SATLOC®

AirTrac

User Guide

Part No. 875-0105-001 Rev F1

AgJunction®

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

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

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6501346	7277792	7460942	8102325	8271194	
6539303	7292185	7689354	8138970	8307535	
6549091	7292186	7808428	8140223	8311696	
6711501	7373231	7835832	8174437	8334804	
6744404	7388539	7885745	8184050	RE41358	
6865465	7400294	7948769	8190337		

Other U.S. and foreign patents pending.

Notice to Customers

Contact your local dealer for technical assistance. To find the authorized dealer near you:

Satloc
2207 Iowa Street
Hiawatha, KS 66434
Phone: 785-742-2976
Fax: 785-742-4584
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www.satloc.com

Technical Support

If you need to contact Satloc Technical Support:

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Product Features

Satloc Bantam DGPS Receiver Advantage

How AirTrac Uses DGPS

Satloc® AirTrac™ aerial guidance software provides precise, flexible guidance technology for today's aerial spray market. AirTrac is included as part of the Satloc Bantam™ system, which allows you to fly and spray precise patterns using constant rate flow control—reducing fuel, flying time, and application costs.

This short introductory chapter lists AirTrac features, describes the advantages of differential GPS (DGPS), and explains how AirTrac uses DGPS.

Product Features

AirTrac guidance software includes the following features:

- Touchscreen interface
- Dry flow control support
- Nighttime screen color options
- Multiple pattern types
- Ability to set a USB flash drive or the Bantam hard drive as the logging read/write device (see "Starting AirTrac" on page 4)

Satloc Bantam DGPS Receiver Advantage

DGPS stands for differential GPS (or differentially corrected GPS), providing enhanced (more accurate) GPS signals. Satloc Bantam receivers support such differential signals as SBAS, L-band, and beacon and, during a temporary signal outage, employ Hemisphere GPS™ patented COAST™ technology that enables you to use aging correction data for 40 minutes or more without significantly affecting positioning quality. So with a Satloc Bantam receiver, you will never be without a differential signal.

Satloc Bantam receivers also support Hemisphere GPS e-Dif® technology, a differential solution for areas where it is geographically difficult to obtain a good differential signal. With e-Dif, you can achieve GPS accuracy of a few feet without the need for a differential signal broadcast. e-Dif generates internal differential corrections based on your starting location and these corrections are modeled over time and applied to the GPS data to maintain a consistent relative position.

How AirTrac Uses DGPS

AirTrac uses DGPS data to provide highly accurate guidance to help you efficiently complete your spray jobs.

Once you establish a reference line, or starting location for your pattern, AirTrac can calculate exactly where your next swath should be based on your selected swath width and pattern using a GPS location it computes 5-20 times per second. The GPS location is made more accurate by applying DGPS corrections. The resulting lightbar guidance cues reflect your real-time GPS data.

AirTrac also uses GPS data to guide you to specific waypoints—GPS coordinates of a specific location.

Chapter 2: Getting Started

Starting AirTrac
AirTrac Setup
AirTrac Display
Before You Start

This chapter provides an introduction to AirTrac and covers the following topics:

- Starting AirTrac
- Selecting default settings
- Basic setup options
- Overview of the AirTrac display
- Working with AirTrac (using the touchscreen, using an optional mouse and keyboard, entering data, etc.)

Starting AirTrac

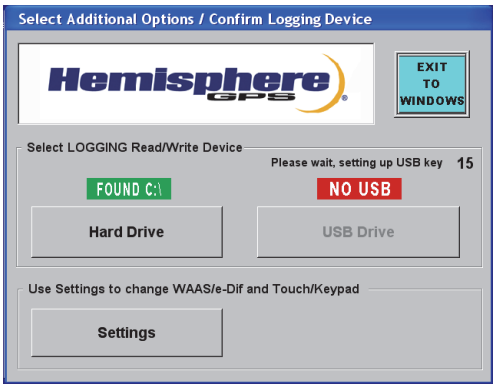
Refer to the Satloc Bantam Installation Guide for more information on how to set up and power on your Bantam system and how to start AirTrac. Contact Satloc Technical Support for information on Bantam documentation.

When you first start AirTrac you select basic options that you are more than likely to only do once as well as select your logging read/write device.

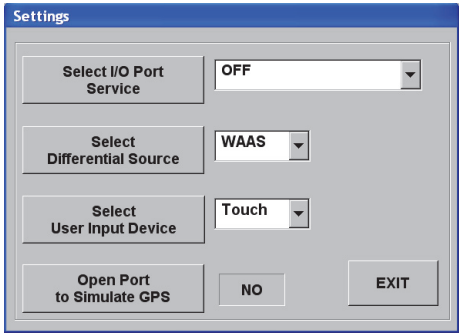
To start AirTrac:

1. Power on your Bantam AirTrac system. The Disclaimer screen appears (shown at right).

2. Press **ACCEPT**. The Select Additional Options / Confirm Logging Device screen appears (shown at right).



3. Press **Settings**. The Settings screen appears (shown at right).



4. Make the desired selections...
   - For I/O Port Service (peripheral devices, such as a camera or AIMMS weather system) and Differential Source (WAAS or e-Dif) select from the appropriate drop-down list.
   - For the Open Port to Simulate GPS field (dealer diagnostic services only), press the button to make your selection (pressing the button repeatedly toggles back and forth between YES and NO).

   ...and then press **EXIT** to return to the Select Additional Options / Confirm Logging Device screen.

Note: For User Input Device, leave the value as Touch.

5. In the Select LOGGING Read/Write Device area press **Hard Drive** or **USB Drive**.

Note: The Hard Drive option is always available ("FOUND" appears above the Hard Drive button). However, the USB Drive option is only available if a USB flash drive is plugged into one of the two USB ports on the Bantam. "NO USB" appears above the USB Drive button if no USB flash drive is plugged in. When you plug in a flash drive Bantam displays text counting down until the flash drive is ready and then displays "FOUND" above the USB Drive button.

After you press either Hard Drive or USB Drive, the Select Additional Options / Confirm Logging Device screen closes and the AirTrac splash screen appears (shown at right).

After several seconds the splash screen closes and the AirTrac Setup screen appears (see "AirTrac Setup" on page 6).

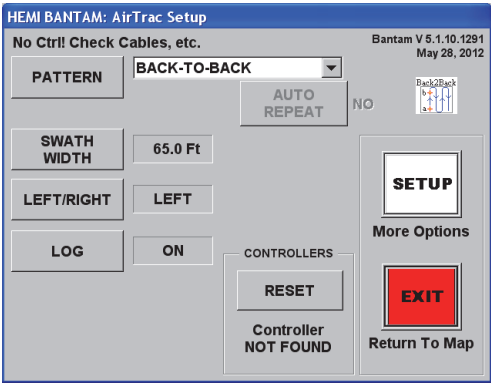
AirTrac Setup

The first screen you see after the Welcome screen is the AirTrac Setup screen (shown at right).

The AirTrac Setup screen allows you to select various options and provides a path to select additional options via the SETUP button.

For instructions on selecting options on the AirTrac Setup screen see “Entering Basic JOB Details (Quick Start)” on page 23.

Tip: *Before you select any options you should familiarize yourself with the various AirTrac screens using the menu map in Appendix A, “AirTrac Screen Map.”*



AirTrac Display

The AirTrac display includes important status information and user-configurable display options. AirTrac includes a virtual keypad on the display screen that functions like a numeric keypad on a PC keyboard. Upon exiting the AirTrac Setup screen the Map screen appears.

Understanding the Map Screen

The Map screen is the main display screen in AirTrac and is divided into three areas: the "Data" area, the "Moving Map" area, and the "Header" area.

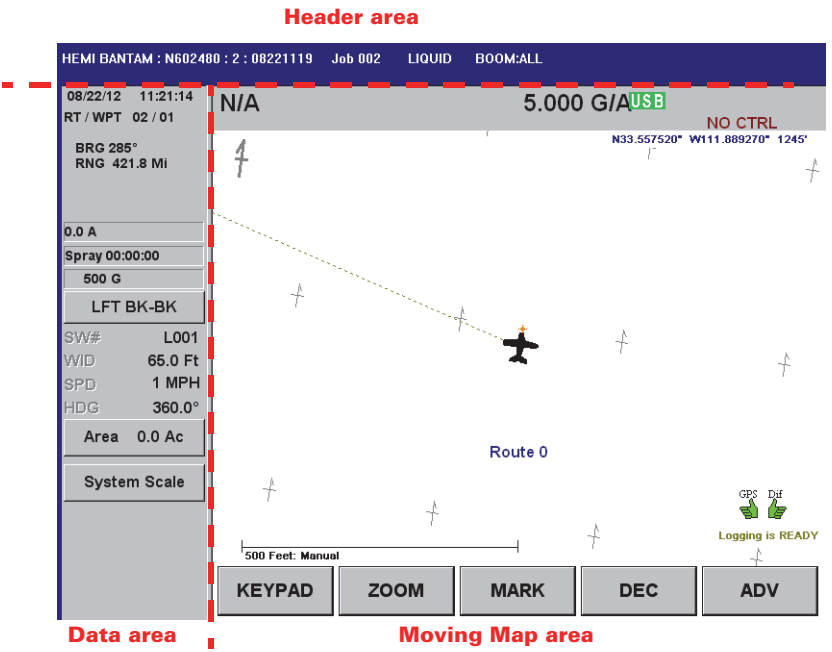


Figure 2-1: Map screen

Note: For a list of options for the Moving Map area's large format display fields and the Data area's fields 1 – 3, see Appendix A, "Lightbar and Screen Display Options."

Moving Map Area

The Moving Map area shows a GIS-generated map of the field when you create a job file or open a log. The map includes an outline of the field's shape and size, areas to spray and to not spray, and any marks in the field. The Moving Map area also shows your differential status and whether logging is on or off.

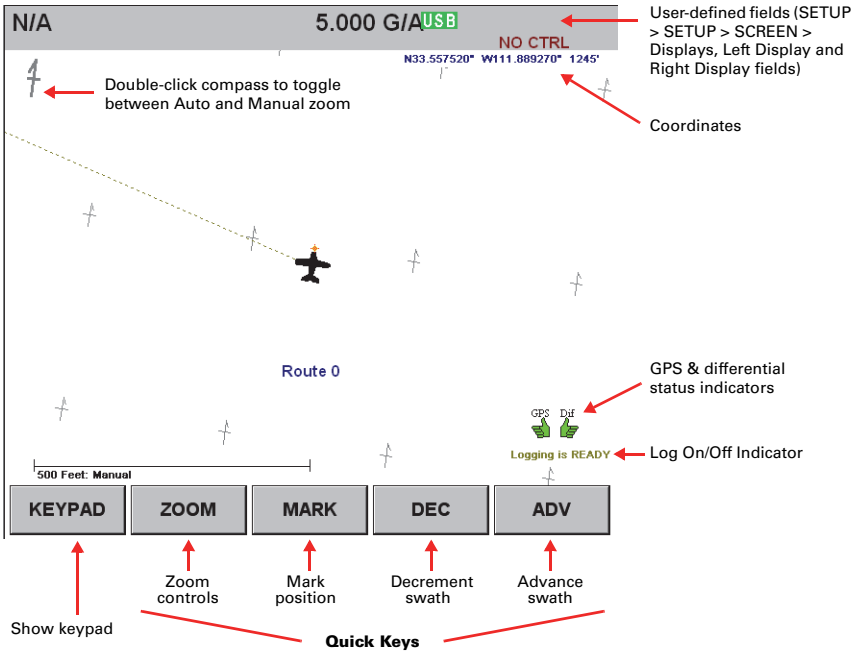
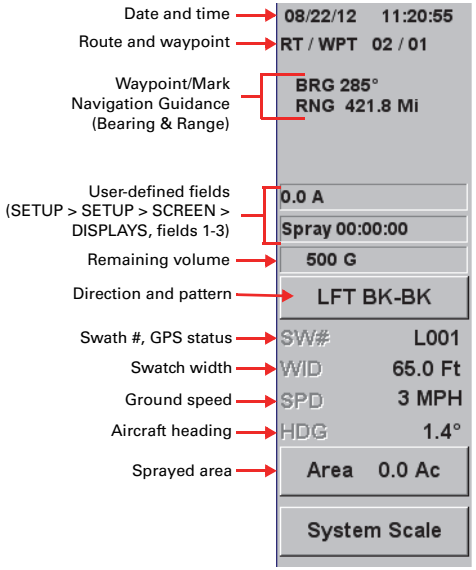


Figure 2-2: Moving Map area

Data Area

The Data area shows the current date and time, status information for special functions (such as waypoints and missions, help messages, GPS status), and your current job information including pattern, direction, swath width and number, speed, heading, and sprayed area.



Header Area

The Header area displays the following information along the top of the Map screen:

- Pilot name
- Aircraft name
- Log label
- Log name (current log; if no open log then <No Open Log> appears)
- Liquid or dry material
- Boom status

Information in the Header area is read-only. You can change some of the data; you just cannot change the information from the Header area.

Pressing Buttons in AirTrac

This manual uses the following format to describe pressing buttons in succession:

Button1 > Button2 > Button 3, etc.

Table 2-1 provides examples of this format.

Table 2-1: Pressing buttons in AirTrac as described in this manual

To Do This	How Described in This Manual
Press the SETUP button, press the next SETUP button, then press the SCREEN button	Press SETUP > SETUP > SCREEN
Press the KEYPAD button, press the CLEAR button, press the JOB button, then press the ENTER button	Press KEYPAD > CLEAR > JOB > ENTER

Using the Keypad

You enter custom setup options, values, and commands using (touching or pressing) buttons on the keypad.

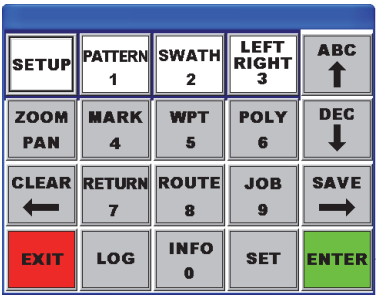
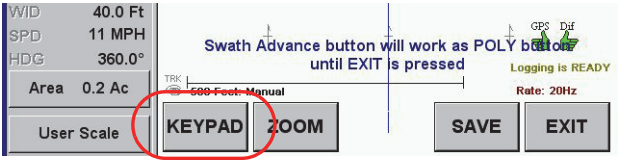


Figure 2-3: Keypad

To display the keypad:

- Press KEYPAD at the bottom of the Map screen



Note: In this User Guide, when describing procedures, buttons are referred to with their function or data type in uppercase and their numeric value. For example LEFT RIGHT\3 or MARK\4.

The most often used keys—SETUP, PATTERN\1, SWATH\2, and LEFT RIGHT\3—are highlighted in white. Table 2-2 describes the function of each key on the keypad.

Table 2-2: Keypad keys and functions

Key	Function	Numeric Value
SETUP	Display the main (first) AirTrac Setup screen.	N/A
PATTERN 1	Cycle through available patterns (the pattern name changes in the Data area).	1
SWATH 2	Enter a swath width (the new value appears as the WID value in the Data area).	2
LEFT RIGHT 3	Change direction (left to right or right to left) of the current pattern (the direction changes in the Data area). You are either flying to the left or to the right of the A-B line.	3
ABC ↑	Create A, B, and C points when creating a pattern. Once you set the pattern this button functions as a swath advance button (if not using the ADV quick key or the remote swath advance switch).	N/A
ZOOM PAN	Display the Zoom/Pan window. See “Zooming and Panning the Moving Map Area” on page 15 for more information.	N/A
MARK 4	Display the Quick Marks window where you can quickly set a mark (1-9). Press this key after pressing an action key to: • Set a mark (MARK > SAVE) • Recall a mark (MARK > SET) • Delete a mark (MARK > CLEAR)	4
WPT 5	Press this key after pressing an action key to: • Set a waypoint (WPT > SAVE) • Recall a waypoint (WPT > SET) • Delete a waypoint (WPT > CLEAR)	5
POLY 6	Press this key to set a polygon point or press after pressing an action key to: • Set a polygon (POLY > SAVE) • Recall a polygon (POLY > SET) • Delete a polygon (POLY > CLEAR)	6
DEC ↓	Swath decrement (if not using the DEC quick key on the Map screen or the remote decrement switch).	N/A

Table 2-2: Keypad keys and functions (*continued*)

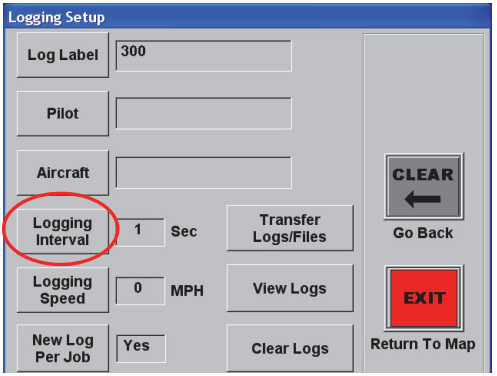
Key	Function	Numeric Value
CLEAR ←	Also use CLEAR > CLEAR then YES (or EXIT TO WINDOWS) to correctly exit AirTrac *before powering down*. For important information on exiting AirTrac see the Exit warning on page 19. Additionally, make sure you understand the difference between clearing a data type from the screen or clearing (deleting) a data type from the database by entering its number. If you delete a JOB, you also delete the job's polygons and patterns. Used in conjunction with other keys to either clear a data type from the screen or delete a data type. For example: • To clear job data (polygons and patterns) from the screen: Press CLEAR > JOB > ENTER • To delete the job from the database (you have to confirm the deletion): Press CLEAR > JOB > n > ENTER (where n = the job number) You also use this button to exit AirTrac: • To close AirTrac and return to Windows: Press CLEAR > CLEAR > Exit To Windows • To close AirTrac and shut down Windows Press CLEAR > CLEAR > YES For important information on exiting AirTrac and powering off see "Exiting AirTrac" on page 19. ⚠WARNING: Make sure you understand the difference between clearing a data type from the screen or clearing (deleting) a data type from the database by entering its number. If you delete a job, you also delete the job's polygons and patterns.	N/A
RETURN 7	Press this key and then a number key (1 - 9) to return to a mark numbered 1 - 9. You cannot return to a mark > 9 because only the first digit counts. To return to a mark > 9 use SET (see SET later in this table).	7
ROUTE 8	Press this key after pressing an action key to: • Set a route (ROUTE > SAVE) • Recall a route (ROUTE > SET) • Delete a route (ROUTE > CLEAR)	8
JOB 9	Press this key after pressing an action key to: • Set a job (JOB > SAVE) • Recall a job (JOB > SET) • Delete a job (JOB > CLEAR)	9
SAVE →	Use in conjunction with other keys to save a data type. For example, to save a mark press SAVE > POLY > n (where n = polygon #).	N/A
EXIT	Return to the Map screen (saving your changes).	N/A

Table 2-2: Keypad keys and functions (*continued)*

Key	Function	Numeric Value
LOG	Display the Logging screen where you can: • Start a new log • Turn logging off/on • Quickly transfer log files from the Bantam hard drive to a USB flash drive—for transfer to a PC for example. See "Transferring Only Log Files" on page 54.	N/A
INFO 0	Use in conjunction with other keys to view data type information. For example, to display information about the mark in the Data area press INFO > MARK.	N/A
SET	Use in conjunction with other keys to recall a specific data type. For example: • To provide guidance back to a mark press SET > MARK > n > ENTER (where n = Mark #). Use the RETURN key to return to marks numbered 1-9. • To switch the display between Normal (daytime) and Dark (nighttime) mode press SET > SET.	N/A
ENTER	Save changes (when you press a combination of buttons to perform a task) and return to the Map screen. For example, to create a mark numbered 10-99 press SAVE > MARK\4 > nn > ENTER.	N/A

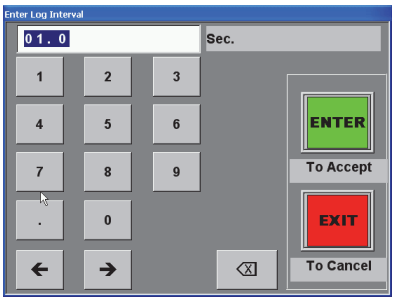
Entering Field Values

To enter field values in AirTrac, such as on the Logging Setup screen (at right), press the button for the field. For example, to enter the Logging Interval value press the Logging Interval button (circled at right).



AirTrac then displays one of two types of data entry windows: numeric only or alphanumeric. AirTrac determines if the value for the field can be numeric only or alphanumeric and automatically displays the appropriate data entry window.

For example, on the Logging Setup screen the Logging Interval and the Logging Speed fields can be only numeric values. If you press the button for either field, AirTrac displays the numeric entry window (left figure in Figure 2-4). Log Label, Pilot, and Aircraft, however, can all be alphanumeric values so when you press the buttons for these fields, AirTrac displays the alphanumeric data entry window (right figure in Figure 2-4).



Numeric only data entry window

Alphanumeric data entry window

Figure 2-4: Data entry windows

To enter values in either data entry window:

1. Press buttons as required.
2. Press **ENTER** (numeric only data entry window) or **Accept** (alphanumeric data entry window) to accept the entry (to save it). The data entry window closes and the value you entered populates the appropriate field on the previous screen.

   or

   Press **EXIT** to cancel the entry (to not save it) and return to the previous screen.

Zooming and Panning the Moving Map Area

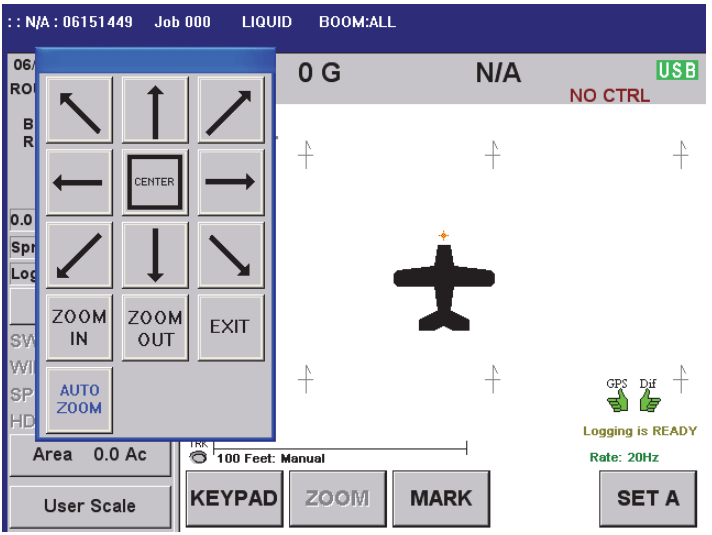
Zooming refers to making a section of the screen larger so you can see more detail (zoom in) or making the screen smaller so you can see a larger area (zoom out).

Panning refers to moving the screen in a specific direction (such as left or right) so you can see detail that may not be viewable on the current screen.

Zooming and Panning

To zoom/pan the Map screen:

1. Touch **ZOOM** on the Map screen. The Zoom/Pan window appears.



2. Press the buttons in the Zoom/Pan window to zoom and pan as follows:
   - To pan the map:
     - Press the appropriate arrow key to pan the display in the direction of the arrow
     - Press (and hold) the map and drag in the map window (similar to dragging a mouse on a PC)
   - To zoom in/out, press a zoom key (ZOOM IN or ZOOM OUT)
   - To center the display on the aircraft, press CENTER. Continue pressing CENTER to toggle through the following centering options:
     - Prescription map (if active)
     - Each active polygon in a job
     - Everything (such as prescription maps, polygons, and aircraft)

Switching Between the Screen Color Options

AirTrac has both a normal (daytime) screen color mode and dark (nighttime) screen color mode. You can switch between them by pressing SET twice on the Main menu (recommended) or through the menus (SETUP > SETUP > SCREEN > Mode).

Before You Start

Each time you start AirTrac you have the option to select an external storage device (USB flash drive) or the Bantam hard drive as the logging read/write device. The option you select affects various file transfer procedures. For more information see "Starting AirTrac" on page 4 and "Transferring Data Files" on page 52.

AirTrac's default settings should meet most users' needs. However, you will need to set some systemwide values and options to suit your local requirements. After setting these values or options, you can start using AirTrac.

Note: You can save customized settings and transfer them via USB flash drive to a PC or other Bantam units. For more information see "Customized Settings" on page 83.

Understanding Systemwide Settings

Table 2-3 describes the AirTrac systemwide settings you can select.

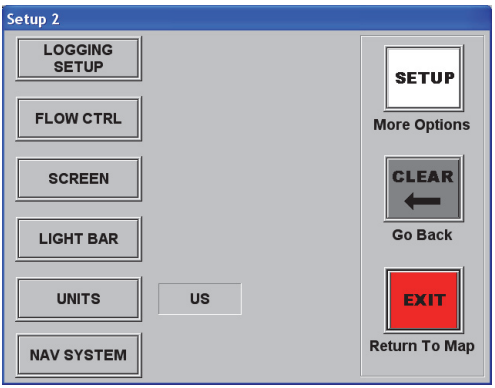
Table 2-3: AirTrac systemwide settings

Setting	Description
Local time offset	AirTrac is set to Greenwich Mean Time (GMT). To convert to local time, you must know the time difference between GMT and local time for both standard and daylight saving. For example, Arizona, U.S. is located in the Mountain time zone and does not observe daylight saving. So, to use AirTrac in Arizona, you would set the local time setting to -07:00 (7 hours behind GMT). If you live in an area that observes daylight saving, you will need to set the local time twice a year.
Global units of measurement	AirTrac comes preset with imperial units (such as feet and pounds). To use metric units change the Global Units setting. You can also assign units to individual data types (such as speed and area) in the Units Advanced Setup screen.
GPS coordinates	You can display GPS coordinates in decimal degrees (default), decimal minutes, or decimal seconds.
Laser altimeter offset	AG Laser is an optional product. To purchase AG Laser contact your dealer. The AG Laser is a laser altimeter used to provide AirTrac with a distance from the aircraft to the ground/crop canopy (see Note following). The offset is a number that you can set to offset the difference between the actual mounting location of the Ag Laser (usually in the wing) and the lowest point of the aircraft (the landing gear) to determine exactly how high the lowest part of the plane is off the ground/crop canopy. *About 'ground/crop canopy'.* The laser will bounce off the ground or off the canopy of whatever crop the plane is flying over if the vegetation is thick and hides the ground.

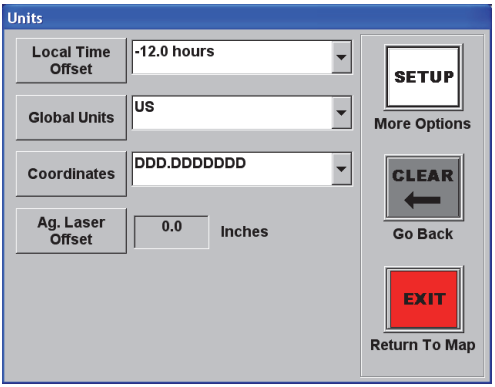
To select systemwide settings:

1. On the Map screen press **KEYPAD** to display the Main menu.

2. Press **SETUP** to display the AirTrac Setup screen and then press SETUP to display the Setup 2 screen.



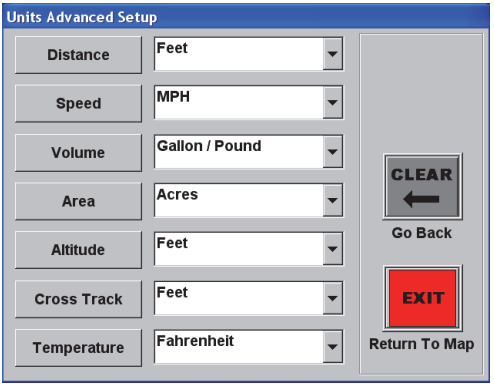
3. Press **UNITS** to display the Units screen.



4. Set the **Local Time Offset** from (+)14 hours to -12 hours in half hourly increments.
5. Set your **Global Units** (select from US, Metric, or Nautical).

   'Global' means all the units in AirTrac. You can override the global setting for individual units on the Units Advanced Setup screen (see step 8 below).
6. Set the **Coordinates** format as one of the following:
   - DDD.DDDDDDD - decimal degrees
   - DDDMM.MMMM - decimal minutes
   - DDDMMSS.SSS - decimal seconds
7. Set your **Ag. Laser Offset** - this is the number to allow for the difference between the actual mounting location of the Ag Laser (usually in the wing) and the lowest point of the aircraft (the landing gear).

8. To override the global units for certain values, press **SETUP** on the Units screen to display the Units Advanced Setup screen.



9. Change individual units from your global setting as desired.

Detecting Your Flow Control System

AirTrac automatically detects if a flow control system is connected and what type it is: AerialACE™, IntelliFlow®, or IntelliGate™. If AirTrac detects a flow control system it displays the type at the top of the Flow Control Setup window. If the system does not detect a flow control, it displays a message to that effect at the top of the window. For more information see “Spray Options” on page 26 and “Flow Control” on page 83.

Exiting AirTrac

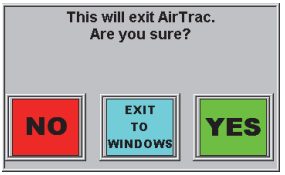
You have two options when exiting AirTrac:

- Exit AirTrac and return to Windows
- Exit AirTrac and shut down Windows

⚠WARNING: To protect your data, you must exit (shut down) AirTrac before you turn the power source off. If you power off without first exiting AirTrac you risk corrupting your data. Data integrity can be ensured only if you exit IntelliTrac before powering off.

To exit AirTrac:

1. On the keypad press **CLEAR > CLEAR**. The exit window appears.



2. Press **YES** to exit AirTrac and shut down Windows.

   or

   Press **EXIT TO WINDOWS** to exit AirTrac and return to Windows.

Chapter 3: Work Options

Jobs and JOBS in AirTrac
Entering Basic JOB Details (Quick Start)
Understanding Job and Log Data
Spray Options

After you complete basic setup in AirTrac (see “Starting AirTrac” on page 4) the AirTrac Setup screen appears. On this screen you enter the following basic job details you need to quickly get to work:

- Pattern
- Swath width
- Direction (Left/Right)
- Logging on/off

Jobs and JOBS in AirTrac

This User Guide uses the terms “job” (lowercase) and “JOB” (uppercase) in the following manner:

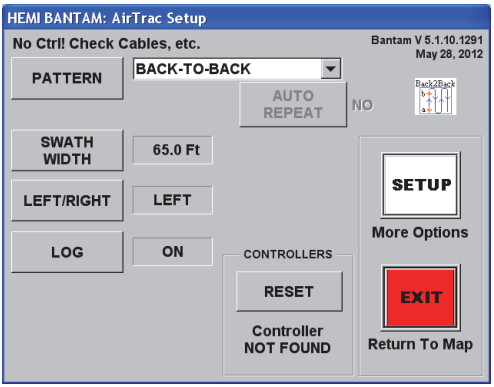
- A “job” is a piece of work in AirTrac, such as flying/spraying a pattern.
- A “JOB” is an AirTrac entity comprising one or more polygons and one or more flown patterns. You can save, delete, add to, and subtract from a JOB.

Note: If you exit the AirTrac Setup screen and later shut down with a saved JOB loaded, that JOB is still loaded when you restart AirTrac. If you shut down with ***<No Job>**** *active, you will see JOB 000 loaded. (You get <No Job>* active by pressing CLEAR > JOB > ENTER). See “Exiting AirTrac” on page 19 for more information on exiting AirTrac.*

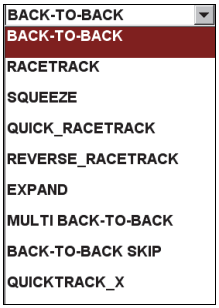
Entering Basic JOB Details (Quick Start)

The following steps provide a quick way to enter basic JOB details.

1. From the Main menu press **SETUP**. The AirTrac Setup screen appears.



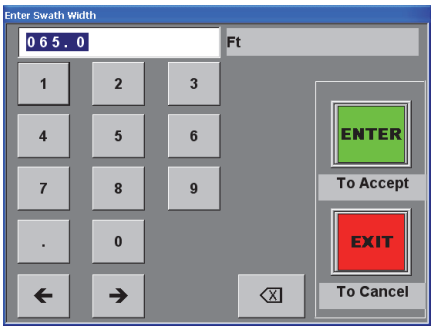
2. Press **PATTERN** and select the pattern type you require from the drop-down list.



3. Press **AUTO REPEAT** (to show YES) to repeat the current pattern when you have completed it.

   If auto repeat is NO, AirTrac reverts to a Back-to-Back pattern when you have completed the current pattern.

4. Press **SWATH WIDTH** and then enter the swath width.



5. Press **LEFT/RIGHT** to select a direction. The field toggles between left and right.

6. Press **LOG**. The Logging window appears.

7. Select **Start New Log** or **Turn Logging Off**.

   By default, logging is ON. If you change it to OFF and return to the Map screen, you can quickly turn logging back on by pressing **KEYPAD > LOG > Start New Log > Exit**.

For more information on job functionality, see “Saving and Recalling JOBs” on page 60.

Understanding Job and Log Data

If logging is enabled (default setting), AirTrac automatically creates a log file for each job flown, assigning the time/date stamp of each new log as the log file name. You can enter additional (optional) details to your job, such as a name/number, pilot name, and aircraft name/number.

Note: This is job information (a piece of work) stored in the log; it is not JOB information (polygons and patterns). The optional job information you add through the Logging Setup screen becomes part of the log file.

Log Data

Log data includes exact positioning and rate of spray application, precise time and date record, flight speed, altitude, patterns flown, and GPS position quality. AirTrac records this information in the log any time you are above a pre-designated airspeed.

The default is 45 mph but you can change this in SETUP > SETUP > LOGGING SETUP, Logging Speed field. For more information see “Changing Logging Defaults” on page 82.

Adding Job Information to the Log

You add Job information to a log in the Logging Setup screen (SETUP > SETUP > LOGGING SETUP).

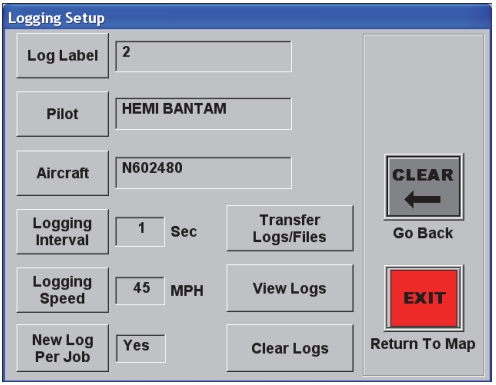


Figure 3-1: Logging Setup screen

You can enter such information as a job name (Log Label), pilot name, and aircraft name in their respective fields. The entries appear in the Header area at the top of the Map screen (see “Header Area” on page 9).

You also set the logging interval and speed and set New Log Per Job to Yes or No.

You can transfer logs and files, view logs, and clear (delete) logs from the Logging Setup screen. See “Viewing Log Data” on page 49, “Clearing Log Data” on page 50, and “Transferring Data Files” on page 52.

Spray Options

You set your spray options in the Flow Control Setup screen.

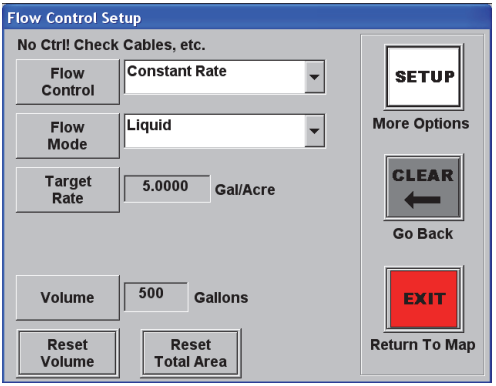


Figure 3-2: Flow Control Setup screen

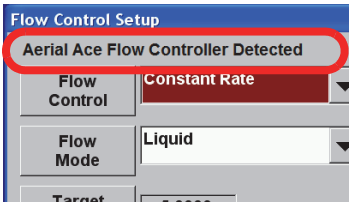
To display the Flow Control Setup screen (from the Main menu):

- Press **SETUP > SETUP > FLOW CTRL**

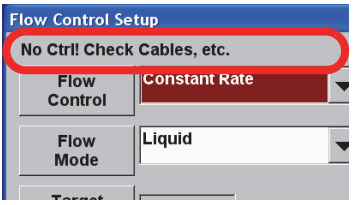
  or

  Press **INFO\0 > INFO\0**

AirTrac automatically detects if a flow control system is connected and what type it is: IntelliFlow, IntelliGate, AerialACE, or third-party products such as AutoCal. As shown in Figure 3-3 AirTrac displays the flow control system name (if detected) or an error message (no flow control system detected).



Flow control system detected



No flow control system detected

Figure 3-3: Flow control system detection message

AirTrac supports constant rate flow control for liquid or dry applications (flow modes).

If you have a flow control system installed, you will need to set your basic job spray options in AirTrac, including:

- Spray application type (liquid or dry - displays in the Header area as LIQUID or DRY)
- Target spray rate (Gal/Acre liquid; Lb/Acre dry - U.S. units)
- Spray volume

You can also set AirTrac to spray with the entire boom (default setting) or only the left or right boom (shown in the Header area as BOOM:ALL/LEFT /RIGHT).

Note: See "Header Area" on page 9 for an example of spray type and boom settings in the Header area.

If defining and flying polygons, you may also want to set the flow control system to automatically turn on/off when entering/leaving a polygon.

Finally, you can change your flow lead time—the flow control system's reaction time to reach the proper rate at the proper location.

The following sections describe spray options for:

- Basic flow control
- Flow mode and target rate
- Volume

Setting Spray Options - Basic Flow Control

Table 3-1 describes the options for the Flow Control field:

Table 3-1: Flow Control field options

Option	Description
Constant Rate	Constant rate flow control.
Constant Rate Poly	Constant rate flow control that automatically turns on/off at polygon borders.
Monitor Only	With Monitor Only selected you just monitor the flow system. In this mode, you control the flow manually. For example, use this mode to calibrate your flow meter or for logging rates if using AutoCal.

Table 3-2 summarizes the flow control options and how the various parameters you can select affect each option. The defaults shown in Table 3-2 are recommended, but may not be suitable for all applications.

Table 3-2: Flow control options summary

	Auto Boom Yes/No Option	Target Rate
Constant Rate Poly	YES - Pump On, Valve Static NO - Valve Closed, Rate 0	N/A
Constant Rate Manual	N/A	Actual Spray Rate

Setting Spray Options - Flow Mode and Target Rate

You select Liquid or Dry to match your spray application type in the Flow Mode field (see Figure 3-3 on page 26) and set your target rate in gallons per acre for liquid applications or pounds per acre for dry applications (US units).

Setting Spray Options - Volume

You set the beginning hopper volume in the Volume field. This value counts down as material is sprayed. If you refill the hopper with the same amount you can reset the volume to the last amount you entered using the Reset Volume button. You can also reset the total sprayed area (as shown in the Data window) back to 0.

To reset the spray volume or area counters:

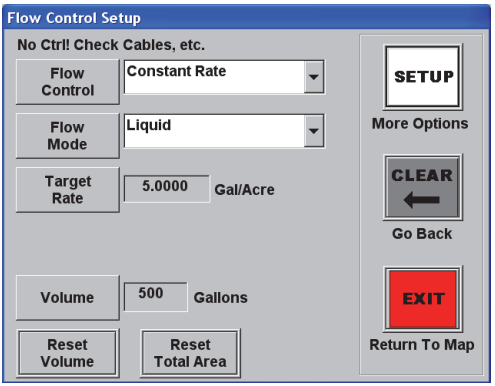
- Press **Reset Volume** or **Reset Total Area**. The volume resets to the default value of 500 gallons and the Total Area counter resets to 0.

Note: When AutoCal reports that it is using dry flow control, the volume and rate is based on weight (volume = 1000 kg; rate=100 kg/h).

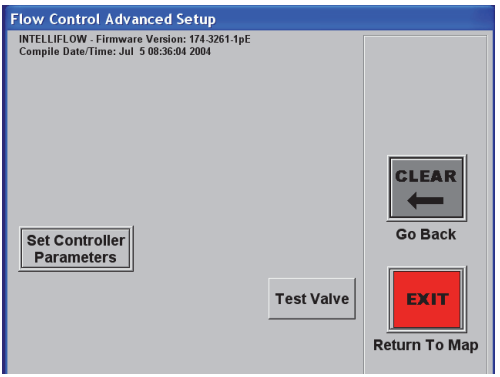
Setting Flow Control Parameters

To set flow control parameters:

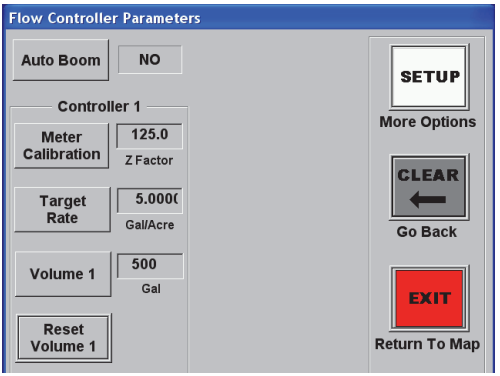
1. From the Main menu press **SETUP > SETUP > FLOW CTRL**. The Flow Control Setup screen appears.



2. Press **SETUP**. The Flow Control Advanced Setup screen appears.

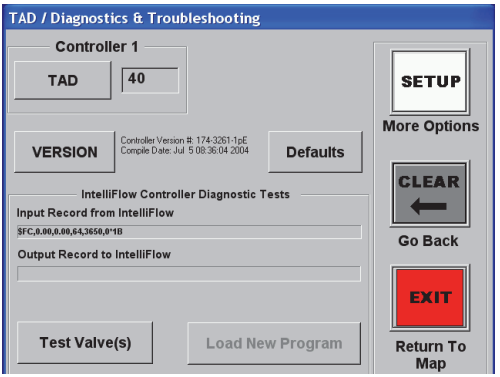


3. Press **Set Controller Parameters**. The Flow Controller Parameters screen appears.



4. Use the buttons in the Controller 1 area to make the desired changes:
   - Press **Auto Boom** to toggle automatic boom shutoff between YES (on) and NO (off).
   - Press **Meter Calibration** to change the Z Factor value (start with the Z Factor value shown on the meter). This has the same effect as changing the meter calibration via the Flow Controller Parameters windows (see step 6).
   - Press **Target Rate** to change the target rate.
   - Press **Volume 1** to change the volume.
   - Press **Reset Volume 1** to reset the volume to zero.

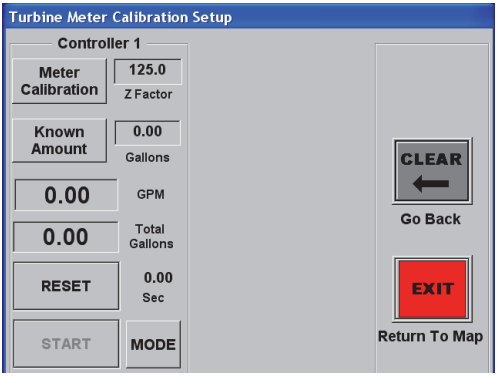
   To view additional setup options press **SETUP**. The TAD / Diagnostics & Troubleshooting screen appears.



5. Use the buttons on the TAD screen to make the desired changes:
   - Press **TAD** to change the input/output of the flow controller within a range of 20 (minimum) and 80 (maximum). Generally, you do not need to change this value.

- Press **Version** to install a new version of IntelliFlow (controller software).
- Press **Defaults** to restore factory settings for IntelliFlow.
- Press **Test Valve(s)** to initiate the valve test procedure.

To view additional setup options press **SETUP**. The Turbine Meter Calibration Setup screen appears.



6. Use the buttons in the Controller 1 area to make the desired changes:
   - Press **Meter Calibration** to change the Z Factor value (start with the Z Factor value shown on the meter). This has the same effect as changing the meter calibration via the Flow Controller Parameters windows (see step 4).
   - Press **Known Amount** to enter the known amount liquid in the hopper.
   - Press **RESET** to reset the calibration time to zero.
   - Press **MODE** to stop the calibration process. When you press MODE the button turns gray (unavailable) and the START button becomes available. You can then press **START** to begin the calibration process.
7. Press **EXIT** to return to the Map screen.

Chapter 4: Pattern Guidance

Open and Closed Patterns
Flying Patterns
Available Pattern Types Overview
Flying the Available Pattern Types
Understanding Marks (Return Points)
Managing Data and Log Files

This chapter covers patterns—the pattern types and how you set them and fly them. It also covers data and log files—how you view, delete and transfer them.

Open and Closed Patterns

There are two basic classifications of patterns in AirTrac:

- Open patterns - In an open pattern, you can fly an unlimited, or "open" number of swaths because the pattern is not dependent on the size of the field.
- Closed patterns - In a closed pattern, the number of swaths you can fly is limited, or "closed". The number of swaths you can fly is limited because in closed patterns you define the width of the field.

Both open and closed patterns need an initial guideline on which to base the pattern's GPS coordinates. In AirTrac, this initial guideline is called the A-B line. Closed patterns need an additional defining point—C.

After entering the number of points required for a pattern—two or three—AirTrac places an array of swath guidelines on the screen with the A-B line in red.

Understanding the A-B Line - Open Patterns

In an open pattern, point A of the A-B line is the beginning of the line; point B is the end of the line. All swaths you fly will be parallel to this initial A-B line.

Note: The A-B line may be inside or outside the field. Points A and B should be as far apart as possible to ensure the accuracy of the line. Establishing A and B points too close together may result in a small error that will create a large divergence over a long distance.

Understanding the A-B Line - Closed Patterns

In a closed pattern, you also set points A and B to define your A-B line. However, in a closed pattern, you define the width of your field by setting a third point - the "C" point.

AirTrac automatically prompts you to set your A, B, and when applicable, C points according to the pattern you select.

Note: You can have AirTrac automatically place an A-B line for you. If you load a JOB that has a polygon or polygons saved with it, when you press ENTER > POLY > PATTERN, AirTrac places an A-B line on the optimal side of the active polygon. You can move the A-B line to other sides as required. For a full description of this figure, see "Rotating the A-B Line Around a Polygon" on page 69.

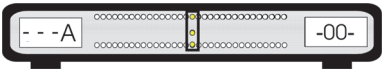
Flying Patterns

After you set your job options (see Chapter 3, “Work Options”), you are ready to begin flying with AirTrac. The following example uses a back-to-back (BK-BK) pattern.

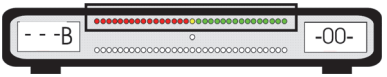
Note: The following example uses factory default settings. If you change the default setup you may see different data in your lightbar.

Flying a Basic Pattern

1. Begin flying. Your lightbar prompts you to set point A of the A-B line (notice “- - -A” in the left LED display).

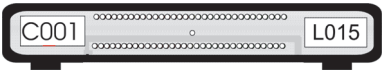


2. Fly to the beginning of your A-B line and press the remote swath advance button to set your A point. The lightbar prompts you to set your B point by flashing the upper row of LEDs.



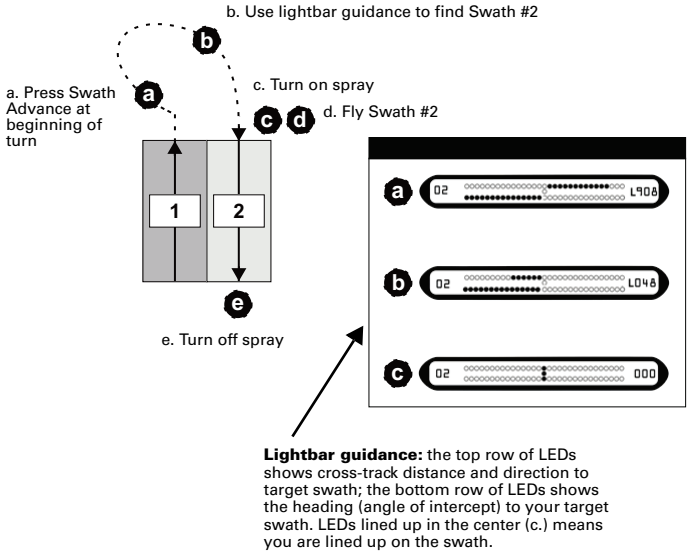
3. Turn on your spray as you enter the field.
4. Press the remote swath advance to set your B point.

   If you are flying a closed pattern, the lightbar next prompts you to set your C point. “C” appears in the left display followed by your current swath number. Press the remote swath advance button to set your C point.



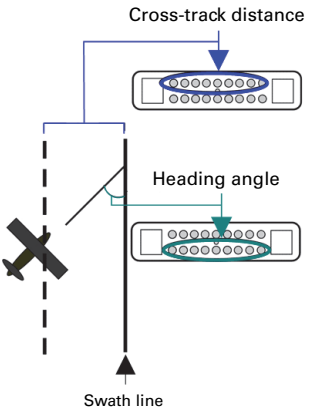
5. Turn off the spray as you leave the field.
6. Press the remote swath advance button to advance to Swath #2.

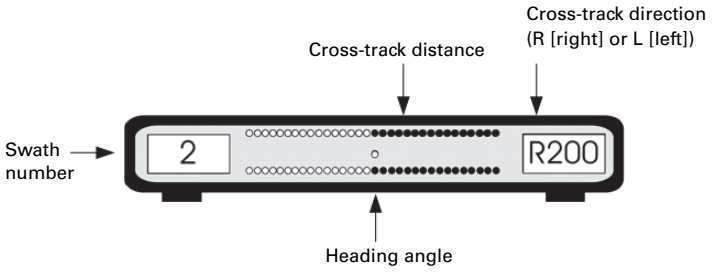
7. Make the turn onto your next swath using the lightbar for guidance.



8. Turn the spray on as you enter the field.
9. Fly Swath #2 using lightbar guidance. The top row of LEDs show you the distance and direction (right or left) you need to fly to get to the target swath line. The default right display tells you the exact cross-track distance.

   The bottom row of LEDs tells you the heading angle needed to intercept the target swath line. The default left display tells you the current swath number.

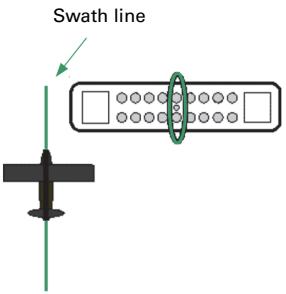




Each LED represents a certain distance. For example:

- For cross-track distance (top row of LEDs), the more you are off-track, the more LEDs are lit. When you are closer to your target, fewer LEDs are lit.
- For heading angle, the farther off-center the lit LED is, the farther you are off from the required heading angle needed to intercept the target swath.

When the center vertical row of lightbar LEDs is lit, you are on the target swath.



10. Continue to fly the rest of your swaths using lightbar guidance.

Common Pattern Flying Tasks

Table 4-1 provides information on common pattern flying tasks.

Table 4-1: Common pattern flying tasks

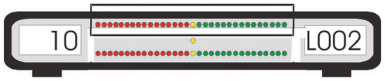
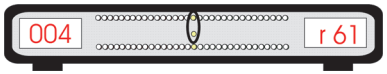
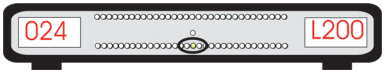
Task	How To (from the Main menu)
Changing direction	To change direction at any time while flying a pattern, from flying to the right of the A-B line to flying to the left of it (or vice versa): • Press **LEFT RIGHT\3** AirTrac transfers the swath guidance grid to the other side of the A-B line.
Advancing/ decrementing swaths	To change your remote swath advance button to a swath decrement button: • Press **SET > DEC** To change it back to swath advance: • Press **SET > ABC**
Resetting the current pattern	To reset the current pattern: • On the keypad press **CLEAR > PATTERN\1 > ENTER** "Waiting A" appears on the lightbar. Your current spray data remains visible in the map window.
Recalling a saved pattern	To recall a saved pattern: • Press **SET > PATTERN\1 n > ENTER**
Clearing the aircraft swath mark display	To clear the aircraft swath mark display in the map window: • Press **CLEAR > SWATH\2**

Troubleshooting

When flying a pattern, you may get a lightbar warning. Warnings include spraying a previously sprayed swath (double-spray warning), invalid or poor DGPS reception, or distance/time to polygons or waypoints.

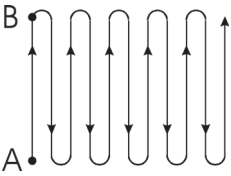
When AirTrac generates a warning your active guidance display disappears from the lightbar. In its place you see flashing LEDs and/or additional error information in the left and right display screen.

Table 4-2: Troubleshooting lightbar warnings

Lightbar Display	Warning Message
	Swath Double Spray Upper LED row flashes when spray on is detected on a previously sprayed swath. This will flash until the swath number is changed. By default this is turned on. You can turn this feature off in the *Double Spray Warning* field (press SETUP > SETUP > LIGHT BAR).
	Extrapolated GPS Center yellow LEDs blink. Reboot system and check for receiver and power status lights. Refer to your receiver owner's manual for more information on status indicators.
	Poor DOP (Dilution of Precision) Lower center yellow LED flashes. Check status lights on receiver. Reboot and wait up to 5 minutes for a better solution. Increasing or decreasing your mask angle may also improve DOP. To change your mask angle, see your receiver owner's manual.

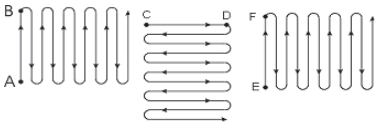
Available Pattern Types Overview

AirTrac supports nine pattern types (both open and closed), providing the flexibility to fly any field shape. This section describes these patterns and how you fly them. Although AirTrac includes nine pattern types, you can store as many as a hundred flown patterns—flown jobs—in a JOB.



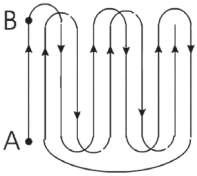
Back-to-Back (BK-BK)

Fly consecutive swaths parallel to the A-B line.



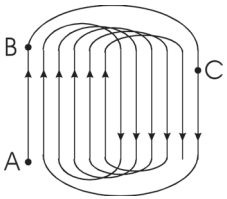
Multi Back-to-Back (MB2BK)

Fly multiple Back-to-Back patterns. Tell AirTrac the number of fields you want to fly (up to 9) and whether you want to full rotate (123, 123) or half rotate (123, 321). AirTrac automatically rotates your A-B line for each field and provides guidance accordingly.



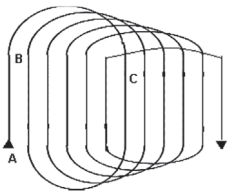
Back-to-Back Skip (BKBKS)

Fly the odd-numbered swaths first, then the even numbered swaths.



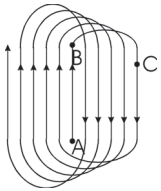
Racetrack (RCTRK)

Fly each side of a field, then alternately work from Swath #2 to the middle, and from the middle toward the other end of the field. This pattern is useful for flying wide, smooth turns.



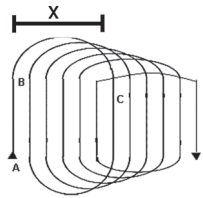
Quick Racetrack (QKRTK)

Fly a pattern similar to the Racetrack, but set your C point in the middle of the field.



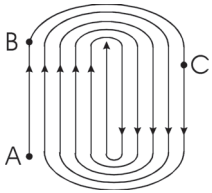
Reverse Racetrack (RVTRK)

Fly a pattern similar to the Racetrack. This is called the 'Reverse' Racetrack because you are flying in one direction, but swaths are incrementing in the opposite direction. In this pattern, you set your A-B line in the center of the field. This pattern is useful for flying circular fields or other fields where the center line is clearly visible.



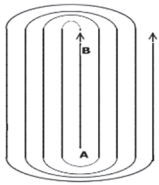
QuickTrack X (QuickTrac X)

Fly a pattern similar to the Quick Racetrack. You specify the 'C' point for Quicktrack X patterns by the number of swaths or the distance from A-B to the furthermost swath in the pattern. After you have set the A and B points, fly the pattern like a Quick Racetrack: the second swath is in the middle of the field, the third is swath #2, and so on.



Squeeze (SQUEZ)

Fly loops of decreasing size, from the outside of the field to the middle of the field. This pattern allows you to make wide turns at the beginning of a job when carrying a heavy load, and narrower turns as your load becomes lighter.



Expand (EXPND)

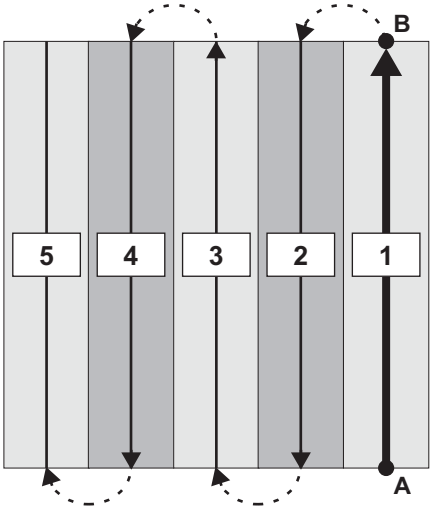
Fly successive swaths outward from the center of the field. This pattern is useful for fields with a visible center line or a long, irregular shape.

Flying the Available Pattern Types

This section reiterates the main points about each pattern and describes how to fly the patterns.

Back-to-Back Patterns (BK-BK)

Fly consecutive swaths parallel to the A-B line



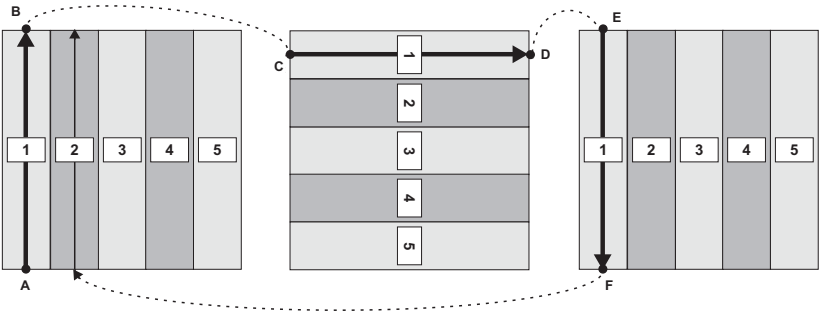
1. Set your A-B line.
2. Fly swaths consecutively: 1, 2, 3, and so on.

Multi Back-to-Back Patterns (MB2BK)

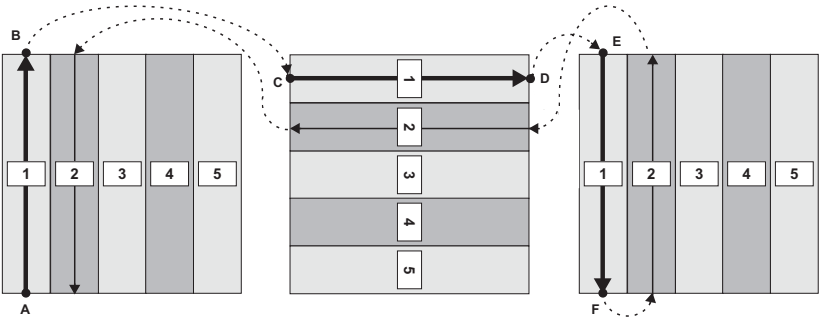
Fly back-to-back patterns over a maximum of nine fields. Multi back-to-back patterns can be full rotate or half rotate patterns.

Note: In the two pattern examples below, the bold and the italic text highlights the difference in the swath order between full rotate and half rotate patterns. Regular text indicates swaths are flown in the same order in both patterns.

Back-to-back full rotate pattern: Field 1-Swath 1, Field 2-Swath 1, Field 3-Swath 1; **Field 1-Swath 2**, Field 2-Swath 2, *Field 3-Swath 2*



Back-to-back half rotate pattern: Field 1-Swath 1, Field 2-Swath 1, Field 3-Swath 1; *Field 3-Swath 2*, Field 2-Swath 2, **Field 1-Swath 2**.



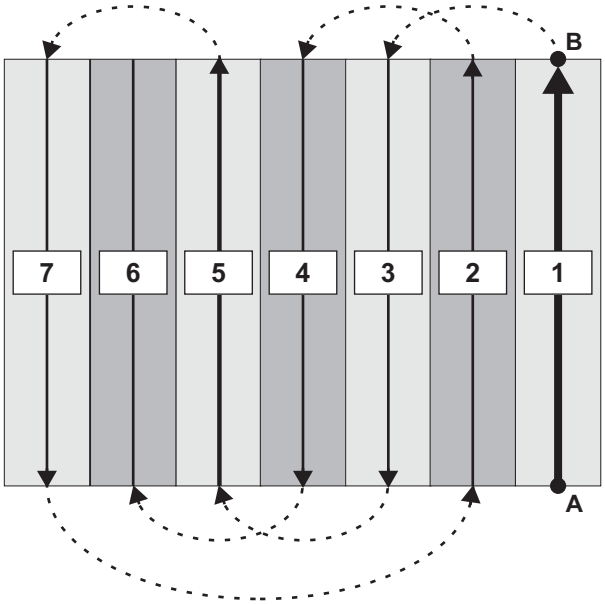
AirTrac automatically rotates your A-B line for each field and provides guidance accordingly.

To fly a multi back-to-back pattern:

1. Enter the number of fields you wish to fly at the menu prompt.
2. Select either full rotate or half rotate.
   - Full rotate means you fly the first swath of each field and then fly the second swath of each field starting again at field 1 (such as 123, 123).
   - Half rotate means you fly the first swath of each field, and then fly the second swath of each field in the opposite direction beginning with field 3 (such as 123, 321).
3. Set your A-B line for each consecutive field.
4. Follow the guidance prompts to complete flying your pattern.

Back-to-Back Skip Patterns (BKBKS)

Fly the odd-numbered swaths first, then the even numbered swaths in a back-to-back pattern.

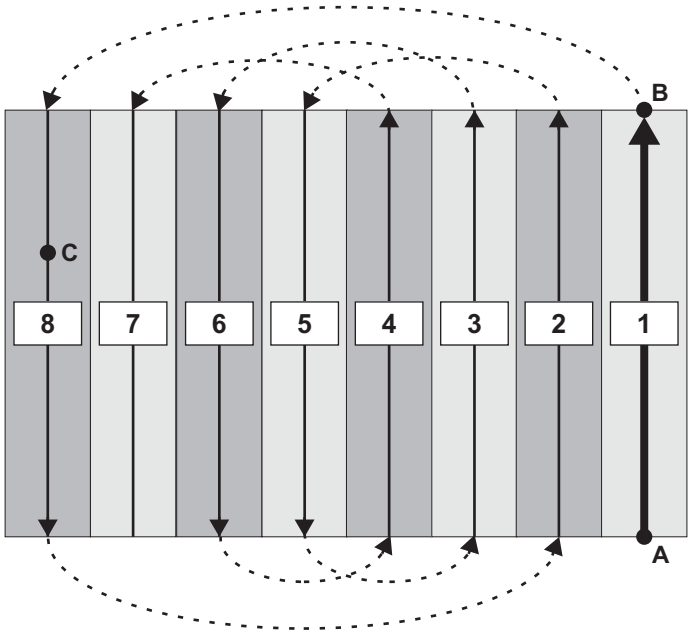


To fly a back-to-back skip pattern:

1. Set your A-B line.
2. Fly your odd numbered swaths first.
3. To switch from odd to even numbered swaths, press ENTER.
4. Fly your even numbered swaths.

Racetrack Patterns (RCTRK)

Fly a series of loops, or 'racetracks.' This results in wider, smoother turns. In a Racetrack pattern, you first fly each side of a field, then alternately work from Swath #2 to the middle, and from the middle toward the other end of the field.



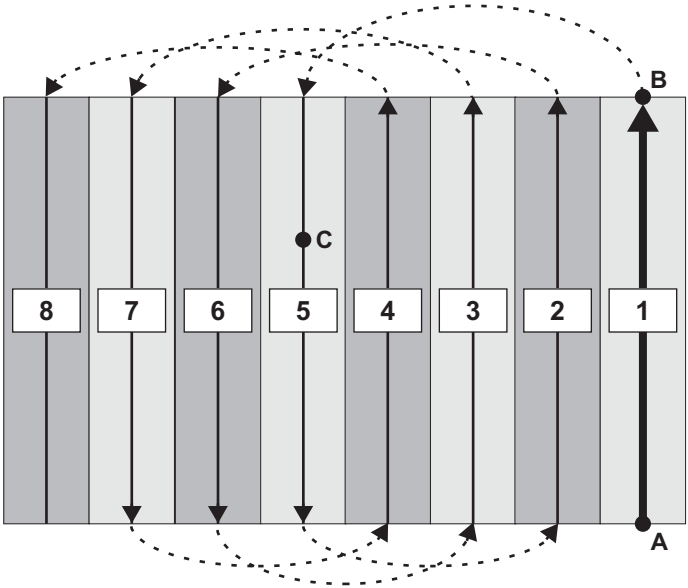
To fly a racetrack pattern:

1. Set your A-B line.
2. Fly swaths in the following order: 1, 8, 2, 5, 3, 6, 4, 7.

Quick Racetrack Patterns (QKRTK)

These are similar to the racetrack pattern; however, in a quick racetrack pattern you set your C point in the center of the field, not at the end. This is called a 'quick' racetrack because you do not have to fly to the end of the field to press the C point.

In the quick racetrack pattern you fly a constant size loop after setting the A, B, and C points. Point C is the swath on or after the field center line.



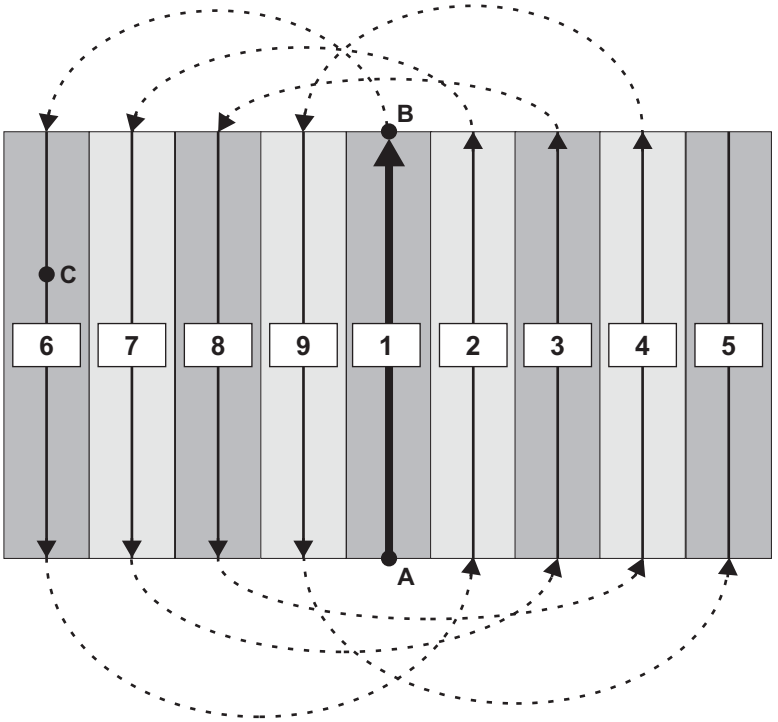
To fly a quick racetrack pattern:

1. Set your A, B, and C points.
2. Fly swaths in the following sequence: 1, 5, 2, 6, 3, 7, 4, 8.

Reverse Racetrack Patterns (RVTRK)

These are also similar to the racetrack pattern. They are called a ‘reverse’ racetrack because you are flying one direction, but swaths are incrementing in the opposite direction. In this example, we are flying to the left, but the swaths are incrementing to the right.

Unlike the racetrack pattern, in reverse racetrack, you set your A-B line in the middle of the field. Point C is still on the edge of the field. This pattern is recommended for circular fields or other fields where the center line is clearly visible.



To fly a reverse racetrack pattern:

1. Set your A-B line.
2. For a 9-swath *right reverse racetrack* pattern, spray the swaths in the following sequence: 1, 6, 2, 7, 3, 8, 4, 9, 5.

QuickTrack X Patterns (QuickTrac X)

These are similar to the quick racetrack pattern. You specify point C for the QuickTrac X pattern by either the number of swaths or by the distance from the A-B line to the furthermost swath in the pattern. After the A-B points are set, you fly the pattern like a quick racetrack.

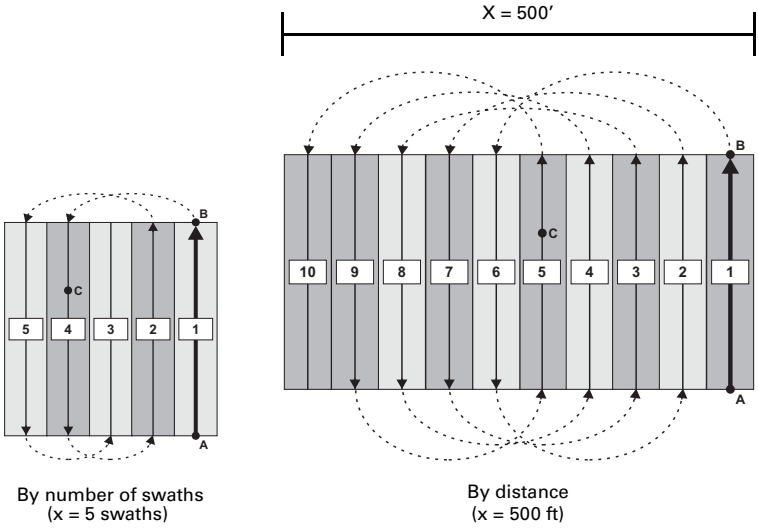


Figure 4-1: QuickTrac X patterns

To fly a QuickTrac X pattern:

1. Enter a value and select either Distance or Total Swaths at the prompt.
2. Set your A, B, and C points.
3. Fly the rest of the pattern according to guidance cues:
    - If x = total swaths: For example, if x = 5 (total swaths), fly the swaths in the following order: 1, 4, 2, 5, 3

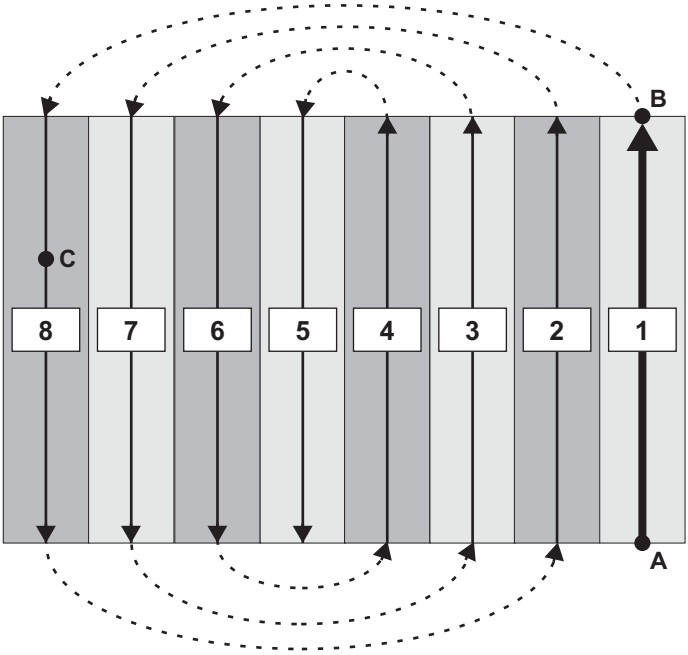
      Note: To repeat the QuickTrac X pattern after flying the initial defined number of swaths, press the ABC button. The pattern repeats on swaths 6-10 (so 6, 9, 7, 10, 8), then 11-15 and so on.

    - If x = distance: For example, if x = 500’ (Swath Width set at 50’), fly the swaths in the following order: 1, 6, 2, 7, 3, 8, 4, 9, 5, 10

Squeeze Patterns (SQUEZ)

These consist of loops of decreasing size, from the outside of the field to the middle of the field. In a squeeze pattern, you define the outside edges of your field (the largest loop) by your A, B, C points.

In the squeeze pattern, you to make wide turns at the beginning of your spray job when your load is heavy then make narrower turns as your load becomes lighter.

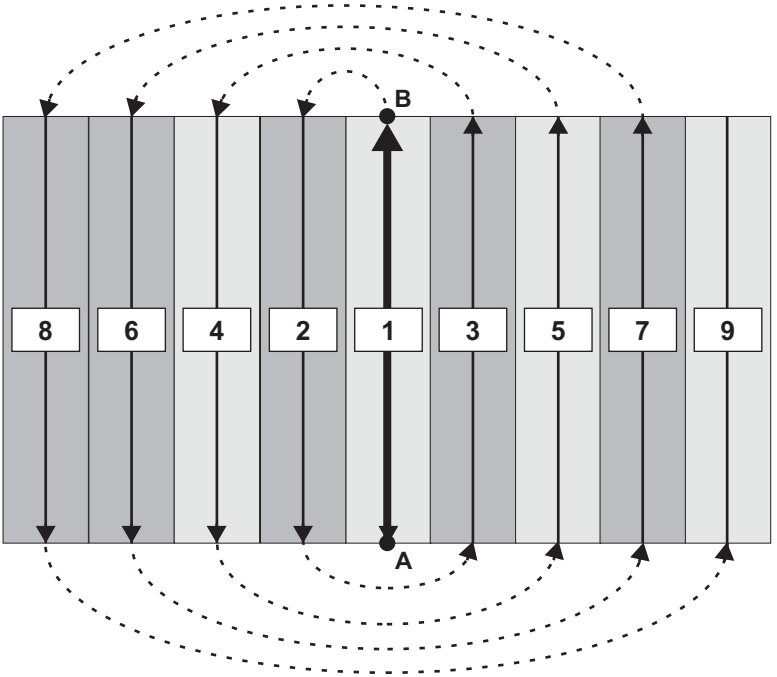


To fly a squeeze pattern:

1. Set your A-B line.
2. For an 8-swath field, spray the swaths in the following sequence:
   1, 8, 2, 7, 3, 6, 4, 5

Expand Patterns (EXPND)

These begin with the A-B line in the center of the field. Successive swaths increase outward. Expand patterns are useful for fields with a visible center line or with a long, irregular shape.



To fly an expand pattern:

1. Set your A-B line.
2. For a 9-swath *Expand Left* pattern, spray the swaths in the following sequence:

   1, 2, 3, 4, 5, 6, 7, 8, 9

Understanding Marks (Return Points)

Marks are points to which you want to return. When you create a mark, AirTrac saves the following current swathing information:

Swath number	Pattern
A-B line	Direction
JOB ID	Acreage
Swath width	Spray information

Creating/Numbering Marks

You create a mark in two ways: one for marks 1 to 9, one for marks 10 to 99.

To create marks numbered 1-9:

- Press the MARK quick key in the Map screen and enter a mark number in the number pad. Already used numbers are indicated, but you can reuse them to reposition a mark (to overwrite its position to the new position).

To create marks numbered 10-99:

- From the Main menu press **SAVE > MARK\4 nn > ENTER**

The mark number appears in the Map screen, for example Mark #1 appears as "**M1**".

Note: AirTrac automatically saves your last sprayed point (last spray off point) as mark zero (M0), but it is overwritten each time the spray is turned off. If you want to keep a spray off point marked, manually give it a mark number (n) immediately after turning spray off. You will get M0 and Mn (almost) together and Mn will stay while M0 will become the next spray off point. To return to the last sprayed mark, press RETURN\7 > INFO\0. The lightbar provides guidance back to the mark.

Returning to a Mark

You return to a mark in two ways:, one for marks numbered 1-9, one for marks numbered 10-99.

To return to marks numbered 1-9:

- From the Main menu press **RETURN\7 n**. (In this case RETURN\7 is doubling as the return key and the mark key).

To return to marks numbered 10-99:

- From the Main menu press **SET > MARK\4 nn > ENTER**.

While returning to a mark, the lightbar displays heading and distance to the mark. Press ENTER to cancel the guidance. If you select the wrong mark to return to, you do not have to cancel guidance to that mark—just use either return method above for guidance to a different mark.

Clearing a Mark

To clear a mark permanently from AirTrac's memory:

- From the Main menu press **CLEAR > MARK\4 n > ENTER**.

Managing Data and Log Files

AirTrac enables you to transfer such data types as logs, jobs, marks (marks.dat files), waypoints (wypts.dat files) and pilot settings (airtrac.ini files), between an external storage device (USB flash drive) and the Bantam hard drive. You can also transfer any data stored on the flash drive to a PC, where you can then view data in MapStar. You can also transfer MapStar data back to AirTrac using the flash drive.

Note: If you select the Bantam hard drive as the logging read/write device (see "Starting AirTrac" on page 4) you must transfer data from the hard drive to the USB flash drive before transferring it to your PC.

About Log Data Files and Job Data Files

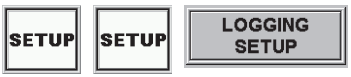
Log files and JOB files are independent of each other. A JOB file contains polygons and patterns. A log file contains the spray information that comes from spraying a pattern and any additional optional information that you entered, such as the pilot's name or aircraft ID. Although the JOB file is used as a boundary to spray in, the log file that is created from spraying is not linked to that file. This means opening one does not open the other.

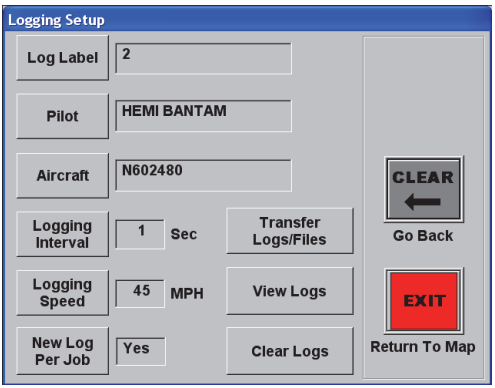
You can open any job at any time, and you can view any log at any time. If you want to view a log file and a job file, for example to make sure that you have sprayed the full field, you need to ensure that the log file is from the field that the job file represents.

Viewing Log Data

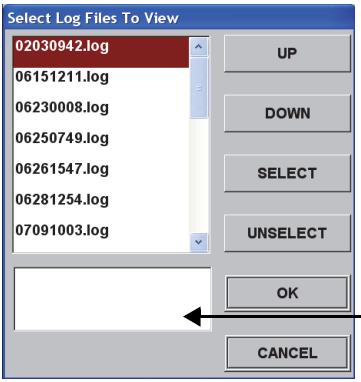
Viewing log data enables you to see a physical representation of where you sprayed, how much you sprayed, and if you missed anything.

1. From the Main menu press **SETUP > SETUP > LOGGING SETUP**. The Logging Setup screen appears.





2. Press **View Logs**. The Select Log Files to View window appears.



3. Use the **UP** and **DOWN** buttons to highlight a log to view then press **SELECT** (selected files move to the lower box in the window). Repeat the select process for other files you want to view. Press **OK** to return to the map window.

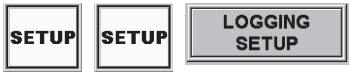
4. After selecting the files you want to view, press OK to return to the map window. The log with the lowest number is displayed on the screen. Use the **CENTER** button in the Zoom window to cycle through the selected logs.

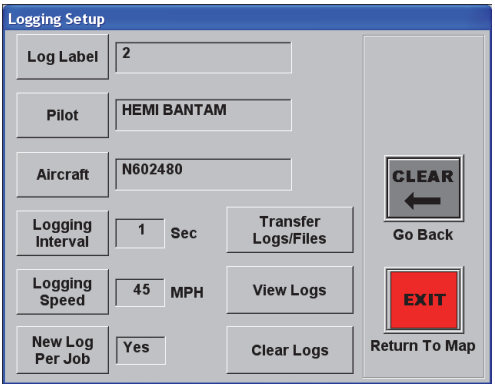
Clearing Log Data

AirTrac can store up to 1,000 hours of log time—depending on the storage capacity of your USB flash drive—before you need to clear storage space by deleting some or all of your log files. You can delete all logs or specific logs.

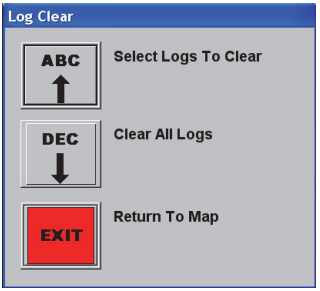
⚠WARNING: Deleting (clearing) logs permanently erases them from AirTrac's memory.

1. From the Main menu press **SETUP > SETUP > LOGGING SETUP**. The Logging Setup screen appears.





2. Select **Clear Logs**. The Log Clear window appears.

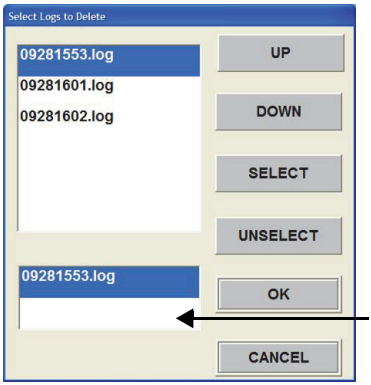


3. To clear all logs:
   a. Press **DEC** (Clear All Logs). The confirmation screen appears.
   b. Press **YES** to confirm the deletion (NO to cancel it).

(to clear selected logs, see top of next page)

To clear selected logs:

a. Press **ABC** (Select Logs to Clear). The Select Logs to Delete window appears.



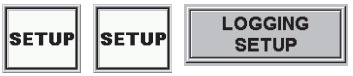
b. Use the **UP** and **DOWN** buttons to highlight a log to delete then press **SELECT** (selected files move to the lower box in the window). Repeat the select process for other files you want to delete.

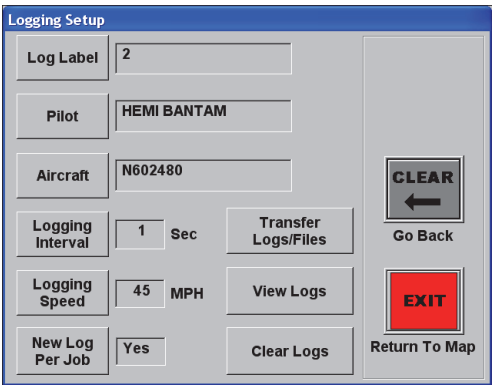
c. Press **OK** to delete the selected logs and return to the map window.

Transferring Data Files

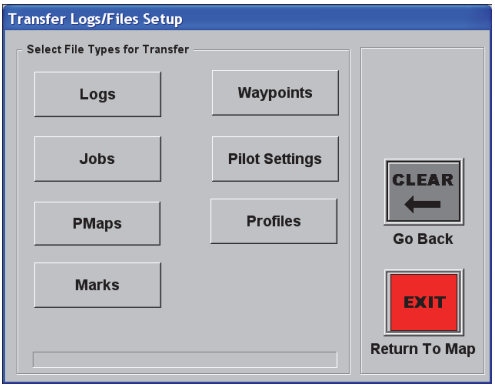
You can transfer data files—for example, logs, jobs, marks, waypoints, pilot settings—between your USB flash drive and the Bantam hard drive.

1. From the Main menu press **SETUP > SETUP > LOGGING SETUP**. The Logging Setup screen appears.

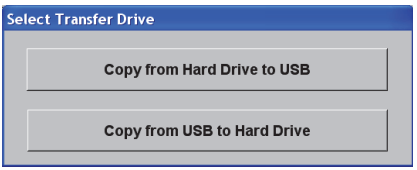




2. Select **Transfer Logs/Files**. The Transfer Logs/Files screen appears.

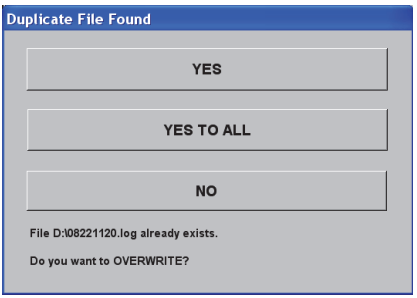


3. Select the file type you want to transfer. A message appears with two options: transfer from the hard drive to a USB flash drive or transfer from a flash drive to the hard drive.



Note: You can also transfer log files from the Bantam hard drive to a USB flash drive from the Logging screen (KEYPAD > LOG). See "Transferring Only Log Files" on page 54.

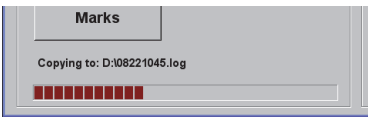
4. Select the desired transfer option. AirTrac checks for duplicate files on the destination drive, and if found, the Duplicate File Found screen appears asking if you want to overwrite the duplicates.



If the Duplicate File Found screen appears select one of the following:

- **YES** (overwrite the duplicate file)
- **YES TO ALL** (overwrite all duplicate files)
- **NO** (do not overwrite the file)

After you select the desired transfer option (and, if necessary, choose to overwrite a duplicate file) you are returned to the Transfer Logs/Files Setup screen, which displays the file transfer status (*Copying to*) at the bottom of the screen.



Transferring Only Log Files

AirTrac enables you to quickly transfer log files directly from the Bantam hard drive to a USB flash drive without you having to first navigate to the Transfer Logs/Files Setup screen and selecting Logs (as described in “Transferring Data Files” on page 52).

Note: This procedure is only relevant if you are logging to the Bantam hard drive. If you selected a USB flash drive as your logging read/write device at startup (see “Starting AirTrac” on page 4) this procedure does not apply because logs will have already been written to your flash drive. You can, instead, proceed with “Transferring Logs to a PC” on page 54.

1. From the Main menu press **LOG**. The Logging screen appears.

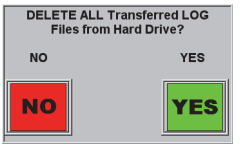
2. Press **Transfer Logs**. AirTrac copies the files from the Bantam hard drive to the flash drive.

   When copying is complete, AirTrac asks if you want to delete the transferred files from the hard drive.

3. Press **NO** to keep the files on the Bantam hard drive.

   or

   Press **YES** to delete the files from the Bantam hard drive.



Transferring Logs to a PC

On startup, if you selected the Bantam hard drive as the logging read/write device, you will need to transfer the data from the hard drive to the USB flash drive before you can transfer it to your PC. See step 1 below.

1. If necessary, transfer the logs to your USB flash drive (see “Transferring Data Files” on page 52 or “Transferring Only Log Files” on page 54.)
2. Remove the USB drive from the Bantam controller.
3. Insert the flash drive into a USB port on your PC.
4. Open MapStar to view the log data.

Chapter 5: Advanced Navigation

Understanding Waypoints and Routes
Saving and Recalling JOBs
Understanding Polygons
Understanding Patterns

Advanced navigation features enable you to easily manage multiple jobs and pilots. Using AirTrac with MapStar, you can plan and program an entire spray job from start to finish. Advanced navigation features in AirTrac include waypoints and routes, JOBs using saved polygons and patterns, missions, and GIS files.

- **Waypoints and routes** enable you to add waypoints and routes during flight or beforehand by manually entering coordinate values or using a mapping program. You can then navigate to the waypoints or along routes.
- **JOBs** enable you to save pattern information (type/direction, swath width, A and B points, offset, and field width) and multiple polygons.
- **Polygons** let you set the polygon points of any field or spray area and save them. Like waypoints, you can add them during flight or beforehand by manually entering coordinate values or using a mapping program.
- **Missions**, created in MapStar and moved to AirTrac, are a useful feature, especially for night flying. You can pre-establish the mission, including the flight path and A-B line, by flying the mission or by entering the coordinate values. The mission then provides guidance cues based on the pre-established path.
- AirTrac supports, through MapStar, the most popular **GIS file** formats for import and export. GIS files can include new polygons or other graphics. You can also convert an existing job to a GIS file format for use in a third-party software package.

Understanding Waypoints and Routes

A waypoint is the GPS coordinate (latitude and longitude) of a significant location. Examples of waypoints you might set are the beginning or end of your spray job, or a marker along a route at which you will stop or change course.

A route is made up of individual waypoints. Each waypoint is automatically assigned to a route in AirTrac - even if there is only one waypoint.

A radius value tells AirTrac to automatically provide guidance to the next waypoint when you are within the radius (for example, 1320.0 feet) of the current waypoint).

Managing Waypoints

You can number and name each waypoint you create and associate it with a particular route. You can set your waypoints while flying or by entering the coordinates into AirTrac. Tasks you may need to perform for waypoints include:

- Setting a waypoint while flying
- Setting a waypoint by entering GPS coordinates
- Recalling a waypoint
- Editing a waypoint
- Deleting a waypoint

Setting waypoints while flying

To set waypoints while flying:

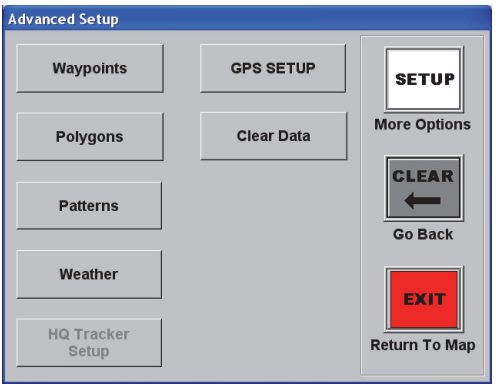
- Press **SAVE > WPT\5 n > ENTER**

  “Waypoint n saved.” appears briefly in the in map window.

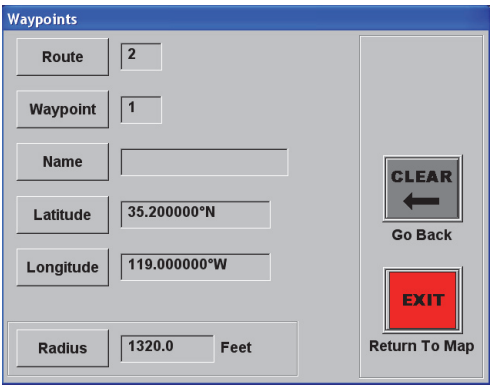
Setting waypoints by manually entering GPS coordinates

Instead of entering waypoints while flying, you can enter waypoint coordinates manually. You can assign the waypoints to a route at the same time.

1. From the Main menu press **SETUP > SETUP > SETUP** to display the Advanced Setup screen.



2. Press **Waypoints** to display the Waypoints screen.



3. Enter the route and waypoint numbers in their respective fields.
4. Enter the waypoint name (optional).
5. Enter the waypoint's latitude and longitude in their respective fields.

   Make sure your coordinates are in the proper coordinate format before entering. To change the coordinate format (see "You can display GPS coordinates in decimal degrees (default), decimal minutes, or decimal seconds." on page 16).
6. In the Radius field, enter the distance to the current waypoint you will reach before receiving guidance to the next one (for example, 1640.0 feet). See "Setting up Automatic Guidance" on page 59.

Recalling a Waypoint

When you recall a waypoint you are automatically provided with guidance to the waypoint.

To recall a waypoint:

- From the Main menu press **SET > WPT\5 n**

  "Guiding to Waypoint n." appears in the map window. The bearing and range show in the data window and the lightbar.

Note: You only receive navigation to a waypoint during a non-swathing mode—there is no guidance to a waypoint if you are flying a pattern.

Editing a Waypoint

To edit a waypoint:

1. From the Main menu press **SETUP > SETUP > SETUP > Waypoints** to display the Waypoints screen.
2. Enter the required waypoint number in the Waypoint field. The current waypoint information populates the remaining fields.
3. Edit the desired fields (Name, Latitude, Longitude).

Deleting a Waypoint

Deleting a waypoint removes it from AirTrac's memory.

To delete a waypoint:

- From the Main menu press **CLEAR > WPT\5 n > ENTER**

Managing Routes

A route is made up of a single waypoint or a series of waypoints. A waypoint or waypoints are always associated with a route, that is, you cannot create a waypoint without creating a route—even if the route is to have only a single waypoint.

To set waypoints for a route other than Route 1, create Route n in the Waypoints screen (SETUP > SETUP > SETUP > Waypoints). You can then enter the waypoint data (number, coordinates) or you can return to the Map screen, note that your route number is showing in the Data area, and set the route's waypoints while flying.

Note: If setting a single waypoint, use Route 1. If defining multiple routes, associate each waypoint with the appropriate route.

Assigning a Waypoint to a Route

A waypoint is automatically assigned to the current route when you set a waypoint while flying. The current route is shown in the upper left corner of the data window.

Recalling a Route

When you recall a route all the waypoints on the route are also recalled.

To recall a route:

- From the Main menu press **SET > ROUTE\8 n > ENTER**

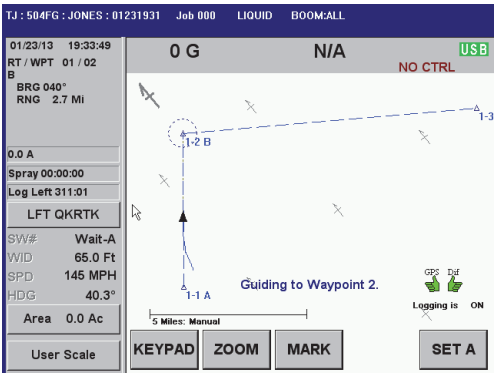
  where **n** is the route number

To change your currently selected route, press ROUTE\8. Each press cycles through the routes you have defined—the route number shows in the Data area of the Map screen. When you change routes in this manner, AirTrac automatically provides guidance to waypoint 01 for that route.

For example, if you select Route 02 (SET > ROUTE\8 2 > ENTER) you will see ROUTE 02 in the Data area. If you press ROUTE\8 again, you will see RT / WPT 02 /01 in the Data area and you will be under guidance to waypoint 1 in route 2. Once you get around waypoint 01, you are automatically guided to waypoint 02. To change the waypoint you want guidance to, use SET > WPT\5 n > ENTER.

Setting up Automatic Guidance

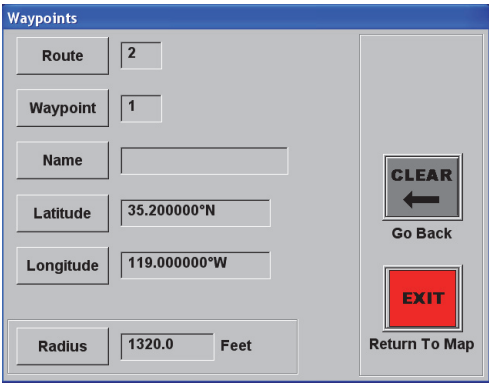
You can set automatic guidance along a route by setting a radius value. When you are within the designated radius (distance) from the target waypoint, AirTrac displays guidance to the next waypoint in your route.



The radius you specify shows as a dotted circle around the waypoint you are receiving guidance to. When you arrive at the radius the message “Advancing to next waypoint in Route” appears briefly in the Moving Map area. The bearing and range update in the Data area and on the lightbar.

To set up automatic guidance:

1. From the Main menu press **SETUP > SETUP > SETUP > Waypoints**.
2. On the Waypoints screen, in the Radius field enter the distance from the current waypoint you want to be before AirTrac switches to guidance to the next waypoint.



Saving and Recalling JOBs

You can save JOBs and recall them for reuse. JOBs can comprise patterns and polygons and the job functionality enables you save up to 99 patterns (type/direction, swath width, A and B points, offset, and field width) and up to 99 polygons per JOB.

By default, any JOB you fly in AirTrac is saved to "JOB 00," or the *active* JOB. JOB 00 will be overwritten by the next job you fly unless you save it to a new job number between 1 and 999 (shown as n-nnn).

To save a JOB:

- From the Main menu press **SAVE > JOB\9 n-nnn > ENTER**

To recall a JOB:

- From the Main menu press **SET > JOB\9 n-nnn > ENTER**

Understanding Polygons

A polygon is the shape of a field (or other area, such as a forest plot) that you define. Table 5-1 describes the types of polygons:

- Inclusion polygons (areas you do spray)
- Exclusion polygons (areas you do not spray)
- Open polygons

Inclusion and exclusion polygons visually show you the borders of your spray/no spray areas in the map window.

Table 5-1: Types of polygon

Polygon Type	Description
Inclusion	AirTrac saves any polygon with three or more points as an inclusion type polygon. Inclusion polygons define spray areas and are shown with a green border on the screen. AirTrac sums the areas of multiple inclusion polygons in a JOB and you can choose Total Polygon Area as an on-screen or lightbar display.
Exclusion	You convert an inclusion polygon to an exclusion polygon by changing the polygon's type (SETUP > SETUP > SETUP > Polygons). Exclusion polygons are shown on screen with a purple border. Exclusion polygon areas wholly or partially within an inclusion polygon subtract from the total polygon area (see "Calculating Total Polygon Area" on page 64).
Open	Open polygons are multi-point polylines. You create them in MapStar and then transfer them to AirTrac. Use them, for example, to mark roads or other similar ground features. Multi-point open polylines created in MapStar become open polygons in AirTrac.

Using Polygons

In addition to using polygons to define the shape of your spray/no spray area(s) you can have AirTrac automatically apply an A-B line to your polygons. See "Managing A-B Lines with Polygons" on page 68.

You can use your Distance/Time to Edge display options to warn you when you are approaching or leaving a polygon, so you know when to manually turn your spray on or off, respectively. If you are using automatic spray on/off (or off/on) functionality, AirTrac will turn spray on as you enter an inclusion polygon and turn it off when you leave it. If there is an exclusion polygon (or part of one) within the inclusion polygon, AirTrac will turn spraying off as you enter the exclusion polygon and back on as you leave it.

You can also set a warning based on time or distance to polygons. See “Setting the Lightbar Edge Warning” on page 76.

Setting Polygon Points

You can set a polygon’s points in three ways:

- As you fly
- By entering the polygon’s GPS coordinates manually
- By importing a shape (GIS) file from MapStar (or other third-party mapping software)

Setting Polygon Points as You Fly

When setting polygon points while flying, on entry of the third point AirTrac creates a triangle onscreen by joining the third point to the first point and displays the enclosed area. As you add points AirTrac joins the last point to the start point so gives you, progressively, a quadrilateral, a pentagon, a hexagon, a heptagon and so on depending on the number of points you set. The enclosed area is updated with each added point.

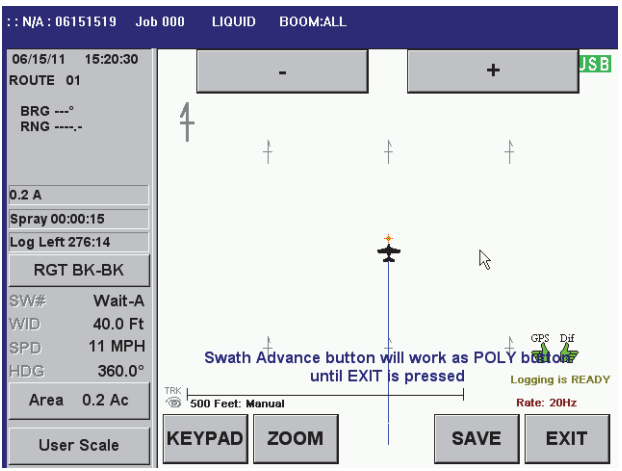
To set polygon points as you fly:

1. From the Main menu press **POLY\6** twice. The map screen displays the following message:

   Swath Advance button will work as POLY button until EXIT is pressed

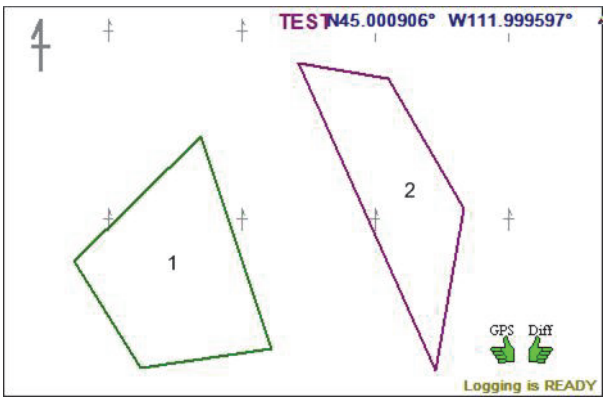
   The - (minus) and + (plus) buttons appear in the map window, along with a SAVE quick key and the EXIT button.



2. Enter polygon points as you fly. You can enter polygon points while flying by:
    - Using the remote swath advance button
    - Pressing the + button (the minus button removes the last polygon point you entered)
    - Pressing **KEYPAD > ABC** (which acts as the swath advance button during this operation)
3. On completion of the polygon, press **SAVE** then enter a polygon number using the number pad and press **ENTER** (To Accept) in the number pad screen.

4. To save the new polygon to a JOB (<No Job>* showing in the Header area), press **KEYPAD > SAVE > JOB n > ENTER**. (See "Saving and Recalling JOBs" on page 60).
5. (OPTIONAL) Press **SETUP > SETUP > SETUP > Polygons** to display the Polygons screen, where you can give your polygon a name (it defaults to the polygon's number), set the polygon type to EXCLUSION and adjust the lat/lon of any polygon point. Exclusion polygons' sides are purple on the map screen.

   If an exclusion polygon is wholly or partially inside an inclusion polygon, the area of the exclusion polygon inside the inclusion polygon is subtracted from the total polygon area. See "Calculating Total Polygon Area" on page 64.

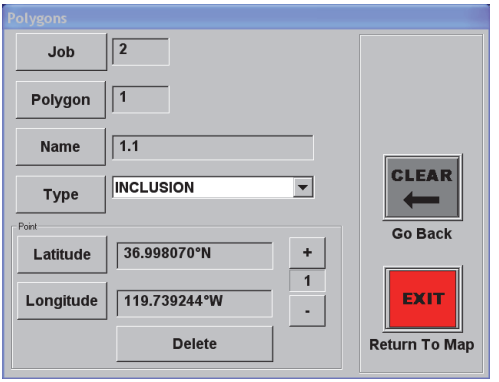


Tip! *To see the total cumulative area of your inclusion polygons, set your left or right large format display, or one of your field (fields 1-3) displays, to* ***Total Polygon Area*** *through SETUP > SETUP > SCREEN > DISPLAYS. The total polygon area is the sum of the inclusion polygon areas less the area of any exclusion polygons wholly or partially inside an inclusion polygon (see "Calculating Total Polygon Area" on page 64).*

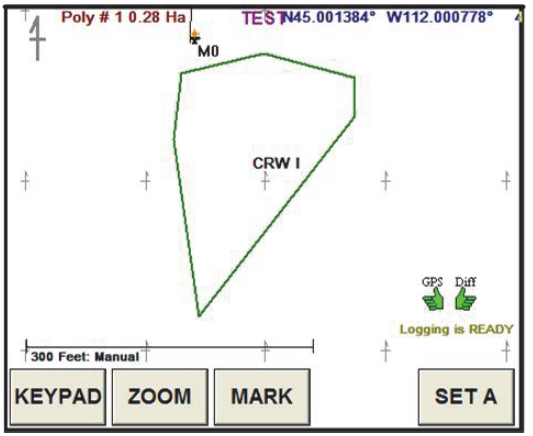
Entering GPS Coordinates Manually

To manually enter the GPS coordinates of the polygon:

1. From the Main menu press **SETUP > SETUP > SETUP > Polygons** to display the Polygons screen



2. Select the job and polygon number as required. The default job is the currently active JOB (the JOB loaded on the map screen). The default polygon number is 1.
3. Give the polygon a name as required. The name ("CRW I" in the example) replaces the polygon's number within the polygon in the map screen. The information *Poly # n [Area]* at the top left of the Moving Map area retains the polygon's number (Poly # 1 below).



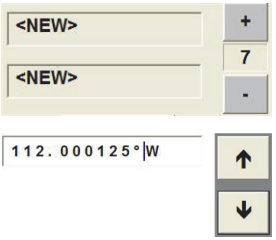
4. Set the polygon type to INCLUSION, EXCLUSION, or OPEN.
   - Inclusion - the area of the polygon is included in the total polygon area calculation.
   - Exclusion - the area of the polygon is excluded from the total polygon area calculation.

(See “Calculating Total Polygon Area” on page 64 for more information on the effect of exclusion polygons on the total polygon area calculation.)

- Open - this is an open-ended polygon. You can use an open polygon as a drawing tool to show objects such as roads (see “Open” on page 60 for more information).

5. Set the latitude and longitude for each polygon point using the numeric keypad. Use the + button to create a new point (the field will show <NEW> initially). Thereafter, the + and - buttons cycle through the polygon points in ascending and descending order, respectively.

   The up and down arrows in the numeric keypad toggle between N and S for latitudes, E and W for longitude when the cursor is to the left of the N, S, E or W value.



Importing Coordinates from a GIS File

To import a shape (GIS) file (including using MapStar):

1. Remove the USB flash drive from the Bantam.
2. Insert the flash drive into the personal computer (PC) that the shape or GIS file resides on. If using MapStar, go to step 4.
3. Save the shape (GIS) file to the flash drive. Make sure you save the shape file with a “**n.job**” extension (where n = Job number). Continue from step 5.
4. Open MapStar, then
   a. Press the **GIS** button.
   b. Open the shape file.
   c. Select **File > Save As** and save the file to the flash drive.

   When using MapStar, the file is automatically saved with the .job extension.
5. Remove the flash drive from the PC.
6. Insert the flash drive into AirTrac. Your job file is now ready to open in AirTrac.
7. Press **SET > JOB\9 n > ENTER** to open the JOB file. AirTrac opens the plot containing the shape file.

Tip! *If using MapStar, you can edit the GIS shape file to reduce the number of polygon points in a polygon (remember, a polygon can only have up to 250 points), or to break a shape file into separate jobs. For example if contracting multiple pilots, you may want to break a region into quadrants. See your MapStar manual for help with editing shape files in MapStar.*

Calculating Total Polygon Area

The total polygon area is the sum of the areas of all the inclusion polygons in a JOB less the area of any part of an exclusion polygons within the inclusion polygon(s).

From the total area of the inclusion polygons, AirTrac subtracts the:

- Area of any external polygon wholly within an inclusion polygon
- Area of any part(s) of an exclusion polygon within an inclusion polygon (or polygons)

Figure 5-1 shows how AirTrac calculates the total polygon area. Polygons 1, 3, and 4 are inclusion polygons; polygon 2 is an exclusion polygon.

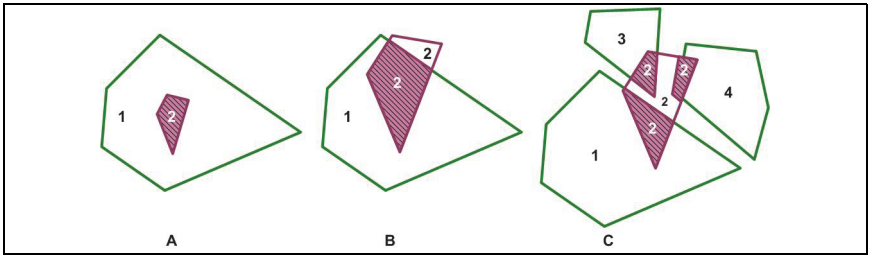


Figure 5-1: Total polygon area calculations

In A, the total polygon area is Area Polygon 1 minus Area Polygon 2.

In B, the total polygon area is Area Polygon 1 minus the shaded area of polygon 2.

In C, the total polygon area is the sum of Area Polygons 1, 3 and 4 minus the three shaded areas of polygon 2.

Note: Total Polygon Area is one of your many on-screen or lightbar display options.

Saving Polygons

While setting up your polygons while flying, there is a SAVE quick key on the screen. When you have set all your polygon points, use the SAVE quick key to save the polygon with the number you give it.

Polygons are normally components of a JOB (as are flown patterns) so if you are creating polygons to save with a JOB ensure you save the JOB as well as the polygons. You save the polygon first, using the SAVE quick key, then save the JOB using KEYPAD > SAVE > JOB n. The number you give a polygon shows on screen within its boundary (see Figure 5-1) when you first save the polygon's parent JOB. Once the JOB is saved, new polygons saved with that JOB display their number as they are saved.

You can create, save, and use polygons without making them components of a JOB (see following two sections).

Saving/using a Polygon without a JOB - Single Session

If you want to create and use a polygon but do not want to keep the polygon after you shut down follow this procedure.

1. From the Main menu press **CLEAR > JOB > ENTER** to clear all JOBs. <No Job>* is displayed in the Header area at the top of the Map screen.
2. Press **POLY\6** twice then use the swath advance buttons to define your polygon points. (See Step 1 of "Setting Polygon Points as You Fly" on page 61).

3. When you have finished defining your polygon, do not use the SAVE quick key. Instead, press **KEYPAD** > **SAVE** > **POLY** > **EXIT** (so do not enter a poly number). This allows you to keep the polygon on screen but without a number (think of it as a temporary save). AirTrac returns you to the map screen with the polygon still there and with the **SET A** button available. The polygon swath setup buttons are no longer on screen.
4. Set your A, B (and C if necessary) points and fly your swath guidance lines in pattern order.

   You cannot use the Enter Poly Pattern feature with these temporarily saved polygons.

   When you shut down, your temporarily saved/used polygon is cleared from the AirTrac.

Saving/Using a Polygon without a JOB - Multiple Sessions

If you want to create and use a polygon and want to keep the polygon after you shut down, without saving the polygon to a JOB, complete the following steps.

Note: In this procedure the polygon is, in fact, being saved to a JOB but it is not you doing the saving. AirTrac saves the polygon as a component of JOB 00 (000). It will remain a component of JOB 00 until you overwrite JOB 00.

1. From the Main menu press **CLEAR > JOB > ENTER** to clear all jobs. <No Job>* is displayed in the Header area at the top of the Map screen.
2. Press **POLY\6** twice then use the swath advance buttons to define your polygon points. (See Step 1 of "Setting Polygon Points as You Fly" on page 61).

3. When you have finished defining your polygon, press **SAVE** > **POLY n** > **ENTER**. AirTrac returns you to the map screen with the polygon still there with the **SET A** button available and the polygon setup swath buttons cleared from the screen. **Do not** save the JOB.
4. Set your pattern points (A, B and C if necessary) and fly your swath guidance lines in order.

   You can use the ENTER POLY PATTERN feature with polygons saved like this. See "Managing A-B Lines with Polygons" on page 68.

   When you shut down, AirTrac automatically saves your polygon to JOB 000 and when you restart AirTrac, JOB 000 is on screen with your polygon (ZOOM > CENTER if necessary). The polygon will remain a component of JOB 000 until you save JOB 000 with new components.

Displaying Time and Distance to Polygons

Time to Edge and Edge Distance are display options for the map screen and lightbar. The values show when a polygon side is in your flight path. If you keep flying as you cross the polygon's edge, and are inside the polygon, the display changes to the time and distance to the next side in your flight path.

To display Time to Edge and Edge Distance in the lightbar, you must enter guidance mode first.

1. From the Main menu press **SET > POLY\6 n > ENTER** to get the bearing and range showing.
2. Press **KEYPAD > ENTER** to cancel the guidance mode.

Editing a Polygon

To edit a polygon:

- From the Main menu press **SETUP > SETUP > SETUP > Polygons**.

  The Job and Polygon fields in the Polygons screen default to the current JOB and polygon 1 in the JOB - select the JOB and polygon number as required and edit the polygon data as required.

Deleting a Polygon

⚠WARNING: Because you can use the same polygon numbers in multiple JOBs, make sure you delete a polygon from the right JOB. The number you enter is the number of the polygon in the current job.

To delete a polygon:

1. From the Main menu press **CLEAR > POLY n > ENTER**.
2. Press **YES** to confirm the deletion.

Navigating to a Polygon

To receive guidance to a polygon:

1. From the Main menu press **SET > Job\9 n** to load the JOB the polygon is saved in.
2. Press **SET > POLY\6 n**.

   AirTrac displays a dotted line to the center of the polygon and the lightbar provides guidance to the center of the polygon. The lightbar and the data window will show bearing and range (BRG and RNG in the data window.)

To cancel guidance to the polygon:

- Press **KEYPAD > ENTER**

  The map screen displays the following message:

  Return to Mark cancelled

Managing A-B Lines with Polygons

When you create a polygon and save it with a job, AirTrac can apply an A-B line to one side of the polygon. If required, you can move the auto-applied A-B line sequentially around the polygons sides.

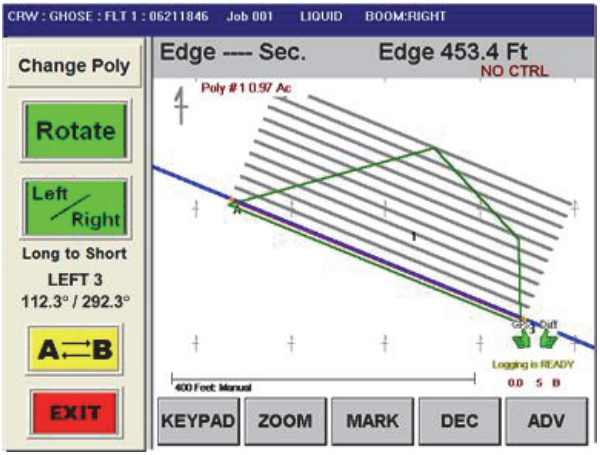
Auto-applying A-B Lines to a Polygon

When AirTrac automatically applies an A-B line to a polygon side it also automatically provides a swath guidance array from that A-B line. This eliminates the need for you to manually create (fly) an A-B line.

By default, AirTrac applies the A-B line to the JOB's lowest numbered polygon (you can change this) and the side of that polygon that results in the least number of swaths to cover the polygon area. You can, however, change the polygon side that the swath array is based upon (see "Rotating the A-B Line Around a Polygon" on page 69).

To use this feature, generally referred to as 'Enter Poly Pat', you need to first load a job that has a polygon or polygons saved with it.

1. Press **SET > JOb\9 n** to load a JOB that has a polygon or polygons saved with it.
2. If necessary select the pattern type you want to fly (see "Entering Basic JOB Details (Quick Start)" on page 23 for the pattern setup procedure).
3. From the Main menu press **ENTER > POLY\6 > PATTERN\1**. AirTrac returns you to the map window and applies an A-B line on the side of the lowest numbered polygon that will result in the least number of swaths. AirTrac also provides an array of guidance lines and a poly pattern window in place of the data window.



4. Press the **Change Poly** button to apply the A-B line to a different polygon if your JOB has multiple polygons. The A-B line and guidance array shift to the next polygon and the on-screen polygon data updates (for example to *Poly # 2 1.5 Ac*).

5. Press the **Rotate** button to move the A-B line counter-clockwise to the next longest side of the polygon (see "Rotating the A-B Line Around a Polygon" below.)

6. Press the **Left/Right** button to switch the guidance array to the left or right of the A-B line.

7. Press the **AB** button to switch to the opposite side of the polygon. The A and B points reverse so that the guidance array stays on the correct side of the A-B line.

Rotating the A-B Line Around a Polygon

After AirTrac has applied the A-B line you can rotate it around the polygon to suit the prevailing conditions.

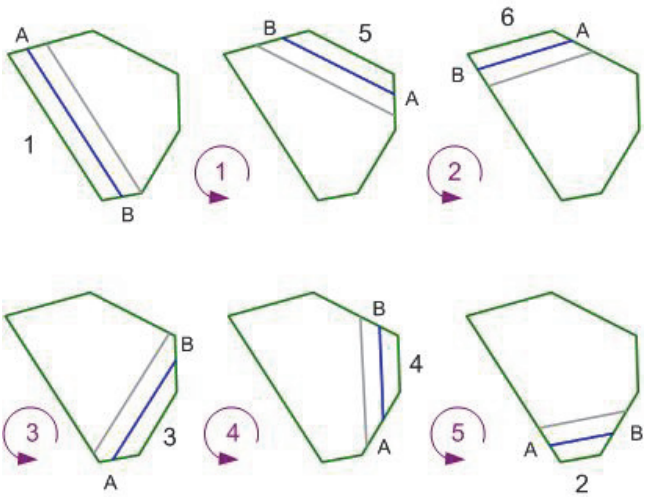


Figure 5-2: Rotating the A-B line around your polygon

Figure 5-2 shows the counter-clockwise order in which AirTrac applies the A-B line to the polygon sides using the Long(est) to Short(est) rule. AirTrac has initially applied the A-B line to side 1—the side that results in the least number of swaths. Each time you press the **Rotate** button, in our example, AirTrac applies the A-B line in the order longest side to shortest side, that is in the order side 5, 6, 3, 4, 2.

(Only one guidance line is shown after the A-B line to indicate that the guidance array is to the left of the A-B line.)

- 1 is the side that will require the least number of swaths to complete the spraying (it is also the longest side in the example but it may not be)
- 2–6 are the polygon sides by decreasing length

Each press of the Rotate button rotates the A-B line counter-clockwise to the polygon side in the order shown.

Understanding Patterns

A pattern in AirTrac refers to the spray pattern you use to spray your field. You can to store up to 99 patterns per job with AirTrac. See “Flying Patterns” on page 33 for an overview of AirTrac pattern types.

Saving Patterns

To save a pattern to a polygon:

- From the Main menu press **SAVE > PATTERN\1 > n > ENTER**

Recalling a Saved Pattern

To recall a saved pattern:

- From the Main menu press **SET > PATTERN\1 n > ENTER**

Chapter 6: Advanced Setup and Customization

With AirTrac you can customize the default factory settings. This chapter discusses advanced setup features and customizations that you can make to such things as the lightbar, the display screen, job data logging, and flow control. The chapter ends with information on saving your customizations.

Advanced Setup Options

In the Advanced Setup screen you can enter waypoint, polygon, pattern, and weather details as well as some GPS data. You can also clear all user-created data such as logs, marks, and JOBs.

From the Main screen press SETUP three times to access the Advanced Setup screen.

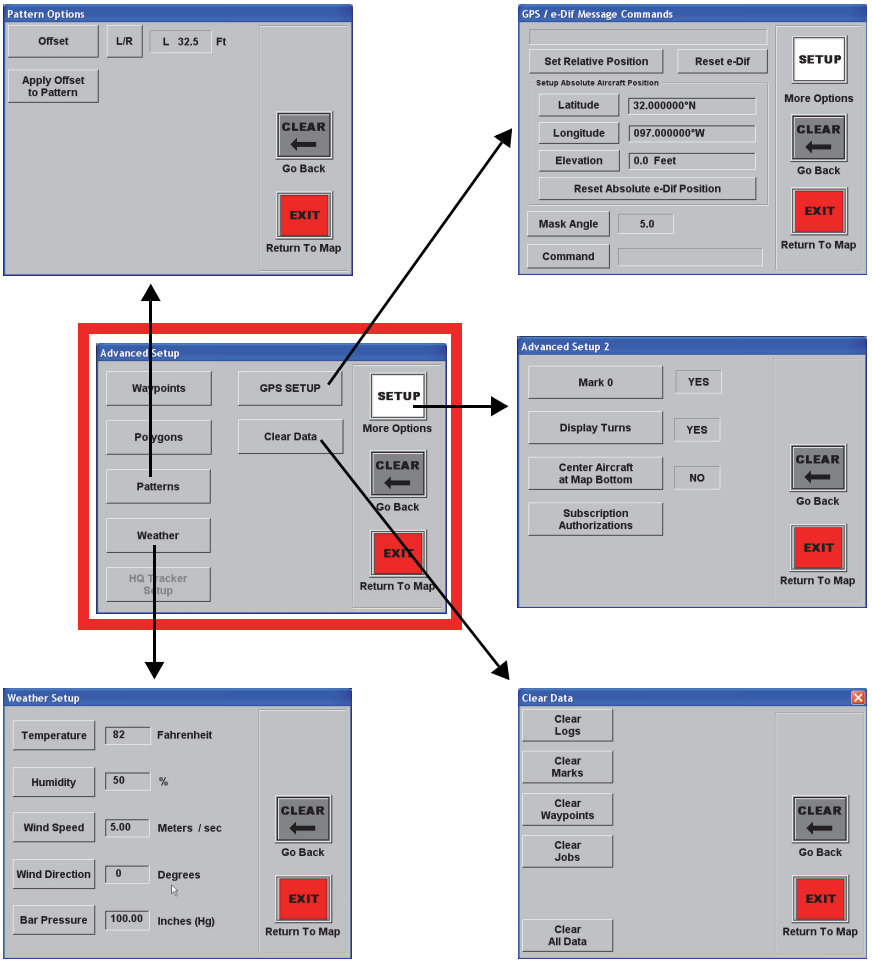
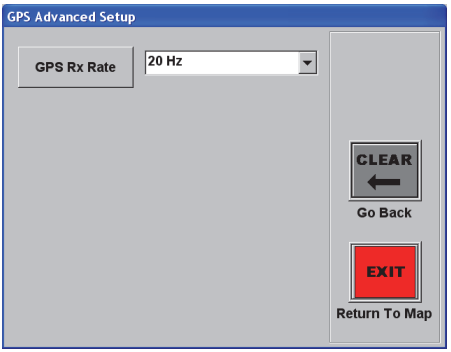


Figure 6-1: Advanced Setup screen and subscreens

Table 6-1 describes the Advanced Setup subscreens.

Table 6-1: Advanced Setup subscreens

Subscreen	Description
Waypoints	See “Understanding Waypoints and Routes” on page 56.
Polygons	See “Understanding Polygons” on page 60.
Pattern Options	Set an offset value and direction (left or right) then apply it to the current pattern. The offset lets you set a distance to the left or right of the A-B line, always relative to coming into the field at the A point and exiting at the B point. A is always south in this scenario, B is always north, left is always to the west of the line, and right is always to the east of the line. The offset is always relative to these directions, no matter from which direction you are flying into the field. See also Chapter 4, “Pattern Guidance.”
Weather Setup	Enter values for temperature, humidity, wind speed and direction, and bar pressure.
Clear Data	See “Clearing Data” on page 74.
Advanced Setup 2	Enter last sprayed point, toggle on/off the trailing flight line on the display, and toggle spray on/off if SO cable connected.
GPS Status	Enter a mask value, a command, and, if e-Dif is available, start (activate) e-Dif. The mask value is an angle setting inside the GPS receiver. For example, setting it at 5° means the receiver will ignore any GPS satellites that it sees at 5° or below on the horizon. This helps AirTrac block satellites that are too far out, which will have their signals bounce off the atmosphere and cause degraded GPS data. The command field enables you to send a $ command to the receiver. For more information on commands contact Satloc Technical Support (see the beginning of this manual for contact information). If AirTrac is using e-Dif, Start e-Dif enables you to take a manual fix. Pressing **Start e-Dif** sends the $JRAD,3 command to the receiver to activate an e-Dif solution. Press **Setup** to display the GPS Advanced Setup screen where you can select the GPS update rate (5 Hz, 10 Hz, or 20 Hz). For example, you may have different peripherals and need to change the rate to work correctly. 

Clearing Data

Clear just logs, marks, waypoints or JOBs, or all data. You can also revert to all factory settings by pressing Factory Default Settings (and then YES), for example: Units = US; Pattern = BACK-TO-BACK; Swath Width = 65.0 ft.

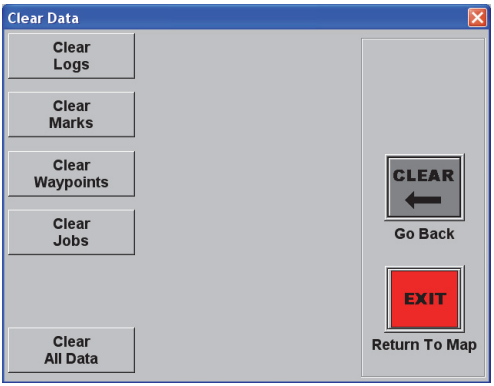
When you clear data you delete it from the Bantam hard drive or the USB flash drive (wherever your data is stored). Make sure you no longer need the data before clearing it, since you cannot retrieve the data once it is cleared (deleted).

You can clear the following data:

- Logs
- Marks
- Waypoints
- JOBs
- All data

To clear data:

1. From the Main menu press **SETUP > SETUP > SETUP > Clear Data**. The Clear Data screen appears.



2. Press the appropriate button to delete those items. For example, press Clear Marks to clear all marks.

Understanding the Lightbar

Lightbar setup options include:

- Setting the left and right lightbar displays
- Desensitizing the lightbar LEDs when navigating to a mark or waypoint
- Turning the swath Double-Spray Warning off/on (the default is on)
- Setting the upper and lower LEDs to:
  - Display as a solid bar of lights
  - Use the outermost LED only that represents your current cross-track distance or heading angle
- Changing the LED cross-track distance and heading angle values
- Setting a guidance delay - the delay in milliseconds between the time the lightbar shows a guidance cue and when you need to react

Lightbar setup consists of basic settings and advanced settings.

Setting Up the Lightbar - Basic

To begin basic setup from the Main menu press **SETUP > SETUP > LIGHT BAR** to display the Light Bar Setup screen.

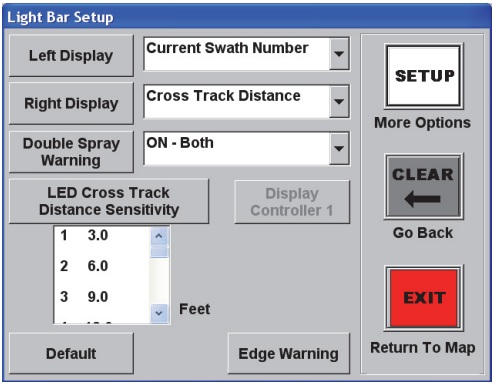
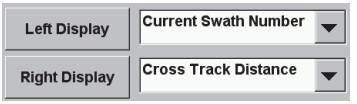


Figure 6-2: Light Bar Setup screen

Setting the Left and Right Displays

To set the Left and Right displays:

- On the Light Bar Setup screen, in the Left Display and Right Display fields, select the required option from the field's drop-down list.



For a list of display options for the left and right displays on the lightbar, see Appendix A, "Lightbar and Screen Display Options."

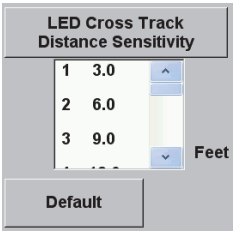
Setting a Double-Spray Warning Option

To set a double-spray warning option:

- On the Light Bar Setup screen, in the Double-Spray Warning field, select an option from the drop-down list to:
  - Turn the warning off
  - Turn the lightbar warning on for either the lightbar or the display screen
  - Turn the lightbar warning on for both the lightbar and the display screen

Setting the Cross-track Sensitivity

To set cross track sensitivity:



1. On the Light Bar Setup screen, in the LED Cross Track Sensitivity field, press the number of the corresponding LED for which you want to change the cross-track distance.
2. In the Numeric Entry screen enter a new value and then press Enter.

To reset the cross-track distance settings to defaults values:

- On the Light Bar Setup screen, press **Default**

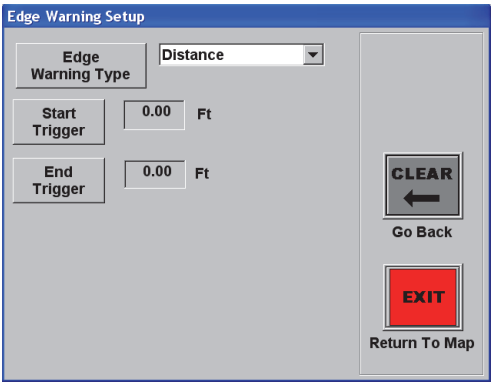
Setting the Lightbar Edge Warning

The Edge Warning feature in AirTrac enables you to receive a visual warning when you get within a certain distance or time of a polygon. The warning is the flashing lightbar. The start trigger determines when the lightbar will start flashing and the end trigger determines when the flashing will stop.

The start of the flashing lets you know you are getting close; the end of the flashing lets you know you are at the point where you need to take action, for example, set an A-B line or turn on spray.

To set the lightbar edge warning:

1. On the Light Bar Setup screen, press **Edge Warning**. The Edge Warning Setup screen appears.



2. Set the edge warning type to Time or Distance.
3. Set the start trigger and end trigger values. The start trigger value must be a greater distance or a greater number of seconds than the end trigger value.

Setting Up the Lightbar - Advanced

Press SETUP in the Light Bar Setup screen to display the Lightbar Setup Advanced screen.

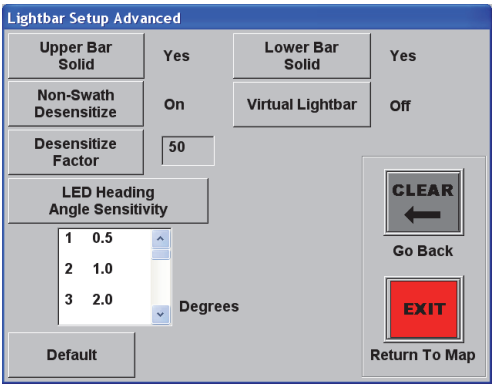


Figure 6-3: Lightbar Setup Advanced screen

Setting the Upper and Lower LEDs Display

You can set the upper and lower LEDs display as a solid bar or a single LED.

- Press **Upper Bar Solid** to toggle between Yes and No (default is Yes).
- Press **Lower Bar Solid** to toggle between Yes and No (default is No).

Desensitizing the LEDs

Desensitizing the LEDs relates to when you navigate to a mark or waypoint. If you turn this on, you will need to set a desensitize factor. Setting the Non-Swath Desensitize field allows you to navigate to/from a mark or waypoint with less sensitive LED distance warnings. The distance each lightbar LED represents is multiplied by the value you enter in this field. For example, if the first LED is set to 3.0 feet and you enter "20" in the Non-Swath Desensitize field, the first LED will not light up until you are within 60 feet of a swath.

- Press **Non-Swath Desensitize** to toggle between Off and On.

Note: As soon as you press ABC ADV (or the remote Swath Advance button) to enter the "A" point of a pattern, the LED-desensitizer is deactivated.

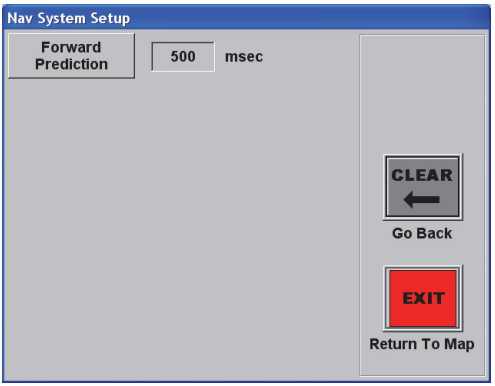
Understanding Guidance Delay

Guidance delay or 'forward prediction' in AirTrac is the delay in seconds between when the lightbar displays a guidance prompt and when you need to react.

For example, if you set this value to "500," the lightbar will prompt you 500 msec before you need to react.

Setting a Guidance Delay

1. From the Main menu press **SETUP > SETUP > NAV SYSTEM** to display the Nav System Setup screen.



2. Set the guidance delay value you want in the Forward Prediction field.

Note: The default 500 msec guidance delay is geared toward the average airspeed.

Screen Displays Screen

The Screen Displays screen setup options include:

- Setting the mode (Normal [daytime] colors or Dark [nighttime] colors)
- Setting the left and right display options (these correspond to the Large Format Display Area on the display screen)
- Setting the display screen orientation (course up, north up, or A-B line up)
- Setting the display screen motion (background or aircraft stationary)
- Setting the display language
- Setting the zoom and pan options (advanced setup)

Setting Up the Display Screen

From the Main menu press **SETUP > SETUP > SCREEN** to display the Screen Setup screen.

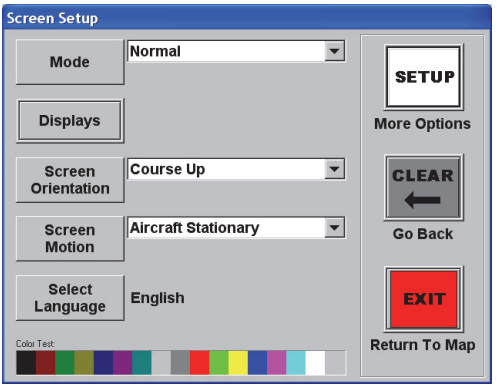


Figure 6-4: Screen Setup screen

Setting the Mode

In the Mode field, select Normal or Dark for daytime or nighttime screen colors, respectively.

Tip! *You can also switch between the daytime and nighttime colors by pressing SET > SET.*

Setting the Display Screen Options

Press the Displays button on the Screen Setup screen. The Screen Displays screen appears. Your selections here determine what is displayed in the AirTrac screen.

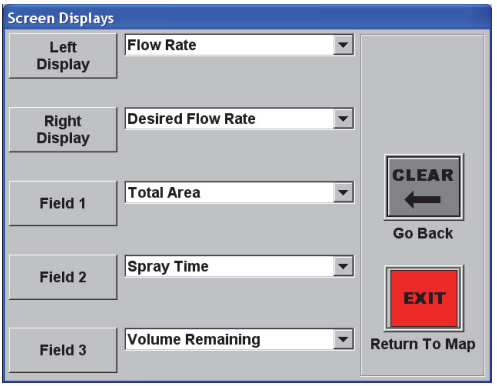


Figure 6-5: Screen Displays screen

In the Left Display and Right Display fields, select the required display option from their respective drop-down lists. Your selections here appear in the Large Format Display at the top of the map window.

For Field 1 to Field 3, select the fields you would like to display from their respective drop-down lists. Your selections here appear in the data window.

For a list of display options see Appendix A, “Lightbar and Screen Display Options.”

Setting the Screen Orientation

To set the screen orientation:

- In the Screen Orientation field, select course up, north up, or A-B line up from the drop-down list.

Setting the Screen Motion

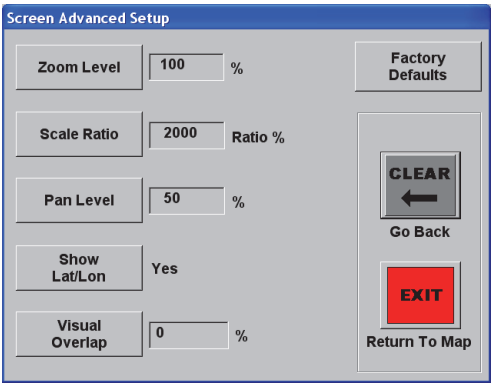
To set the screen motion:

- In the Screen Motion field, select background stationary or aircraft stationary from the drop-down list.

Changing the Zoom/pan Options

To change the zoom and pan options:

1. From the Main menu press **SETUP > SETUP > SCREEN > SETUP.** The Screen Advanced Setup screen appears.



2. Using the following table as a guide, make the desired changes.

Field	Description
Zoom Level	Enter the percentage each zoom in/out moves the display.
Pan Level	Enter the percentage the screen moves in the direction of the arrow you press.
Scale	Press the Scale button to change the scale from Auto to Preset. The Scale field controls the default scale of the screen. If you select Preset, you will need to set the Scale Ratio value.
Show Lat/Lon	Press the Show Lat/Lon button to toggle between Yes and No.
Visual Overlap	Enter the spray overlap percentage you want to view in the map window. In the map window, the spray overlap visually represents the distance beyond the spray boom that spray is applied. If you enter this percentage as "0," the map window will only show spray applied as the length of the boom. For example, a 65-foot spray width with a spray overlap of 10% will display a 6.5-foot total spray overlap (3.25 feet on each side of the spray boom). *Visual overlap applies to the display in the map window only. It does not apply to guidance or logged data.*
Factory Defaults button	Press this button to restore the advanced setup settings to the factory defaults.

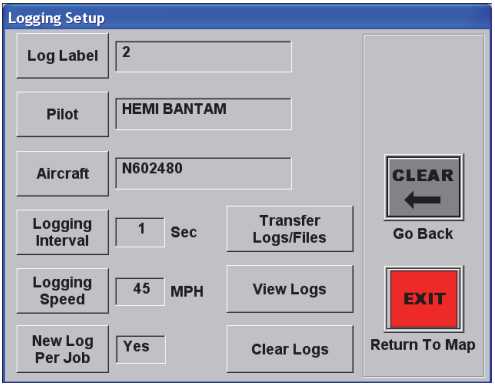
Changing Logging Defaults

As described in "Understanding Job and Log Data" on page 25, logging is a valuable way to track information for each job, such as spray data, pattern details, time, and location.

By default, AirTrac starts logging flight data once you are flying at or above 45 mph (72.4 km/h and spray distance and area every 2 sec.

To change logging defaults:

1. From the Main menu press **SETUP > SETUP > LOGGING SETUP**. The Logging Setup screen appears.



2. Using the following table as a guide, make the desired changes.

Field	Description
Log Label	Enter the job name (optional - logs are automatically time/date stamped with the file name).
Pilot	(Optional) Enter the pilot name.
Aircraft	(Optional) Enter the aircraft name.
Logging Interval	Enter a different logging interval.
Logging Speed	Enter a different logging speed.
New Log Per Job	Toggle between Yes and No to have AirTrac start a new log each time a JOB is reloaded.
Transfer Logs/Files	Allows you to transfer data files. See "Transferring Data Files" on page 52 for more information.
View Logs	Allows you to view log data. See "Viewing Log Data" on page 49 for more information.
Clear Logs	Allows you to clear log data. See "Clearing Log Data" on page 50 for more information.

Flow Control

AirTrac supports several flow control options. If you have a flow control system installed, flow data is collected and displayed via the AirTrac interface. For detailed information on flow control options, contact Satloc Technical Support regarding the following documentation:

- AerialACE User Guide, Part No. 875-0135-002
- IntelliFlow User Guide, Part No. 875-0180-000
- IntelliGate User Guide, Part No. 875-0193-000

Differential GPS

SBAS Receiver Applications

Satloc Bantam GPS receivers come with two receiver applications.

You may want to switch SBAS receiver applications if you lose satellite reception. Since you cannot switch receiver application via AirTrac, refer to your receiver user guide for information on switching applications.

AirTrac automatically detects the active signal from your receiver.

Using e-Dif with AirTrac

To use e-Dif with AirTrac, you simply select e-Dif as the differential source on the Settings screen. See “Starting AirTrac” on page 4.

Customized Settings

When you customize settings the changes are saved to either the USB flash drive or the Bantam hard drive, depending on the logging read/write device you selected at startup (see “Starting AirTrac” on page 4). The user settings are stored in the .ini file. Because the changes can be saved to the flash drive, you have the following benefits:

- You can change settings on one system and transfer the new settings into another Bantam system. You then can begin using the second system immediately without having to change the setup.
- You can store different settings on different flash drives and swap the drives depending on the job and settings you want to access.

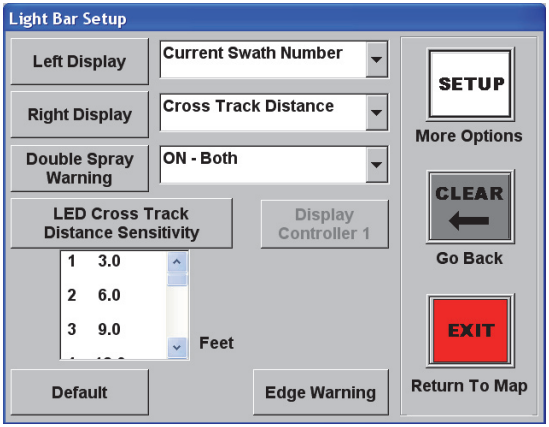
Note: If AirTrac does not find an .ini file on the flash drive, it will copy the .ini file found on the hard drive to the flash drive. Also, if there is no flash drive detected in the Bantam, AirTrac will use the .ini file on the hard drive. Finally, if neither .ini file exists (as is the case with a new installation), the settings are defaulted.

Tip: *To copy the customized settings from the flash drive to the hard drive, press SAVE > SETUP. To restore default factory settings, select SETUP > SETUP > SCREEN, and press the Factory Defaults button.*

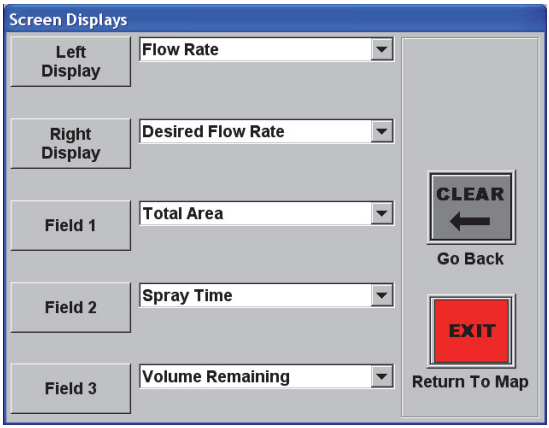
Appendix A: Lightbar and Screen Display Options

The following table lists the display options you have for the lightbar, the left and right 'large format' displays in the Moving Map area of the Map screen, and fields 1 to 3 in the Data area of the Map screen.

Lightbar/Screen Display Options By Type	**Lightbar/Screen Display Options Alphabetical**
Cross Track Distance	Altimeter
Current Swath Number	Altitude
Swath Width	Amount Per Minute
Speed	Amount Per Swath
Pattern Type & Direction	Arrival Time
Heading	Barometric Pressure
Field Area	Bearing
Total Area	Blank
Edge Distance	Cross Track Distance
Time To Edge	Current Swath Number
Distance To AB	Desired Flow Rate
Distance To A	Distance To A
Distance To B	Distance To AB
Distance To Spray-on	Distance To B
Volume Sprayed	Distance To Spray-on
Volume Remaining	DOP/DF
Amount Per Swath	Edge Distance
Amount Per Minute	Elevation Difference
Flow Rate	Field Area
Desired Flow Rate	Flow Rate
Valve\Encoder Position	Heading
Time	Humidity
Elevation Difference	Job ID
Altimeter	Log Name
Polygon Entry #	Log Time Remaining
Total Polygon Area	MARK Range
Polygon In/Out	Pattern Type & Direction
Polygon ID	Polygon Entry #
Job ID	Polygon ID
Spray Time	Polygon In/Out
Swath Heading	Route/Waypoint
Log Time Remaining	Speed
Log Name	Spray Time
Wind Speed/Dir	SV/DF
Temperature	Swath #/DF
Barometric Pressure	Swath Heading
Humidity	Swath Width
DOP/DF	Temperature
SV/DF	Time
Swath #/DF	Time To Edge
Arrival Time	Total Area
Route/Waypoint	Total Polygon Area
WPT Range	Valve\Encoder Position
MARK Range	Volume Remaining
Bearing	Volume Sprayed
Altitude	Wind Speed/Dir
Blank	WPT Range



The left and right display fields on the Light Bar Setup screen.



The left and right display fields and fields 1-3 on the Screen Displays screen.

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21. TERMINATION. Licensee may terminate this Agreement at any time without cause. Hemisphere may terminate this Agreement on 30 days notice to Licensee if Licensee fails to materially comply with each provision of this Agreement unless such default is cured within the 30 days. Any such termination by a party shall be in addition to and without prejudice to such rights and remedies as may be available, including injunction and other equitable remedies. Upon receipt by Licensee of written notice of termination from Hemisphere or termination by Licensee, Licensee shall at the end of any notice period (a) cease using the Software; and (b) return to Hemisphere (or destroy and provide a certificate of a Senior Officer attesting to such destruction) the Software and all related material and any magnetic or optical media provided to Licensee. The provisions of Sections 6), 7), 8), 9), 10), 15), 21), 26) and 27) herein shall survive the expiration or termination of this Agreement for any reason.

22. **EXPORT RESTRICTIONS**. Licensee agrees that Licensee will comply with all export control legislation of Canada, the United States, Australia and any other applicable country's laws and regulations, whether under the Arms Export Control Act, the International Traffic in Arms Regulations, the Export Administration Regulations, the regulations of the United States Departments of Commerce, State, and Treasury, or otherwise as well as the export control legislation of all other countries.

23. **PRODUCT COMPONENTS.** The Product may contain third party components. Those third party components may be subject to additional terms and conditions. Licensee is required to agree to those terms and conditions in order to use the Product.

24. **FORCE MAJEURE EVENT.** Neither party will have the right to claim damages as a result of the other's inability to perform or any delay in performance due to unforeseeable circumstances beyond its reasonable control, such as labor disputes, strikes, lockouts, war, riot, insurrection, epidemic, Internet virus attack, Internet failure, supplier failure, act of God, or governmental action not the fault of the non-performing party.

25. **FORUM FOR DISPUTES**. The parties agree that the courts located in the State of Kansas and the courts of appeal there from will have exclusive jurisdiction to resolve any disputes between Licensee and Hemisphere concerning this Agreement or Licensee's use or inability to use the Software and the parties hereby irrevocably agree to attorn to the jurisdiction of those courts. Notwithstanding the foregoing, either party may apply to any court of competent jurisdiction for injunctive relief.

26. **APPLICABLE LAW**. This Agreement shall be governed by the laws of the State of Kansas, exclusive of any of its choice of law and conflicts of law jurisprudence.

27. **CISG.** The United Nations Convention on Contracts for the International Sale of Goods will not apply to this Agreement or any transaction hereunder.

28. **GENERAL.** This is the entire agreement between Licensee and Hemisphere relating to the Product and Licensee's use of the same, and supersedes all prior, collateral or contemporaneous oral or written representations, warranties or agreements regarding the same. No amendment to or modification of this Agreement will be binding unless in writing and signed by duly authorized representatives of the parties. Any and all terms and conditions set out in any correspondence between the parties or set out in a purchase order which are different from or in addition to the terms and conditions set forth herein, shall have no application and no written notice of same shall be required. In the event that one or more of the provisions of this Agreement is found to be illegal or unenforceable, this Agreement shall not be rendered inoperative but the remaining provisions shall continue in full force and effect.

Warranty Notice

COVERED PRODUCTS: This warranty covers all products manufactured by Hemisphere GPS and purchased by the end purchaser (the "Products"), unless otherwise specifically and expressly agreed in writing by Hemisphere GPS.

LIMITED WARRANTY: Hemisphere GPS warrants solely to the end purchaser of the Products, subject to the exclusions and procedures set forth below, that the Products sold to such end purchaser and its internal components shall be free, under normal use and maintenance, from defects in materials, and workmanship and will substantially conform to Hemisphere GPS's applicable specifications for the Product, for a period of 12 months from delivery of such Product to such end purchaser (the "Warranty Period"). Repairs and replacement components for the Products are warranted, subject to the exclusions and procedures set forth below, to be free, under normal use and maintenance, from defects in material and workmanship, and will substantially conform to Hemisphere GPS's applicable specifications for the Product, for 90 days from performance or delivery, or for the balance of the original Warranty Period, whichever is greater.

EXCLUSION OF ALL OTHER WARRANTIES. The LIMITED WARRANTY shall apply only if the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Hemisphere GPS's relevant User's Manual and Specifications, AND the Product is not modified or misused. The Product is provided "AS IS" and the implied warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE and ALL OTHER WARRANTIES, express, implied or arising by statute, by course of dealing or by trade usage, in connection with the design, sale, installation, service or use of any products or any component thereof, are EXCLUDED from this transaction and shall not apply to the Product. The LIMITED WARRANTY is IN LIEU OF any other warranty, express or implied, including but not limited to, any warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, title, and non-infringement.

LIMITATION OF REMEDIES. The purchaser's EXCLUSIVE REMEDY against Hemisphere GPS shall be, at Hemisphere GPS's option, the repair or replacement of any defective Product or components thereof. The purchaser shall notify Hemisphere GPS or a Hemisphere GPS's approved service center immediately of any defect. Repairs shall be made through a Hemisphere GPS approved service center only. Repair, modification or service of Hemisphere GPS products by any party other than a Hemisphere GPS approved service center shall render this warranty null and void. The remedy in this paragraph shall only be applied in the event that the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Hemisphere GPS's relevant User's Manual and Specifications, AND the Product is not modified or misused. NO OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR CONTINGENT DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO PURCHASER, even if Hemisphere GPS has been advised of the possibility of such damages. Without limiting the foregoing, Hemisphere GPS shall not be liable for any damages of any kind resulting from installation, use, quality, performance or accuracy of any Product.

HEMISPHERE IS NOT RESPONSIBLE FOR PURCHASER'S NEGLIGENCE OR UNAUTHORIZED USES OF THE PRODUCT. IN NO EVENT SHALL HEMISPHERE GPS BE IN ANY WAY RESPONSIBLE FOR ANY DAMAGES RESULTING FROM PURCHASER'S OWN NEGLIGENCE, OR FROM OPERATION OF THE PRODUCT IN ANY WAY OTHER THAN AS SPECIFIED IN HEMISPHERE GPS'S RELEVANT USER'S MANUAL AND SPECIFICATIONS. Hemisphere GPS is NOT RESPONSIBLE for defects or performance problems resulting from (1) misuse, abuse, improper installation, neglect of Product; (2) the utilization of the Product with hardware or software products, information, data, systems, interfaces or devices not made, supplied or specified by Hemisphere GPS; (3) the operation of the Product under any specification other than, or in addition to, the specifications set forth in Hemisphere GPS's relevant User's Manual and Specifications; (4) damage caused by accident or natural events, such as lightning (or other electrical discharge) or fresh/salt water immersion of Product; (5) damage occurring in transit; (6) normal wear and tear; or (7) the operation or failure of operation of any satellite-based positioning system or differential correction service; or the availability or performance of any satellite-based positioning signal or differential correction signal.

THE PURCHASER IS RESPONSIBLE FOR OPERATING THE VEHICLE SAFELY. The purchaser is solely responsible for the safe operation of the vehicle used in connection with the Product, and for maintaining proper system control settings. UNSAFE DRIVING OR SYSTEM CONTROL SETTINGS CAN RESULT IN PROPERTY DAMAGE, INJURY, OR DEATH. The purchaser is solely responsible for his/her safety and for the safety of others. The purchaser is solely responsible for maintaining control of the automated steering system at all times. THE PURCHASER IS SOLELY RESPONSIBLE FOR ENSURING THE PRODUCT IS PROPERLY AND CORRECTLY INSTALLED, CONFIGURED, INTERFACED, MAINTAINED, STORED, AND OPERATED IN ACCORDANCE WITH HEMISPHERE GPS'S RELEVANT USER'S MANUAL AND SPECIFICATIONS. Hemisphere GPS does not warrant or guarantee the positioning and navigation precision or accuracy obtained when using Products. Products are not intended for primary navigation or for use in safety of life applications. The potential accuracy of Products as stated in Hemisphere GPS literature and/or Product specifications serves to provide only an estimate of achievable accuracy based on performance specifications provided by the satellite service operator (i.e. US Department of Defense in the case of GPS) and differential correction service provider. Hemisphere GPS reserves the right to modify Products without any obligation to notify, supply or install any improvements or alterations to existing Products.

GOVERNING LAW. This agreement and any disputes relating to, concerning or based upon the Product shall be governed by and interpreted in accordance with the laws of the State of Arizona.

OBTAINING WARRANTY SERVICE. In order to obtain warranty service, the end purchaser must bring the Product to a Hemisphere GPS approved service center along with the end purchaser's proof of purchase. Hemisphere GPS does not warrant claims asserted after the end of the warranty period. For any questions regarding warranty service or to obtain information regarding the location of any of Hemisphere GPS approved service center, contact Hemisphere GPS at the following address:

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