

**Hemisphere**  
GPS



# Outback eDrive

## User Guide

Part No. 875-0171 Rev. C1



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

- This device may not cause harmful interference.
- 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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Outback Guidance Technical Support  
Hemisphere GPS  
2207 Iowa Street  
Hiawatha, Kansas 66434  
USA  
Phone 800.247.3808 Fax 785.742.4584  
outbackcs@outbackguidance.com  
<http://www.hemispheregps.com>

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# **1: Overview**

Product Overview

What's Included

Parts Listing

## Product Overview

Congratulations on the purchase of an Outback eDriveTC<sup>®</sup>. The Outback eDriveTC GPS assisted steering system extends the functionality of the Outback Guidance<sup>®</sup> system. The eDriveTC electronic components have been designed to work with a wide range of agricultural equipment and applications. A series of equipment specific kits have been developed with the necessary components and detailed instructions to install the eDriveTC on specific equipment models. A complete system consists of an Outback S2<sup>™</sup> (sold separately), an equipment model specific eDriveTC install kit, and the eDriveTC electronic components. This manual covers the installation of the electronic components along with the eDriveTC setup and operation.



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**Note:** The equipment model specific kit should be installed first. Please refer to the instructions included with the model specific kit prior to completing the electronic installation and setup.

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**Note:** This manual covers the eDriveTC installation and operation with the S2.

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## What's Included

The following equipment is included with the Outback eDriveTC:

- eDriveTC console
- CAN/Power cable
- CAN/Expansion cable
- CAN/Battery cable
- Auxiliary power cable
- Tie straps
- Screws (#8 x 3/4")

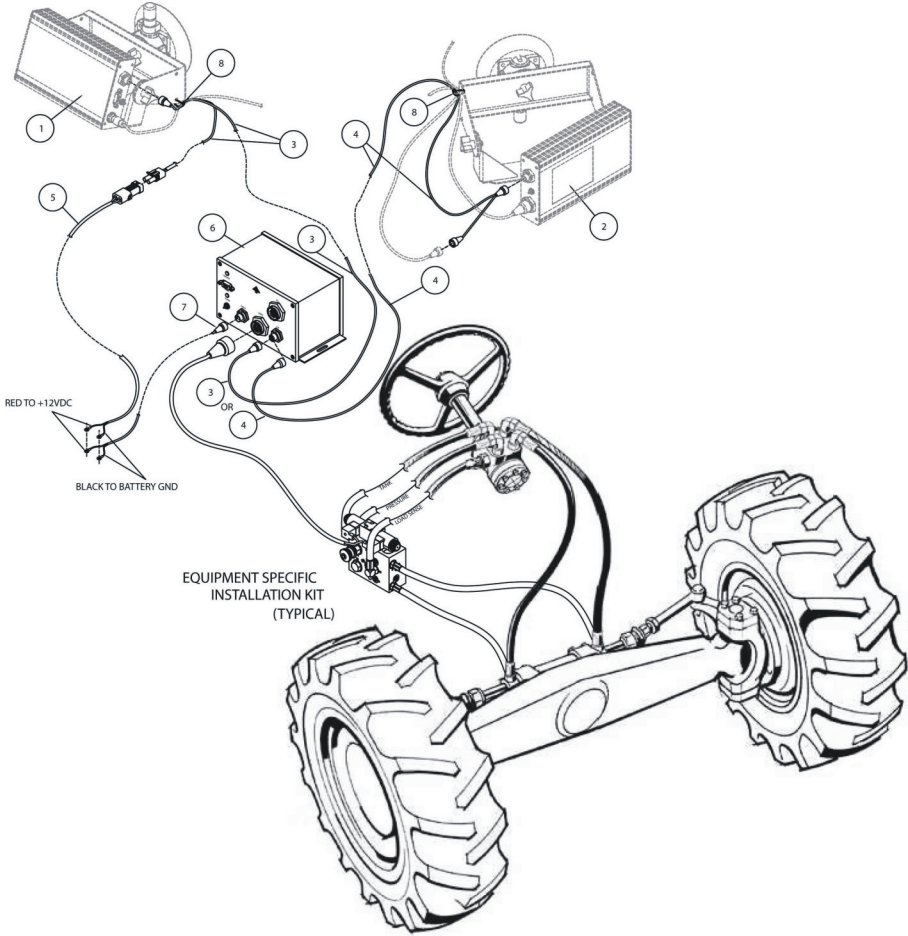


**Figure 1-1. Outback eDriveTC and Equipment**



1: Overview

# Parts Listing



**Table 1-1: Outback eDriveTC Guidance System**

<b>Ref.</b>	<b>P/N</b>	<b>Description</b>	<b>Qty.</b>
1		Outback S2 (required)	
2		Outback External CAN Device (optional)	
3	051-0101-001#	CAN/Power Cable, OKB-eDriveTC - 10ft Lg/15ft Lg, WP	1
4	051-0067-005#	CAN/Expansion Cable, OBK-eDriveTC - 10ft	1
5	054-0065-000#	CAN/Battery Cable, OBK-eDriveTC - 5ft Lg.	1
6	806-1007-03A	Console, OBK-eDriveTC	1
7	054-0044-003#	Auxiliary Power Cable, OBK-eDriveTC - 12ft Lg.	1
8	677-2002	Tie Strap, #7 - Releasable	12
	675-1138-000	SCR, #8-18 x 3/4", SD, HEX COMBO, ZP	2
	485-1154	Decal, "Outback Equipped" - reverse printed	1



## 1: Overview





## **2: Getting Started**

Overview

Installing the eDriveTC

Powering the Unit

System Configuration



## Overview

Before using the Outback eDriveTC for the first time, you'll need to:

- install the eDriveTC
- turn on the power,
- and set basic features.

### Installing the eDriveTC

**Exchange Power Cable** - If the power cable currently used with the S2 does not have a second CAN connector then it will need to be replaced by the CAN/Power cable in the eDriveTC package. If the current power cable used with the S2 has a second CAN connector then proceed to the next page.

1. Locate the CAN/Power cable in the eDriveTC package.
2. Install the right angle connector into the Outback S2 CAN/Power port as shown.
3. Twist the connector firmly until it locks into place.
4. Secure the CAN/Power cable and antenna cable back to the console mounting base with tie straps to provide strain relief.





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**Note:** The Outback eDriveTC may also be used in combination with an optional Outback external CAN device (example: Outback 360.) If an external CAN device is already installed, it is not necessary to exchange the power cable. Instead, a three-connector CAN/Expansion cable is installed between the external CAN device and the eDriveTC.

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**Daisy Chain Power Cable** - Install an optional Outback external CAN device, using the instruction booklet provided.

1. Locate the CAN/Expansion cable in the eDriveTC package.
2. Disconnect the CAN connector from the external CAN



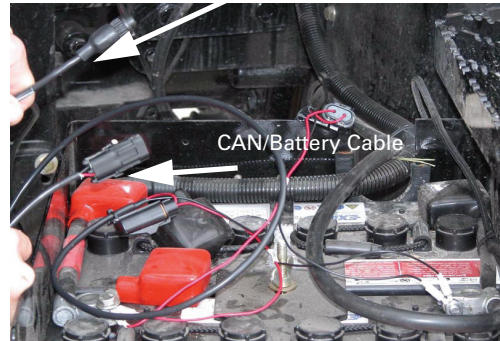
- device and insert the 'Y' end of the CAN expansion cable as shown.
3. Twist connectors firmly until they lock into place.
4. Secure the cables to the console mounting base with tie straps to provide strain relief.



## 2: Getting Started

### Connect Cables To Battery -

1. Locate the Auxiliary Power cable in the eDriveTC package. It has a 2-pin round connector on one end and a pair of ring terminals on the other.



2. Locate the short CAN/Battery cable. It has a 2-pin flat connector on one end and a pair of ring terminals on the other.
3. Connect the ring terminal ends of both cables directly to the battery. The red wire goes to the positive terminal, and the black wire goes to the negative.
4. Route both cables into the cab, securing with tie straps. Avoid sharp edges and pinch points which could damage the cables and cause a short circuit.



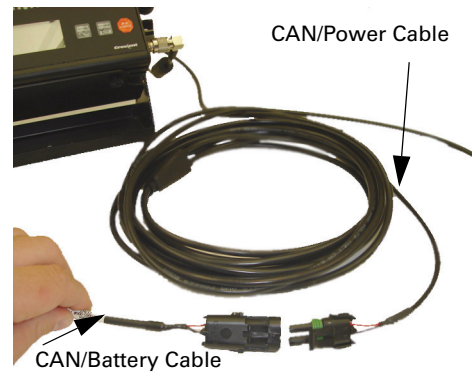
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**Note:** Outback electronic components are designed for 12 volt negative ground automotive systems. Make certain there are good solid connections to 12 volts and ground. Connect the red wire to positive(+) and the black wire to negative(-) or ground.

---



**Connect CAN/Battery Cable:** - Connect the CAN/Battery cable to the CAN/Power cable.



**Use this criteria when mounting the eDriveTC unit:**

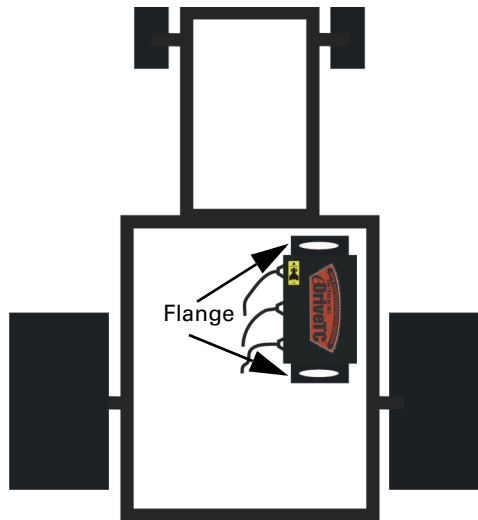
1. Securely mount the eDriveTC unit to the vehicle with screws on the eDrive console flanges. (See Figure 2-2 on page 12.)
2. Have the top of the eDriveTC console face upwards according to the "up" arrow on the console. (See Figure 2-2 on page 12.)



## 2: Getting Started

3. Ensure that the eDriveTC unit is on a surface that is level when the machine is level with the ground. (See Figure 2-2.)

Follow the instructions on the new label with regards to the mounting orientation. The default is to mount the eDriveTC unit parallel to the line of travel with the connectors towards the left. (See Figure 2-2.)



**Figure 2-2. Mounting location**



**Install Auxiliary Power Cable: -**

1. Connect the Auxiliary Power cable to the eDriveTC console.
2. Twist the connector firmly until it locks into place.



**Install CAN/Power Cable: -**

1. Connect the CAN/Power cable to the eDriveTC console.
2. Twist the connector firmly until it locks into place.



CAN/Power cable



## 2: Getting Started

### Install Valve Control Cable: -

1. Connect the valve control cable (supplied with the model specific installation kit) to the eDriveTC console.
2. Twist the connector firmly until it locks into place.



Valve Control Cable

### Install Steering Wheel Switch Cable: -

1. Connect the steering wheel switch cable (supplied with the model specific installation kit) to the eDriveTC console.
2. Twist the connector firmly until it locks into place.



Steering wheel switch cable (refer to the steering wheel kit instructions (part number 876-0082) to install the steering switch cable)



## Powering the Unit

### To power up both units

Turn on the power switches of the Outback S2 and eDriveTC in any order. The Outback S2 will boot up and begin acquiring a DGPS signal. The eDriveTC will establish communication with the S2 and wait for the DGPS signal to be acquired. The S present light on the eDriveTC console indicates that communication has been established.



### To power up the Outback S2 only

Turn the power switch of the Outback S2 on and leave the Outback eDriveTC off. This causes the Outback S2 to operate as normal. Refer to the Outback S2 manual for operation instructions.





## System Configuration

Configuration of the Outback eDriveTC is accomplished through the menu system of either the Outback S2, or an external serial device. During power-up, the eDriveTC is detected, and additional menu options are included to configure the eDriveTC for operation.



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**Note:** Refer to the Menu Map in your S2's owner manual to determine the location of the eDriveTC Setup Menu on your system.

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### Using the menu

To access the menu, press the MENU button. Choose the item you want using the UP and DOWN ARROW buttons. The > character points to the active menu item. Press ENTER to select.



### Initial system startup sequence

After completing the eDriveTC system installation, perform the following startup sequence prior to field operation.

1. Select the eDriveTC STEERING ADJUST menu item. Press the DOWN (left steer) arrow and verify steering moves left. Reverse valve cable connections, or output hoses, if operation is backward.
2. Determine the cycle time and adjust the steering control rate. See equipment specific installation manual for adjustment procedure and suggested initial steering cycle time.



3. Test drive the vehicle in straight guidance mode, and fine tune the steering control rate for smooth response and minimum tracking errors. See Appendix B for tips on fine tuning.

**Table 2-2: eDriveTC Setup Menu Options**

<b>Menu Item</b>	<b>Display Sequence</b>	<b>Defaults</b>	<b>Description</b>
Vehicle Type	Vehicle Type >Wheel	[Wheel, Track] Default= Wheel	Allows the user to change steering mode if using eDriveTC on a machine equipped with tracks and differential steering.
Sensitivity (only in Wheel Mode)	Sensitivity > 10	[1 to 10] Default= 10	Allows the user to adjust the sensitivity of the eDriveTC to prevent over-reaction in difficult to control machines.
Dampening (only in Wheel Mode)	Dampening >Off	[On, Off] Default= Off	When turned ON, it provides a smoothing effect to machines that have large amounts of body roll which may induce steering oscillations.
Steering Speed (only in Track Mode)	Steering Speed > 35	[0 to 100] Default= 35	Adjusts how rapidly the track machine will make a steering correction when given a command.
Max Turn Rate (only in Track Mode)	Max Turn Rate > 100	[0 to 100] Default= 100	Determines the percent of maximum steering speed that can be commanded to the track machine.



2: Getting Started

**Table 2-2: eDriveTC Setup Menu Options**

<b>Menu Item</b>	<b>Display Sequence</b>	<b>Defaults</b>	<b>Description</b>
Steering Adjust	<=DN UP=> ENTER TO STOP	<<<DN UP>>> ENTER TO STOP	<p>Press DOWN ARROW to move vehicle steering to the left. Press ENTER to stop at left extreme.</p> <p>Press UP ARROW to move vehicle steering to the right. Press ENTER to stop at right extreme.</p> <p>Adjust steering control rate knob to achieve desired end-to-end steering cycle time.</p>
Auto Engage	Auto Engage >Off	[On, Off] Default= Off	Select ON if you want the Auto Engage feature to be enabled.
Diagnostics	Ver 2.87 Gyro 0		Displays current eDriveTC console software version, and internal gyro sensor data. The number indicates vehicle turning rate (in degree/second), negative to the left, positive to the right.



**Tilt Compensation setup sequence:** - After completing initial system startup sequence, perform the following tilt setup sequences prior to field operation.

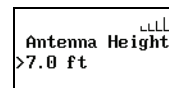
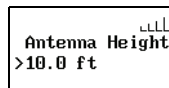
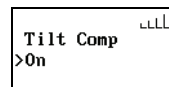
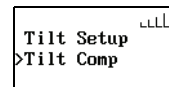
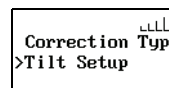
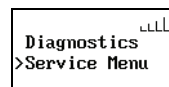



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**Note:** Be sure the vehicle is parked on a level surface before calibrating the accelerometer value. It may be necessary to use a long bubble level against a rigid vehicle surface to verify that it is indeed level.

---

1. Press the MENU button.
2. Scroll down to Service Menu.
3. Press the ENTER button.
4. Scroll down to Tilt Setup.
5. Press the ENTER button.
6. Select Tilt Comp.
7. Press the ENTER button to select On (or Off if you want to turn tilt compensation off).
8. Press the ENTER button.
9. Scroll down to Antenna Height.
10. Press the ENTER button.
11. Use the UP and DOWN ARROW buttons to select the antenna height.
12. Press the ENTER button.



## 2: Getting Started

13. Scroll down to Calibrate.

```
Antenna Height ■■■■  
>Calibrate
```

14. Press the ENTER button to get to the "to Calibrate" screen.

```
Press Enter ■■■■  
to Calibrate
```

15. Press the ENTER button.

16. The system will function if the angle displayed here is less than 2 degrees. Use spacers and adjust the mounting screws to tilt the eDriveTC console so this value is as close 0.0 degrees as possible.

```
0.00 ■■■■  
Enter when Level
```

```
2.06 ■■■■  
Enter when Level
```

17. Press the ENTER button to calibrate the eDriveTC unit. (This will provide the degree of level.)

18. Scroll down to Diagnostics.

```
Calibrate ■■■■  
>Diagnostics
```

19. Press the ENTER button to show the eDriveTC version and tilt angle. The angle value displayed is the calibrated vehicle slope from level. The version number is the current eDriveTC software version.

```
Ver 2.87 ■■■■  
Angle + 2.06
```



**Table 2-3: Tilt Setup Menu (only always present in eDriveTC)**

<b>Menu Item</b>	<b>Display Sequence</b>	<b>Defaults</b>	<b>Description</b>
Tilt Comp	Tilt Comp > Off	[On, Off] Default = Off	Allows the user to enable or disable the tilt sensor functionality.
Antenna Height (if Tilt Comp ON)	Antenna Height > 10.0 ft (3 m)	'+/-XX.X Feet Default = 10.0 ft (3 m)	The user must input the distance from the ground to the GPS antenna in feet or meters (depending on the unit of measure mode) for proper tilt compensation.
Calibrate (if Tilt Comp ON)	Press Enter to Calibrate 0.24 Enter when Level	2.5 Retry when < 2°	Allows the user to see the current angle measurement of the tilt sensor for mounting adjustment and to enter a zero angle calibration point (refer to tilt compensation setup sequence on page 19).
Diagnostics (if Tilt Comp ON)	Ver 2.87 Angle +2.06		Displays the current software version and the calibrated angle measurement produced by the tilt sensor. (See page 20.)



## 2: Getting Started

**Gyro Calibration:** - The eDriveTC uses a rate gyro to improve guidance and control the steering. This is automatically calibrated after power up, while moving and using GPS data. It requires some turns and straight runs to optimize its performance. Users may find it beneficial to momentarily slow down beneath the minimum speed, 1 M.P.H. or 0.25 M.P.H. for RTK, after the first few U turns. This ensures a more accurate gyro heading to give better on-line tracking and speeds up the calibration.





## **3: eDriveTC Operation**

Guidance Overview

Auto-Disengage

Auto-Engage



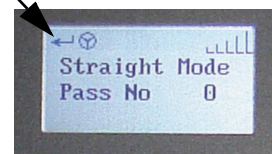
## Guidance overview

Operation of the Outback eDriveTC is an intuitive extension of the stand-alone Outback guidance modes. If you are a first time user of Outback products, carefully review the instruction booklet provided with the Outback guidance controller.

### General Operation

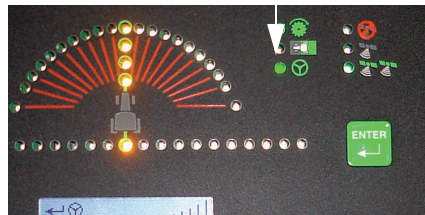
1. Select the appropriate guidance mode.
2. Manually steer the vehicle close to the guideline. After a guideline is acquired, the eDriveTC prompts the operator to engage.

eDriveTC icon indicating eDriveTC is active and is ready to engage.



3. Press ENTER to engage the eDriveTC. The console indicates that the eDriveTC is engaged.
4. Just Let Go™

eDriveTC Engaged Indicator Light



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### Warning!

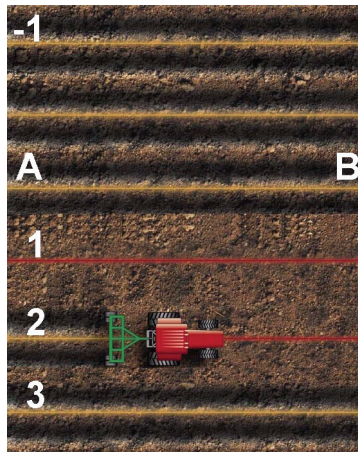
ALWAYS KEEP ALERT. eDriveTC cannot detect trees, gullies, fences, and other field obstacles. To avoid personal injury and/or significant property damage, stay alert at all times. Disengage the eDriveTC and manually steer the vehicle around obstacles.

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### For Straight Driving

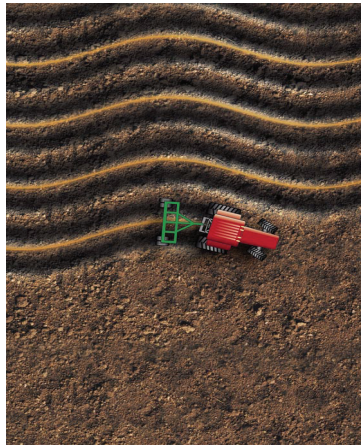
1. Enter the STRAIGHT GUIDANCE mode and establish the guideline following the prompts given by the guidance controller.
2. Manually steer the vehicle close to the guideline and engage the eDriveTC.
3. At the end of the pass, manually turn the vehicle around and line up on the next pass.



### 3: eDriveTC Operation

#### For Contour Driving

1. Enter the CONTOUR GUIDANCE mode and make the initial pass. Anytime you approach a previous pass, the Outback guidance controller begins to display guidance.
2. Manually steer the vehicle close to the guideline and engage the eDriveTC. For sharp turns, slow down or manually steer the vehicle.



In either straight or contour mode, the eDriveTC automatically disengages when manually steered off the guideline.



---

#### Warning!

Switch off power to the eDriveTC console when traveling between fields at road speeds. This will prevent the chance of a false engagement of the automated steering, which may cause unexpected steering behavior or dangerous steering reactions.

---



## Auto-Disengage

To ensure safe and reliable automated steering, the auto-disengage feature, if engaged, is always active and continually monitoring vehicle operation. The eDriveTC will automatically disengage whenever:

1. The current position error exceeds 6 feet (2 meters) (or 10% of swath width, whichever is larger).
2. Manually turning the steering wheel. This activates the switch sensor and disengages the auto sensor steering.
3. The vehicle's ground speed is less than 1 m.p.h. or greater than 20 m.p.h.



---

**Note:** If your system has RTK corrections, the eDriveTC will automatically disengage if your ground speed is less than 0.25 m.p.h. or greater than 20 m.p.h.

---



## Manual Disengage

The eDriveTC can also be manually disengaged.

### To manually disengage the eDriveTC:

1. Select a non-operational display (system) mode or menu.



---

**Note:** When operating in contour mode, the Outback guidance controller's free-style method continuously searches for a previous pass to guide along. If no previous pass is found nearby, the display will show LOGGING PASS, and the eDriveTC is disabled. Once a previous pass has been detected, guidance indicators will be displayed, and the eDriveTC can be engaged. In complex contour/terrace applications where multiple previous passes exist nearby, the free-style method selects the closest path. This can result in unexpected eDriveTC auto-disengage, and/or guiding along the wrong pass. To minimize this effect, clear the Outback guidance controller's guidance memory as each sub-area is completed, particularly after making the outside passes around the field.

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2. Press the ENTER key.



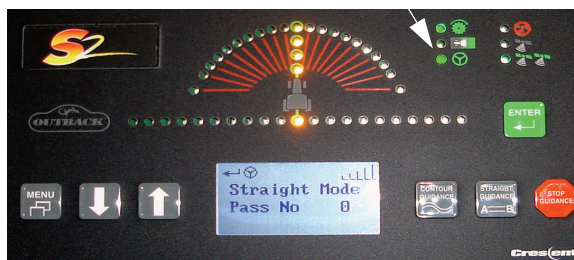
## Auto-Engage

The Auto-Engage™ feature is optional. It allows the vehicle operator to turn around at the end of one pass, line up on the next guideline, and automatically re-engage eDriveTC without pressing the ENTER button. The auto-engage feature may be turned on or off through the eDriveTC setup menu.

### To operate with the auto-engage:

1. Initiate guidance and manually engage the eDriveTC, using the normal operating procedure.
2. At the end of the pass, manually steer off the guideline to auto-disengage eDriveTC. The eDriveTC indicator light will begin flashing.

eDriveTC indicator light



3. Turn the vehicle around and manually steer to the next pass. Center both the current position and steering guide™ lights for one second. The eDriveTC will automatically re-engage and the eDriveTC indicator light will turn on solid.




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**Note:** If you continue to manually steer after the vehicle is on the guideline, the eDriveTC will sense the movements in the steering wheel and disengage.

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### 3: eDriveTC Operation



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**Note:** For safety reasons, there is a time-out of 45 seconds for the auto-engage to operate. If the auto-engage does not re-engage within this time, the indicator light will stop flashing and eDriveTC must be manually re-engaged by pressing the ENTER button.

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## **4: Troubleshooting**

Fine Tuning Performance

Troubleshooting Tips

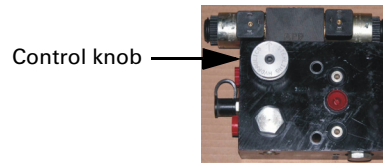
Vehicle Type Setup Table



## Fine-Tuning Performance

Proper setting and periodic adjustments of the steering control rate are required to achieve smooth steering response, minimize tracking errors, and optimize the eDriveTC's performance.

**Increasing the Steering Control Rate by using the control knob on the steering block (the control block may vary according to the specific equipment): -**



**Figure 4-3. Control knob on steering block example**

- Results in more aggressive steering corrections and reduced guidance tracking error.
- Setting the control rate too high will result in unstable steering corrections and larger errors.
- Refer to the specific equipment specific installation instructions for the proper adjustment procedure.

**Decreasing the Steering Control Rate: -**

- Results in more stable steering corrections and smoother response.
- Setting the control rate too low will result in sluggish steering corrections and large tracking errors.



**Contour Operation: -**

- The steering control rate should be adjusted while operating in straight guidance mode.
- The eDriveTC tracking errors in contour guidance can be minimized by reducing travel speed on sharp curves.



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**Note:** The overall accuracy of the eDriveTC system depends on many factors. Refer to Appendix A: Making the Most of Automated Steering for more information.

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## Troubleshooting Tips

### **No eDriveTC Setup Menu on Outback S2: -**

- Verify Outback S2 application software is the appropriate version, "6.0 and above."
- Verify the S Present light is lit on the eDriveTC console.
- Check CAN communication cable and connections.

### **No Steering Output at eDriveTC Steering Adjust Menu: -**

- Check the valve control cable and connections.
- Verify indicator lights, or voltage, at the hydraulic valve solenoid connection.
- Verify hydraulic operation (refer to equipment specific installation sheet for details).

### **Erratic or No Steering Corrections While Engaged: -**

- Verify eDriveTC console is securely mounted and correctly oriented in the upright position.
- Check the gyro sensor data using eDriveTC Diagnostics Menu. Drive the vehicle in a straight line. Sensor data should be near zero. Turning to the left, data should display negative. Turning to the right, data should display positive.
- Fine-Tune the steering control rate for smooth response and minimum tracking errors.



### Vehicle Type Setup Table

<b>Machine Type</b>	<b>GPS Antenna Location</b>	<b>Sensitivity</b>	<b>Dampening</b>
MFWD or 2WD Row-Crop Tractor	Leading edge of the vehicle cab	10	OFF
Articulated 4WD Tractor	Leading edge of the vehicle cab	10, In some cases it may be necessary to lower the sensitivity to prevent erratic movements. Start with the sensitivity at 10 and adjust the oil flow as close as possible then move the sensitivity down by 1 number at a time to reduce any jerking movements.	OFF
Self Propelled Sprayers	Back edge of the vehicle cab	10	OFF, Some applications may require turning the dampening term ON to reduce oscillations. In general these machines are CaseIH SPX Sprayers, Nitro Sprayers, and Hagie Sprayers.
Combines	Leading edge of the vehicle cab	10	OFF



#### 4: Troubleshooting

<b>Machine Type</b>	<b>GPS Antenna Location</b>	<b>Sensitivity</b>	<b>Dampening</b>
Track Machines (Differential Steering only, use Track Mode. A CaseIH QuadTrac is not considered a track machine because it does not use differential steering, refer to Articulated 4WD tractors)	Leading edge of the vehicle cab	N/A	N/A





## **Appendices**

A: Making the Most of Automated Steering

B: Frequently Asked Questions

C: Sales and Service Information

## A: Making the Most of Automated Steering

Hemisphere GPS Crescent Receiver Technology sets new standards for accuracy and flexibility in precision ground agriculture.

However, in-the-field accuracy for automated steering applications is influenced by a variety of factors, not just the inherent accuracy of the GPS system.



**Figure 5-1. Factors Influencing Automated Steering Accuracy.**

### GPS Signal Accuracy

#### GPS Antenna Location -

Make sure to install the GPS antenna on the vehicle in a location that will optimize its performance. In most cases (with exception of high-speed self-propelled sprayers,) it is best to have the GPS antenna mounted on the leading edge of the vehicle cab. This usually provides an open view of the sky, and prevents multi-path reflections and signal masking from near-by vertical obstructions.

In the case of high-speed self-propelled sprayers, installing the GPS antenna on the back edge of the vehicle cab allows more stable automated steering control.





**Figure 5-2. GPS antenna installed on the leading edge of the vehicle cab and centered left to right.**

It is also important to install the GPS antenna in the center (left and right) of the vehicle. This prevents swath offsets resulting in skips and overlaps. If the center of the working implement is not in line with the center of the guided vehicle, be sure to enter an appropriate Swath Offset into the S2 during setup.

#### **Cable Installation -**

To prevent problems with signal interference and power fluctuations, give careful consideration when installing the GPS antenna cable, rover radio cable, and power cables.

Try to route antenna and radio cables away from any other RF (radio frequency) cables. Also, be careful to avoid any cables carrying high amperage electrical pulses. Be sure that all cables are routed and secured properly to prevent crimping and abrasion.

Connect power cables to stable 12-volt power supplies such as vehicle power outlets or direct battery connections. Avoid using cigarette lighter adapters.





### **Steering Controller and Tilt Compensation Installation -**

The automated steering controller contains sensors for the yaw (left/right turn) and roll (tilt side to side) axes so it is important to install it in the appropriate orientation.

For proper operation, calibrate the tilt compensation sensor according to the operator's manual. Also, be sure to install the steering controller on a level cab surface with the connectors facing left with regard to the direction of travel.



**Figure 5-3. Mounted automated steering controller**

The yaw (left/right turns) sensor needs special consideration when choosing a mounting location. Install the steering controller as far forward in the vehicle cab as possible in order to make the yaw sensor more sensitive to turn rate (steering movements).



## Machine / Vehicle Control

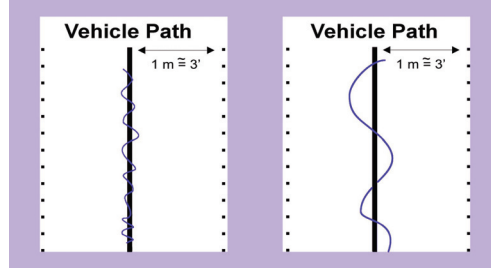
### Automated Steering Hydraulic Tuning -

It is necessary to adjust the steering speed on the automated steering hydraulic valve to optimize machine control accuracy. Make adjustments when the vehicle hydraulic oil is at operating temperature. To fine-tune the steering speed, make several straight test passes. Refer to the equipment specific installation manuals for the proper adjustment procedure.

Adjust the steering speed until the vehicle can maintain the GPS guideline accurately without rapidly overshooting or sluggishness.

If the steering corrections are too rapid causing the machine to jerk erratically back and forth across the line, the hydraulic steering speed is too fast.

If the machine slowly weaves down the guideline, the hydraulic steering speed is too slow.



**Figure 5-4. If the steering is causing the machine to jerk back and forth across the intended line, reduce hydraulic steering speed. If the machine is slowly weaving over the intended line, increase the hydraulic steering speed.**

Once the hydraulic steering speed is tuned, then it should not be necessary to adjust the steering speed again unless there is a major



## Appendices

change in the vehicle or application. For example, adding an implement with significantly more draft, adding duals or ballasting, and/or dramatically increasing operational ground speed.

### **Vehicle Setup: Steering Maintenance, Ballasting and Stance, Traction Aids -**

It is important to consider the physical characteristics of a vehicle that may affect the ability of the automated steering system to perform at an optimal level.

When preparing a vehicle for use with automated steering it is necessary to inspect all of the vehicle steering components including cylinders, joints, linkages, wheels, and tires. All mechanical steering connections must be within the manufacturer's specifications for free play in order to achieve maximum machine control accuracy.

Wheels must be true, properly aligned, and spaced evenly from side to side. For optimal automated steering performance, it is best to have the vehicle properly ballasted and a wide wheel stance. Ballasting improves traction for more rapid and precise steering corrections.



Additionally, a wider wheel stance with front and rear duals (where applicable) will dramatically improve vehicle stability allowing for increased steering accuracy.



**Figure 5-5. Machine ballasted with full set of front suitcase weights and rear wheel weights. Wide stance with duals front and rear for stability and traction.**

Lastly, it is important to use vehicle traction aids, when possible. The use of mechanical front wheel drive and differential lock will improve vehicle traction and steering making it easier to maintain the guideline. The use of differential lock may not be appropriate in some field conditions; however, most straight-line guidance scenarios will have improved tracking with the use of differential lock.

### **Implement Tracking**

The tracking performance of the implement plays a major role in accuracy. Implements can often move back and forth across the guideline independent of the guided vehicle, especially in rolling terrain or tough soil conditions. In addition, non-uniform draft loads created by an implement can actually work against the automated steering system, degrading accuracy.



### **Drawn Implements -**

Implements with long drawbar connections to the vehicle can often move back and forth behind a vehicle that is driving in a straight path. It is important to use stabilizing methods such as disk coulters to help the implement track inline with the towing vehicle.

### **3-Point Implements -**

In the case of 3-point mounted implements, make sure to balance the implement behind the vehicle. That is, all ground engaging elements should be evenly spaced and in proper adjustment. It is common for items such as cultivator shanks or bedder row-units to gradually slip left or right on a tool bar causing uneven draft. Regular checking and adjustment will minimize this problem.

In addition, on 3-point implements, it is necessary to adjust the sway blocks on the vehicle draft arms. Allow only a very small gap at the sway blocks to prevent large side-to-side movements of the implement.

Similar to drawn implements, 3-point implements will benefit from evenly spaced coulters set deep enough to prevent side-to-side movements. As implement widths grow in 3-point applications, it may be necessary to use draft chains connected from the ends of the



implement to the front of the vehicle to prevent deflection in the outer sections of the implement.



**Figure 5-6. Vehicle 3-point sway block set tight and spaced evenly on both sides.**

### **Field Conditions**

Field conditions can also play a role in accuracy. Smooth, flat fields with uniform tith will obviously allow for the best possible accuracy. However, this ideal scenario is usually not reality. Many fields have rolling terrain, contour terraces, old crop rows, varying soil conditions and other characteristics. Understanding these elements and how they effect steering will help to maximize the guidance accuracy.

### **Rolling Terrain -**

Be sure the implement is setup with stabilizing coulters for proper tracking behind the tow vehicle.



**Contour Terraces -**

Similar to rolling terrain, but may require the use of contour guidance mode. Contour guidance mode uses a smoothing feature to gradually reduce curve severity with every consecutive pass. Therefore, each pass will have some amount of error at the transitions of each curve. In addition, drawn implements do not track directly behind the tow vehicle when navigating curves inherently reducing accuracy. When possible, use straight mode guidance and work up and over mild terraces in high accuracy situations.

**Old Crop Rows -**

Old rows can create non-uniform draft loads on an implement pulling it and possibly the tow vehicle off line. Working against old rows at an angle will improve the draft uniformity. In some cases, it may be necessary to completely work down old rows in order to develop new, very accurate rows.

**Soil Conditions -**

Very loose soil may require more steering effort and traction from the guided vehicle. To improve accuracy, it may be necessary to add weight over the steering wheels, use mechanical front wheel drive, and/or differential lock. Irregular and tight soil conditions, such as those encountered when working with old crop rows, can cause similar conditions. To improve accuracy, it is critical to use stabilizing elements on the implement and have the proper ballasting on the tow vehicle.

**Consistent Accuracy and Increased Productivity**

Special attention to the previous four main factors (GPS signal accuracy, machine/vehicle control, implement tracking and field conditions) affecting automated steering accuracy can help you achieve consistent results that maximize productivity.



## B: Frequently Asked Questions

1. When I tried to install the steering wheel switch I could not find an exposed portion of the steering shaft. Where should I install the magnets and the switch?

The steering wheel switch kit was designed to be universal and able to be installed on a wide variety of machine platforms. On some machines the steering shaft is covered by a sleeve and it is necessary to drill a hole in this sleeve that is large enough to install the magnets then attach the sensor so it can read the magnets through the hole. Any rotating assembly connected to the steering wheel can be used to install the sensor magnets as long as the sensor is able to read the magnets as the steering wheel is turned. See page 14 and the Universal Steering Wheel Switch Kit manual (part number 876-0082) for more information.

2. Does it make a difference which eDriveTC steering hose is connected to the A and B ports of the eDriveTC hydraulic block?

No, the steering outputs of the eDriveTC hydraulic block can be reversed and easily corrected. When performing the steering adjust function, the vehicle steering should turn left with the down arrow and right with the up arrow. If the steering direction is reversed simply switch the two connectors on the eDriveTC valve interface cable and confirm proper directional orientation.

3. Why does my vehicle turn hard left/right when I engage eDriveTC?

This may occur for a number of reasons. Make sure the steering speed of the eDriveTC hydraulics is set to a reasonable cycle time before attempting a driving test; see the vehicle specific install instructions. Make sure the eDriveTC console is fastened securely to the vehicle in the proper orientation. The vehicle must be reasonably aligned with the desired GPS guideline before engaging in order to minimize line overshoot.

4. What causes eDriveTC to constantly engage and disengage during a pass?

There are three things that cause eDriveTC to auto-disengage (see page 27 of the user guide) and two things that cause the eDrive to





## Appendices

manually disengage (see page 28 of the user guide). If there are any application errors by the vehicle or the user that cause one of the disengage conditions to be met, then eDriveTC will disengage. For example: the operator occasionally bumps the steering wheel activating the steering switch, or the vehicle is operating near the ground speed cutoff and occasionally exceeds or goes below it. If the Auto-Engage feature is turned on and parameters to engage are met then eDriveTC will automatically reengage after one of these events.

5. My Auto-Engage feature is turned on but the eDriveTC will not engage after setting the AB line.

This likely is happening because one of the eDriveTC disengage criteria are being met. Each time one the eDriveTC is disengaged then the system is reset and must go back through the auto-engage routine. See pages 27 to 30 in the eDriveTC User Guide for eDriveTC auto-disengage, manual disengage and auto-engage criteria.

6. Why are the lights on the valve interface cable connectors flashing?

When eDriveTC is engaged, the hydraulic valve is pulsed at a high rate. Each time a pulse is sent to turn left or right, one of the LED's on the valve interface cable will illuminate.

7. How do I know that I have a reliable electric power source for the eDriveTC system?

The eDriveTC system needs to be connected to a solid 12 volt automotive power supply. Any intermittent or low voltage may cause poor auto steering performance. Typically a direct connection to a 12 volt battery is the best way to ensure reliable power. If in doubt about the voltage of your power supply, use a volt-meter to measure the voltage of the connection during a typical field operation.



8. What Max Turn Rate and Steering Speed should I set for my track tractor?

Follow the recommended settings provided in the hydraulic installation manual for your specific vehicle. Use the Steering Speed value to adjust how fast the vehicle reacts to steering commands. Only use the Max Turn Rate to prevent the tractor from making large overshooting steering corrections when acquiring the line or reacting to disturbances. Adjust the values by 5 points at a time to get close to the desired performance then begin adjusting by finer increments to optimize the system.

9. Should the vehicle steering wheel turn when eDriveTC is operating?

No, under normal field operation the vehicle steering wheel should not turn when eDriveTC is steering. When performing the steering adjust function the steering wheel may begin to turn if eDriveTC after the steering cylinders have reached the end of their stroke. If the vehicle steering wheel is turning as the machine is auto-steering through the field then you need to make sure that you have a counterbalance valve properly installed.

10. Will the eDriveTC engage in reverse?

Yes, but the steering commands will be in the opposite direction and the machine will not steer correctly onto the line.

11. I opened the hydraulic flow control all of the way and the steering cycle time does not decrease.

There could be too much resistance on the steering wheels for the eDriveTC to completely steer left and right. Perform the steering adjust function with the vehicle rolling slowly to check the cycle time.



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12. Which lights on the eDriveTC console should be on during operation?

Both the POWER and S PRESENT lights should be on solid during operation.

13. Why does my manual steering seem stiff with eDriveTC installed?

If the system uses a closed center eDriveTC valve then the load sense signal from the manual steering unit is not being correctly transmitted; make sure that the eDriveTC is installed properly. Secondly, make sure that there is not something in the hydraulic circuit creating back pressure on the return line for the manual steering.

14. Why does the eDriveTC steering seem sluggish in the morning when I first start operating?

The eDriveTC system performance is temperature dependent controlling the flow of oil to the vehicle steering. When the hydraulic oil is significantly colder than operating temperature it does not flow through the system as easily which temporarily changes the auto-steering characteristics. The solution is to change the eDriveTC steering speed setting until the hydraulic oil warms up, then return the setting to its previous location.

15. How do I arrange the steering wheel switch magnets in a track machine application since it only takes a small movement of the steering wheel to steer the tractor?

With the steering wheel centered so that the tractor drives straight, place two magnets on the steering shaft about 3/8 inches apart. Mount the steering wheel switch sensor so that it is centered between the two magnets. Now when the steering wheel is turned slightly both edges of one magnet or the other should be read by the sensor. The sensor must read two edges within two seconds to disengage eDriveTC. See page 14 and the Universal Steering Wheel Switch Kit manual (part number 876-0082) for more information.



## C: Sales and Service Information

### Contacting the Factory

U.S:	Canada:
Outback Guidance	Outback Canada
Hemisphere GPS	Hemisphere GPS
2207 Iowa Street	3244 Portage Avenue
Hiawatha, KS 66434	Winnipeg, MB R3K 0Y9
USA	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](mailto:outbacksales@outbackguidance.com)
- **Customer Service:** [outbackcs@outbackguidance.com](mailto:outbackcs@outbackguidance.com)
- **Website Feedback:** [outbackweb@outbackguidance.com](mailto: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



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**U.S. REGIONAL SALES OFFICES:**

- 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 Illinois- Jacksonville, IL 1-888-477-6070



### Outback eDriveTC Extended Service Plan (ESP) Summary

U.S. and Canada Only

<b>Item</b>	<b>Standard Term</b>	<b>Extended Term</b>
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 OGCTM	Provided by Customer or OGCTM
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 eDriveTC Extended Service Plan**

The Outback eDriveTC 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 eDriveTC 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 eDriveTC 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 eDriveTC system) for the Outback eDriveTC 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](http://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 eDriveTC 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 eDriveTC Extended Service Plan nor the exclusions, limitations, and reservations.





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