OUTBACK S™ OWNER'S MANUAL

Congratulations on your purchase of an Outback S™ GPS Guidance unit. We at Hemisphere GPS wish to thank you for your patronage and appreciate your confidence in OUTBACK™ equipment. Your Outback S™ GPS Guidance unit has been carefully designed and ruggedly built to provide many years of dependable service in return for your investment.

This manual has been prepared to assist you in the operation and maintenance of your Outback S™ GPS Guidance unit and to provide the necessary part numbers to keep it in near original condition.

Outback S™ Serial Number_____

Footnotes: OUTBACK™, OUTBACK Guidance®, OUTBACK Guidance Center™, OUTBACK S™, OUTBACK S2™, OUTBACK 360™. OUTBACK Steering Guide™, OUTBACK Hitch™, eDrive®, Just Let Go™ and Baseline™ are proprietary trademarks of Hemisphere GPS, L.L.C. The OUTBACK S™ automated navigation and steering guide system is protected under U.S. Patents No. 6,539,303 and No. 6,711,501. The OUTBACK Hitch™ automated hitch control system is protected under U.S. Patent No. 6,631,916. Other U.S. and international patents pending.

INSTALLATION

1. Determine Antenna Location: The antenna should be mounted centered on the vehicle as high and as far forward as possible. This is usually along the front edge of the vehicle cab.

NOTE: *Do not place the antenna within 2 feet of a transmitting radio antenna, for example: 2-way or business band radio.*

2. Attach Antenna: Clean and dry the surface where the antenna mounting plate will be attached. Remove the paper backing from the adhesive strips on the back of the mounting plate. Position the mounting plate and press down hard for good adhesion. Place the magnetic mounted antenna on the plate and be sure it is on the exact centerline of the vehicle.

3. Determine Display Location: Normally, the display is located above and behind the center of the steering wheel just below the driver's line of sight. The easiest installation is on the front glass of the cab. If that's not possible, it can vacuum mount to any non porous (metal) surface or the vacuum mount can be removed and the bracket mounted with bolts.

4. Mount Display Unit: THOROUGHLY clean the inside cab window surface directly in front of the steering wheel. Remove the red cover of the vacuum mount, press it to the window and pump the button located on the vacuum mount. Pump until the red line is no longer visible on the button. (Check it periodically. If the red line becomes visible, you may have to pump it a little to maintain suction). Adjust the display for proper viewing angle.

NOTE: *Do not leave console unattended for extended periods of time. If possible, remove the unit from glass when not in use. Continued exposure to the elements (such as direct sunlight), can be harmful to the suction cup.*

5. Route Antenna Cable: Securely attach one end of the cable to the antenna. Route the cable to a cab opening where rubber protection exists to protect the cable. (A closed window works fine.) Do not bend the cable to a radius of less than 6 inches. Avoid routing it within 12 inches of radio wires, power generator wires, heat source or moving parts. Attach the other end of the cable to the display unit. Coil excess cable in a protected location and secure the installation with tie straps.

6. Install Power Cable: Connect the power cable to the display unit at the CAN port. Twist connector <u>firmly</u> until it snaps into place. For permanent installations, we recommend removal of the cigarette lighter plug and hard-wiring the leads to a reliable 12 volt power supply. Use a 5-amp inline fuse on the red lead to protect the console and wiring. Red goes to positive and black to negative. Coil excess cable in a protected location and secure the installation with tie straps.

Use tie strap through mounting hole to relieve cable strain.

NOTE: *Cigarette lighter sockets are **notorious** for intermittent power. For permanent installation, we recommend wiring directly to the battery, using a 5-amp inline fuse.*

POWER UP

1. Turn Unit On, After Starting Engine: Toggle the power switch located on the right end of the display. The RED status light will illuminate.

Power Switch

2. Acquire a DGPS Signal: The unit automatically begins acquiring a DGPS signal. This process may take a few minutes. During this process, the vehicle can be moving or the operator can perform menu functions. Upon achieving a GPS signal, the YELLOW status light will illuminate. Finally, once the DGPS correction signal is acquired, a GREEN status light will illuminate. The GREEN DGPS light must be present for the Outback S™ to provide guidance.

NOTE: *The antenna must have a clear view of the sky to acquire a DGPS signal.*

SETUP

Using the Menu: To access the menu, press the MENU button. Choose the item you want using the up and down arrow keys. The **>** character points to the active menu item. Press ENTER to select.

1. EDRIVE SETUP: Optional menu item appears only if eDrive® is installed. See the Outback eDrive® owner's manual for details.

2. BRIGHTNESS: Adjust the display brightness from 1 to 10 as desired. A setting of 1 is dim while a setting of 10 is bright.

3. UNITS OF MEASURE: Choose desired units of measure as feet or meters.

4. SWATH WIDTH: Adjust this number to equal the width of the implement or boom.

5. SENSITIVITY: Adjust guide sensitivity to LOW, MEDIUM or HIGH.

6. SHIFT A=B: Adjust straight guidance A=B line left or right (see page 9).

7. HEADLAND ALERT: Turn headland indicator on or off.

8. PERIMETER SETUP: Select RIGHT, CENTER, or LEFT edge of swath width for field perimeter area calculation (see page 10).

9. DIAGNOSTICS: (See page 15)

10. CORRECTION TYPE: (See Page 6)

11. NMEA PORT SETUP: (See Page 14)

12. LANGUAGE: Select desired language choice.

CORRECTION TYPES

The differential correction type used by the Outback S™ is selected from the two options loaded into the receiver. WAAS and e-Dif™ are the factory installed options with other types available as field installed options. The correction type can be changed from the **CORRECTION TYPE** item in the setup menu (see page 5). Choose WAAS, e-Dif™, EGNOS, OmniStar, or other field installed correction option(s).

WAAS is free and is available anywhere in North America. e-Dif™, as factory installed, is pre-activated with a secondary one-time subscription code which can be used only in North America. A one-time primary subscription to e-Dif™ may be purchased for use anywhere in the world.

EGNOS, like WAAS, is also free and is available in Europe. OmniStar correction service is available throughout the world, however, an annual subscription must be purchased. Field installation of OmniStar correction must replace one of the existing correction types and may be performed either from a PC or from an Outback 360™.

NOTE: *The use of e-Dif™ on OUTBACK Guidance® equipment as a GPS differential correction is intended only for relative guidance applications and is not recommended for data recording and subsequent comparative analysis. Relative positional accuracy will typically drift at a rate of 1-2 meters (3-6.5 feet) per hour; however, absolute positional accuracy errors may approach ±10 meters (±33 feet).*

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CONTOUR GUIDANCE

1. Background: Choose contour guidance whenever you want to follow previous passes. In this mode, you are either logging an initial pass or guiding from a previous pass. After choosing contour guidance, you proceed by making your initial pass anywhere you like without using the guide. Later, when you attempt to follow a previous pass, the guide will turn on. Contour guidance is generally used for working out borders, turn areas and contour following.

2. Make The Initial Pass: Press CONTOUR GUIDANCE before beginning. The display will read "LOGGING PASS". Proceed with the initial pass using any path you desire.

3. Guide On Subsequent Passes: Anytime you approach a previously made pass, the Outback S™ will automatically recognize what you're doing and will begin to guide. That pass, in turn, will become the pattern for the next pass and so forth. In contour mode, any previous pass (even those made in straight mode) can be used to guide from.

4. Making A New First Pass: Let's say you've made several passes and then want to start a new line that doesn't follow the last one. Simply drive where you want to go. Once it becomes obvious that you're not guiding from another pass, the unit will go back into logging pass mode.

5. Switching Modes: You may switch between straight and contour at any time. When switching from straight to contour, the Outback S™ guides from any previously made pass.
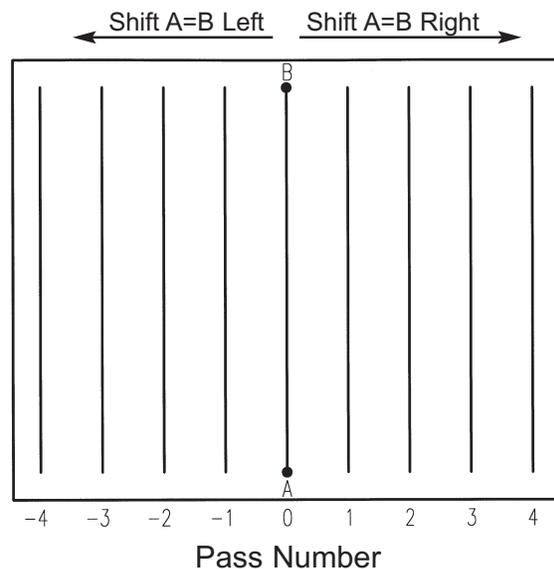
STRAIGHT GUIDANCE

Background: Choose straight guidance whenever you want the unit to generate straight, parallel paths for you to follow. You can establish the first pass along a straight side of the field or you can divide the field with a straight swath and work out each side. All passes will be perfectly and uniformly spaced across the field.

An A=B line is defined by marking an A point and a B point. The imaginary line that passes through those two points defines the first pass. All other passes are perfectly spaced on both sides of the first pass.

1. Mark Point A: With the tractor positioned at the beginning of the first pass, press STRAIGHT GUIDANCE. You'll get the message PRESS ENTER FOR POINT "A". Press ENTER to mark the point.

2. Mark Point B: Then drive some or all of the first pass. If following a straight side of the field, go all the way to the end before marking Point B. If dividing the field, it's only necessary to go a short distance. You will be prompted to press the ENTER button again to mark Point B.

Shift A=B Left ← → Shift A=B Right

B

A

−4   −3   −2   −1   0   1   2   3   4

Pass Number

3. Begin Straight Guiding: After Point B is entered, the unit automatically begins guiding. Keep the Steering Guide™ lights centered by moving the steering wheel. When one pass is finished, just turn around in the approximate area of the pass you wish to follow and the unit will automatically seek the new pass.

4. Switching Modes: You may switch between straight and contour modes at will. When switching to straight mode for the second time, you are given the option of using the previous A=B line or setting a new one.

5. Pass Numbering: Once the A=B line is established, all passes will be numbered as shown on the previous page. While turning around at the headland, the nearest pass number is displayed. Passes may be worked in any order.

6. Shift A=B: The A=B line may also be shifted left or right, rather than re-establishing a new A=B line. To shift the A=B line, select the SHIFT A=B menu setup item, and press the down or up arrow keys to adjust the amount of left or right shift as desired. The left and right directions are defined relative the A point towards the B point as shown on the previos page.

NOTE: *The Shift A=B setup menu item is best used to insert a desired gap between consecutive parallel swaths, for example a conservation barrier strip. To make on-the-go A=B line adjustments, correcting for DGPS drift over time, use the alternate display screen adjustment described on the next page.*

HEADLAND PRESENCE

The headland presence indicators display anytime that the antenna crosses into a previously applied area. This feature may be turned on or off from the setup menu.
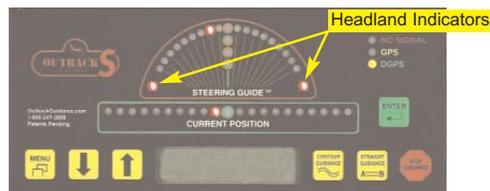
ALTERNATE DISPLAY SCREENS

While operating in either contour or straight guidance modes, the up or down arrow keys will present alternate display screens. Repeated pressing of the down arrow will display the following screens:

0. **Normal Guidance Screen**
1. **Perimeter Area / A=B Line Adjustment Screen**
2. **Ground Speed and Heading Screen**
3. **Latitude and Longitude Screen**

Repeated pressing of the up arrow will display the alternate screens in the reverse order.

ON-THE-GO A=B LINE ADJUST

While operating in straight guidance mode, the A=B line may be adjusted, on-the-go, without interrupting normal guidance operation. This feature is especially useful to correct for DGPS drift over time.

1. Straight Guidance: Operate in straight guidance mode as you would normally.

2. Display 1st Alternate Screen: Press the down arrow key to display the 1st alternate screen. Manually drive the vehicle to the desired swath position. Press STRAIGHT GUIDANCE. This will cause the nearest A=B guide line to be aligned with the current vehicle position (snap A=B to here). Press the up arrow key to return to the normal guidance display screen.

3. eDrive® Engaged: If the optional eDrive® system is installed and engaged, pressing STRAIGHT GUIDANCE at the 1st alternate screen will display a shift A=B adjustment screen. Pressing the down and up arrow keys will nudge the A=B guide line left or right, relative to the direction of travel. Press STRAIGHT GUIDANCE to exit the shift A=B adjustment screen.

NOTE: *On-the-go A=B line adjustments can only be made while operating in straight guidance mode.*

FIELD PERIMETER AREA

At the beginning of each new field, the Outback S™ can be used to calculate the field perimeter area of the first contour pass around the field.

1. Erase Memory: Press STOP GUIDANCE, press down arrow to choose ERASE MEMORY, and press ENTER (see page 12).

2. Perimeter Setup: Go to perimeter setup in the menu (see page 5), and choose Right, Left, or Center position of the swath width to configure the outside edge of the field perimeter calculation.

3. Make Outside Round: Press CONTOUR GUIDANCE, and drive the vehicle around the outside edge of the field. The normal guidance screen will display "LOGGING PASS". Press the down arrow key to display the perimeter area calculation in the 1st alternate screen. As you proceed around the field, the perimeter area calculation will continue to update. Once you return within one swath width of the original starting point, the calculation will automatically close the perimeter and display the final calculation.

NOTE: *The units for the area calculation are Acres if the unit of measure is set to Feet, and Hectares if the unit of measure is Meters.*

CONTOUR & STRAIGHT GUIDANCE SUMMARY

Item	CONTOUR MODE	STRAIGHT MODE
Mode of Operation	Freestyle. Guide relative to any previous pass.	Predefined straight parallel and numbered passes.
Work Recorded In Memory	Yes. In fact, the recorded pass defines where the next pass will be guided.	Yes. Although, recorded work in straight mode is not used for guidance, it would be used if the operator switches to contour mode and then wishes to make a pass along previous work.
A=B Points required	No. Guidance is based on previous passes.	Yes. The A=B defines the first pass and then all other passes are laid out automatically.
Guides from previous pass	Yes. Once the Outback S™ "sees" another previous pass close by, it will automatically begin to guide on that pass. Wherever the previous pass goes will guide the next pass.	No. Straight guidance only looks at predefined straight lines spaced by the width of the implement.
Numbered Passes	No	Yes. The first A=B line is pass #0. Passes to the right increment +1, +2, etc... and passes to the left increment -1, -2, etc...
Swath Width Integrity Across The Field	No. Since the guide is always working from the last pass, driving errors multiply as you work across the field. Each pass redefines the next pass.	Yes. Since the guide is always looking at predetermined straight lines, all passes will be in perfect multiples of the swath width. This works well when planting, harvesting, ditching, and furrowing.
Switching Modes	Yes. You may switch from contour to straight at any time.	Yes. You may switch from straight to contour at any time. Contour mode will recognize passes previously done in straight mode.
Skip Passes?	If you skip some area, the unit will recognize it as a new pass and start logging. You may then guide off the new pass or continue guiding off of old passes as well.	Yes. You can do passes in any order desired. They will still be perfectly spaced across the field.

STOP GUIDANCE

1. Background: It's important to use the STOP GUIDANCE whenever you aren't guiding. During guidance, the Outback S™ records all movement. Choosing STOP GUIDANCE tells the unit not to guide or to record movement.

2. Hold Feature: To stop logging during turns or to relocate to another section of the field, press STOP GUIDANCE without choosing any of the available menu items. To begin guiding again, press either STRAIGHT GUIDANCE or CONTOUR GUIDANCE.

3. RETURN HERE: If you need to suspend application to reload or to end the day, you can record where you left off. Press STOP GUIDANCE, choose RETURN HERE, and press ENTER. This saves the return point in memory. The console may be turned off and the return point will be remembered next time you come back.

4. ERASE MEMORY: Removes all recorded passes, and points, for the job and prepares the Outback S™ for a new job. This is normally done at the end of each field. Press STOP GUIDANCE, press down arrow to choose ERASE MEMORY, and press ENTER.

NOTE: *There are 8.33 hours of total memory available. If not erased between fields, it will fill up. If this happens, you will receive a "MEMORY FULL" message. Use the ERASE MEMORY function to clear the memory.*

5. RETURN TO PREVIOUS POINT: To return to a point previously saved, press STOP GUIDANCE, choose RTRN PREV PT, and press ENTER. The Steering Guide™ will guide you to the saved point. After returning to that point, you can resume by pressing STRAIGHT GUIDANCE or CONTOUR GUIDANCE.

STOP SUMMARY

Hold Feature	Stops logging. Use during turns or to relocate.
RETURN HERE	Saves the job and the ending point for later return.
RTRN PREV PT	Starts guidance to take you back to a previously saved point.
ERASE MEMORY	Clears memory in preparation of a new job.
UPDATE E-DIF	Resets e-Dif™ correction to match current position with previous return point.

USING e-Dif™ CORRECTION

The patented e-Dif™ correction method uses only the standard GPS satellites and does not require an external correction signal of any type. It works by analyzing the error trends from the GPS satellites and projects new correction values into the future. This technique is stable and accurate within short time frames, making it perfect for progressive pass-to-pass guidance. As long as each pass is within a few minutes of the last pass, accuracy performance is excellent. Since the 24-hour repeatability is not as accurate as satellite based correction, a feature is included which allows the operator to correct the starting point today with the ending point from yesterday, so a job can be continued seamlessly.

Power On Initialization and DGPS Lock: After turning power on to the Outback S™, the system must track GPS satellites for 10 minutes before differential corrections can be generated. The vehicle may be moving or stationary during this time. While tracking, the Outback S™ will show the GPS light and will display the number of satellites being tracked. Once the 10 minute initial tracking period has elapsed, the DGPS light will show and READY will be displayed.

Stop Guidance and Resuming at a Future Time: Any time the operator needs to suspend field application, whether for an hour or days, the following procedure will allow guidance to be resumed without interruption.

Create a return point at the end of application. On the Outback S™, press STOP GUIDANCE followed by a RETURN HERE menu selection. This records the current position to memory. In addition, a physical mark must be established in the field corresponding to this position. The physical mark should be easy to drive back to at a future time.

Upon subsequent return to the field, drive back to the exact physical mark where application stopped. On the Outback S™, press STOP GUIDANCE followed by an UPDATE E-DIF menu selection. The system will display CONFIRM POSITION and pressing the ENTER button will cause the e-Dif™ correction to match the current starting point with the ending point previously recorded as the return point.

This method allows interrupted application guidance to continue seamlessly, even though the 24-hour repeatability of e-Dif™ is not as accurate as satellite based correction methods.

OUTBACK S™ COMMUNICATIONS

The DGPS signals of the Outback S™ can be shared with 3rd party mobile applications. Any application designed to receive DGPS signals from an external receiver over an RS232 Serial Interface using either NMEA 0183 or RTCM messages will work with the Outback Guidance® System. Various connecting cables and kits are available for specific applications such as yield monitors, rate controllers, laptops, PDAs, etc.

For successful communication, both the Outback S™ console and the external application must be configured to communicate in the same way. Many applications can use the default communication protocol, however, some applications may require alteration from the default settings.

Default Configuration and Supported Options			
Baud Rate	*4800*	9600	19200
NMEA Messages			
GGA	OFF	*1 Hz*	5 Hz
GLL	*OFF*	1 Hz	5 Hz
VTG	OFF	*1 Hz*	5 Hz
GSV	*OFF*	1 Hz	
RMC	*OFF*	1 Hz	5 Hz
GSA	*OFF*	1 Hz	
ZDA	*OFF*	1 Hz	5 Hz
GST	*OFF*	1 Hz	
RTCM Message	*OFF*	ON	
Serial Data Format: Data Bits=8, Stop Bits=1, Parity=None, Flow Control=None			

CHANGING DEFAULT SETTINGS

The default communication settings can be changed from the **NMEA PORT SETUP** item in the Outback S™ Setup Menu (see page 5). All functions located in the menu are navigated and selected using the ARROWS and ENTER key.

NMEA PORT SETUP
1. **NMEA PORT BAUD:** 19200, 9600, 4800.
2. **GGA RATE:** OFF, .2 HZ, 1 HZ, 5 HZ.
3. **GLL RATE:** OFF, .2 HZ, 1 HZ, 5 HZ.
4. **VTG RATE:** OFF, .2 HZ, 1 HZ, 5 HZ.
5. **GSV RATE:** OFF, .2 HZ, 1 HZ.
6. **RMC RATE:** OFF, .2 HZ, 1 HZ, 5 HZ.
7. **GSA RATE:** OFF, .2 HZ, 1 HZ.
8. **ZDA RATE:** OFF, .2 HZ, 1 HZ, 5 HZ.
9. **RTCM RATE:** OFF, 1 HZ.
10. **GST RATE:** OFF, .2 HZ, 1 HZ.
11. **NMEA 2000:** OFF, ON. (CAN output messages)

NOTE: *The current configuration status is not displayed in the setup menu selections. These items can only be used to change the current configuration. The display only shows the available options, NOT the current setting.*

DIAGNOSTICS

This section provides helpful information for operating or troubleshooting the unit.

Item	Description
SATS: TRK=00 USE IN CALC=00	Tells the number of satellites currently visible in the sky. This is only GPS satellites and does not include the correction satellites.
CORRECTION TYPE	Displays the type of differential correction being used. There are two types loaded into the receiver. WAAS and e-Dif™ are the factory installed options. Other types may be field installed.
DIFF AGE	This indicates the age of the RTCM corrections used in the DGPS calculation. It is only for use by technicians.
BIT ERROR RATE	This shows a number that measures the relative strength of the correction satellite(s). In the case of WAAS, two numbers are shown separated by a hyphen. The number can be from 0 to 500 with 0 being good and 500 being bad. See page 17 for a more detailed explanation.
MEMORY	All passes are recorded in memory until erased at the end of each field. This shows how much memory (in hours) is left. To clear the memory, press STOP GUIDANCE and ERASE MEMORY.
GPS SOFTWARE VER	GPS software version.
APP SOFTWARE VER	Application software version.
SERIAL NUMBER	This is the serial number of the unit. It should match the number on the serial number tag on the back of the unit. This number is required when subscribing to OMNISTAR.
LED TEST	Tests each display LED.
POSITION	Displays current Latitude and Longitude.

TROUBLESHOOTING

OUTBACK-S TROUBLE-SHOOTING FLOW CHART
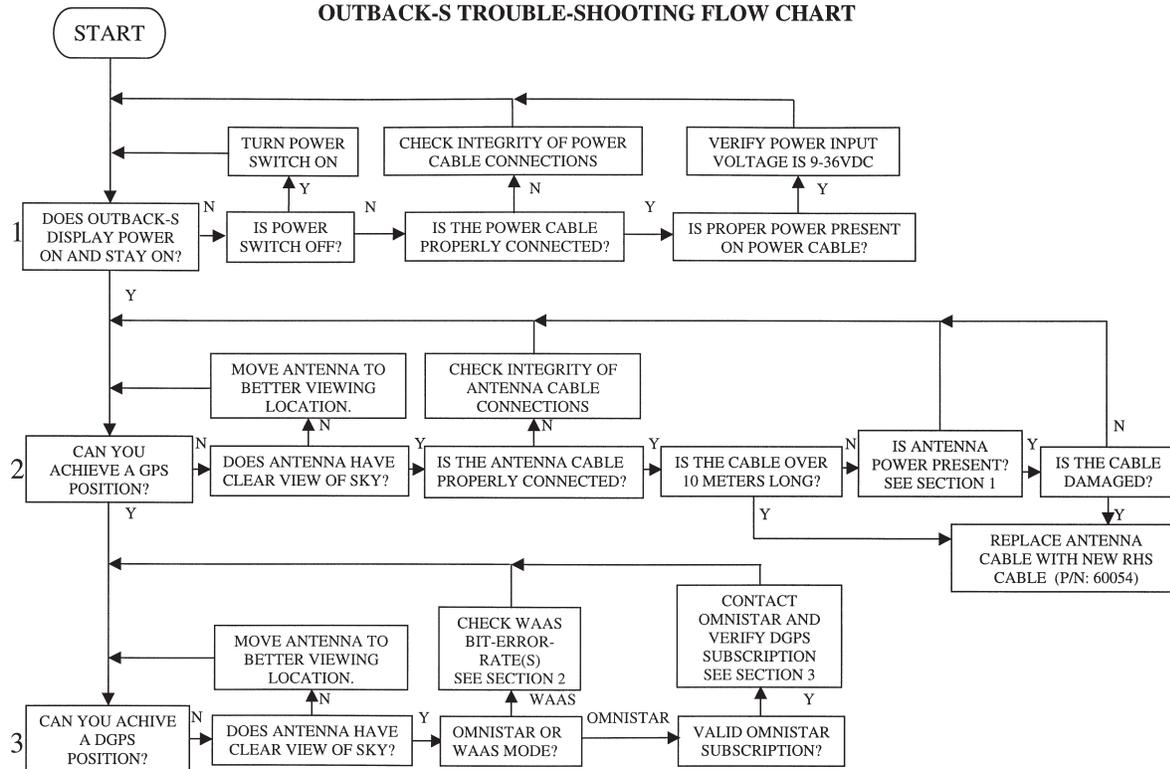
SECTION 1 - TESTING ANTENNA VOLTAGE

The Outback antenna is an "Active" antenna that requires power to operate. This power is supplied to the antenna by way of the coaxial cable connecting it to the Outback console.

By testing the antenna voltage, you can:
a) ensure the Outback receiver is supplying power to the antenna; and
b) verify your antenna cable is not damaged.

PROCEDURE:
1. Turn off the Outback console.
2. Disconnect the coaxial cable from the Outback Antenna.
3. Turn on the Outback console.
4. Using a voltmeter set to VDC, measure the voltage output across the coaxial cable. You should measure ±5 VDC between the center conductor and exterior connector shell.
5. Turn off the Outback console.
6. Disconnect the coaxial cable from Outback console.
7. Turn on the Outback console.
8. Using a voltmeter set to VDC, measure the voltage output across the antenna output on the console. You should measure ±5 VDC between the center conductor and exterior housing. If you measure ±5 VDC at the console connector, but not at the end of the coaxial cable, then the cable is damaged. Replace the coaxial cable and return to step 1.
9. If you do not measure ±5 VDC from your Outback console, contact Outback Customer Service to return the console for servicing.

SECTION 2 - CHECKING BIT-ERROR-RATE (BER)

You can view the Bit-Error-Rate (or BER) for your Outback receiver by navigating to the "DIAGNOS-TICS" portion of the menu system. In the Diagnostics menu, a screen is present which contains the BER.

The BER is a check of the quality of the correction signal reception. The Outback uses a scale of 0 to 500 to indicate the signal quality. BER values of less than 20 are ideal. If not, ensure the antenna has a clear view of the sky in order for it to properly find and track the correction satellites.

When using WAAS for the correction type, the Outback can track one or two correction satellites. Both of these sources will have a different BER and will be displayed with a hyphen separating the two val-

ues. For example, a value of 8-500 means that the Outback has a very good signal on one satellite (8) and is not receiving corrections from the other satellite (500). Only one satellite must have a low BER value to provide differential corrections.

When using OmniStar for the correction type, the Outback tracks only one correction satellite and the BER will be displayed as a single value. If the BER is 500, then the receiver is not tracking the Omnistar correction satellite. BER values below 500 and above 50, indicate that the receiver does not have a valid Omnistar subscription. BER values below 50 indicate valid differential corrections are being received.

SECTION 3 - VERIFYING OMNISTAR DGPS SUBSCRIPTION

In order to subscribe your Outback console's internal L-band sensor, you must know the unit number of the L-band receiver. This L-band unit number is the same as the serial number and can be found on the product label located on the back of the receiver. The serial number should be a six-digit number which begins with the number 8. The format will be as shown below:

Serial Number: 8xxxxx

You may activate the OmniSTAR DGPS service for your Outback console by contacting the service provider in your region. Contact OmniSTAR with your unit number and they will activate your subscription over the air. Please be ready to have your receiver ready to receive the OmniSTAR signal for subscription validation. A BER value below 500 is required to enable a subscription.

FREQUENTLY ASKED QUESTIONS

ABOUT GPS GUIDANCE

Q: What is GPS?
A: GPS stands for Global Positioning System. It's a satellite based signal operated by the Department of Defense and is available to anyone to provide position information to receivers on the ground. Usually, several satellites are used by the receiver to pinpoint the exact position. For more information, go to http://gps.faa.gov/Basics/basics.htm.

Q: What is DGPS?
A: The D stands for Differential Correction. It just means that a second signal is used to correct inherent errors in the GPS signal making it even more precise. The Outback S™ can utilize either WAAS or L-Band correction.

Q: What is WAAS?
A: WAAS stands for Wide Area Augmentation System. It is a satellite based correction signal operated by the U.S. Federal Aviation Administration and is free to those who use it. The service works throughout most of North America from Mexico north to the 55th parallel in Canada. WAAS is not available currently anywhere else in the world. For more information about WAAS contact the FAA at http://gps.faa.gov/Programs/WAAS/waas.htm.

Q: What is L-BAND?
A: L-BAND is a satellite based correction signal operated by OmniStar. It requires paying an annual subscription for the use of the signal. It is available in most parts of the world. To subscribe, contact OmniStar at www.omnistar.com or phone 888-666-4782.

Q: How accurate is Outback S™ DGPS?
A: In normal operations where each subsequent pass is being made within minutes of the last, swath to swath accuracy is just a few inches. The more lapsed time from one pass to the next may increase the chance for additional error. Driving error is usually greater than GPS error. The Outback S™ provides a Steering Guide™ to improve driving.

Q: What about Foam Markers and Disk Markers?
A: The answer is … use them if they help. The best guidance is whatever works for the operator. The more visual indications to guide from the better. One thing is certain, GPS Guidance will be the primary guidance

means and everything else will be secondary.

Q: Can I plant using GPS Guidance?
A: GPS guidance is a great planting aid. Especially for making the straightest rows possible. We recommend combining the use of disk markers and GPS giving the driver every possible advantage he could have.

Q: How does weather affect the GPS signal?
A: Weather normally does not affect the GPS signal. This includes rain, sleet, snow, thunderstorms and wind. Lightning isn't a problem unless it's a close strike. A direct lightning strike will damage the unit. Snow and ice accumulation on the antenna can also cause a problem.

Q: How do power transmission lines affect the GPS signal?
A: Normally, high voltage power transmission lines do not affect the GPS signal at all.

ABOUT OUTBACK S™

Q: What's the difference between Steering Guide™ and Current Position?
A: The Steering Guide™ calculates the nose heading for the driver to steer in order to correctly follow the intended path. Current Position only reports the distance left or right of the intended path. The operator drives using the Steering Guide™ and checks results using Current Position.

Q: Can I use the Outback S™ as a receiver for other uses?
A: Yes. Outback S™ accommodates both NMEA and CAN communication protocol. You may contact the factory at any time to get the latest compatibility list.

Q: How long does it take Outback S™ to attain a usable signal?
A: It normally takes 2 - 5 minutes. The GPS signal will be acquired first giving a yellow light. DGPS correction will then be acquired which gives a green light. The vehicle can be in motion during this process.

Q: Does the Outback S™ have memory?
A: The Outback S™ records all movement as long as guidance is on. When the Stop button is used to pause the job, movement is not being recorded. When the job is finished, the memory is erased. If historical data needs to be collected and stored, another accessory is required to be plugged into the Outback S™ to perform that function.

Q: How do I erase memory?

A: To erase the memory in the Outback S™, first press the STOP GUIDANCE button. Next, press the down arrow to place the pointer next to ERASE MEMORY. If ERASE MEMORY does not appear, simply press the down arrow until it does. Finally, press the enter button to select the function.

Q: What's Straight Guidance?
A: In straight mode, the Outback S™ generates perfectly straight, parallel lines based on the first A=B pass. It then records in memory the actual movement over those lines as you guide. A new line can be generated at any time with the Outback S™.

Q: What's Contour Guidance?
A: In contour mode, all movement is recorded as the machine moves around. During the first pass, no guidance is given. When the operator attempts to make a second pass, the Outback S™ begins to guide along the previous pass. All movement is recorded in memory.

Q: Can I switch from Straight to Contour in one job?
A: The operator can switch back and forth between straight and contour. Since contour guidance follows other passes, it will attempt to follow any pass that was recorded in the current job no matter if that pass was done in straight or contour mode.

Q: How do I perform headlands?
A: This is very easy. Usually headlands are performed in contour mode. Make one pass and then use the guide on the second pass. Do this wherever turning will be done.

Q: How do I mark the A=B Line?
A: When doing straight passes, the initial pass is defined by marking two points in the field. The Outback S™ will generate a line through the two points defining the first pass. When bordering the edge of a field, mark the A point at one end of the pass and the B at the other end. When cutting the field in half, mark the A point at the start, start heading in the right direction and mark the B point. Then guide the rest of the way across the field.

Q: Can the Outback S™ store a waypoint?
A: A waypoint can be stored so the operator can guide back to that point. It's used primarily when a job is paused. For example, when stopping for a refill the operator would pause the job, save the point and return back to that point to resume.

Q: How do you mount the console?
A: The console is equipped with a vacuum mount that

works great on glass. The best location is directly in front of the operator, immediately above and behind the steering wheel. Wipe the glass with a damp cloth, attach the vacuum mount, then use the swivel and tilt adjustments to get the right viewing angle.

Q: Does bright sunlight affect the display?
A: The display is easily viewable with any ambient light situation. Brightness can be controlled in the menu primarily for dimming at night.

Q: How do you mount the antenna?
A: It's mounted along the front edge of the top of the cab, on the exact centerline of the vehicle. Avoid close proximity to a transmitting radio antenna. Do not drill holes in the cab roof. Use the adhesive plate provided for mounting. Additional plates are available for multiple vehicles.

Q: How does the Outback S™ account for implement lag in turns?
A: It doesn't, but that's good. We assume turning lag will be about the same on each pass. As long as tractor spacing is right, implement spacing will follow. This also goes for side hills. Do not attempt to put the antenna on the implement to account for lag.

Q: What electrical power do I need for the Outback S™?
A: You need a standard DC power supply between 9 and 36 volts. Current is 1 Ampere at 12 VDC. The unit won't be damaged by reverse polarity (positive to negative), but it will not operate.

CONTACTING THE FACTORY

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  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)
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  Website Feedback: outbackweb@outbackguidance.com

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U.S. REGIONAL SALES OFFICES:
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  - **Outback Nebraska** - Hastings, NE
    1-877-777-6142
  - **Outback Texas** - Hewitt, TX
    1-866-857-4448
  - **Outback Dakotas** - Watertown, SD
    1-888-825-6031

OUTBACK S™ WARRANTY SUMMARY

Item	Standard Warranty	Extended Service Plan
Price	Free	$299
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)

LIMITED OUTBACK S™ ONE-YEAR WARRANTY

Hemisphere GPS, L.L.C. ("OUTBACK") manufactures its hardware products from parts and components that are in accordance with industry standard practices. OUTBACK warrants that the hardware products it manufactures will be free from defects in materials and workmanship. The limited warranty term is one-year, 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 warranty. Otherwise, this limited warranty does not cover damage due to external causes, including accident, abuse, misuse, problems with electrical power, servicing not authorized by OUTBACK, 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 OUTBACK.

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

OUTBACK will repair or replace product(s) covered under this limited warranty that are returned to the OUTBACK facility. To request warranty service, you must call OUTBACK (U.S. 800-247-3808, Canada 866-888-4472) or go to outbackguidance.com for information, within the warranty period. If warranty service is required, OUTBACK will issue a Return Material Authorization Number. You must ship the products back to OUTBACK in their original or equivalent packaging, prepay shipping charges, and insure the shipment or accept risk of loss or damage during shipment. OUTBACK will ship by UPS Ground Service, the repaired or replacement products, within 5 business days, freight paid. In any instance in which OUTBACK issues a Return Material Authorization Number, OUTBACK must receive the product(s) for repair prior to the expiration of the warranty period in order for the repair(s) to be covered by the limited warranty.

OUTBACK owns all parts removed from repaired products. OUTBACK uses new and reconditioned parts made by various manufacturers in performing

warranty repairs and building replacement products. If OUTBACK repairs or replaces a product, its warranty term is the remainder of the limited warranty term.

OUTBACK MAKES NO EXPRESS WARRANTIES OR CONDITIONS BEYOND THOSE STATED IN THIS LIMITED WARRANTY STATEMENT. OUTBACK DISCLAIMS ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR CONDITIONS, SO THIS LIMITATION MAY NOT APPLY TO YOU.

OUTBACK RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS LIMITED WARRANTY STATEMENT. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION).

OUTBACK DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS LIMITED WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to the OUTBACK Limited Outback S™ One-Year Warranty only. For provisions of any extended service plan covering your system, refer to your invoice or the separate extended service plan that you received.

OUTBACK 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 warranty nor the exclusions, limitations and reservations.

LIMITED OUTBACK S™ EXTENDED SERVICE PLAN

The Outback S™ ESP only applies to the electronic components of the product, including the console, antenna, and related cables. The term "hardware" below applies only to the non-software portions of the electronic components. Coverage for the mechanical portions of the Outback S™ is described in the one-year warranty statement.

Hemisphere GPS, L.L.C. ("OUTBACK") manufactures its hardware products from parts and components that are in accordance with industry standard practices. OUTBACK warrants that the hardware products it manufactures will be free from defects in materials and workmanship. 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 OUTBACK, 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 OUTBACK.

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

OUTBACK will provide, on an exchange basis and subject to the OUTBACK Exchange Policy in effect on the date of the exchange, replacement parts (up to and including a complete Outback S™ system) for the Outback S™ product(s) covered under this limited plan when parts require replacement. To request service, you must call OUTBACK (U.S. 800-247-3808, Canada 866-888-4472) or go to outbackguidance.com for information, within the plan period. If replacement is required, OUTBACK 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 OUTBACK in this packaging. In any instance in which OUTBACK

issues a Return Material Authorization Number, OUTBACK 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.

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

OUTBACK MAKES NO EXPRESS WARRANTIES OR CONDITIONS BEYOND THOSE STATED IN THIS LIMITED WARRANTY STATEMENT. OUTBACK DISCLAIMS ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. SOME STATES (OR JURISDICTIONS) DO NOT ALLOW LIMITATIONS ON IMPLIED WARRANTIES OR CONDITIONS, SO THIS LIMITATION MAY NOT APPLY TO YOU.

OUTBACK RESPONSIBILITY FOR MALFUNCTIONS AND DEFECTS IN HARDWARE IS LIMITED TO REPAIR AND REPLACEMENT AS SET FORTH IN THIS LIMITED WARRANTY STATEMENT. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS, WHICH VARY FROM STATE TO STATE (OR JURISDICTION TO JURISDICTION).

OUTBACK DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES SET FORTH IN THIS LIMITED WARRANTY STATEMENT OR LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR FOR LOST DATA OR SOFTWARE.

SOME STATES (OR JURISDICTIONS) DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE PRECEDING EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

These provisions apply to the OUTBACK Limited Outback S™ Extended Service Plan only.

OUTBACK 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 warranty nor the exclusions, limitations and reservations.
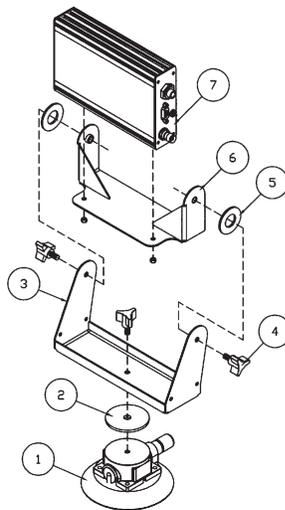
PARTS LISTING
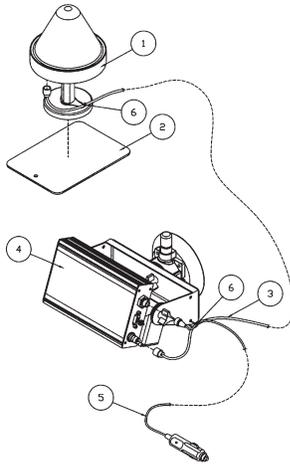
Outback S™ Guidance System

REF.	P/N	DESCRIPTION	QTY.
1		Antenna Assembly, see page 31	
2	AB443	Plate, Antenna Mounting w/Double Sided Tape	1
3	60054	Antenna Cable, OBK-S - 20ft Lg	1
4		Console Assembly, see page 30	
5	60055	Power Cable, OBK-S - 15ft Lg, Cig Lighter Plug	1
6	TS-7R	Tie Strap, 7" - Releasable	6

Console Mounting Details

REF.	P/N	DESCRIPTION	QTY.
1	60066	Vacuum Cup, 4-1/2" /w 1/4NC Insert	1
2	60063	Washer, Rubber - 2-1/4OD x 3/8ID x 1/8T	1
3	AB440	Base, Console Mounting - OBK-S	1
4	60065	Knob, 3-Arm - 1/4NC x 1/2 Stud, 1-1/8 Dia.	3
5	60064	Washer, Rubber - 1-1/2OD x 3/4ID x 3/32T	2
6	AB441	Frame, Console Mounting - OBK-S	1
7	60050	Console, OBK-S w/Mounting Hardware	1
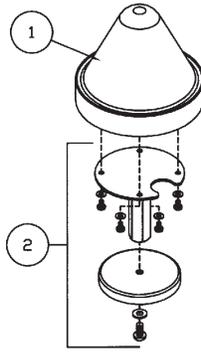
Antenna Mounting Details

REF.	P/N	DESCRIPTION	QTY.
1	AB444	Antenna, OBK-S w/Labels - Replacement	1
2	60052	Antenna, Mounting Kit - Generic	1
	60085	Magnet, Antenna Mount - Replacement	

NOTES

Outback Guidance Supplemental Instructions for Version 4.06 Software

ALTERNATE DISPLAY SCREENS

While operating in contour or straight guidance modes, the up and down arrow keys will present alternate display screens. Repeated pressing of the down arrow will display the following screens.

0. **Normal Guidance Screen**

1. **Perimeter Area / A=B Line Adjustment Screen**

2. **Ground Speed and Heading Screen**

3. **Latitude and Longitude Screen**

Repeated pressing of the up arrow will display the alternate screens in the reverse order.

ON-THE-GO A=B LINE ADJUST

While operating in straight guidance mode, the A=B line may be adjusted, on-the-go, without interrupting normal guidance operation. This feature is especially useful to correct for DGPS drift over time.

1. **Straight Guidance: Operate in straight guidance mode as you would normally.**

2. **Display 1st Alternate Screen:** Press the down arrow key to display the first alternate screen. Manually drive the vehicle to the desired swath position. Press STRAIGHT GUIDANCE. This will cause the nearest A-B guide line to be aligned with the current vehicle position (snap A=B to here). Press the up arrow key to return to the normal guidance display screen.

3. **eDrive® Engaged:** If the optional eDrive® system is installed and engaged, pressing STRAIGHT GUIDANCE at the 1st alternate screen will display a shift A=B adjustment screen. Pressing the down and up arrow keys will nudge the A=B guide line left or right, relative to the direction of travel. Press STRAIGHT GUIDANCE to exit the shift A=B adjustment screen.

Note: *On-the-go A=B line adjustments can only be made while operating in straight guidance mode.*

FIELD PERIMETER AREA

At the beginning of each new field, the Outback S can be used to calculate the field perimeter area of the first contour pass around the field.

1. **Erase Memory:** Press STOP GUIDANCE, press down arrow to choose ERASE MEMORY, and press ENTER (see page 12).

2. **Perimeter Setup:** Go to PERIMETER SETUP in the menu (see page 5), and choose RIGHT, LEFT, or CENTER position of the swath width to configure the outside edge of the field perimeter calculation.

3. **Make Outside Round:** Press CONTOUR GUIDANCE and drive the vehicle around the outside edge of the field. The normal guidance screen will display "LOGGING PASS". Press the down arrow key to display the perimeter area calculation in the first alternate screen. As you proceed around the field, the perimeter area calculation will continue to update. Once you return within one swath width of the original starting pointing, the calculation will automatically close the perimeter and display the final calculation.

Note: The units for the area calculation are Acres if the unit of measure is set to FEET and Hectares if the unit of measure is METERS.