



Hemisphere
GPS

Outback A221 Base Station

User Guide

Part No. 875-0245-000 Rev. A1



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

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Hemisphere GPS Precision GPS Applications

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6,111,549	6,397,147	6,469,663	6,501,346	6,539,303
6,549,091	6,631,916	6,711,501	6,744,404	6,865,465
6,876,920	7,142,956	7,162,348	7,277,792	7,292,185
7,292,186	7,373,231	7,400,956	7,400,294	7,388,539
7,429,952	7,437,230	7,460,942		

Other U.S. and foreign patents pending.

Notice to Customers

Contact your local dealer for technical assistance. To find the authorized dealer near you, call or write us at:

Outback Guidance
2207 Iowa Street
Hiawatha, KS 66434
Phone: (800) 247-3808
Fax: (785) 742-4584
www.outbackguidance.com

Warranty Notice

Covered Products

This warranty covers all products manufactured by Hemisphere GPS (the "Products").

Hemisphere GPS Limited Warranty

Hemisphere GPS hereby warrants solely to the end purchaser of the Products, subject to the exclusions and procedures set forth herein below, that the Products sold to such end purchaser shall be free, under normal use and maintenance, from defects in material and workmanship for a period of 12 months from delivery to such end purchaser. Repairs and replacement components are warranted, subject to the exclusions and procedures set forth below, to be free, under normal use and maintenance, from defects in material and workmanship for 90 days from performance or delivery, or for the balance of the original warranty period, whichever is greater.

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The end purchaser's exclusive remedy under this warranty shall be limited to the repair or replacement, at the option of Hemisphere GPS, of any defective Products or components thereof. The end user shall notify Hemisphere GPS or a Hemisphere GPS approved service center immediately of any claimed defect. Repairs shall be made through a Hemisphere GPS approved service center only.

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- DGPS service provider performance specifications.

Hemisphere GPS reserves the right to modify Products without any obligation to notify, supply or install any improvements or alterations to existing Products.

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In order to obtain warranty service, the end purchaser must bring the Product to a Hemisphere GPS approved service center along with the end purchaser's proof of purchase. For any questions regarding warranty service or to obtain information regarding the location of any of Hemisphere GPS' approved service centers, contact Hemisphere GPS at the following address:

Hemisphere GPS

Outback Guidance

2207 Iowa Street

Hiawatha, KS 66434

Phone: (800) 247-3808 Fax: (785) 742-4584

www.outbackguidance.com

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Hemisphere GPS is committed to the quality and continuous improvement of our products and services. We urge you to provide Hemisphere GPS with any feedback regarding this guide by writing to the following email address: DocFeedback@hemispheregps.com.

Contents

Chapter 1 Introducing the A221 Base Station

Parts and Connections	3
Parts List	4
Connectors	5

Chapter 2 Getting Started

Mounting the A221 Base Station	8
Powering the A221 Base Station	9
Using the Menus	11
Navigating the Menus	11
Entering Alphanumeric Characters	12
Operating the A221 Base Station	13
Reading the LEDs	15

Chapter 3 Configuring the A221 Base Station

Setting an Alternate Reference Point	18
Managing Configurations	19
Saving a Configuration	19
Returning to a Saved Configuration	20
Deleting a Saved Configuration	20

Appendices

Appendix A: Technical Specifications	24
Appendix B: Menu Map	28



Contents

Main Menu28

Configuration Wizard Menu28

Data Logging Menu29

SBAS Menu29

GPS Menu30

System Setup Menu31

Base Station Menu32

Appendix C: Sales and Service Information33

 Contacting the Factory33

 Outback A221 Extended Service Plan (ESP) Summary34

 Limited Outback A221 Extended Service Plan35

End User License Agreement





Chapter 1: Introducing the A221 Base Station

Parts and Connections

1: Introducing the A221 Base Station

The A221 Base Station offers fast, portable, professional-level accuracy in a rugged, all-in-one enclosure.



Figure 1-1: A221 Base Station.

The A221 Base Station has a built-in RTK radio and is powered by Hemisphere GPS' powerful, dual-frequency Eclipse® OEM board. It is ideal for a wide variety of agriculture applications, including:

- Automatic steering
- High-accuracy machine control

The A221 Base Station has a flexible design to meet your application and integration needs. Easy-to-read LED status indicators for power, GPS, and DGPS make the system easy to use. Simply mount the base station on a tripod, and you're ready to go!



Parts and Connections

Figure 1-2, below, shows an A221 Base Station kit. The complete kit includes the base station, cables, tripod, tripod adapter, and documentation needed to install the A221.



Figure 1-2: A221 Base Station kit.



Parts List

Table 1-1 lists the parts included in your A221 Base Station kit.

Table 1-1: A221 Base Station Kit Parts List

Part No.	Description	Qty
804-0065	A221 Base Station	1
750-0050	Tripod	1
676-0018	Tripod mounting adapter	1
676-0019	Tripod mounting adapter stem	1
054-0119	Power cable	1
002-0073	Case	1
875-0245	A221 Base Station User Guide	1
875-0246	A221 Base Station Quick Reference Guide	1



Connectors

Figure 1-3 shows the A221 Base Station connectors.

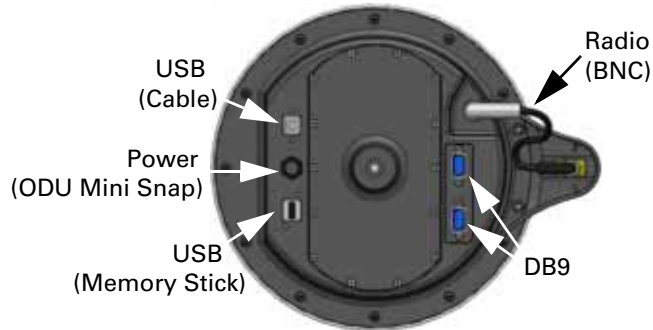


Figure 1-3: A221 Base Station connectors.

Table 1-2 describes the purpose of each available connector.

Table 1-2: A221 Base Station Connectors

Connector	Used For	Qty
DB9	Software updates or advanced configurations. Both DB9 serial ports are available; however, only one serial port is active at a time.	2
USB	Advanced service and applications. One connector supports a USB memory stick; the other supports a direct connection to a host computer via a cable.	2
BNC	Radio connector.	1
ODU Mini Snap	Power cable connector.	1





Chapter 2: Getting Started

Mounting the A221 Base Station

Powering the A221 Base Station

Using the Menus

Operating the A221 Base Station

Reading the LEDs

The A221 Base Station is pre-configured for use as a base station in an RTK system. The provided kit includes everything you need to set up and begin using your base station.

This chapter includes the following sections:

- Mounting the A221 Base Station
- Powering the A221 Base Station
- Using the Menus
- Operating the A221 Base Station
- Reading the LEDs

Mounting the A221 Base Station

Mount the A221 Base Station to the tripod using the provided tripod adapter.

To mount the A221 Base Station:

1. Thread the provided tripod stem (676-0018) onto the tripod adapter (676-0019).
2. Mount the tripod adapter unit onto the tripod.



3. Thread the center hole of the base station onto the tripod stem.



Powering the A221 Base Station

Connect the A221 Base Station to a car battery (110 V) using the supplied power cable. The base station is automatically “on” upon connecting a power source.

To connect a power source to the A221 Base Station:

1. Connect the provided power cable (054-0119) to the A221 Base Station's power port.
2. Attach the positive and negative leads at the opposite end of the power cable to a car battery's positive and negative terminals.



2: Getting Started

3. Check the LED status on the base station. The red LED indicates power and a successful connection.



Using the Menus

The A221 Base Station menu screens are simple to use. For a complete menu map, see “Appendix B: Menu Map”.

Navigating the Menus

On startup, the A221 Base Station will display the main menu screen. You can access all of the setup menus from the **Main** menu.



Figure 2-1: Main menu.

To navigate the menus:

Use the up and down arrow keys to scroll through the available options in each menu. Use the green arrow button to select an option. To return to the **Main** menu screen, use the arrow key to scroll down and select **Top Menu**.







Figure 2-2: A221 Base Station display.



Entering Alphanumeric Characters

Use the arrow keys to enter alphanumeric characters (for example, when entering a job name or a subscription code).

To enter alphanumeric characters:

Step	Screen Item (when applicable)
<p>1. At the prompt, press  to scroll to your desired character.</p> <p><i>Tip: The character will appear on a black background when the prompt is active.</i></p>	
<p>2. Press  to select the character. The prompt will move to the next character.</p>	
<p>3. Press  when done.</p>	



Operating the A221 Base Station

Follow the steps below to begin using the base station:

1. **Plan the base station location.** The base station automatically uses its current location as the reference point. Place the base station:
 - at least 1 meter (3 feet) away from the rover radio, with an unobstructed view of the sky, and
 - at least 50 meters (160 feet) from any obstructions.

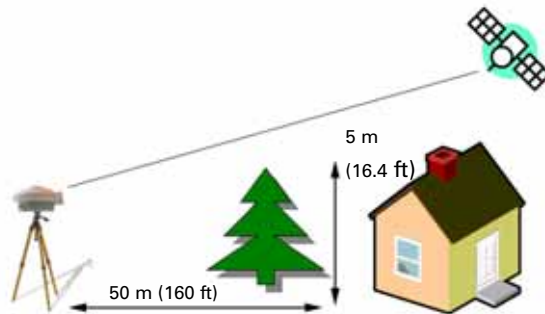



Figure 2-3: Location of the base station.





2. **Select the desired radio channel.** The base station and rover radios must be set to the same channel.

To select the radio channel:

Step	Screen Item (when applicable)
a. From the main menu, select Base Station > Radio . You will see the Radio screen displaying the radio manufacturer, version number, and channel.	



2: Getting Started

Step	Screen Item (when applicable)
b. Press  to select the <i>Channel</i> field.	
c. Use the arrow keys to select the desired channel. Press  to save.	
d. Select Back to return to the previous menu.	

3. **Wait for RTK lock (maximum accuracy).** The screen will cycle through the following displays.

Note: It takes 3 - 5 minutes for the base station to achieve RTK lock in an unknown location.

It typically takes the base station less than 60 seconds to achieve RTK lock in a known location.

4. You're ready to work!



Countdown to position lock.



Position lock.






GPS Position Status screen.



Reading the LEDs

As shown in Table 2-1 , the A221 Base Station has three LEDs indicating power, GPS, and DGPS status.

Table 2-1: LED Display

Display	Function	Description
	Power	Power on
	GPS	GPS position calculated (Blinking LED indicates acquiring data)
	DGPS	DGPS lock (Blinking LED indicates broadcast of a differential correction from the radio)

Note: The A221 Base Station features Hemisphere GPS COAST™ technology, which provides continuous coverage in the event of a temporary differential signal outage.





Chapter 3: Configuring the A221 Base Station

Setting an Alternate Reference Point
Managing Configurations



This chapter covers configuring advanced features for your A221 Base Station. Advanced users may want to:

- Set an alternate reference point
- Manage configurations for different jobs

Setting an Alternate Reference Point

To set an alternate reference point, use the **Base Station** menu.

To set an alternate reference point:

Step	Screen Item (when applicable)
<p>1. From the main menu, select Base Station > Reference > Enter New.</p> <p><i>Tip: Use the arrow keys to scroll through the main menu.</i></p> <hr/> <p>Note: You may also return to Use Current Position or Re-Average Position.</p>	
<p>2. Enter the desired coordinates.</p>	



Managing Configurations




The A221 Base Station Configuration Wizard allows you to:

- Save a configuration
- Return to a saved configuration
- Delete a saved configuration

Saving a Configuration

Use the **Configuration Wizard** to create and save a configuration.



To save a configuration:

Step	Screen Item (when applicable)
<p>1. From the main menu, select Config Wizard > Proceed Wizard.</p> <p><i>Tip: Use the arrow keys to scroll through the main menu.</i></p>	
<p>2. Select Enter Name. Use the arrow keys to enter a name.</p>	
<p>3. Select Save to Location to save.</p>	




Returning to a Saved Configuration

To return to a saved configuration:


Step	Screen Item (when applicable)
<p>1. From the main menu, select Config Wizard > Use Previous.</p> <p><i>Tip: Use the arrow keys to scroll through the main menu.</i></p>	
<p>2. Select the desired configuration</p>	

Deleting a Saved Configuration

To delete a saved configuration:

Step	Screen Item (when applicable)
<p>1. From the main menu, select Config Wizard > Delete Saved.</p> <p><i>Tip: Use the arrow keys to scroll through the main menu.</i></p>	



Step	Screen Item (when applicable)
<p>2. Select the desired configuration.</p> <hr/> <p>Note: There is no warning prompt. Once you select Enter, you will lose the saved configuration.</p> <hr/>	





Appendices

Appendix A: Technical Specifications

Appendix B: Menu Map

Appendix C: Sales and Service Information

Appendix A: Technical Specifications

Tables A-1 through A-6 provide the power, mechanical, communication, environmental and DGPS specifications for the A221 Base Station.

Table A-1: Power Specifications

Item	Specification
Input voltage	9 - 36 VDC
Power consumption	< 5 W @ 12 VDC
Current consumption	400 mA @ 12 VDC
Power connector	Cable mount environmentally sealed

Table A-2: Mechanical Specifications

Item	Specification
Height	15 cm (5.91 in)
Width	24.4 cm (9.6 in)
Weight	1.8 kg (4 lbs)
Mounting Options	Tripod mount

Table A-3: I/O Communications

Item	Description
Serial ports	2 full-duplex RS232
USB port	2 USB ports
Pulse output	1 PPS (HCMOS, active high, rising edge sync)
Baud rates	4,800 - 115,200



Table A-3: I/O Communications (Continued)

Item	Description
Differential correction I/O protocol	Hemisphere GPS Proprietary DFX and ROX RTCM SC-104 v3 CMR+
Data I/O protocol	NMEA 0183 and SLX binary
Ground speed output	Range: 0.8 - >322 Km/h (0.5 - >200 mph) Signal: Opto-isolated pulse out Frequency Conversion: 94 Hz/m/s (28.65 pulse per foot traveled)
Event mark output	HCMOS, active low, falling edge sync, 10 k-ohm, 10 pF load

Table A-4: Environmental Specifications

Item	Specification
Operating temperature	-30° C to +65° C (-22° F to + 149° F)
Storage temperature	-40° C to +85° C (-40° F to + 185° F)
Humidity	EP455 Section 5.13.1 Humidity
Enclosure	Enclosure IP67
Compliance	FCC, CE
Shock	EP455 Section 5.14.1 Operational
Vibration	EP455 Section 5.15.1 Random
EMI certification	FCC part 15, E-Mark



Table A-5: GPS Sensor Specifications

Item	Specification
Receiver type	L1 and L2 RTK carrier phase smoothing (Patented COAST™ technology during differential signal outage)
Channels	12 L1CA GPS 12 L1P GPS 12 L2P GPS 3 SBAS or 3 additional L1CA GPS
Update rate	1 - 20 Hz positions (10 Hz standard)
Startup time	Cold start: < 60 s Warm start: 30 s Hot start: 10 s (typical)
Satellite reacquisition	< 1 s
Differential options	SBAS, autonomous, external RTCM, RTK, OmniSTAR (HP/XP)



Table A-6: Horizontal Accuracy

DGPS Source	RMS (67%)	2 DRMS (95%)
RTK ^{1,2}	10 mm + 1 ppm	20 mm + 2 ppm
OmniSTAR HP ^{1,3}	0.1 m	0.2 m
SBAS (WAAS) ¹	0.3 m	0.6 m
Autonomous, no SA ¹	1.2 m	2.5 m

Notes:

¹Depends on multipath environment, number of satellites in view, satellite geometry and ionospheric activity

²Depends also on baseline length

³Requires a subscription from OmniSTAR



Appendix B: Menu Map

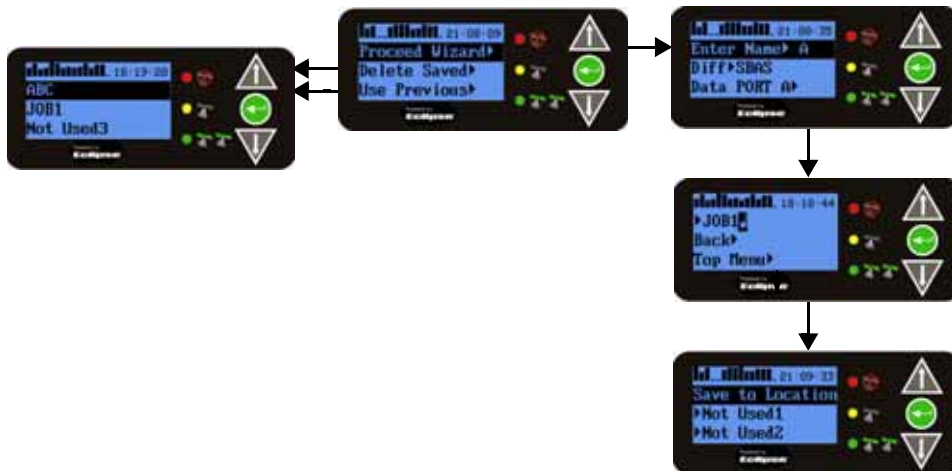
Main Menu

Use the main menu to access the system submenus.



Configuration Wizard Menu

Use the **Configuration Wizard** menu to manage jobs. This menu allows you to create a job, delete a job, or use a previous job.



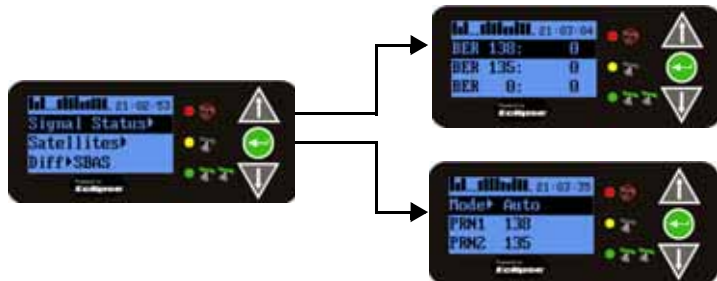
Data Logging Menu

Use the **Data Logging** menu to log job data. Tasks include naming your data log, selecting whether to include receiver information in the log file, selecting the file type of your log file, and starting and stopping your log file.



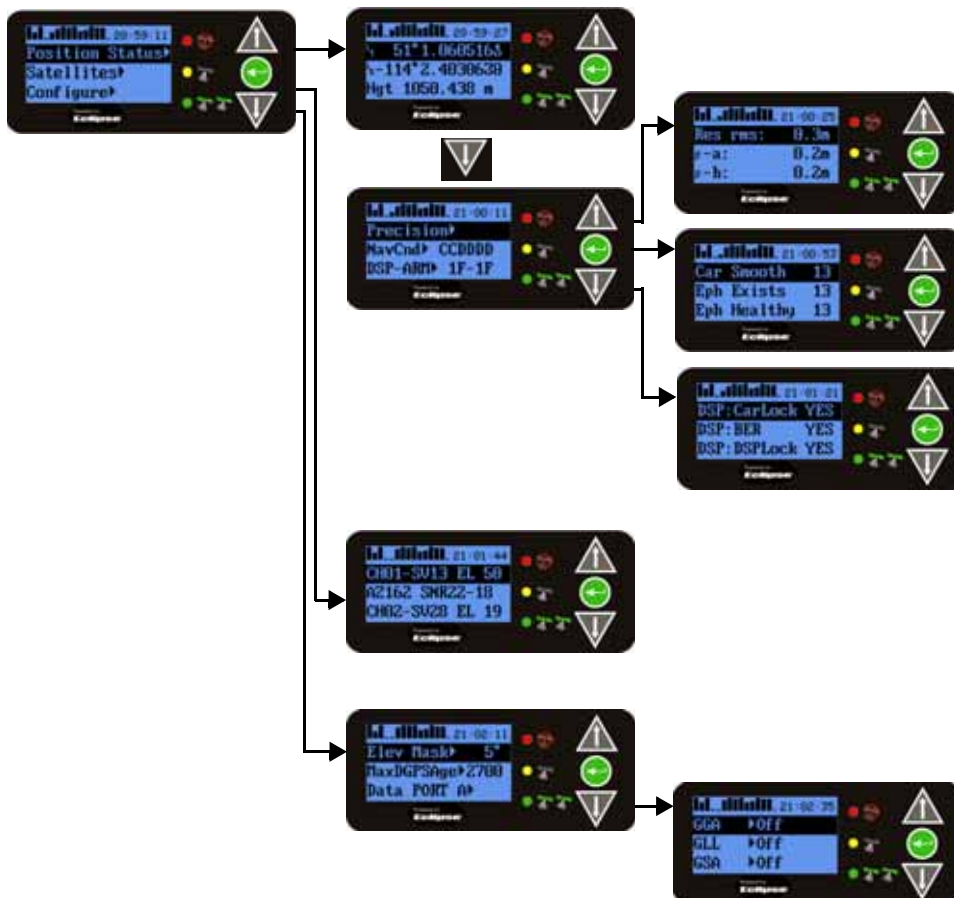
SBAS Menu

Use the **SBAS** menu to view differential signal status.



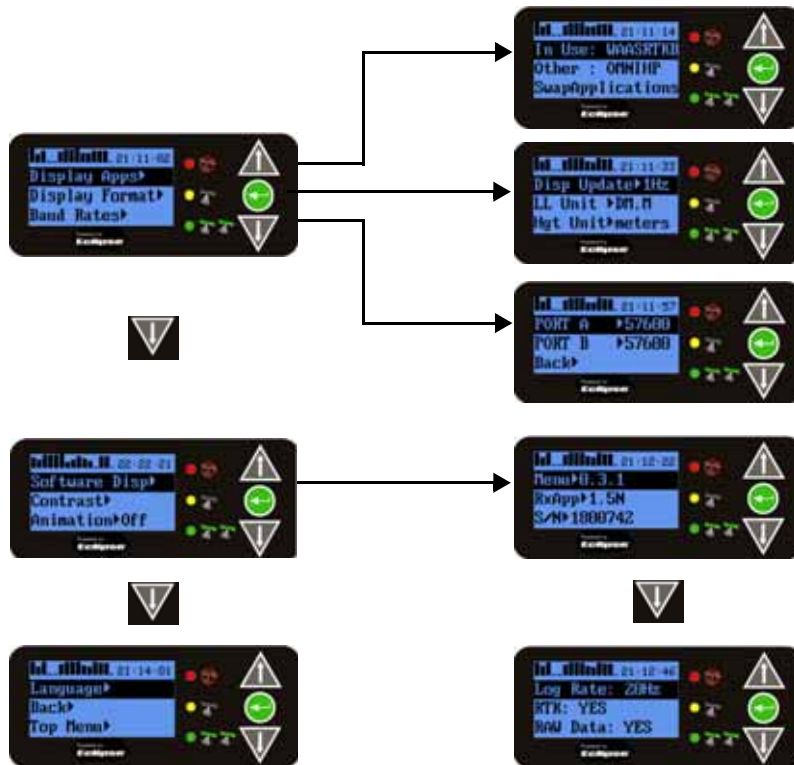
GPS Menu

Use the **GPS** menu to view position status, individual satellite data, or to change GPS settings, such as the elevation mask or maximum DGPS age.



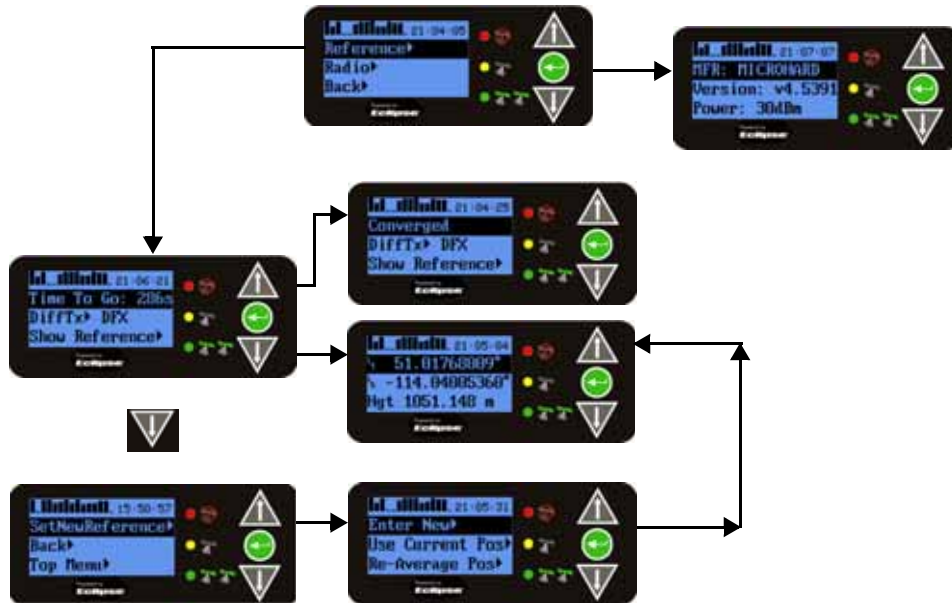
System Setup Menu

Use the **System Setup** menu to configure basic system options, including the differential type, display format (units, update rate of the display), baud rates, display screen contrast, subscription number, or language.



Base Station Menu

Use the **Base Station** menu to view radio details, set an alternate reference point, return to using your current position or to re-average your position.



Appendix C: Sales and Service Information

Contacting the Factory

U.S:

Outback Guidance
Hemisphere GPS
2207 Iowa Street
Hiawatha, KS 66434
USA

Canada:

Outback Canada
Hemisphere GPS
3244 Portage Avenue
Winnipeg, MB R3K 0Y9
CANADA

ONLINE: <http://www.outbackguidance.com>

PHONE: Monday Through Friday 8AM-5PM U.S. Central Time

- **U.S:** 1-800-247-3808 (Customer Service & Ordering)
- **Canada:** 1-866-888-4472 (Customer Service & Ordering)
- **From all other countries:** 01-785-742-2976

E-MAIL: 24 hours/7 days a week, your inquiry will receive a response from one of our Customer Support Representatives within one business day.

- **Sales:** outbacksales@outbackguidance.com
- **Customer Service:** outbackcs@outbackguidance.com
- **Website Feedback:** outbackweb@outbackguidance.com

FAX: 24 hours/7 days a week, your inquiry will receive a response from one of our Customer Support Representatives within one business day.

- 1-785-742-4584

U.S. REGIONAL SALES OFFICES:

- Outback North - Fargo, ND 1-888-825-6031
- Outback South - Hewitt, TX 1-866-857-4448



Outback A221 Extended Service Plan (ESP) Summary

U.S. and Canada Only

Item	Standard Term	Extended Term
Price	Free	\$399
Term	1 Year ESP	3 Year ESP (Standard +2 Years)
Exchange Service	Yes	Yes
Software Revision Updates	No Charge	No Charge
Software Revision Installation	Provided by Customer or OGC™	Provided by Customer or OGC™
Damage During Shipments	Covered	Covered
Damage After Customer Receipt	Not Covered	Not Covered
Shipping, Outback to Customer	Outback Paid (Next Day Air & Saturday* Delivery)	Outback Paid (Next Day Air & Saturday* Delivery)
Shipping, Customer to Outback	Outback Paid (Ground Service)	Outback Paid (Ground Service)

* Saturday delivery may not be available in all service areas.



Limited Outback A221 Extended Service Plan

The Outback A221 ESP (U.S. and Canada only) applies only to the non-software portions of the electronic components of the product, including the console and related cables. Coverage for the mechanical portions of the Outback A221 is described in the warranty notice. The limited plan term is one-year standard, or three-years extended if purchased at the time of the original order, beginning on the date of invoice to the original purchaser.

Damage caused by shipping the product(s) to the original purchaser is covered under this limited plan. Otherwise, this limited plan does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by Hemisphere GPS, usage not in accordance with product instructions, failure to perform required preventive maintenance and problems caused by use of parts and components not supplied by Hemisphere GPS.

This limited plan does not cover any items that are in one or more of the following categories: software (except for Hemisphere GPS authorized revision updates), external devices (except as specifically noted), accessories or parts added to an Outback A221 system after the system is shipped from Hemisphere GPS, accessories or parts that are not installed in the Hemisphere GPS factory.

Hemisphere GPS will provide, on an exchange basis and subject to the Hemisphere GPS Exchange Policy in effect on the date of the exchange, replacement parts (up to and including a complete Outback A221 system) for the Outback A221 product(s) covered under this limited plan when parts require replacement. To request service, you must call Hemisphere GPS (U.S. 800-247-3808, Canada 866-888-4472) or go to outbackguidance.com for information, within the plan period. If replacement is required, Hemisphere GPS will issue a Return Material Authorization Number and will ship by UPS Next Day Air & Saturday Delivery the replacement part(s) within 1 business day. You must ship by UPS Ground Service collect, the original product(s) back to



Hemisphere GPS in this packaging. For Canadian customers, Saturday delivery is not available and the shipping carrier is Purolator.

In any instance in which Hemisphere GPS issues a Return Material Authorization Number, Hemisphere GPS must receive the original part(s) prior to the expiration of the plan period in order for the replacement(s) to be covered by the limited plan. Failure to return original part(s), for which replacement(s) have been sent, within 30 days of initial shipment, will result in the issuance of an invoice for the cost of the sent part(s). Failure to pay the invoice, or return the part(s), will result in cancellation of this limited plan.

Hemisphere GPS owns all parts removed from repaired products. Hemisphere GPS uses new and reconditioned parts made by various manufacturers in performing service repairs and building replacement products. If Hemisphere GPS repairs or replaces a product, its plan term is the remainder of the limited plan term.

These provisions apply to the Limited Outback A221 Extended Service Plan only. Hemisphere GPS reserves the right to make improvements in design or changes in specifications at any time, without incurring any obligation to owners of units previously sold. No one is authorized to alter, modify or enlarge this Limited Outback A221 Extended Service Plan nor the exclusions, limitations, and reservations.





End User License Agreement

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 - c. copy any of the Software or any written materials for any purpose except as part of Licensee's normal backup processes;
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 - g. use or operate Product for the benefit of any third party in any type of service outsourcing, application service, provider service or service bureau capacity;
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