The GPS message identifies the GPS position fix mode, the SVs used for navigation, and the DOP values. The message structure is shown below:

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

Table C.7 identifies the GSA message fields.

Table C.7 GSA Message Fields

Field	Description
1	Mode M: Manual, forced to operate in 2D or 3D A: Automatic, 3D/2D
2	Mode 1: Fix not available 2: 2D 3: 3D
3-14	ID's of SVs used in position fix (null for unused fields)
15	PDOP
16	HDOP
17	VDOP

GST Message

(GPS Pseudorange Noise Statistics)

The GST message is used to support Receiver Autonomous Integrity Monitoring (RAIM). The message structure is shown below:

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

Table C.8 describes the GST message fields.

Table C.8 GST Message Fields

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

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

GSV Message

(GPS Satellites in View)

The GSV message identifies the number of SVs in view, the PRN numbers, elevation, azimuth and SNR values. The message structure is shown below:

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

Table C.9 identifies the GSV message fields.

Table C.9 GSV Message Fields

Field	Description
1	Total number of messages of this type in this cycle
2	Message number
3	Total number of SVs visible
4	SV PRN number
5	Elevation in degrees, 90½ maximum
6	Azimuth, degrees from true north, 000½ to 359½
7	SNR, 00-99 dB (null when not tracking)
8-11	Information about second SV, same format as fields 4–7
12-15	Information about third SV, same format as fields 4–7
16-19	Information about fourth SV, same format as fields 4–7

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

MSS Message

(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 message structure is shown below:

```
$GPMSS,52.5,23.7,287.0,100*4C
```

Table C.10 describes the MSS message fields.

Table C.10 MSS Message Fields

Field	Description
1	Signal Strength (SS), dB ref: 1 υV/m
2	Signal-to-Noise Ratio (SNR), dB
3	Beacon Frequency, 283.5 to 325.0 kHz
4	Beacon Bit Rate (25, 50, 100, 200), bits per second
5	Channel Number

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

RMC Message

(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 message structure is shown below:

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

Table C.11 describes the RMC message fields.

Table C.11 RMC Message Fields

Field	Description
1	Time: UTC time of the position fix in hhmmss.ss format
2	Status A: Valid V: Navigation Receiver Warning (V is output whenever the receiver suspects something is wrong)
3	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)
4	Latitude direction: N = North, S = South
5	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)
6	Longitude direction W: West E: East
7	Speed Over Ground (SOG) in knots (0–3 decimal places)
8	Track Made Good, True, in degrees
9	Date in dd/mm/yy format
10	Magnetic Variation in degrees

Table C.11 RMC Message Fields (Continued)

Field	Description
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 Message

(Course Over Ground and Ground Speed)

The VTG message identifies the actual track made good and speed over ground. The message structure is shown below:

```
$GPVTG,0,T,,,0.00,N,0.00,K*33
```

Table C.12 identifies the VTG message fields.

Table C.12 VTG Message Fields

Field	Description
1	Track made good
2	Fixed text ‘T’ shows that track made good is relative to true north
3	Not used
4	Not used
5	Speed over ground in knots (0–3 decimal places)
6	Fixed text ‘N’ shows that speed over ground is in knots
7	Speed over ground in kilometers/hour (0–3 decimal places)
8	Fixed text ‘K’ shows that speed over ground is in kilometers/hour

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

XTE Message

(Cross-Track Error)

The XTE message reports the vessel's cross-track error. The message structure is shown below:

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

Table C.13 describes the XTE message fields.

Table C.13 XTE Message Fields

Field	Description
1	A: Valid (fixed)
2	A: Valid (fixed)
3	Cross-track Error, in nautical miles
4	Direction to Steer L: Left R: Right
5	N:Nautical mile units

ZDA Message

(Time and Date)

The ZDA message identifies UTC time, day, month, and year, local zone number and local zone minutes. The message structure is shown below:

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

Table C.14 identifies the ZDA message fields.

Table C.14 ZDA Message Fields

Field	Description
1	UTC time
2	Day
3	Month
4	Year
5	Local Zone Number (– for East Longitude)
6	Local Zone Minutes

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

PTNLEV Proprietary Message

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 message structure is shown below:

```
$PTNLEV,184804.00,0*XX
```

Table C.15 identifies the PTNLEV message fields.

Table C.15 PTNLEV Message Fields

Field	Description
1	Time: UTC time of the position fix in hhmmss.ss format
2	Event number, starting with event 0

The PTNLEV message is enabled using TSIP.

PTNLID Proprietary Message

(Trimble Receiver Identity)

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 message structure is shown below:

```
$PTNLID,097,01,XXX,XXX,DD/MM/YY*XX
```

Table C.16 identifies the PTNLID message fields.

Table C.16 PTNLID Message Fields

Field	Description
1	Machine ID
2	Product ID
3	Major firmware release number
4	Minor firmware release number
5	Firmware release date, in DD/MM/YY format

The PTNLID message, if enabled, is output every 30 seconds.

PTNLDG Proprietary Message

(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 message structure is shown below:

```
$PTNLDG,XXX.X,XX.X,XXXXXXX.X,XXXXX,XX,
X,X,XXX*XX
```

The PTNLDG message fields are defined in free format with the maximum number of characters in the field indicated in above (i.e. 25 bps displayed as xxx,25,xxx instead of xxx,00025,xxx). Additionally, if a channel is disabled, the channel fields may be null fields (commas only). If more than one channel is available, the message should be repeated for each channel. Table C.17 identifies the message fields.

Table C.17 PTNLDG Message Fields

Field	Description
1	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.
2	Channel signal to noise (SNR) level, in dB
3	Channel frequency, in kHz
4	Channel bit rate, in bits per second (bps)
5	Channel number, 0-99
6	Channel tracking status 0: Channel idle 1: Wideband FFT search 2: Searching for signal 3: Channel has acquired signal 4: Channel has locked on signal 5: Channel disabled

Table C.17 PTNLDG Message Fields (Continued)

Field	Description
7	Specified channel is used as RTCM source 0: Not used 1: Used
8	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.

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 1-second interval, the receiver outputs this message at a maximum rate of 1 Hz.*

PTNL,GGK Message

(Time, Position, Position Type and DOP Values)

The PTNL,GGK message string is shown below:

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

Table C.18 describes the PTNL,GGK message fields.

Table C.18 PTNL,GGK Message Fields

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

PTNLSM Proprietary Message

(RTCM Special Message)

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

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

Table C.19 describes the PTNLSM message fields.

Table C.19 PTNLSM Message Fields

Field	Description
1	Reference Station ID number, ranging from 0 to 1023. Leading zeros must be added to fill 4-digit field.
2	ASCII text message message contained within the Type 16 RTCM message.

APPENDIX

D

Flashloader 100

In this Appendix:

- Introduction
- Installing the Flashloader Software
- Using Flashloader to Update Receiver Firmware
- Troubleshooting Flashloader Connection Problems
- Using Flashloader 100 Options
- Running Flashloader 100

Introduction

Flashloader 100 makes updating the Trimble *Ag*GPS 124/132 firmware quick and trouble-free. You can also use this utility to review your receiver's configuration, add purchased receiver enhancement options, and, if technical assistance is needed, collect troubleshooting information.

Tip – Flashloader 100 and the latest *Ag*GPS 124/132 firmware can be downloaded from Trimble's World Wide Web site:

http://www.trimble.com/support/files/index.htm#ag

Installing the Flashloader Software

The Flashloader 100 software requires Windows 95, 98 or 2000.

To install the Flashloader software, do the following:

1. Download the Flashloader 100 software from Trimble's web site:

   http://www.trimble.com/support/files/index.htm#ag

2. In the file download dialog, select Save this program to Disk and specify *My Documents* on your computer's hard drive.

   Download time will take 5–30 minutes depending on your Internet connection speed.

3. Select *My Documents* from your computer's desktop.

   If you are using a different drive or folder, the path name may be different.

4. In the My Documents window, double-click FL100V201.EXE.

5. Click **Next** and follow the instructions displayed by the Flashloader 100 Setup program.

Using Flashloader to Update Receiver Firmware

To update receiver firmware, do the following:

1. Connect the *Ag*GPS receiver to the PC's serial port (usually COM1 or COM2) using the *Ag*GPS 124/132 Data/Power Cable (P/N 30945).
2. From the *Start* menu, select *Flashloader 100*.
3. Click **Find Receiver**.

   The Flashloader 100 software detects the receiver, automatically selects the correct port, and presents a message box to identify the port connected to the receiver.
4. Check the *Upload New Firmware* option in the *Flashloader* window.

   The *Select Flash Code File* window appears.
5. Select the location of the receiver's firmware file (XXXX.TNR) on your computer's hard-disk drive, and click **Open**.
6. The *Flashloader* window now displays the directory path location of the firmware file.
7. Click **Proceed**.

   The update process takes approximately 5 minutes. Once the process is complete, a message box appears if the operation is successful.

   If a warning message appears, disconnect the receiver and try again. For more information, see section Troubleshooting Flashloader Connection Problems, page 176.

Troubleshooting Flashloader Connection Problems

If Flashloader 100 is unable to detect the receiver:

- Make sure that the receiver is connected to an available 12–32 VDC power source.
- Power receiver OFF, then back ON.
- Check all cable connections between the receiver and PC.

  Click **Proceed** again.

If the connection fails again:

- If you use a Windows CE or pocket PC device with your computer, make sure that Microsoft Active Sync is disabled from using the COM port on your computer.
- If you use a Palm Pilot with your computer, make sure that the Synchronization software program is disabled from using the COM port on your computer.
- If the connection problem persists, contact your local Trimble dealer or Trimble Precision Agricultural Systems Technical Support.

Using Flashloader 100 Options

The main window in the Flashloader 100 software displays an options checklist. Once the receiver has been successfully detected, select one or more of the available options. Table D.1 describes each option.

Table D.1 Flashloader 100 Options

Options	Description
Update Receiver with Password	Enables password protection, allowing the *Enter Password* dialog to appear. Enter Trimble-supplied passwords to activate receiver enhancements such as Fast Rate, EVEREST, and the Base Station option.
Download Configuration	Enables these two radio button options: • *Read into file* – Configuration data is written to a specified text file. • *Review on-screen* – The receiver's configuration settings are detailed on the PC computer screen.
Upload New Firmware	When selecting the Upload New Firmware checkbox for the first time, the File dialog appears and you can: • Navigate to the directory where the new receiver firmware file is stored. Only files that have the TNR (Trimble Navigation ROM) extension are displayed. • Select the appropriate file and click **Open**. Flashloader 100 checks the firmware file to make sure that it is valid. If the file is found invalid, a warning message appears. The Upload New Firmware checkbox is automatically deselected.
Read Error Log	Writes the error log data, stored in the receiver, to a file for use by Trimble technical support personnel. Use the dialog to change the filename or storage folder.

Running Flashloader 100

After checking the appropriate options, you may be required to enter a passcode or select a required file (depending the option selected).

Click **Proceed**.

The update process will take approximately 10 seconds to 5 minutes. Once the process is complete, a message box indicates a successful completion.

If a warning message appears, disconnect the receiver and try again. If the problem persists, contact your local Trimble dealer or Trimble Precision Agricultural Systems Technical Support.

APPENDIX

E

Activating Satellite DGPS Service

In this Appendix:

- Activation Flow Charts
- OmniSTAR Activation
- Racal Activation

Activation Flow Charts

This appendix provides step-by-step instructions for activating both OmniSTAR and Racal-LandStar DGPS services.

OmniSTAR Activation

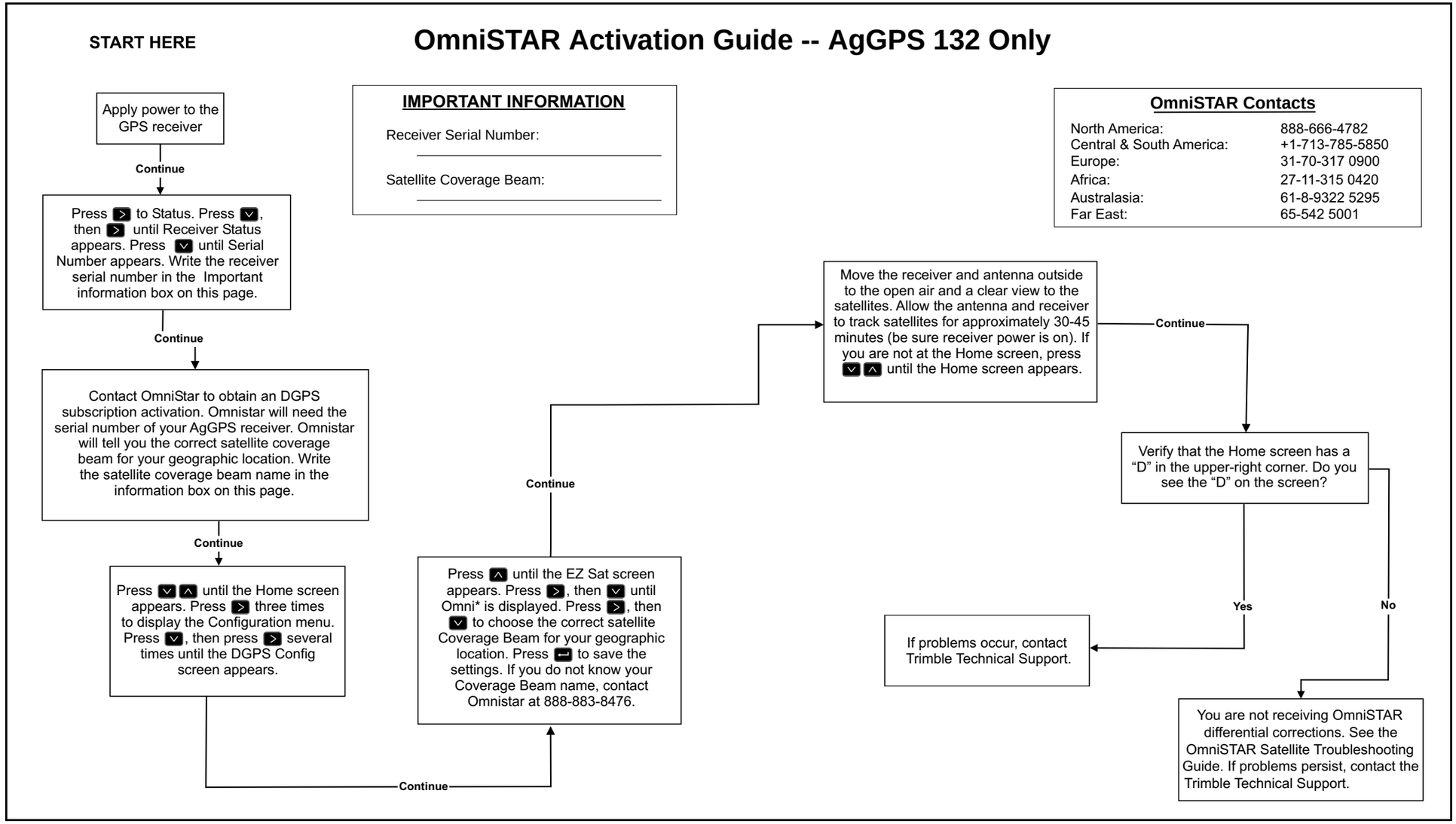


Figure 5.1 OmniSTAR Activation Guide

Racal Activation

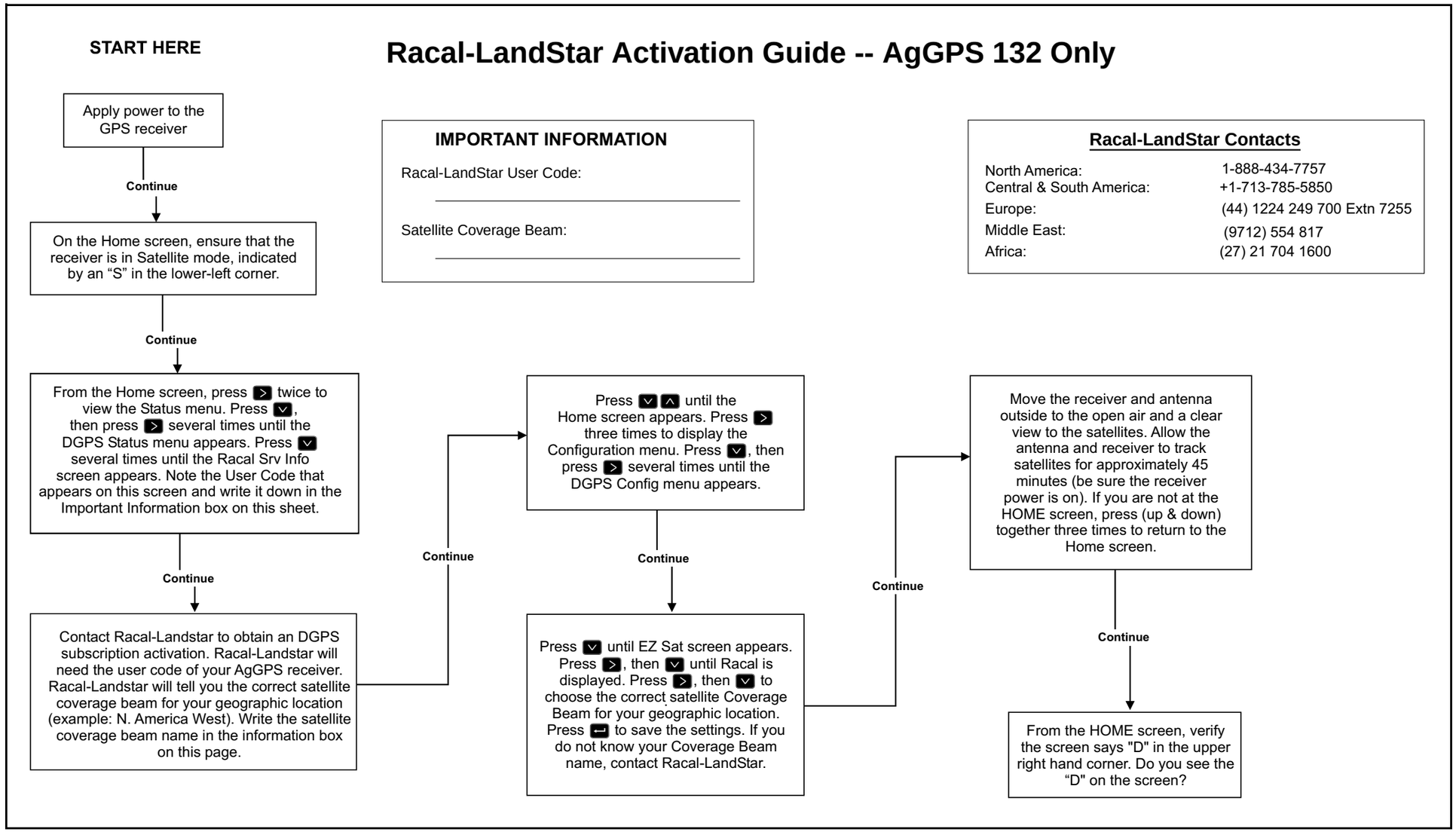


Figure 5.2 Racal-LandStar Activation Guide

APPENDIX

F

Fast Rate Output

In this chapter:

- Installing the Fast Rate Option into an AgGPS Receiver
- Configuring the AgGPS 124/132 for Fast Rate Output
- Setting Port A or B for Fast Rate Output

Installing the Fast Rate Option into an *Ag*GPS Receiver

Before installing the Fast Rate Option, the Flashloader 100 software must be installed on your PC. To install Flashloader 100, see the procedure following this paragraph. If Flashloader software is installed on your PC, perform the procedure in this section.

To install the Fast Rate Option:

1. Connect the *Ag*GPS 124/132 receiver to the PC's serial port (usually COM1 or COM2) using the Data/Power Cable (P/N 30945).
2. In Windows 95/98/2000 go to *Start / Programs* and select *FlashLoader 100*.
3. Click **Find Receiver**.

   The FlashLoader 100 software detects the receiver and automatically selects the correct port. A message box appears to identify the port connected to the receiver.
4. From the *Flashloader* window, click to select *Update Device with Password*.
5. Click **Proceed**.

   The *Enter Passwords* dialog appears.
6. Type the Fast Rate Option password provided by Trimble.
7. Click **OK**.

The update process takes a few seconds and a message box appears if the operation is successful.

If a warning message appears, disconnect the receiver and try again. For more information, see Troubleshooting Flashloader Connection Problems, page 176.

Configuring the *Ag*GPS 124/132 for Fast Rate Output

To configure the *Ag*GPS 124/132 reciever for fast rate output using the receiver's front panel display:

1. Display the *Home* screen (see page 85).
2. Press > three times to display the *Configuration* menu.
3. Press ^ until the *Guidance Config* or *GPS Config* menu appears.
4. Press > until the *Pos Rate* screen appears.
5. Press > to activate the cursor. Press > until the cursor flashes on the second numeric digit displayed.
6. Press ^ to set the output rate. Choose *5* or *10* Hz output rate.
7. Press ↵ to save your settings.
8. Press ^ v to return to the *Home* screen.

Setting Port A or B for Fast Rate Output

To set Port A or B for Fast Rate Output using the receiver's front panel display:

1. Display the *Home* screen (see page 85).
2. Press > three times to display the *Configuration* menu.
3. Press ^ until the *Guidance Config* or *GPS Config* menu appears.
4. Press > until the *Port A Config* or *Port B Config* menu appears.
5. Press ^ until the *NMEA out* screen appears.
6. Press > to activate the cursor. Press 3 until the cursor flashes on the second numeric digit displayed.
7. Press ^ until *ASAP* appears.
8. Press ↵ to save your settings.
9. Press ^ v to return to the *Home* screen.

APPENDIX

G

*Ag*Remote Installation

In this Appendix:

- Installing AgRemote Software
- Connecting to the AgGPS 124/132
- Troubleshooting the Connection

Installing *Ag*Remote Software

The *Ag*Remote software requires Windows 95, 98 or 2000.

To install the *Ag*Remote software:

1. Download the *Ag*Remote software from Trimble's web site:

   http://www.trimble.com/support/files/index.htm#ag

2. In the file download dialog, select *Save this program to Disk*, and specify *My Documents* on your computer's hard drive.

   Download time will take 5–30 minutes depending on your Internet connection speed.

3. Select *My Documents* from your computer's desktop.

   If you are using a different drive or folder, the path name may be different.

4. In the My Documents window, double-click AGREMOTE.EXE.

5. Click **Next** and follow the instructions displayed by the *Ag*Remote Setup program.

Connecting to the *Ag*GPS 124/132

To connect to the *Ag*GPS 124/132:

1. Connect the right-angle, 12-pin Conxall connector to the *Ag*GPS 124/132 using the Standard Data/Power Cable (P/N 30945).
2. Connect the 9-pin female connector to the PC's serial port (usually COM1 or COM2).
3. From the *Start* menu, select *Ag*Remote.
4. After the program starts, select *File / Connect.*

   The *Ag*Remote program detects the receiver.
5. Navigate through the menus, and configure the *Ag*GPS 124/132 and/or *Ag*GPS 21 Lightbar settings. For more information, refer to the *AgGPS Menu System Reference*.

Troubleshooting the Connection

If *Ag*Remote is unable to detect the receiver (screen is blank), try the following:

- Make sure that the receiver is connected to an available 12–32 VDC power source.
- Check all cable connections between the receiver and PC.
- Click *File / TSIP Break* to force the receiver to communicate the *Ag*Remote software.

If the connection fails again, follow these guidelines:

- If you use a Windows CE or pocket PC device with your computer, make sure that Microsoft Active Sync is not using the COM port on your computer.
- If you use a Palm Pilot with your computer, make sure that the Synchronization software program is not using the COM port on your computer.
- If the connection problem persists, contact your local Trimble dealer or Trimble Precision Agricultural Systems Technical Support.

APPENDIX

H

Navigation Maps

In this Appendix:

- AgGPS Menu System

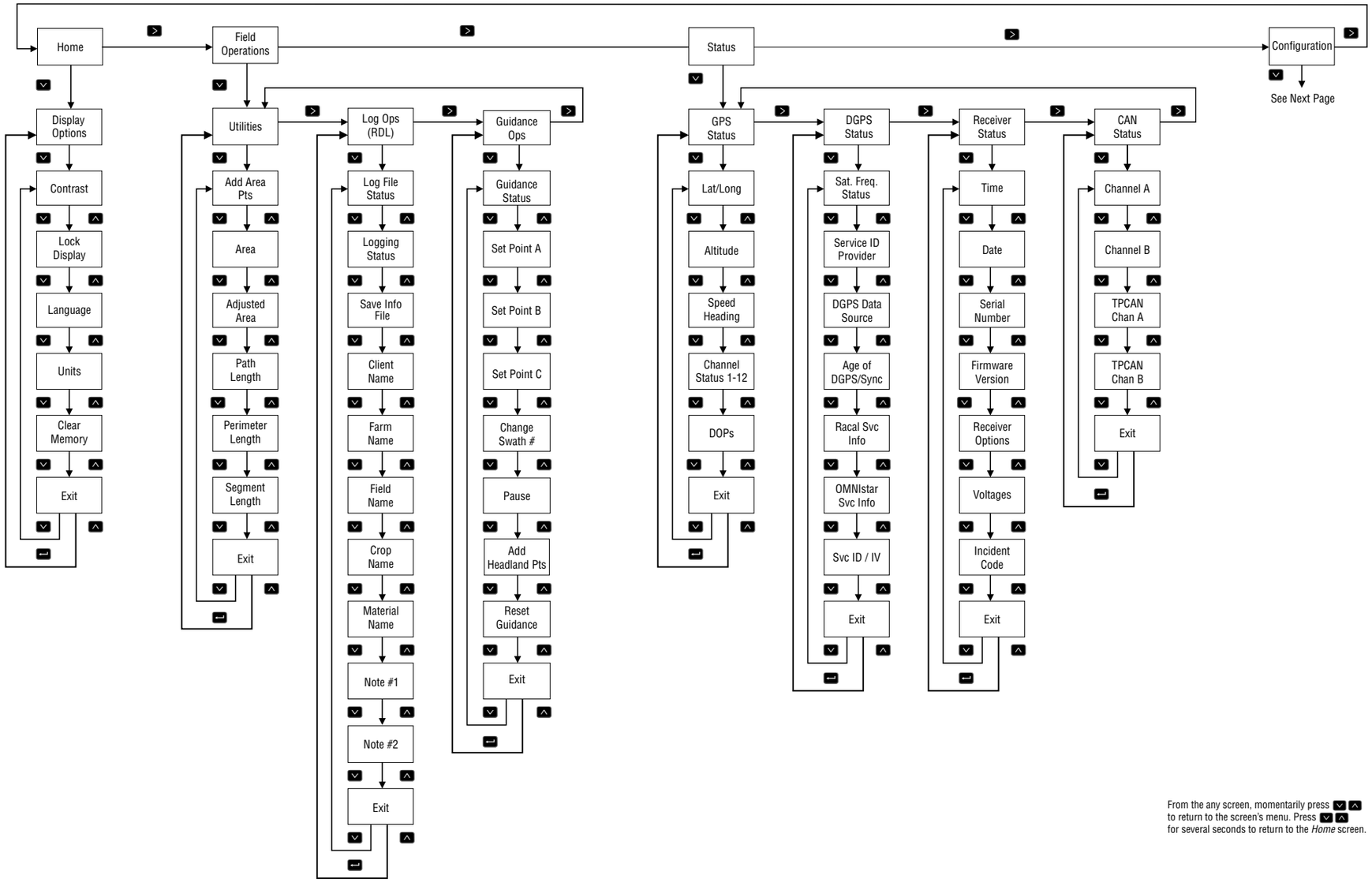
*Ag*GPS Menu System

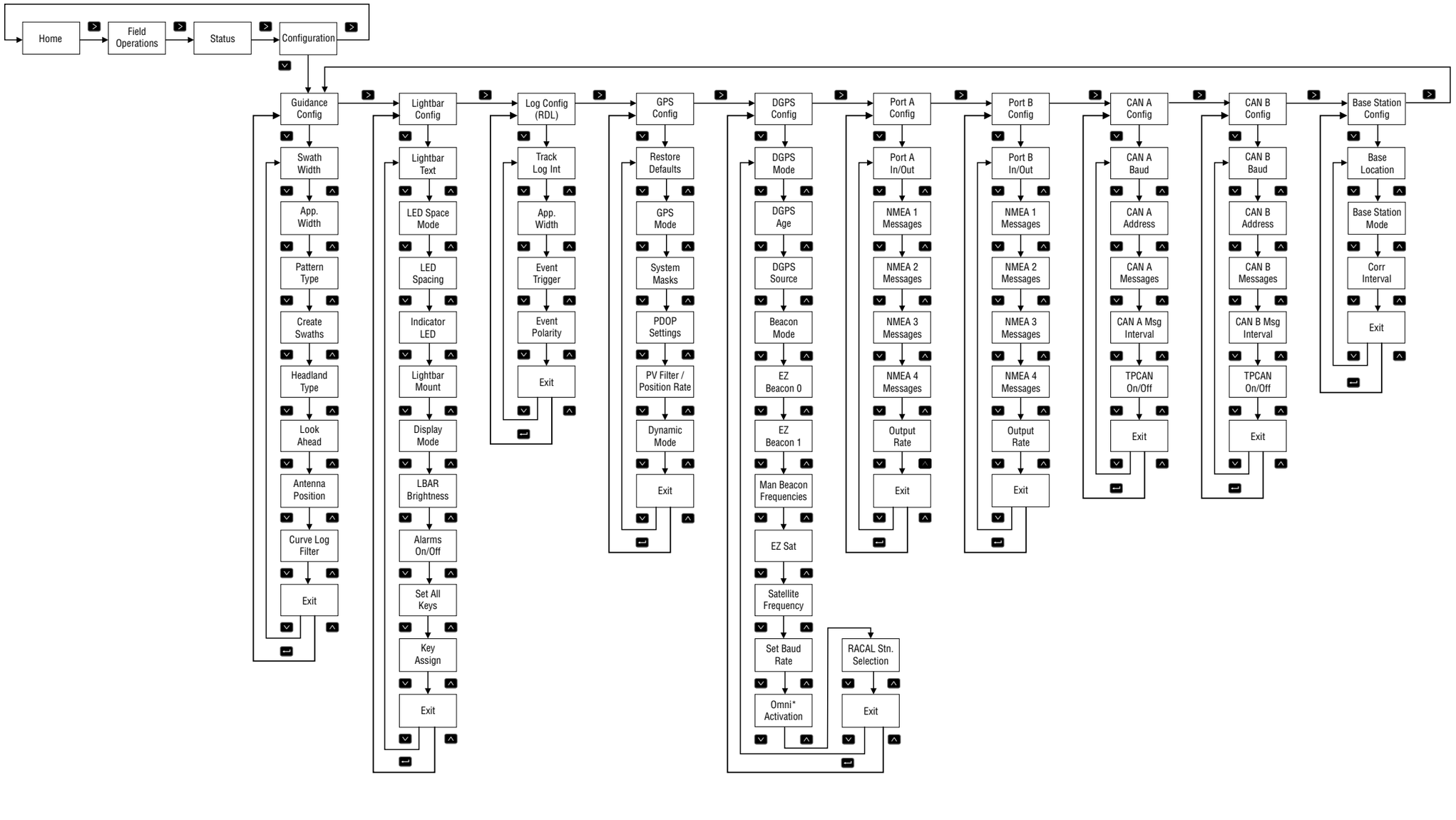
The figures in this appendix show the navigation maps for *Ag*GPS Menu System, firmware version 1.40, 1.41, and 1.42.

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

Basic instructions for configuring the *Ag*GPS 124/132 receiver for operation are included in Chapter 4, Configuring the AgGPS 124/132 Receiver.

For more information, refer to the *AgGPS Menu System Reference*.


Home
Field Operations
Status
Configuration
See Next Page
Display Options
Contrast
Lock Display
Language
Units
Clear Memory
Exit
Utilities
Add Area Pts
Area
Adjusted Area
Path Length
Perimeter Length
Segment Length
Exit
Log Ops (RDL)
Log File Status
Logging Status
Save Info File
Client Name
Farm Name
Field Name
Crop Name
Material Name
Note #1
Note #2
Exit
Guidance Ops
Guidance Status
Set Point A
Set Point B
Set Point C
Change Swath #
Pause
Add Headland Pts
Reset Guidance
Exit
GPS Status
Lat/Long
Altitude
Speed Heading
Channel Status 1-12
DOPs
Exit
DGPS Status
Sat. Freq. Status
Service ID Provider
DGPS Data Source
Age of DGPS/Sync
Racal Svc Info
OMNIstar Svc Info
Svc ID / IV
Exit
Receiver Status
Time
Date
Serial Number
Firmware Version
Receiver Options
Voltages
Incident Code
Exit
CAN Status
Channel A
Channel B
TPCAN Chan A
TPCAN Chan B
Exit
From the any screen, momentarily press to return to the screen's menu. Press for several seconds to return to the Home screen.


Home
Field Operations
Status
Configuration
Guidance Config
Swath Width
App. Width
Pattern Type
Create Swaths
Headland Type
Look Ahead
Antenna Position
Curve Log Filter
Exit
Lightbar Config
Lightbar Text
LED Space Mode
LED Spacing
Indicator LED
Lightbar Mount
Display Mode
LBAR Brightness
Alarms On/Off
Set All Keys
Key Assign
Exit
Log Config (RDL)
Track Log Int
App. Width
Event Trigger
Event Polarity
Exit
GPS Config
Restore Defaults
GPS Mode
System Masks
PDOP Settings
PV Filter / Position Rate
Dynamic Mode
Exit
DGPS Config
DGPS Mode
DGPS Age
DGPS Source
Beacon Mode
EZ Beacon 0
EZ Beacon 1
Man Beacon Frequencies
EZ Sat
Satellite Frequency
Set Baud Rate
Omni* Activation
RACAL Stn. Selection
Exit
Port A Config
Port A In/Out
NMEA 1 Messages
NMEA 2 Messages
NMEA 3 Messages
NMEA 4 Messages
Output Rate
Exit
Port B Config
Port B In/Out
NMEA 1 Messages
NMEA 2 Messages
NMEA 3 Messages
NMEA 4 Messages
Output Rate
Exit
CAN A Config
CAN A Baud
CAN A Address
CAN A Messages
CAN A Msg Interval
TPCAN On/Off
Exit
CAN B Config
CAN B Baud
CAN B Address
CAN B Messages
CAN B Msg Interval
TPCAN On/Off
Exit
Base Station Config
Base Location
Base Station Mode
Corr Interval
Exit

APPENDIX

I

Base Station Option

In this chapter:

- Installing the Base Station Option into an AgGPS Receiver
- Configuring Base Station Options
- Configuring Base Station Options

Installing the Base Station Option into an *Ag*GPS Receiver

Base Station operation may be necessary when working in a remote location where Satellite differential correction and/or Beacon tower differential correction is not available.

Before installing the Base Station Option, the Flashloader 100 software must be installed on your PC. For more information, see Installing the Flashloader Software, page 174.

To install the Base Station Option:

1. Connect the *Ag*GPS receiver to the PC's serial port (usually COM1 or COM2) using the Data/Power Cable (P/N 30945).
2. In Windows 95/98/2000 go to *Start / Programs*, and click *FlashLoader 100*.
3. Click **Find Receiver**.

   FlashLoader 100 detects the receiver and automatically selects the correct port. A message box appears to identify the port connected to the receiver.
4. From the *Flashloader* window, click to select *Update Device with Password*.
5. Click **Proceed**.

   The *Enter Passwords* dialog window will appear.
6. Type the Base Station option password provided by Trimble.
7. Click **OK**.

The update process takes a few seconds and a message box appears if the operation is successful.

If a warning message appears, disconnect the receiver and try again. For more information, see Troubleshooting Flashloader Connection Problems, page 176.

Setting Port A or B for Base Station Output

To set Port A or B for Base Station Output using the receiver's front panel display (Port B is used in the example below):

1. Display the *Home* screen (see page 85).
2. Press > three times to display the *Configuration* menu.
3. Press ^ until the *Guidance Config* or *GPS Config* menu appears.
4. Press > until the *Config Port B* menu appears.
5. Press ^ once to display the *Port Input/Output* screen:

6. Press > to activate the cursor. Press > six times. The cursor will flash on the bottom line of the display.
7. Press ^ until *RTCMI* appears:

8. Press ↵ to save your settings.
9. Press ^ v to return to the *Home* screen.

Tip – You may need change the baud rate (i.e., 9600) and parity (i.e., 0) communication settings to match the settings used by your base station's radio.

Configuring Base Station Options

To configure Base Station Output settings using the receiver's front panel display:

1. Display the *Home* screen (see page 85).
2. Press > three times to display the *Configuration* menu.
3. Press ^ until the *Guidance Config* or *GPS Config* menu appears.
4. Press > until the *Base Stn Config* menu appears.

Note – *The Base Stn Config menu is not visible until the Base Station option is installed into the AgGPS 124/132 receiver.*

In Base Station Mode, the *Ag*GPS 124/132 receiver outputs RTCM (GPS correction) data. The RTCM data can be transmitted to an external radio which then broadcasts the RTCM information to other *Ag*GPS 124/132 "rover" receivers in the field within radio range. Generally the rover unit will be equipped with an identical radio for receiving the RTCM data from the Base Station radio.

The *Ag*GPS 124/132 has real-time capabilities, allowing a submeter reference position to be created in seconds. Set the receiver's antenna over a known surveyed location or allow the receiver to compute the reference location. Once the reference position is supplied, the *Ag*GPS 124/132 receiver can begin computing Psuedo Range Correction information. This information is then converted to an output data format known as "RTCM". RTCM data is applied to the rover receiver's computed GPS position to "correct" the final outputted position to sub-meter accuracy.

Setting the Base Location

The *Base Location* screen lets you determine the *Ag*GPS 124/132 receiver's antenna location by:

- selecting the current computed position,
- entering a known position, or
- averaging the computed position.

To view the *Base Location* screen:

1. Display the *Base Stn Config* menu (see page 202).
2. Press ^ to view the *Base Location* screen (see page 86).

3. Press ↵ to view the current computed reference position. Press ↵ to cycle through current attitude, 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

The *Set From Here* option lets you determine the *Ag*GPS 124/132 receiver's antenna location by selecting the current computed GPS position.

To set the antenna's location to the current computed position:

1. Display the *Base Stn Config* menu (see page 202).
2. Press > to activate the cursor. Press ^ or v to select *Set From Here*.
3. Press ↵.

   The receiver will display three screens showing the current latitude, longitude and altitude.

   – To save the current coordinate value, press ↵

   – To change the reference coordinate value, press ^ or v. Move between characters by pressing >. Press ↵ to save your changes.

   After pressing ↵ to accept the altitude value, the receiver asks whether or not to accept the new reference position. There are two options:

   – To accept the new reference position, press ↵.

   – To reject the new reference position, press ^ or v. Then press ↵

Edit Base Position

The *Edit Base Position* option lets you set the *Ag*GPS 124/132 receiver's antenna to a particular location. This is useful when the antenna is placed over a known surveyed location and the location position coordinates are available.

To set the antenna's location to a known coordinate location:

1. Display the *Base Stn Config* menu (see page 202).
2. Press > to activate the cursor. Press ^ or v to choose *Edit Base Pos*.
3. Press ↵.

   The receiver will display three screens showing the current latitude, longitude and altitude.

   – To save the current coordinate value, press ↵

   – To change the reference coordinate value, press ^ or v. Move between characters by pressing >. Press ↵ to save your changes.

   After pressing ↵ to accept the altitude value, the receiver asks whether or not to accept the new reference position. There are two options:

   – To accept the new reference position, press ↵.

   – To reject the new reference position, press ^ or v. Then press ↵.

Set From Averaged Positions

The *Set From Ave* option lets you determine the *Ag*GPS 124/132 receiver's antenna location by averaging the computed position over a period of time.

To set the antenna's location to a calculated averaged position:

1. Display the *Base Stn Config* menu (see page 202).
2. Press > to activate the cursor. Press ^ or v to choose *Set From Ave*.
3. Press > to move the cursor right. Press ^ or v to select the number of positions desired to determine the average current location value.
4. Press ↵.

   The receiver will begin averaging positions. There are two options:

   – Press > to cancel.

   – Wait until the all calculated positions are collected. Press ↵ to accept the averaged position value.

Setting the Base Station Mode

To operate the *Ag*GPS 124/132 receiver as a base station, the Base Station Mode must be set to *ON*.

Tip – The Base Position must be set first, before the Base Station Mode can set to *ON*.

To change the Base Station Mode:

1. Display the *Base Stn Config* menu (see page 202).
2. Press ^ until the *Base Station Mode* screen appears.

3. Press > to activate the cursor. Press ^ or v set to *ON*.
4. Press ↵ to save your changes.

Setting the PRC Mode

The *PRC Interval* screen (Pseudo Range Correction) lets you select the calculation interval. The Psuedo Range Correction information is applied to the rover receiver's computed GPS position to "correct" the final outputted position.

To set the PRC interval:

1. Display the *Base Stn Config* menu (see page 202).
2. Press ^ until the *PRC Interval* screen appears:

3. Press > to activate the cursor. Press ^ or v to set the Psuedo Range Correction calculation interval.
4. Press ↵ to save your changes.

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Reader Comment Form

_Ag_GPS 124/132 Operation Manual **August 2000**
P/N: 38747-00 **Revision C**

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