COOK'S
//AGPS LLC

//AGPS DITCH PRO
USER MANUAL

www.CooksAGPS.com

//AGPS DITCH PRO

Table of Contents

//AGPS DITCH PRO

AGPS DITCH PRO

Welcome

Thank you for purchasing AGPS-DitchPro™. This manual will guide you through the setup and running of the program.

AGPS-DitchPro™ provides assistance in cutting drainage ditches. The program will calculate the elevation and grade of the ditch and control the scraper or box blade in cutting the ditch.

If you have further questions, please contact your AGPS Dealer or the AGPS technical support via email: support@agpsinc.com

Basic Concepts

AGPS-DitchPro™ will capture the topography of a ditch by surveying the line and based on that topography and on certain parameters (like minimum-slope, minimum-depth, optimum-depth) will calculate a plan of elevations where the ditch should be cut, show it to you and, and control the blade.

AGPS-DitchPro™ can be navigated with either the touch-screen interface or utilizing a standard keyboard. Most of the instructions in this manual are based on utilizing the touch-screen interface. For shortcut keys with a keyboard, see the Buttons menu on page 21.

The touch-screen interface has an on-screen keyboard function – when you need to enter text (job name, naming a control point, etc.) simply touch where you need to enter text and the on-screen keyboard will pop-up.

How the Program Calculates Grade

AGPS-DitchPro™ Designs the ditch based on what the user selects as the minimum slope and optimum depth. The program will attempt to place the ditch at the Optimum Depth while never violating minimum slope.
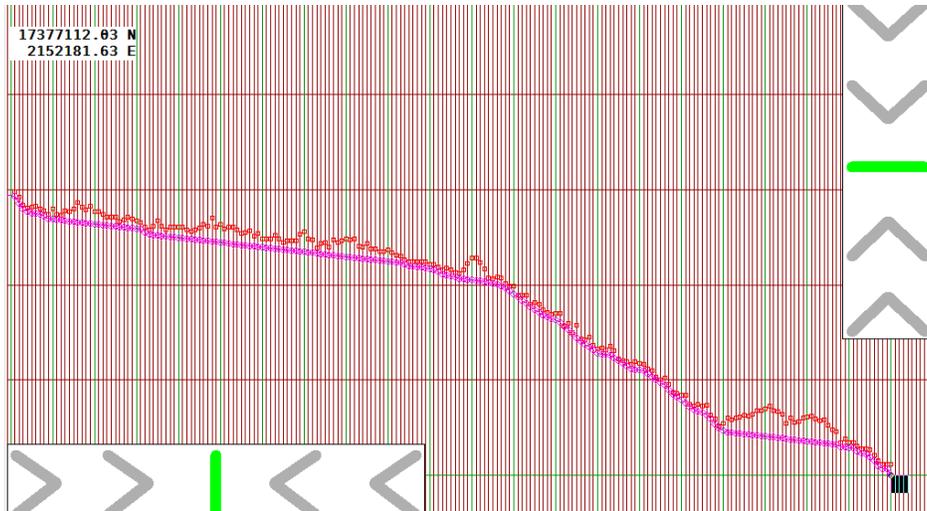
Units of Measure

AGPS-DitchPro™ can be set to work in Feet (International); Feet (U.S. Survey); or Meters. A typical user in the United States will choose Feet (U.S. Survey). For both Feet (International) and Feet (U.S. Survey) will be calculated and displayed in tenths of feet, so that 6.5' is the same as 6'6".

Inches and Eighths to Decimals of a Foot

In.	0	1/8	1/4	3/8	1/2	5/8	3/4	7/8
0	.00	.01	.02	.03	.04	.05	.06	.07
1	.08	.09	.10	.11	.12	.14	.15	.16
2	.17	.18	.19	.20	.21	.22	.23	.24
3	.25	.26	.27	.28	.29	.30	.31	.32
4	.33	.34	.35	.36	.38	.39	.40	.41
5	.42	.43	.44	.45	.46	.47	.48	.49
6	.50	.51	.52	.53	.54	.55	.56	.57
7	.58	.59	.60	.61	.62	.63	.64	.65
8	.67	.68	.69	.70	.71	.72	.73	.74
9	.75	.76	.77	.78	.79	.80	.81	.82
10	.83	.84	.85	.86	.88	.89	.90	.91
11	.92	.93	.94	.95	.96	.97	.98	.99

Example: 3-½" = .29"

Glossary of Terms

Capture	Auto Capture: Automatically captures a data points after user set interval (typically 10 feet) has been traveled. This distance uses both horizontal and vertical measurement. Toggling the Auto Capture button on and off will capture a single point at your current location. Toggled ON/OFF by keyboard spacebar.
Machine Control	In the program the term Machine Control refers to the automatic control of the blade. The control can be toggled by keyboard 0. There are other places in the program that blade used in a sentence will have different context.

Control point (.ctl file)	Sometimes called a benchmark, this point is a known world feature in which coordinates are also known. Control points are important to make your coordinates match those used earlier. See Control Points on page 38.
Data folder	All job file data opened and saved by the program is stored by default in C:\amw\data\
Device	Other forms: Device Menu, External Device, Control Device, etc. The Device refers to interface device that operates the automatic blade control, such as a DAC-7000™ or a LaserTech™ 308 control module.
Instrument	Other forms: Instrument Menu, Measuring Instrument, Read Instrument, etc. The instrument is the positional equipment. Although typically a GPS, there are many other types, and combinations of multiple instruments. See Working with RTK-GPS on page 17.
Local Point	A NEZ coordinate system that uses "fake" coordinates, meaning they are not consistent with State Plane or UTM. An example of this is program default "ptafake 5000 2000 100".
NEZ	Abbreviation for Northing(N) Easting(E) Elevation (Z). Coordinates are always in NEZ. NEZ coordinates are in Feet (or meters if selected) rather than Latitude Longitude and Altitude.
.nez file	A file that uses the following columns: "Name Northing(N) Easting(E) Elevation(Z) Description". (Description is optional)
Path	The line (curved or straight) you wish to follow. You can set a path by touching the path you wish to follow on the Plot. See also: Plot
Plot	Other forms: Plot Menu, Plot Window, etc. The Plot is the lower screen that the field is graphically drawn in. Any options to adjust a feature drawn here are found in the Plot Menu. See Plot Menu on page 44.
Quick setup mode	A toggled option to automatically start this application instead of going to the Main menu to select an application.
Rod (length)	The distance from the reading point (on the GPS antenna) to the blade or ground. The term Antenna Height is also used interchangeably. See Rod Length on page 19.
State Plane	A NEZ coordinate system with zones designed for a particular US State. Every State has one or more zones. See UTM and State Plane on page 53.
Odometer	The current distance from the start of the selected Path.
Status (GPS)	Shown on the working screen to describe GPS status and other related messages. Shows something like "ok: 15 4 1.1 /53" Where 15=satellites 4=datatype 1.1=precision and /53=read counter. Use the table below to evaluate the data type and precision meaning for your GPS. {{TABLE_BELOW}}
Survey File (.svy)	This file will contain all data points captured. Also, "Location Instrument" setup information and other relevant information are logged to this file. Points from this file will be displayed on your plot window as dots. The Survey File Menu includes options to modify this file.
UTM	A NEZ coordinate system with zones designed on Longitude lines. The program can automatically detect your UTM zone. See UTM and State Plane on page 53

Table within Status (GPS):

	RTK Fixed	RTK Float	No RTK base	Precision
GGA (Most manufacturers)	4	5	1	HDOP
John Deere™	4	3=extend 5=float.	1	HDOP
NovAtel™ (Raven™/AgLeader™)	50	49/48/34/17	16	Alt. Std. Deviation
Topcon™ (Javad™ GGA)	4	5	1	HDOP
Trimble™ (GGK)	3	2	1	PDOP

AGPS DITCH PRO

The Main Working Screen

The AGPS-Ditch Pro™ working screen is divided into three sections:
1. The Top Menu Bar on page 8
2. The Middle Plot Screen, with an Overhead View on page 9 and a Profile View on page 10
3. The Bottom Info Bar on page 11

The Main Working Screen – Overhead View
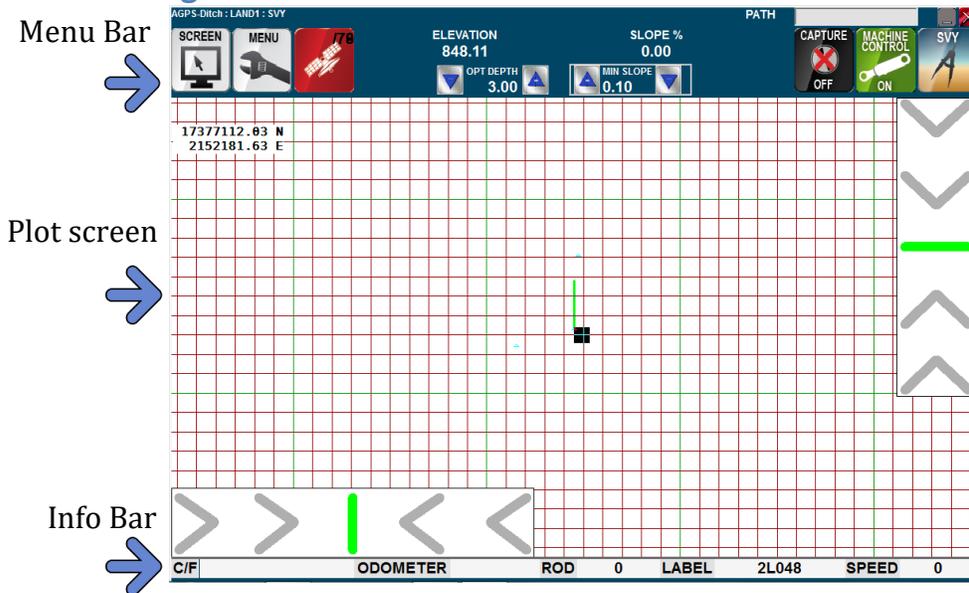
The Working Screen – Profile View
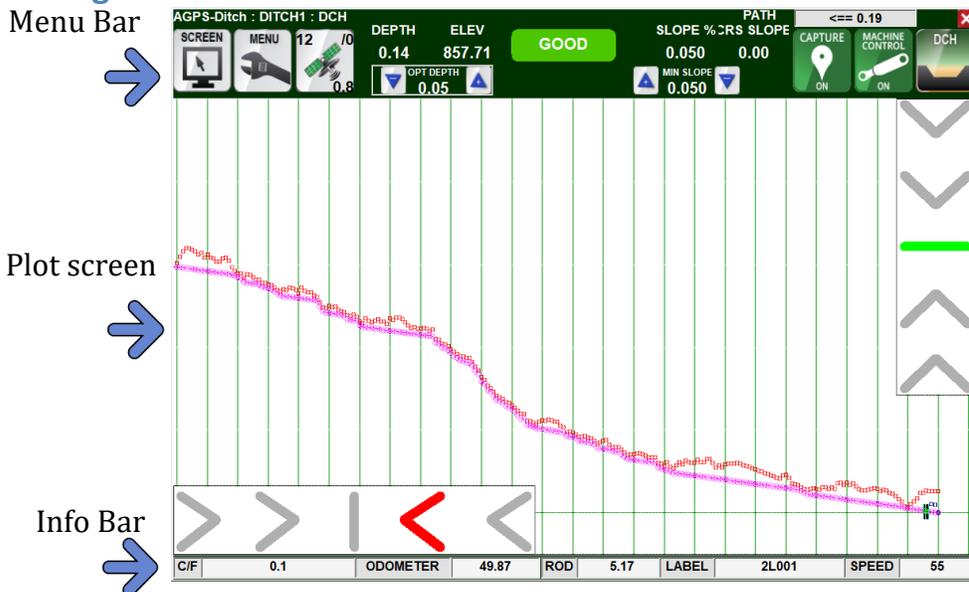
⫽AGPS DITCH PRO

The Working Screen – Menu Bar
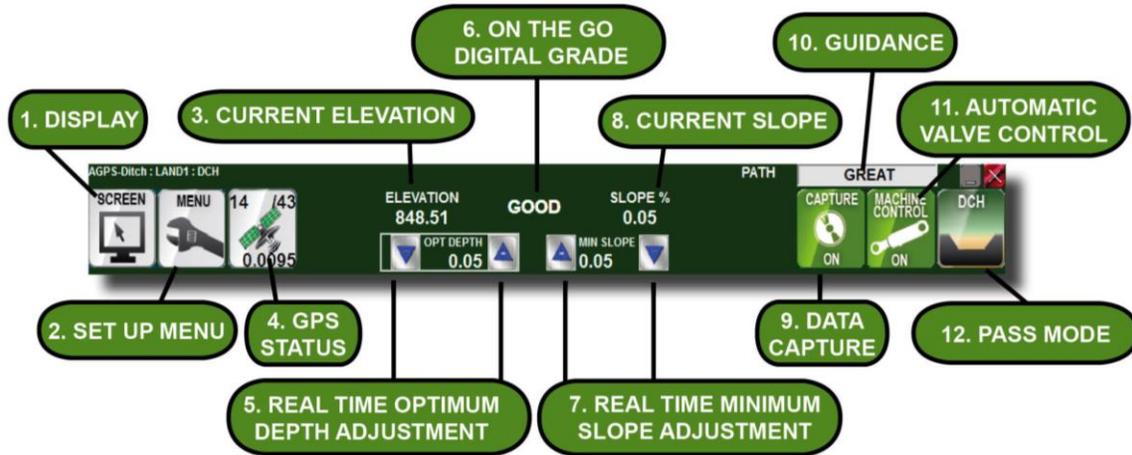
The majority of icons in the Menu Bar are touch active. Several also have a secondary function that can be accessed by pressing and holding the icon for 3 seconds.

The Menu Bar will change color depending on the Current Pass Mode. See Pass Types on page 30.

1.	Display	Touch this icon to drop down the display menu where you can adjust the zoom level, scroll around the screen or adjust the grid. See Adjusting the View on page 20.
2.	Set Up Menu	Touch this icon to start a new job, switch to a different job or adjust your parameters. See Setting up the Program on page 11.
3.	Current Elevation	The current elevation of the blade. Can be in meters, feet-international or feet-survey. See Setting up the Program on page 11.
4.	GPS Status	Icon showing current GPS status. Must be green for the program to work. Touch to access the Instrument Menu see Instrument Menu on page 42. The following menu shows the data types for often used RTK-GPS systems. Shows something like "ok: 15 4 1.1 /53" Where 15=satellites 4=datatype 1.1=precision and /53=read counter.

	RTK Fixed	RTK Float	No RTK base	Precision
GGA (Most manufacturers)	4	5	1	HDOP
John Deere™	4	3=extend 5=float.	1	HDOP
Raven™/NovAtel™/Beeline™	50	49/48/34/17	16	Alt. Std. Deviation
Topcon™ (Javad™ GGA)	4	5	1	HDOP
Trimble™ (GGK)	3	2	1	PDOP

5.	Optimum Depth Adjustment	Adjusts the Optimum Depth of the ditch. Please note that AGPS-DitchPro™ will redesign the ditch from your current location, removing previously cut ditch points for that line from the screen. The amount the Optimum Depth Adjustment buttons adjust can be set in the Parameters Menu on page 47.
6.	Digital Grade	Visual real-time indicator of the position of the blade in relation to designed grade.

7.	Minimum Slope Adjustment	Adjusts the Minimum Slope of the ditch. Please note that AGPS-DitchPro™ will redesign the ditch from your current location, removing previously cut ditch points for that line from the screen. The amount the Minimum Slope Adjustment buttons adjust can be set in the Parameters Menu on page 47.
8.	Current Slope	Slope of the design or ground at the current point.
9.	Data Capture	Auto Capture icon. Green for On, black/red for Off. When on, AGPS-DitchPro™ will capture a point after a preset distance (default is 10 feet). Adjust this distance in the Parameters Menu on page 47.
10.	Guidance	Distance from the survey path.
11.	Valve Control	Automatic control of the machine. Green for On, black/red for Off. Press and Hold to access the Devices (machine control menu).
12.	Pass Mode	Current Pass Mode. Press and Hold to change pass mode. See Pass Types on page 30.

The Plot Screen –Overhead View

1.	Northing-Easting Location	Real time display of your current location in Northing and Easting in Feet (or Meters).
2.	Adjustable Grid Lines	Grid lines to aid in surveying/ditching. See The Grid Menu on page 25
3.	Path Lightbar	Real time guidance light bar. Visual indicator of how far off proposed survey path you are.
4.	Proposed Path	Path Selected from the click men. See Click Menu on page 22.
5.	Ditched Lines	Previously Ditched lines appear as dark blue dotted lines.
6.	Heading	Green line that shows real time heading of the current position. The heading is drawn from the upper left-hand corner of the icon.
7.	Current Position	Visual real-time indicator of the position of the blade. The upper left-hand corner of the icon is considered the 'true' position of the blade. You can set a 'fake' position by touching the screen and either setting where you touched as the fake position or by 'snapping' to a point and setting that as the 'fake' position. 'Fake' positions are useful in rotating the grid.
8.	Vertical Lightbar	Real time Elevation guidance light bar. Visual indicator of how far off the Ditch Plan Profile the blade is. Also functions as a blade offset button. By pressing the up arrow chevrons the program will offset the blade a set amount above plan. See Light Bars on page 23 for more information.
9.	Surveyed Points	As you survey, a pink line will be drawn, and turn to cyan boxes.
10.	Control Point	The visual indication of the location of a Control Point is a cyan triangle. See Control Points on page 38.

//AGPS DITCH PRO

The Plot Screen – Profile View
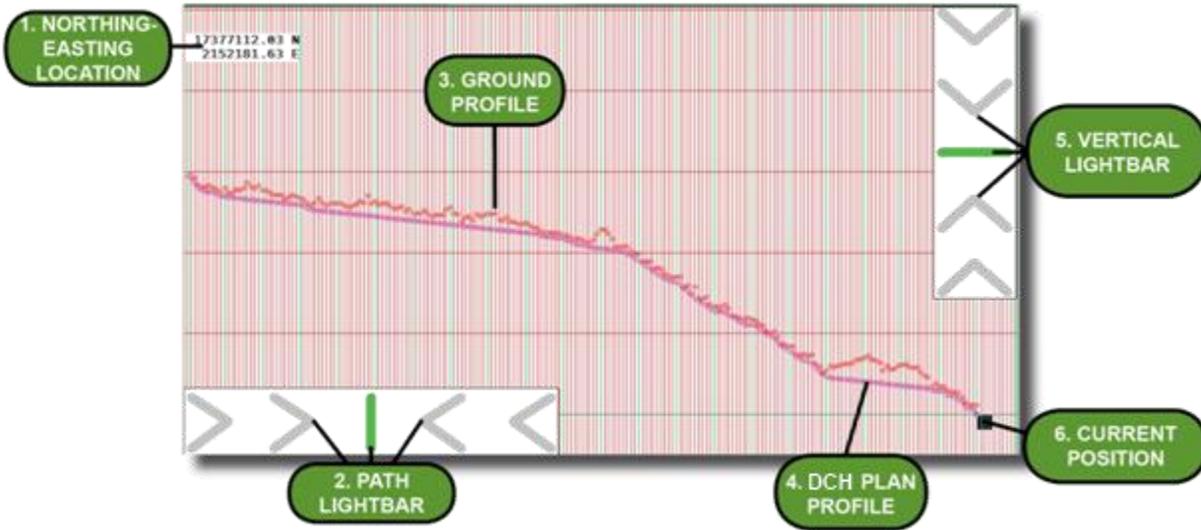
*Important Note: In the Profile View the X and Y (elevation and distance) are NOT drawn to the same scale in order for both the horizontal and vertical lines to fit on the screen. This will cause some lines to seem more steep over distance than they actually are and vice versa.

1.	Northing-Easting Location	Real time display of your current location in Northing and Easting in Survey Feet.
2.	Path Lightbar	Real time guidance light bar. Visual indicator of how far off the original survey pass you are.
3.	Ground Profile	Red data points showing the relative elevation of your original survey pass.
4.	Ditch Plan Profile	Where AGPS-DitchPro™ has calculated the ditch should be placed based on the topography of the line and the Parameters. AGPS-DitchPro™ attempts to place the ditch at the Optimum Depth with never violating the Minimum Slope.
5.	Vertical Lightbar	Real time Elevation guidance light bar. Visual indicator of how far off the Ditch Plan Profile the blade is. Also functions as a blade offset button. By pressing the up arrow chevrons the program will offset the blade a set amount above plan. See Light Bars on page 23 for more information.
6.	Current Position	Visual real-time indicator of the vertical position of the blade. The upper left-hand corner of the icon is considered the 'true' position of the blade.

AGPS DITCH PRO

The Working Screen – Info Bar


```
|C/F          ODOMETER  74.67  ROD  12.53  LABEL    2L4008   SPEED  160 |
```

2. ODOMETER   **4. PASS LABEL**

1. CUT/FILL   **3. ROD LENGTH**   **5. SPEED**
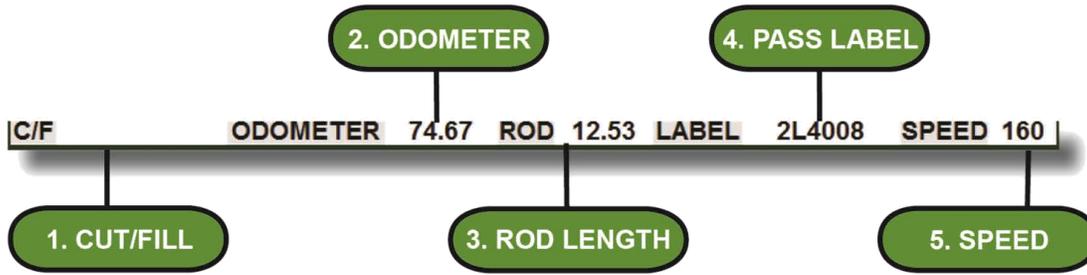
1.	Cut/Fill	The current amount above or below grade AGPS-DitchPro™ is laying ditch at. Touch to set a different Cut/Fill.
2.	Odometer	Real time odometer of the distance of the current pass
3.	Rod Length	The Current Rod Length. The rod length is defined as the distance from the measuring instrument (i.e. GPS globe) and the tip of the blade. See Rod Length on page 19
4.	Pass Label	Current pass label. Touch to choose a different label. See Pass Labels on page 29.
5.	Speed	Current speed in feet or meters per minute

Setting up the program

Setting up the program for the first time:

Follow these procedures for the first time you set up AGPS-DitchPro™. If you have previously set up the program or an AGPS-DitchPro™ Technician has completed these setup procedures, please skip to **Starting a New Job or Restarting a Current Job** on page 15

Start AGPS-DitchPro™		If the program does not load on computer startup, locate the AGPS icon on the desktop or in the Start Menu to load. A starting screen will briefly appear.
Enter the code **AGPS**. Touch the entry field to pull up a touch screen keypad. **Select** the unit of measure (typically Feet U.S. Survey for U.S. users).		
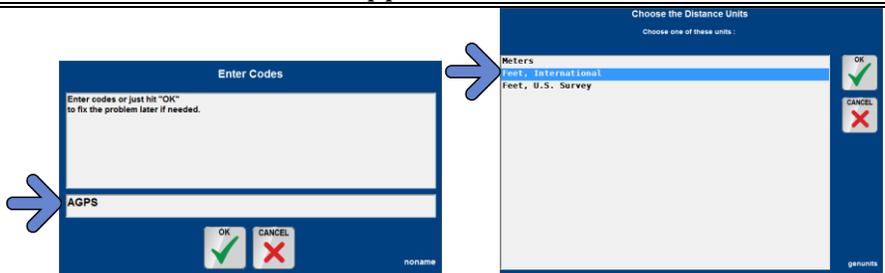
//AGPS DITCH PRO

Select AGPS-DitchPro™ from the Dashboard's "Program" Dropdown menu.

Press Start button.

Agree to the Disclaimer, you must do this every time you start AGPS-DitchPro™

Press Menu [MENU]
Select Setup Program (many questions).
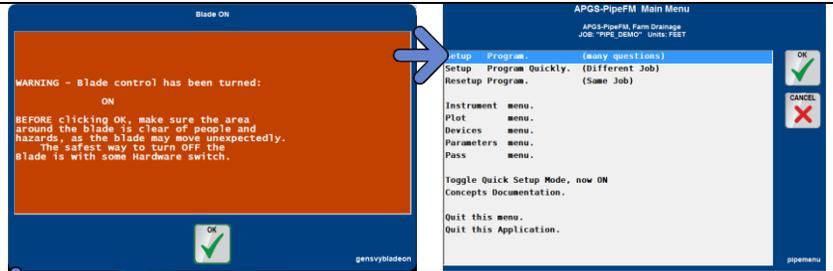
Select None, Make a New Job.
Enter the name of the job (i.e. the name of the field or the name of the customer). You may also enter a description of the job.
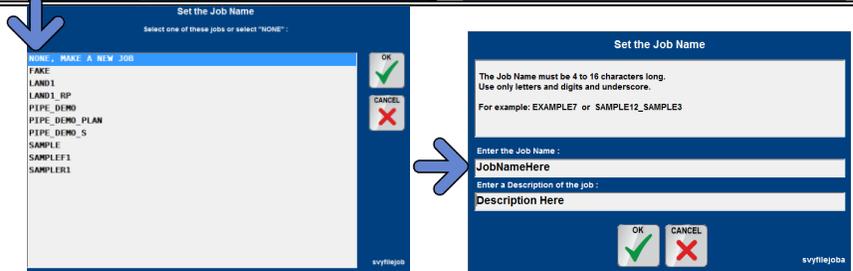
Setup your control points. If you have no control point for this job, select **Quit, No (further) Changes.** If you have control points (see Control Points on page 38) you can choose to **edit the control point file** and add the point.
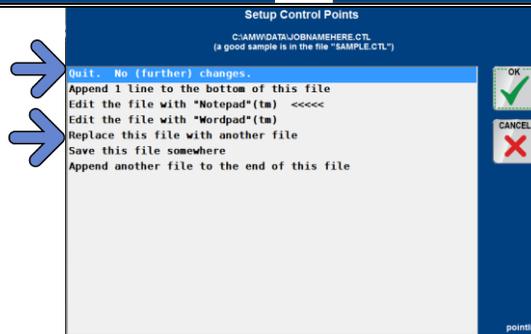
Choose the Instrument (GPS).
The GPS instrument must be configured to output the correct message type. Cousult the GPS manufacturer for specifics.
Then **Choose the Com Port** the GPS is outputting messages to.
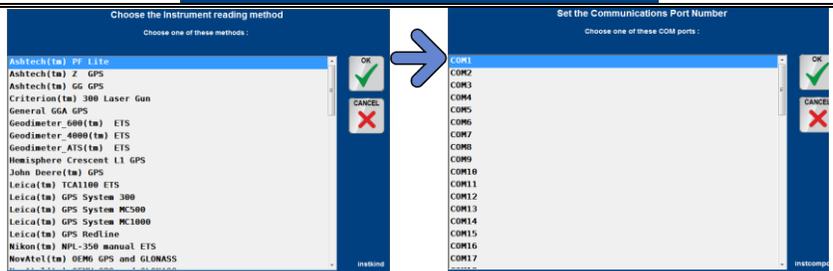
Select the Normal Rod Length.
The Normal Rod is the typical rod length.
To add your rod length, select **Add1**.
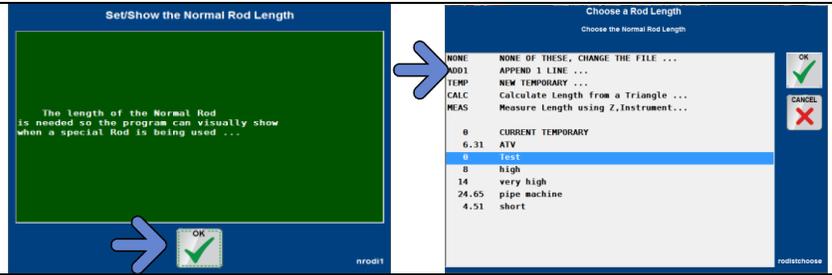
Select Rod Tip Corrections. If you have a slope sensor, select it here. Without a slope sensor select '**Cross and Forward Slope Only'**. The program will attempt to mathematically compensate for steep grades. (You must set the correct Rod Length for this to work properly)
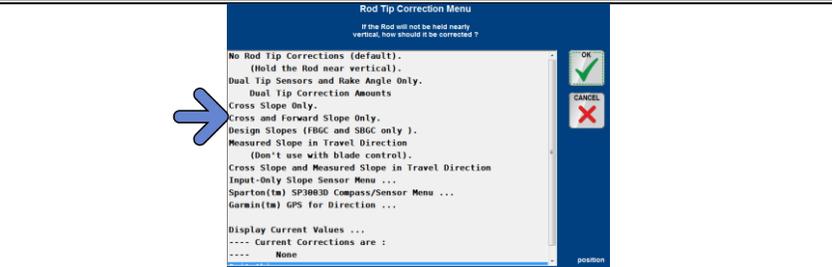
Set the Location-Instrument Position. If you use **UTM**, select UTM 0 point. If you do not know the UTM zone, select Unknown, Calculate. If you use **State Plane**, select **State Plane 0 point** and select the State Plane.

 or
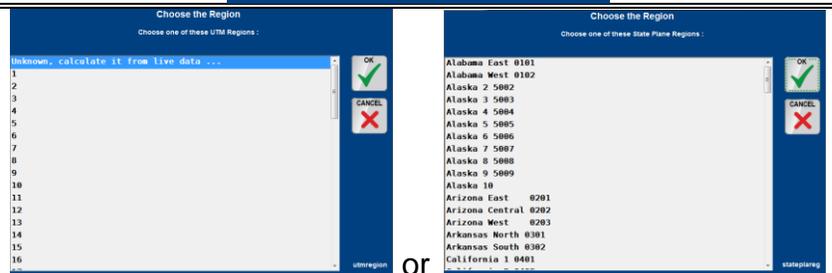
Bitmap control option or **Background Drawing**
You can load a bitmap image for a background drawing. See Loading Background Images on page 27.
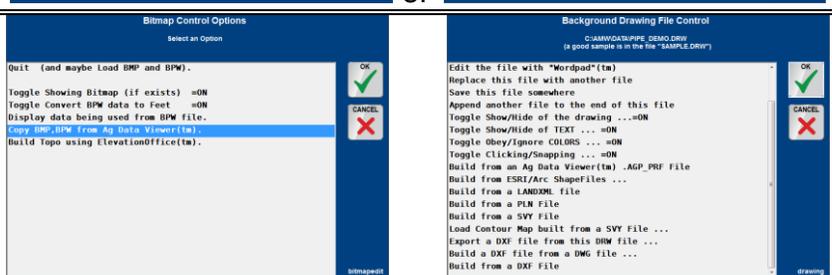
Survey load and Pass-Previous
You will see two status screens that tell you if any points were loaded (new jobs should have 0 points loaded).
Select OK on each screen.

13

Parameters Menu
Adjust the parameters to your preferred settings. Select an option to see a more detailed description.
Be sure to adjust the **Survey-Pass offest.** This is how high the blade is held above the ground when you survey. You must survey with the blade in the same place each time (typically all the way up).
Also adjust the **Optimum Depth and Maximum Depth.**
For more details, reference the section on the Parameters Menu on page 47
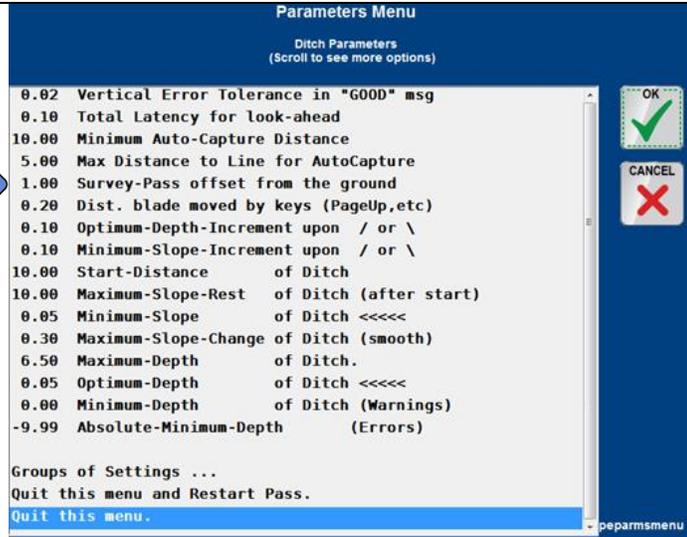
Device Menu. Choose the type of auto-blade controller you have. Contact the Auto-Blade control manufactuerer for more details on setting up the device.

Typical controllers are the DAC 7000™ or LaserTech™ with MultiPlexor. Then select the Com port the controller is plugged into.
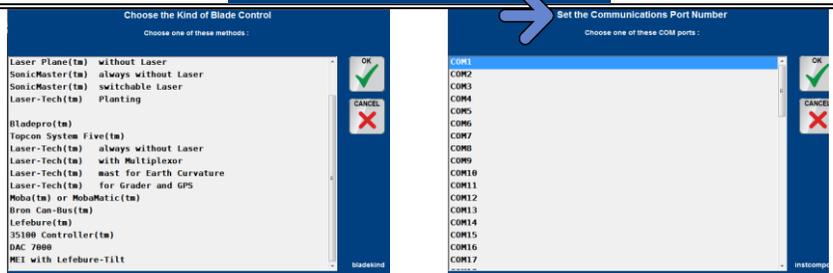
The Main Working Screen will appear: You should be able to begin working.
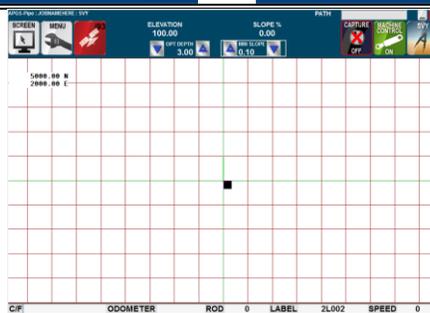
🔧 *TroubleShooting Tips:*

I finished the setup, but the screen flashes red	This is typically related to the GPS signal. See Troubleshooting My GPS on page 18.
I missed/mess up a step	You can go through the setup process again from the Main Menu. Press the Menu Icon on the Working Screen.

AGPS DITCH PRO

Starting a New Job or Restarting a Current Job, via Dashboard:
Explanation of the Startup Dashboard used to start AGPS-DitchPro™.

Start AGPS-DitchPro™	Run Geosite Manager Start AGPS	If the program does not load on computer startup, locate & double tap the Start the AGPS icon on the desktop. A starting screen will briefly appear.

① **Program**	Select a program to open. It should say AGPS-DitchPro. Press the down arrow to show/select other programs purchased.
② **Job Name**	Select a Job Name from the dropdown list. For a New Job: Select **Make New Job**, at the top of the list.

15

③ **Setup Type**	Setup Type Use Previous Setup UTM Coordinates, 0 point UTM Coordinates, 1 point	- If you have no control point, like starting a new job, Select **UTM, 0 point**. See Zones on the last page of this manual. - If you have a control point, Select **UTM, 1 point**.
④ **Region**	(also called zone) displays the region selected in #3 above.	
⑤ **Antenna Height**	Also called Rod Length, is the distance from the GPS Antenna to the tip of the blade on a plow or the bottom of the wheel on a trencher.	
⑥ **GPS Instrument**	Displays the type of instrument, or simulator. This cannot be changed from the Dashboard, see Instrument Menu on page 42	
⑦ **GPS status**	Displays the same information as on working screen, on page 8. If there is an error, that is labeled below the icon. Touching the icon will open the "Control the Instrument" menu with some settings options that vary with each type of instrument.	
⑧ **Check setup**	Not currently implemented.	
⑨ **User Pref**	Preferences menu that allows customization of menu colors/font, as well as a few menu behavior settings.	
⑩ **Job Management**		Various tabs to make changes to control points, design surface, background image, & more. "**Data Backup**" tab allows copying all files from \data folder to another folder on start/exit. Useful for cloud backup.
⑪ **Utilities**	Miscellaneous Utilities. Change Distance units. Security Menu (Show or Set Capabilities)	
⑫ **Help**	Not currently implemented.	
⑬ **Shutdown Computer**	Close the program, and safely Shutdown the Computer. (every 10th time will ask if you want to save a backup of program setting database)	
⑭ **Exit**	Exit the program, back to Windows desktop	
⑮ **Start**	Start the program, with the chosen settings.	
⑯ **Version**	Displays the version of the software currently installed.	

Typical daily workflow, would be:
Confirm (or adjust) ① **Program** ② **Job Name** ③ **Setup Type**
⑮ **Start**

//AGPS DITCH PRO

Working with RTK-GPS

AGPS-DitchPro™ is designed to be used with most high-grade RTK-GPS systems. The accuracy of AGPS-DitchPro™ is directly related to the accuracy of the RTK-GPS system that you utilize. Not all RTK-GPS systems are the same and offer the same accuracy and repeatability. Contact your AGPS-DitchPro™ dealer for recommendations on current RTK-GPS systems.

Configuring my GPS

The following tables list the output options that should be enabled on common brands of GPS systems. If your GPS system does not appear on this list, please contact your AGPS-DitchPro™ Dealer or Technician for setup details. The Hz (update) rate and Baud rate must also be set in the AGPS-DitchPro™ program. To set these, press the Menu icon, select Instrument Menu, Control the Instrument and adjust both the Hz and Baud rates.

	Ashtech	*TopCon*	*JD ITC*	*JD 3000*
Msg type	GGA	GGA	GGA	GGA
HZ rate	10	10	5	10
BAUD rate	57600	57600	38400	57600

	NovAtel	*300/ 410*	*Trimble (older)*	*Trimble (newer)*
Msg type	BestPos	BestPos	GGK	GGA
HZ rate	10	10	10 & ASAP	10
BAUD rate	57600	57600	38400	57600

GPS Status

Each individual RTK-GPS system will have it's own standard for being in 'fix' and the type of data/degree of precision it returns.

Common GPS Systems data:

	RTK Fixed	RTK Float	No RTK base	Precision
GGA (Most manufacturers)	4	5	1	HDOP
John Deere™	4	3=extend 5=float.	1	HDOP
NovAtel™/ Raven™/Beeline™	50	49/48/34/17	16	Alt. Std. Deviation
Topcon™ (Javad™ GGA)	4	5	1	HDOP
Trimble™ (GGK)	3	2	1	PDOP

A Note on 'DOP':

HDOP, VDOP, and PDOP are respectively Horizontal, Vertical, and Positional (3D) Dilution of Precision. The precision of multiple satellites in view of a receiver combine according to the relative position of the satellites to determine the level of precision in each dimension of the receiver measurement. When visible GPS satellites are close together in the sky, the geometry is said to be weak and the DOP value is high; when far apart, the geometry is strong and the DOP value is low. Thus a low DOP value represents a better GPS positional precision due to the wider angular separation between the satellites used to calculate a GPS unit's position. Other factors that can increase the effective DOP are obstructions such as nearby mountains or buildings.

AGPS DITCH PRO

DOP Value	Rating	Description
<1	Ideal	This is the highest possible confidence level to be used for applications demanding the highest possible precision at all times.
1-2	Excellent	At this confidence level, positional measurements are considered accurate enough to meet all but the most sensitive applications.
2-3	Good	Represents a level that marks the minimum appropriate for making business decisions. Positional measurements could be used to make reliable in-route navigation suggestions to the user.
>3	Poor	Should be used only to indicate a very rough estimate of the current location.

Troubleshooting my GPS

TroubleShooting Tips:

COM Port already in use	The Communications Port that the GPS is plugged into is being used by another program or is closed for some reason. 1. Verify that the GPS is plugged into the correct COM port. 2. Unplug the GPS from the COM port, power-cycling the computer, restarting AGPS-DitchPro™ and then re-plugging the GPS.
No GPS Data	The GPS is sending no signal, or the computer is receiving nothing. 1. Verify the GPS is powered on. 2. Verify the GPS is plugged into the COM port. 3. Verify the GPS is sending the configured correctly as described in Configuring my GPS on page 17.
Bad Data	The GPS is sending bad or incorrect data 1. Verify the GPS is plugged into the correct COM port 2. Verify the GPS is configured correctly 3. Verify AGPS-DitchPro™ is configured to the correct instrument and to the correct incoming Baud and Update rate.
Bad Position Type X (#) ***Where X is the type, see table under "GPS Status"***	The GPS is not seeing the base station 1. Verify the base station is powered on. 2. Verify the base station is within the manufacturer guidelines for distance. 3. Verify the rover is configured to read the base station. 4. Double check radio antennas and cable connections.
Goes in and out of fix	The GPS going in and out of fix can be a symptom of several different problems: • Poor line-of-site with the base. • Poor Satellite visibility. • Damaged GPS Rover Antenna.

//AGPS DITCH PRO

Rod Length and Survey Pass Offset

Rod Length (Antenna Height)

The rod length is the distance from the GPS Antenna to the tip of the blade on a blade or the bottom of the wheel on a trencher. This number may change. To adjust your Rod Length, press the "ROD" or "ANT HT" on the bottom Info Bar.
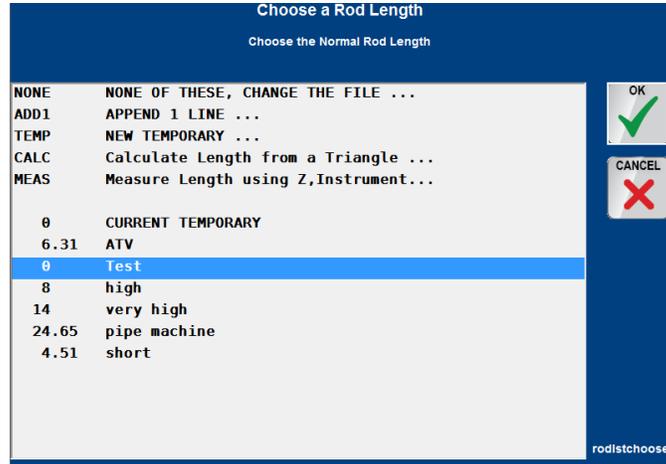
NONE	Allows you to change the entire rod length list, adding or deleting any lengths/descriptions you would like.
Add1	Adds a user-defined label to the Rod Length list.
Temp	Creates a new temporary length but does not add it to the permanent list.
CALC	Calculate the length from a triangle. Not used in AGPS-DitchPro™
MEAS	Measures the length using Z and the Instrument. Not often used.
The remainder are the rod lengths saved in the program.	

Survey Pass Offset

The Survey Pass Offset is the distance that you will hold the bottom of the scraper or blade above the ground while you survey. This number is a constant and cannot be changed after you survey a line. It can be changed in the Advanced parameters menu, see page 48.

//AGPS DITCH PRO

Working with the Program

Adjusting the view

To adjust the view in the Working Screen
Press the Screen Icon
Note: When in Overhead View, the Side View Icon will be visible, and when in Side View, the Topography Icon.

ZOOM IN ⊕	**Zoom In**	Pressing the Zoom In Icon will Zoom the view in, centered on your current position (either real or fake).
ZOOM OUT ⊖	**Zoom Out**	Pressing the Zoom Out icon will Zoom the view out, centered on your current position (either real or fake).
SIDE VIEW / **TOP VIEW**	**Side/Top View**	Toggles between a Side View (Topography) and Top View (Drainage Path).
NEIGHBOR-HOOD	**Neighborhood**	The Neighborhood Icon will Zoom the screen into the neighborhood of your current position (either real or fake).
VIEW ALL	**View All**	Pressing the View All Icon will Zoom the screen to show all completed lines or the entire background image/drawing.
SCROLL	**Scroll**	Pressing the Scroll Icon allows you to recenter the view where you touch the screen by placing a 'fake' position where you touch. To shut off scroll view, press the scroll icon and then select "Turn off any Fake Current Position"
GRID	**Grid**	Displays the Grid Menu. Details on page 25.
BUTTONS MENU	**Buttons Menu**	Displays the Buttons Menu. The Buttons Menu has shortcuts with keyboard hotkeys for commonly used program functions.
CLEAN	**Clean**	Locks the screen for 45 seconds, allowing you to wipe the screen clean. With a keyboard, you may press Esc to exit early.

//AGPS DITCH PRO

The Buttons Menu

The Buttons Menu will display all of the keyboard 'hotkeys' for the program. You can also select the option in the Buttons Menu to do that action.

BackSpace	Switch Pass	*P*	Pass Menu
PageUp	Move Blade Up	*Q*	Quit Menu
Page Down	Move Blade Down	*R*	Specify Radius to Show
ArrowUp	Have of PageUp	*S*	Show View from the Side
Arrow Down	Half of pageDown	*T*	Show View from the Top
SpaceBar	Toggle Auto Capture	*U*	Main Menu
Mouse Left Button	Click Menu	*V*	Toggle between Side/Top view
A	Show All Points	*W**	Show view from the West
B	Show Buttons Menu	*X*	Grid Menu
C	Find Closest Control Point	*Z**	Show 3D View looking NNE
D	Find Closest Data Point	*0*	Toggle Machine Control On/Off
E*	Show View from the East	*1*	Set Rod Length
F	Cut/Fill Offset (subgrade)	*2*	Set Point Label
G	Toggle stop/go mode	*3**	Specify a 3D View
I	Zoom In	*4*	Set the next point number
K	Mark Special Points	*6*	Control the Instrument
L	Draw Line Between Points	*7*	Capture a Note
M	Manually capture a point	*8*	Display/Plot Menu
N	Show Neighborhood of current position	*9*	Devices Menu
O	Zoom out	*=*	Switch Rod-Length Offset

*Only an option when Disable alternate viewing angles =OFF in the Plot Menu, see page 44.

AGPS DITCH PRO

The Click Menu

When you touch the screen you will see the click menu. This menu has many operations that you may want to do while surveying or laying ditch.

```
Handle Mouse Left Click

Select one of these meanings for your
Mouse Click ...

Set (NEZ) 540410.385  13045768.607  739.753           OK
    as the "Fake" Current-Position for further          ✓
    operations.  It is 40.15 away.
Turn off any "Fake" Current-Position.                CANCEL
Snap to closest point first ...                        ✗
Draw Line to here and set "Fake" pos.
Toggle Mouse Tracking Simulated Inst.  =OFF

Pick Path from Grid Line.
Pick Path from Background Drawing.
Path by Offsetting Current Path.
Path from old Laid points ...
Put current Path in Background Drawing.

Use my Current Position instead of Click.
Use the closest point and/or modify SVY file ...
Show information about where I clicked ...
Make new Control Point where I clicked ...
Grid Menu ...
Quit.
                                              pipeclick
```

Set NEZ as 'fake position'	Sets the current NEZ (it will be displayed) as a 'fake position'. A 'fake position' will be used for any zoom, grid, and other functions, rather than your actual position.
Turn off any 'fake' current positions	Turns off any 'fake' positions. After using the scroll icon to move around the screen, you must turn off any 'fake' positions to re-center the screen on the real current position.
Snap to closest point	Will snap to the closest captured point for the NEZ point to be used instead of the clicked point.
Draw Line to here	Will draw a line between the current position and where you clicked (or snapped to closest point)
Toggle Mouse Tracking	Used for GPS Simulators.
Pick Path from Grid	Will choose the closest Grid line as the path for guidance.
Pick Path from Background	Will choose the closest background line for guidance.
Path by Offsetting Current Path	Will offset your current path the amount you enter and set it as the new path for guidance.
Path from old Laid Points	Will select the current path from the closest previously laid ditch line. You will often use this option first then offset the current path in order to ditch a line parallel to a previously laid ditch line.
Put current Path in Background drawing	Places the current path in the background drawing (will create a background drawing if you have not loaded one).
Use my current position	Sets the current NEZ at the top of the click menu as your current position.
Use the closest point and/or modify SVY file	Used to change a pass label on an already laid path. See Pass Labels on page 30.
Show information about where I clicked	Will show information about where you clicked, including it's NEZ (if a previously captured topo is loaded or if you clicked a known point), it's distance from the current position, slope distance and angle (very useful for rotating a grid to a known point).
Make new control point where I clicked	Runs the control point collection steps based on your current position. See Control Points on page 38.
Grid Menu	Opens the Grid Menu. See Grid Menu on page 25.

AGPS DITCH PRO

The Light Bars

The Light Bars allow a visual indication of your path and vertical accuracy. The vertical lightbar also acts as a blade offset. The lightbar menu is a part of the plot menu, details on page 44.

Vertical Lightbar

Path Lightbar

| C/F | 0.1 | ODOMETER | 49.87 | ROD | 5.17 | LABEL | 2L001 | SPEED | 55 |
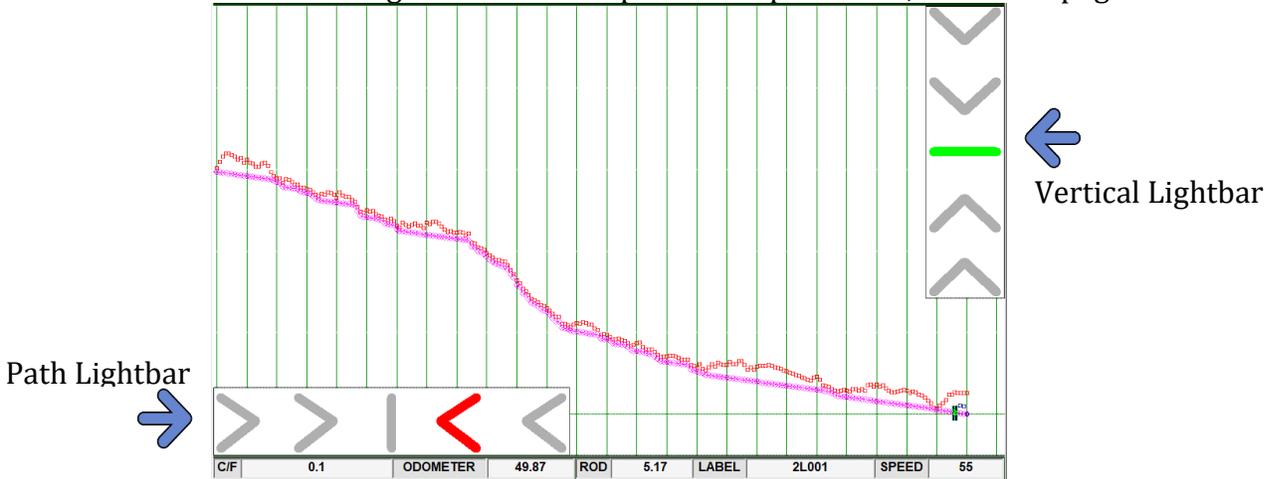
Path lightbar

The Path lightbar will indicate either the path to drive for surveying or the path to drive for laying ditch. The path lightbar will automatically show the path to drive after surveying or ripping a line. If you choose a path to drive (typically from the grid or a background drawing) it will display that path.

Vertical Lightbar
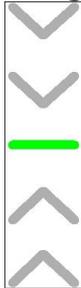
The Vertical lightbar will indicate how far from grade the machine is operating. It also acts as a blade offset. By pressing the down or up chevrons, the program will offset the blade the amount set in the parameters menu for blade offset by keys. To change this amount, see the Parameters Menu on page 47.

Ditch Plan Offsetting

AGPS-DitchPro™ has an Above Plan Offset (Cut/Fill) to aid with cutting a deep ditch or with back-sloping. Touch the Vertical Lightbar chevrons to set the offset amount you want to offset and AGPS-DitchPro™ will cut the ditch above or below the design the offset amount. The current offset amount will be displayed in the upper-left hand of the plot screen, above the NE location, and also in the lower left corner.
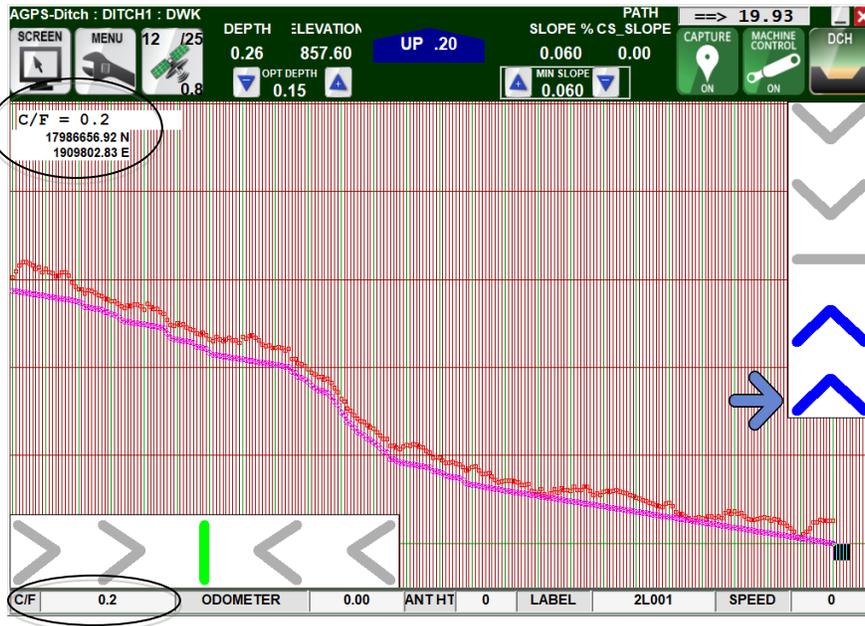
The Light Bar Menu

Toggle Drawing	Toggles between the light bars being ON or OFF. Must =ON to see the light bars.
Toggle show in Side View Only	Toggles showing the light bars in the side (drainage path) view only.

Width of the Vertical Bar	The % width of the Vertical Bar. Increase to make the Vertical Bar wider.
Height of the Vertical Bar	The % height of the Vertical Bar. Increase to make the Vertical Bar taller.
Toggle Drawing Path Bar	Toggles between the path bar being ON or OFF. Must =ON to see the path light bar.
Width of the Path Bar	The % width of the Path Bar. Increase to make the Path Bar wider.
Height of the Path Bar	The % height of the Path Bar. Increase to make the Path Bar wider.
Vertical Zone Values	The value(s) at which the Vertical Light Bar will display the given correction. The Default values are shown. In the defaults shown, the Vertical Bar will display Green for good between .02 and -.02
Path Bar Zone Values	The value(s) at which the Path Light Bar will display the given correction. The Default values are shown. In the defaults shown, the Path Bar will display Green for good between .2 and -.2

The Grid

The Grid allows for exact placement of ditch. You can snap the path of your survey passes to the grid for straight lines and snap your PTL up and down hill passes to the grid. The grid can be adjusted to whatever pattern you need and saved. You can load commonly used grid patterns across jobs.

The grid can be adjusted in several fashions. You can manually rotate to some angle, snap an A – B line, snap to an existing line.

Setting up the Grid

Press the Screen Icon Select Grid
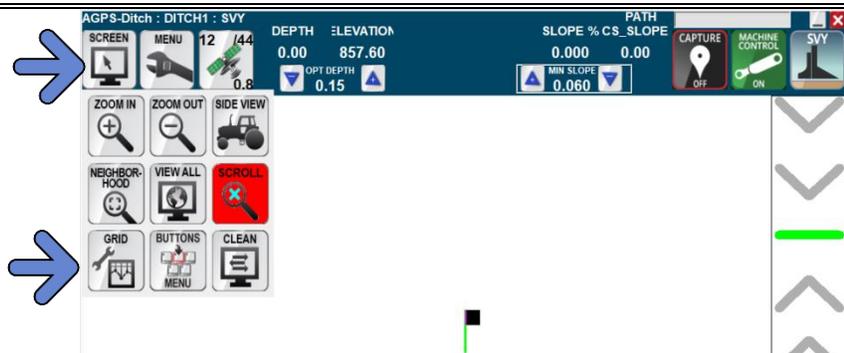
The grid menu is where you adjust the grid
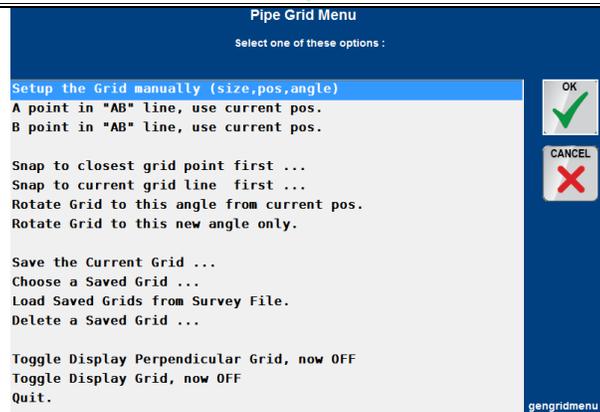
Setup Grid Manually

Allows you to set the course and fine of the grid. Fine will be displayed in RED, course in GREEN. For instance, if you were ditching every 35 feet, you would set the course for 70 and the fine for 35, alternating the grid red and green every 35 feet.

Plot Grid Sizes

Enter both the Coarse and Fine grid sizes. They should both be valid distances. They may both be the same size.

Coarse
1000
Fine
100

OK   CANCEL

genplotgrids
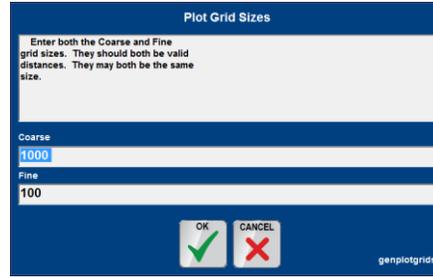
Setup Grid Manually
Grid Offset

Allows you to offset the grid some amount N (north) and E (east) and Z (elevation – uncommon)
For instance, if you wanted to offset the grid 10 feet NorthWest from your current grid, you would add 10 feet to N and subtract 10 feet from E.

Grid Offset

Enter the coordinates of a point that the grid will be relative to. You will probably either type all ZEROES here or will have picked other coordinates by clicking.

Northing
0
Easting
0
Elevation
0

OK   CANCEL

genplotgrido
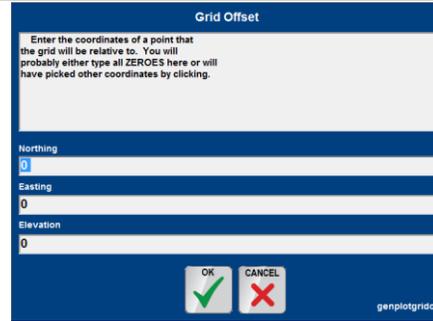
Setup Grid Manually
Set Grid Angle

Rotate some degree based on the Coordinates on the previous screen.

Set the Grid Angle

This is the angle to turn the grid so that it is easier to drive along straight lines.

The angle should be the number of degrees to rotate clockwise from North.

Enter the Angle in degrees :

90

OK   CANCEL

genpgrida
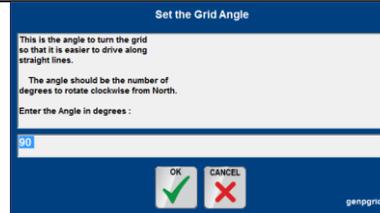
A point in AB Line **B point in AB Line**	Snaps the grid to an A – B point (like a lightbar system.) To snap along your first lateral while surveying, set the A point at the high point, drive the line, then set the B point.
Snap to closest grid point **Snap to closest grid line**	Snap to the closest grid point or line. Useful in setting your path or rotating the grid to a new position relative to the old grid
Rotate Grid to this angle **from current pos.**	If you click on the screen, then select this option, it will snap the grid from your current position to where you clicked
Rotate Grid to this new **angle only**	Keeps grid Northing and Easting as set in Setup Grid Manually, but changes the grid angle from there to where you clicked.

Save the Current Grid

You can save and name your current grid to return to it later

Name the Grid

You may want to enter a name for the current Grid, that you are saving, below:

OK   CANCEL

gengridsave
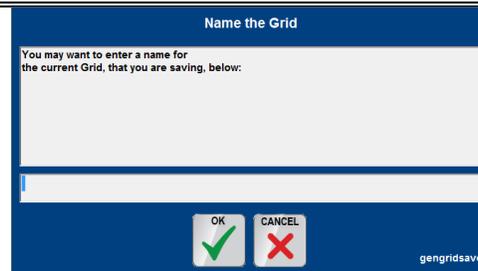
Choose a Saved Grid
Recall a saved grid

Load Saved Grids From Survey File	Selecting this option will allow you to pick from grids saved across different jobs. After selecting it, Choose a Saved Grid.
Delete a Saved Grid	Delete a grid you have saved.
Toggle Display Perpendicular Grid	When the perpendicular grid is ON, there will be two grids meeting at right angles. Turning it OFF goes to a Single Grid (like parallel ditch lines)
Toggle Display Grid	Toggle the entire grid On and OFF.

Using the Grid

Once you have set up the grid, you can use the grid for several features. Simply touch or click the screen on the grid line you want to use to pull up the click menu.
A typical way to use the grid is for guidance using the Path or horizontal lightbar. To automatically highlight the nearest gridline, see "Toggle Paths along Gridlines" in the Parameters Menu on page 47.

Loading Background Images

Background Images can range from 3-D polylines that are selectable to a bitmap image to a topography map.
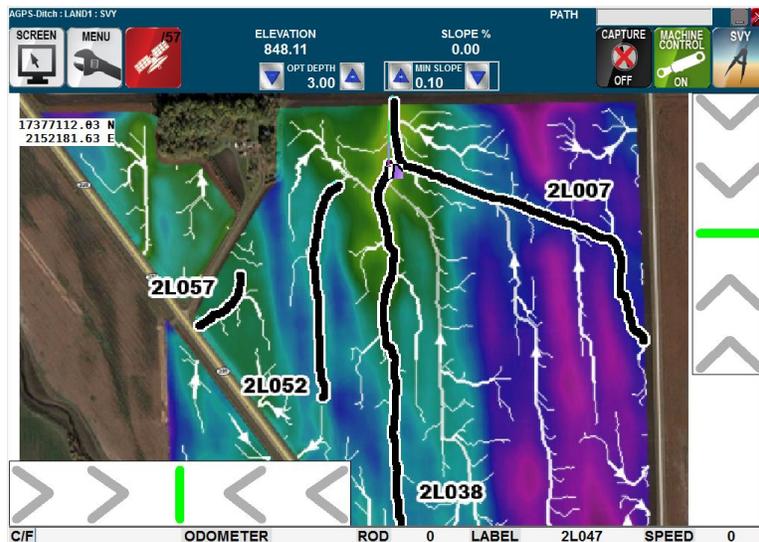
AGPS DITCH PRO

Typically AGPS-DitchPro™ Supports Bitmap images in the .bmp format with a georeferencing .bpw file associated with it or .drw polyline files. Consult your AGPS-DitchPro™ Technician with any questions about these file types.

1. Press the Menu Icon **2. Select Plot Menu** The Plot menu controls how things are displayed on the Working Screen	
3. Select Background <u>Bitmap</u> (step 4) or **Background <u>Drawing</u> (Step 5)** A Bitmap <u>image</u> is a snapshot image (such as you would export from Ag Data Viewer™). A Background <u>Drawing</u> is a 3-D object with polylines that the program can 'read' (such as you would export from Auto-CAD or other 3-D design program)	
4. Load Bitmap **Select Copy BMP, BPW.** **Select the Bitmap Image** You must have a .bpw file in the same directory. Or use "Convert BMP,BPW from other format" if you have JPG+JGW. Confirm Show Bitmap = ON.	
5. Load Backgound Drawing The Load Background Drawing Menu has multiple options for loading or creating a drawing file. Typically you will 'Build from a .dxf'. If you have a .drw file, Select 'Replace this File' and then selct the .drw file. If you have a .SVY from AGPS-Topo, you can pick "Contour Map built from a .SVY file". If you have a .NEZ or other TXT, you can pick "Contour Map built from a .NEZ file". Contact an AGPS Technician for help with other supported file types.	
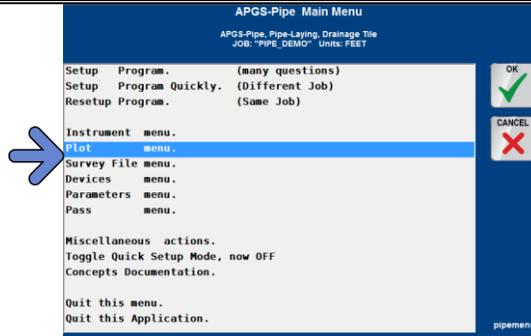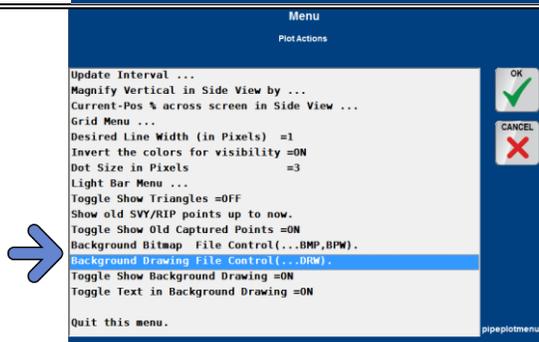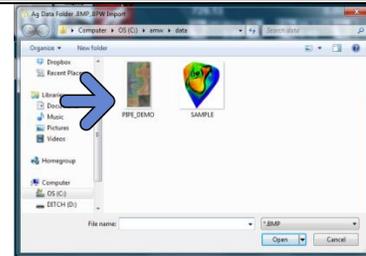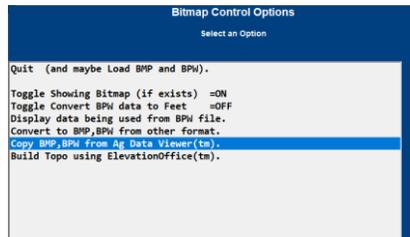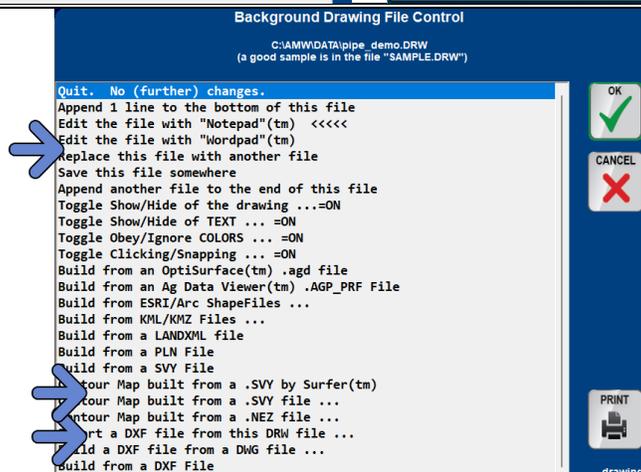
Pass Labels

Pass labels define the type (lateral or main) of ditch.

Reading a pass label

Pass labels will be an alpha-numeric label such as '2L023', where 2 is a check-digit that will always be a part of the label, 'L' means Lateral (it would have an M for Main), and '023' is the pass number (increases automatically after each pass).

Selecting a Pass Label

To select a pass label, press 'Label' in the info bar on the main working screen.
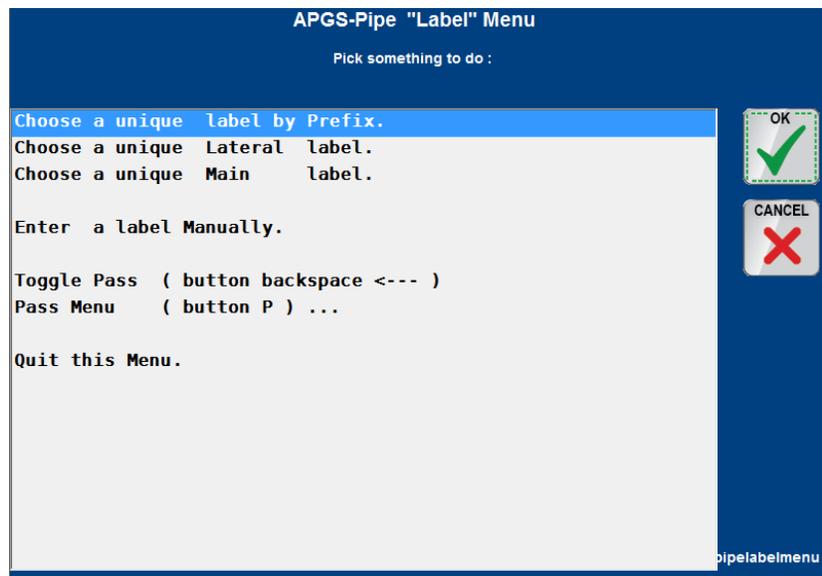
Choose a unique label by Prefix	Opens the Choose a Point-Label menu, see below.
Choose a unique Lateral Label	Selects a lateral label that is unique
Choose a unique Main Label	Selects a main label that is unique.
Enter a label Manually	Works the same as Choose a Unique label by prefix.
Toggle Pass	Same as if you pressed the Pass Icon
Pass Menu	Opens the Pass Menu

Add1	Adds a user-defined label to the Point Label list. For proper reporting Labels must begin with the number 2 and contain no spaces.
Temp	Creates a new temporary label but does not add it to the permanent list. For proper reporting Labels must begin with the number 2 and contain no spaces.
INCR	Increases the current pass label by 1
1STAKE	The Current Temporary. 1STAKE is as a label for putting a stake or other note into the job.
2PER	If you were capturing Topography, it would define the perimeter of the job.
3GRD	Ground elevation points. If you were capturing Topography, it would capture points as you drove and label them as ground points.
The remaining options are custom labels. If you would like a label that is not on the list, select ADD1 and add the label you need.	

Pass Types

There are several types of passes in AGPS-DitchPro™

To select the pass you want
Press and Hold the Pass Icon

	Ditch	A pass done where the ditch is cut. Requires a Survey Pas. The Menu Bar is colored Green in Ditch Mode.
	Survey	A pass to survey the ditch line. The survey is done with the blade at a constant height above the ground. The program subtracts the height from the collected data points. Followed by a Lay Pass. The Menu Bar is colored Light Blue when in Survey Mode.
	Ditch Rework	Recalls a previously surveyed and designed ditch. Defaults to the Nearest previous ditch when selected. Requires use of control points for day-to-day accuracy of GPS.

	Topo	Capture Topography points like you were ditching a line but without a survey or ditch pass. Usefull for capturing previously cut ditches. The Menu Bar is colored Yellow in Topo Mode.
	Use old SVY	Recall a previously recorded Survey a Ditch pass
	Restart Pass	Clears the Ditch Design. Press Capture to redesign the current run.

Survey Pass

The Survey Pass is accomplished by holding the GPS Instrument a constant height above the ground while the intended ditch is driven from the high point to the outlet/connection point.

Creating a Survey Pass

Start at the *high point* of the ditch you want to cut *with the blade raised up; Verify* you are set to the correct *Pass Label.*

1. Press capture It will turn green	
2. Drive the Run **3. Press SVY** It will change to LAY	
4. Lower the Blade to Starting Depth / Grade and Press Capture The run will be designed	
Verify the Survey Design	

5. If Machine Control is not green, press it. Toggle Machine Control ON in your machine. Cut the Ditch

AGPS DITCH PRO

6. Press Ditch to repeat	

1➔ *Start* at the **High Point** of the Ditch with the **blade** raised **up**

2➔ *Press* [CAPTURE OFF] ➡ [CAPTURE ON] and *Drive* to **Low Point** (outlet) of the **ditch**

3➔ *Press* [SVY] ➡ [DCH] and *lower* the **blade** to the **ground**

4➔ *Press* [CAPTURE OFF] ➡ [CAPTURE ON] to **design** the **ditch**

Verify the menu bar looks like this

5➔ *Toggle* **Machine Control** on your tractor and **cut** the **ditch**

6➔ *Press* [DCH] ➡ [SVY] when **done** to **start** a new **ditch**

TroubleShooting Tips:

The designed line is deeper/shallower than in the real world	Check the Survey-Pass Offset in the Parameters Menu.
I get a Minimum Depth error	The starting point is too shallow or there isn't enough grade to cut the ditch at the Minimum Slope. Adjust either as possible.
I accidentally erased the design	Follow the steps on page 35 to recreate the ditch line

Ditch Reworking Pass

The Ditch Reworking Pass recalls the closest previously surveyed and designed ditch.

Note: Ditch Reworking requires accurate and repeatable day-to-day GPS signal. AGPS recommends utilizing Control Points with Ditch Reworking.

Utilizing a Ditch Reworking Pass

Start close to the ditch you want to recall.

//AGPS DITCH PRO

Press and Hold the Pass Icon and select DWK Pass
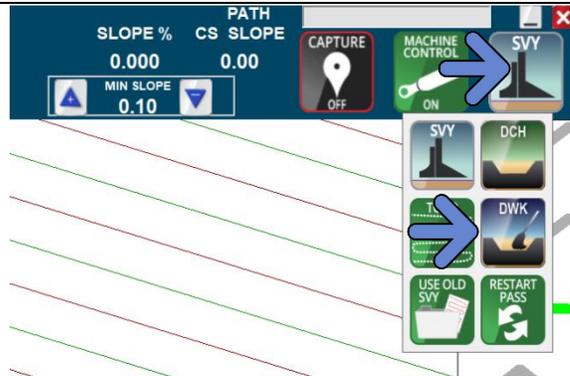
1. Press capture
It will turn green
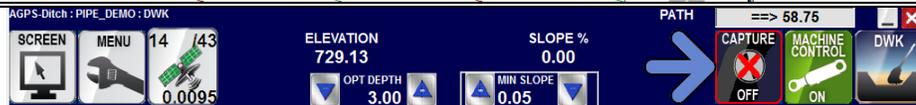
Verify the Design
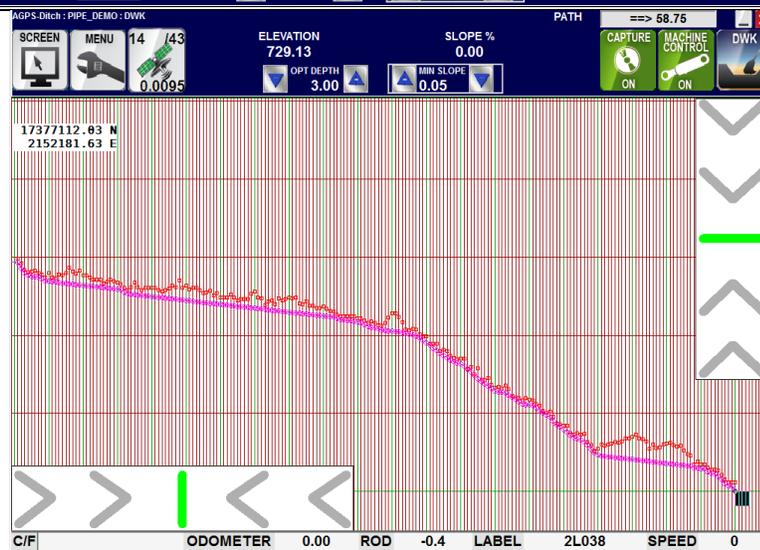
5. If Machine Control is not green, press it. Toggle Machine Control ON in your machine. Cut the Ditch

6. Press DWK to repeat

Verify the *GPS* correction is the **same** as when the **ditch** was **designed**

1 → *Drive* to a **ditch** that has already been **designed**

2 → *Press* and *hold* [SVY] to open the *Pass Menu*

3 → *Select* [SVY DCH TOPO DWK USE OLD SVY RESTART PASS] ← *DWK (Ditch Reworking)*

4 → *Press* [CAPTURE OFF] → [CAPTURE ON] to cut the **recalled ditch**

5 → *Toggle* **Machine Control** on your tractor and **cut** the **ditch**

6 → *Press* [DWK] to **recall** a different **ditch**

AGPS DITCH PRO

Recalling a Previously Captured Survey Pass

Survey Passes can be done previous to when the ditch is being cut.
Take note of the Pass Label for any Survey Pass that you want to come back to.
IMPORTANT: If Surveying is done beforehand, make sure that a Control Point is utilized to ensure correct GPS data.

Start at the point where you want to begin cutting (e.g. where you left off or the outlet)

1. Press and Hold the Pass Icon
2. Select Use Old SVY

---

3. Select the SVY Pass
 Nearest Main or Lateral are options at the top.
 The rest of the list order is most recent at the bottom.

---
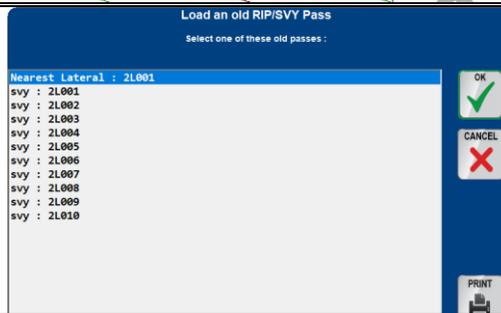
4. Press Capture

Topography Pass
The Topography Pass logs the path you drive as if you were cutting a ditch.

Collecting a Topo Pass

Start at the *either point* of the run you want to log *with the blade raised up;* Verify you are set to the correct *Pass Label.*

Press and Hold the Pass Icon and select Topo Pass
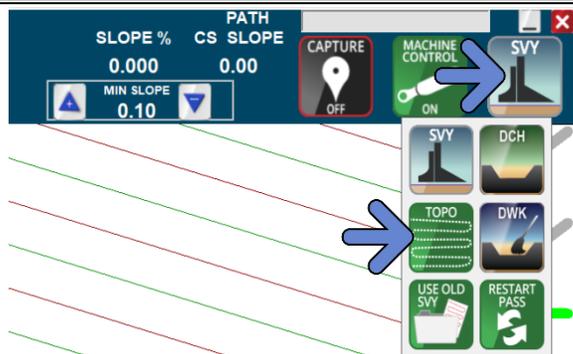
AGPS DITCH PRO

1. Press capture
It will turn green

Topo Pass
The program will drop data points as you drive
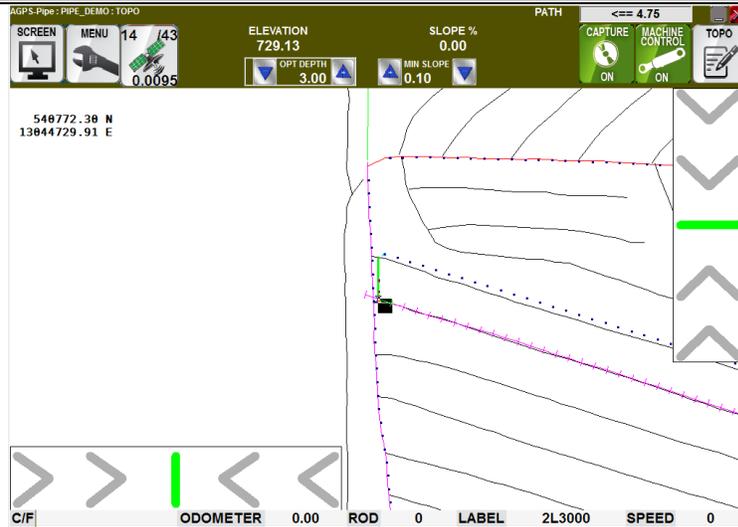
3. Press Topo to repeat

Design Info Screen and Modifying Points in a Design

AGPS-DitchPro™ has a Design Information feature. Simply touch (or click) anywhere on a design to see information about that design. A blue line will be drawn where you touch and a screen with the information about this point will appear.
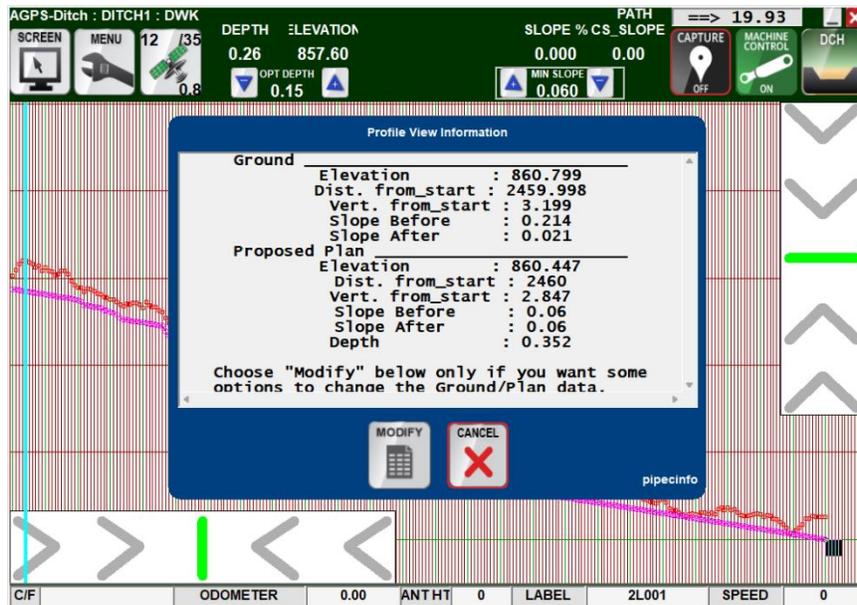
From this design information screen you can select to 'Modify' the points of the design.
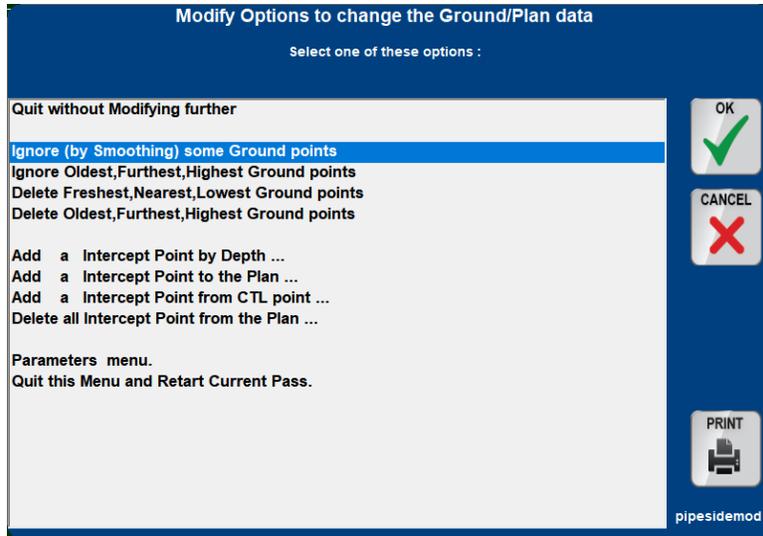
Ignore (by smoothing)	Smooths the points around where you clicked. Useful in eliminating a hill or depression that appears in the design that you want to ignore or that were a mistake in surveying.
Ignore Oldest, Furthest, Highest	Smooths the points at the high point of the run.
Delete Freshest, Nearest	Deletes the points at the low point of the run.
Delete Oldest, Furthest	Deletes the points at the high point of the run.
Add a Intercept Point by Depth	Enter Depth and Distance (from start) for a point for the plan profile to try to cross through.
Add a Intercept Point to the Plan	Enter Elevation and Distance (from start) for a point for the plan profile to try to cross through.
Add a Intercept Point from CTL point	Choose a previously captured CTL point, and enter distance below (or 0) for a point for the plan profile to try to cross through.
Delete all Intercept Point from the Plan.	Delete all points, in case there is a mistake. There is not an option to only delete 1.
Parameters Menu	Shortcut to the Parameters Menu, on page 47.
Quit this Menu and Restart Current Pass.	Restart/Recalculate the Pass after you made changes with other options above.

After choosing one of the ignore/delete options, you will see a menu to input a distance to modify.
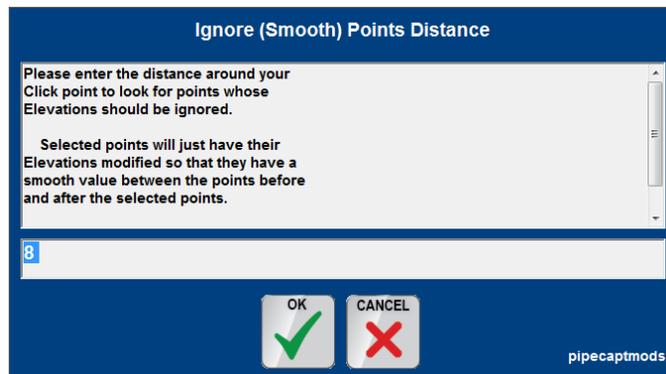
This will allow you to input the radius (each direction from the selected point) how much distance you want to smooth or delete.

Control Points (.ctl file)

A Control Point (sometimes referred to as a Benchmark) is a known location in the real world that has associated coordinate data and can be accessed at a later date.

Control points allow for exact repeatability from topography collection to ditching. They assure that the GPS correction data is correct from day-to-day, month-to-month and year-to-year, independent of a base station or repeater system.

AGPS-DitchPro™ requires the use of Control Points in any Ditch Reworking operation and recommends the use of control points in day-to-day operations.

TroubleShooting Tips:

Where should I set the control point?	A location that isn't likely to change and that you can easily re-locate and access in the future (e.g. culvert, fence-post)
What's the best way to capture/load control points from day-to-day	Simply capture a control point where you stop for the day (with the blade raised up to avoid settling) and load the control point before moving the next day.
My RTK Base station has an internal memory; do I still need control points?	We highly recommend using them. Base stations can lose their memory, people can steal the tripod you left in the field.

Collecting a Control Point

1. Press the Menu Icon
2. Select Quit this Application
3. Select Capture a Control Point Here
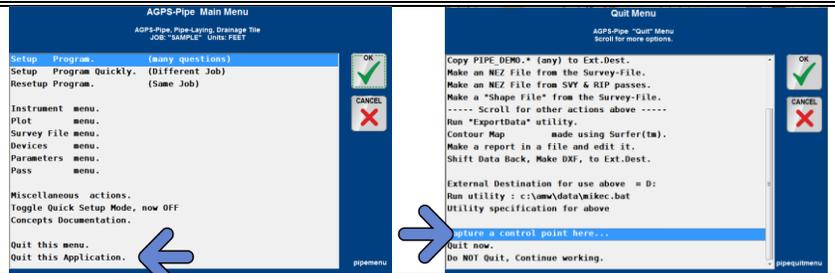
4. Select your Rod Length
This may be the typical rod length of the blade or a different Rod Length (e.g. if you were taking the GPS globe off of the machine to reach a culvert)
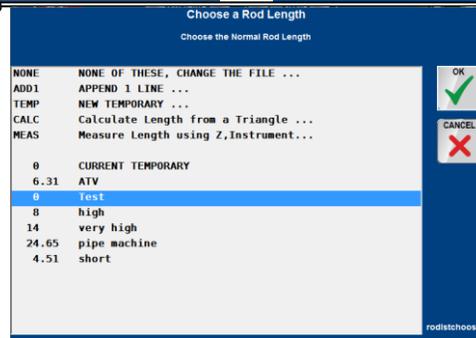
5. Read the Instrument

On this screen you may also
-Control the Instrument
-Pause before read (usually used if capturing a control point by yourself)
-Set the 'Tries' for averaging (10 is common, if you are in dense tree cover you may increase it to 20)

Check Setup
Interactive Instrument Reading

```
Read the Instrument now ...
Control the Instrument first ...
Pause before read amount  =0 seconds ...
Tries # for averaging purposes  =10
Rod Length being used  =0
Quit without reading.
```
OK
CANCEL
instreadia
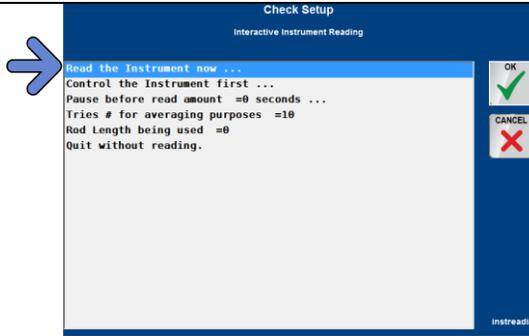
6. Name the Point

You will receive a confirmation that the reads were successful.
You can name the point and put a description. The default name is a1 (this number increases each time you capture a control point.)
The point name must be between 1 and 8 letters and/or numbers long.
Description can be any length.

Check Setup

```
10 successful reads were performed.

    The averaged results are :
    Northing  : 540772.302   RMS=0
    Easting   : 13044729.909   RMS=0
    Elevation : 729.134   RMS=0

Raw : xyh(13044729.909,540772.30186,729.13378697)
```
OK   CANCEL
instctlcapr

Capture a Control Point

```
    Enter a name for the new Control Point

NEZ: 540748.702 13044753.509 729.864

with raw data:
xyh(13044753.509,540748.70186,729.86388697)

Control Point Name
a1
Control Point Description
```
OK   CANCEL
instctlname

Finishing a Job

When you have finished a job will typically want to Export the data.

Exporting Data

AGPS-DitchPro™ can export your data in most common data types.

AGPS-Pipe Main Menu
AGPS-Pipe, Pipe-Laying, Drainage Tile
JOB: "SAMPLE" Units: FEET

```
Setup   Program.        (many questions)
Setup   Program Quickly.  (Different Job)
Resetup Program.        (Same Job)

Instrument  menu.
Plot        menu.
Survey File menu.
Devices     menu.
Parameters  menu.
Pass        menu.

Miscellaneous  actions.
Toggle Quick Setup Mode, now OFF
Concepts Documentation.

Quit this menu.
Quit this Application.
```
OK
CANCEL
pipemenu

1. Press the Menu Icon
2. Select Quit this Application

Quit Menu
AGPS-PipeFM "Quit" Menu
Scroll for more options.

```
    NEZ, Report to Ext.Dest., Quit.
Backup the job to the Ext.Dest.

Zip up whole job (PIPE_DEMO.* to PIPE_DEMO.zip)
Copy PIPE_DEMO.* (any) to Ext.Dest.
Make an NEZ File from the Survey-File.
Make a "Shape File" from the Survey-File.
----- Scroll for other actions above -----
Run "ExportData" utility.
Contour Map       made using Surfer(tm).
Shift Data Back, Make DXF, to Ext.Dest.

External Destination for use above  = D:

Capture a control point here...
Quit now.
Do NOT Quit, Continue working.
```
OK
CANCEL
pipequitmenu

3. Select 'Run "ExportData" Utility

39
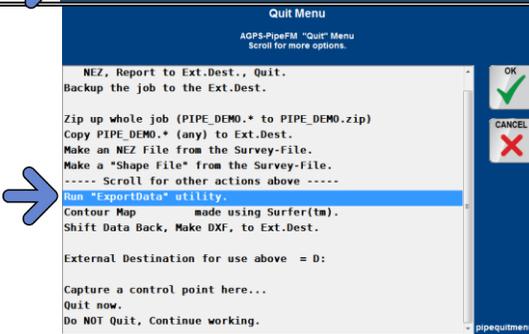
//AGPS DITCH PRO

4. Select options
see Export Data Options
(below) for details
5. Click Export
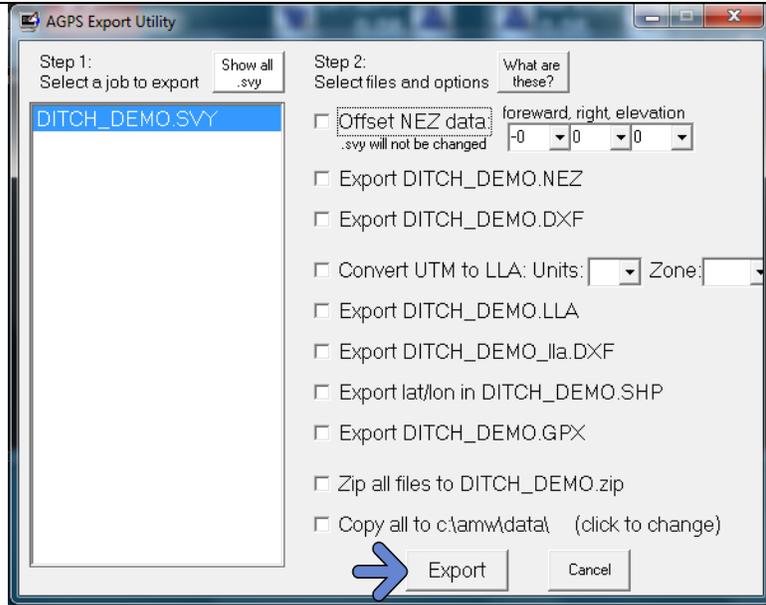
Export Data Options

Select a job to export	The job you are working in will be the selected job. If you press the 'Show all .svy' button, all of the jobs saved will appear on the list.
Offset NEZ Data	This is the amount that the data will be 'offset'. The blade length option from the parameters menu will automatically populate the amount forward it will offset the data.
Export *.NEZ	Exports a N(orthing) E(asting) Z(elevation) file.
Export *.DXF	Exports a .dxf file used in design programs such as AutoCAD™
Convert UTM to LLA	Converts the UTM data to Latitude-Longitude-Altitude data. Select your Units F=Feet I=International Feet M=Meters, and UTM Zone.
Export *.LLA	Exports a Latitude-Longitude-Altitude file
Export *_lla.dxf	Exports a .dxf file using Latitude-Longitude-Altitude.
Export *.SHP	Exports a "shape" file, which is 3 parts: .shp + .shx + .dbf. Used in Ag Data Viewer™, Apex™, FarmWorks™ and others.
Export *.GPX	Exports a .gpx file. Used in GPS devices and Google Earth™ (old format)
Export *.KML	Exports a .kml file. Used in Google Earth™(preferred format)
Zip all Files	Places all of the exported files into a .zip file and exports.
Copy all to D:	Copies to the external destination (typically a USB drive).

//AGPS DITCH PRO

Menus

Main Menu

![MENU] Pressing the Menu Icon will bring up the Main Menu. From here you can select the action you want to perform.

```
                          AGPS-Pipe  Main Menu

                        AGPS-Pipe, Pipe-Laying, Drainage Tile
                            JOB: "SAMPLE"  Units: FEET

 Setup    Program.          (many questions)                         OK
 Setup    Program Quickly.  (Different Job)                         [✓]
 Resetup Program.           (Same Job)

                                                                   CANCEL
 Instrument  menu.                                                  [✗]
 Plot        menu.
 Survey File menu.
 Devices     menu.
 Parameters  menu.
 Pass        menu.

 Miscellaneous  actions.
 Toggle Quick Setup Mode, now OFF
 Concepts Documentation.

 Quit this menu.
 Quit this Application.                                         pipemenu
```

Setup Program (many questions)	Used to perform an initial set-up of the program (select GPS, machine control, etc.). See Setting up the Program for the first time on page 11
Setup Program Quickly	Used to start a new job or to select a previously created job.
Resetup Program	Used to continue in the job you are currently working on.
Instrument Menu	Control the GPS and the GPS Settings as well as Control Point settings and Rod settings. See Instrument Menu on page 42.
Plot Menu	Controls how things are drawn/displayed on the Main Working Screen. See Plot Menu on page 44.
Survey File Menu	Control how the survey file is saved, export survey file, edit the survey file. See Survey File on page 45.
Devices Menu	Set or adjust Machine Controls and/or slope sensors. See Devices Menu on page 47.
Parameters Menu	Control how the ditch line is designed. See Parameters Menu on page 47.
Pass Menu	Control the type of pass (survey, dch, ditch reworking, topo). See Pass Menu on page 30.
Miscellaneous actions	Miscellaneous actions that can be performed. See Miscellaneous actions on page 50.
Toggle Quick Setup Mode	If Quick Setup Mode is toggled ON, AGPS-DitchPro™ will skip asking you to choose the program you want to run on startup and load directly to the AGPS-DitchPro™ Main Menu.
Concepts Documentation	Brings up a digital copy of this Menu.
Quit this Menu	Closes the current menu
Quit this Application	Brings up the Quit Menu, which will allow you to quit the program as well as export data or capture a control point. See Quit this Application Menu on page 50.

AGPS DITCH PRO

Instrument Menu

The Instrument Menu controls the GPS and other forms of measurement
From the Main Menu Select the Instrument Menu.
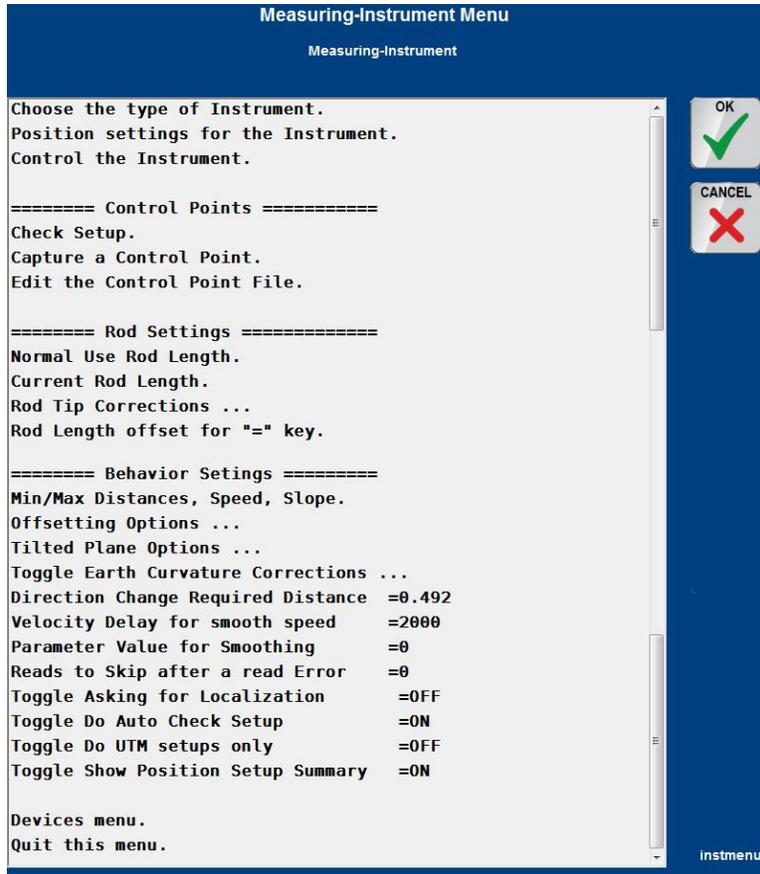
Choose the Type of Instrument	Choose the brand/type of GPS or GPS Simulator the program will use.
Position Settings	Set up the UTM or State Plane of the Instrument. See UTM/State Plane on page 53.
Control the Instrument	Allows you to setup/adjust/troubleshoot the GPS. Please Note: The settings, capabilities and types of data can vary widely between different brands of GPS. Please speak to your GPS Manufacturer with any questions.
Check Setup	Check the setup of the current control point.
Capture a control point	Allows you to capture a control point. See Control Points on page 38.
Edit the control point file	Allows you to edit/adjust the control point file (.ctl). Useful if you need to enter a control point or delete a bad control point.
Normal use Rod Length	Set the 'Normal Use' rod length. The Normal Use rod length will cause the 'current location' icon on the main working screen to display as a square. Using a rod length different than the 'normal use' will display a rectangle.
Current Rod Length	Change the current Rod Length. See Rod Length on page 19
Rod Tip Corrections	Change/adjust the current Rod Tip Corrections.
Rod Length offset	Adjust the amount the rod length is adjusted by pressing the = key.
Min/Max settings	Set Minimum and Maximum distance, speed and slope for the GPS instrument to function.

//AGPS DITCH PRO

Offsetting options	Set how the instrument is offset in relation to the blade point.
Tilted Plane Options	Not recommended for use except in rare scenarios benching into a tilted job.
Toggle Earth Curvature	Toggle correction for Earth Curvature.
Direction Change Required	How much direction change must be experienced before the instrument shows a change in direction
Velocity Delay for Smooth	A setting for how the program determines speed.
Parameter value smoothing	Smooths elevation input. Do not use without advice from a AGPS-DitchPro™ Technician first.
Reads to skip after a read error	Allows you to set how many 'reads' are skipped after the instrument sends an error message.
Toggle Asking for Localization	Toggle ON or OFF the program asking you to set special local stretch.
Toggle Do Auto Check	Toggles between asking or not asking you to check a control point after every startup.
Toggle Do UTM only	Toggles between showing or not showing State Plane/Local options in the Instrument-Localization setup screen.
Toggle Show Position Setup	Toggle between showing or not showing the results of a position setup.

//AGPS DITCH PRO

Plot Menu

The Plot Menu controls how things are drawn/displayed on the Main Working Screen
From the Main Menu Select the Plot Menu or press '8' on the keyboard.

```
                            Menu
                        Plot Actions

Update Interval ...
Magnify Vertical in Side View by ...
Current-Pos % across screen in Side View ...
Grid Menu ...
DRW & Desired Line Width (in Pixels)  =3
Invert the colors for visibility =ON
Dot Size in Pixels              =3
Set Antenna graphic size [Standard]
Light Bar Menu ...
Rotate Top View Menu ...
Toggle Show Triangles =OFF
Show old SVY/RIP points up to now.
Toggle Show Old Captured Points =ON
Disable alternate viewing angles =ON
Background Bitmap  File Control(...BMP,BPW).
Background Drawing File Control(...DRW).
Toggle Show Background Drawing =ON
Toggle Text in Background Drawing =ON

Quit this menu.                              pipeplotmenu
```

Update Interval	Affects how often the main working screen updates.
Magnify Vertical in Side View	Sets the default amount that the program zooms when not viewing 'all'.
Current-Pos % across screen in side View	Sets how from the edge of the screen the 'current position' is put when drawing the side view.
Grid Menu	Takes you to the Grid Menu. See Grid Menu on page 25
DRW & Desired Line Width	Change the Pixel amount for line width. New in ver 26.1231 this increases width of Background DRW lines. Default =1 use a value 2 or 3 for thicker.
Invert the colors for Visibility	Toggle between a 'day' color palate and a 'night' color palate.
Dot size	Change the Pixel size for dots.
Set Antenna graphic	Standard or Large size setting for the Square/Rectangle representing antenna pos
Light Bar Menu	See The Light Bars on page 23
Rotate Top View Menu	Contains Toggle On/Off and settings to automatically rotate the top view screen based on direction of travel.
Toggle Show Triangles	Not used in Ditch.
Show Old SVY/RIP	Shows all of the old survey or rip points captured as a magenta color.
Old Captured Points	Toggle showing old captured points ON or OFF.
Disable alternate viewing angles	Toggle ability to view East, West, or 3D views from the keyboard/buttons menu.
Background Bitmap	See Loading Background Images on page 27
Background Drawing	See Loading Background Images on page 27
Toggle Show Background Drawing	Toggle ON or OFF showing a Background Drawing (.DRW file).

AGPS DITCH PRO

Survey File Menu

The Survey File Menu controls how the survey file is saved, export survey file, edit the survey file. From the Main Menu Select the Survey File Menu.

```
                              Menu
                        Survey File Actions

Backup the job to Ext.Dest.
Format the survey file to a NEZ file.
Format and edit a survey file report
Format a DCA Fieldbook file on Ext.Dest.
Ext.Dest. (External Destination)  = D:

Show Extreme values of points in survey file.
Shift the data in the survey file.
Set/Show the Job Name ( and survey file name).
Load the survey file from the hard disk.
Set the Description of the current job.

!! DANGER !! Options below may destroy work.
Copy Files from another Job to this Job.
Delete the survey file from the hard disk.
Edit the survey file.
Restore the survey file from Ext.Dest.
Edit any file (default is the NEZ file).

Quit this menu.                              svyfilemenu
```

Backup the Job	Backup the current job to the external destination (Typically USB drive).
Format the survey file to a NEZ file	Turns the .svy file into a .nez file and exports it.
Format and edit a survey file report	Turns the .svy file into a .prt file and allows you to edit it.
Format a DCA Fieldbook file	Turns the .svy file into a .dca file
Ext.Dest	External destination (Typically USB Port) used for copying/backing up data.
Show extreme values of points	See a Minimum and Maximum for the survey file.
Shift the Data	Shift the Survey File. Typically used if your control point was slightly off of a known world location.
Set/Show the Job Name	Change the Job Name
Load the Survey File	Reloads the survey file if you have made changes below
Set the Description	Change the description of the current job.
Copy Files	Copy the survey file of a different job to the current job (for instance, if you brought a second machine into a job and wanted to load the data that had been captured to that point)
Delete the Survey File	Deletes the survey file (but keeps the job).
Edit the Survey File	Edit the survey file like a text file (i.e you had a known point you couldn't reach with the machine you wanted to add to a line).
Restore the Survey File	If you backed the survey file to a USB drive and wanted to load it into the computer (usually after a computer failure).
Edit any file	Allows you to choose and edit a file.

AGPS DITCH PRO

Devices Menu

The Devices Menu configures the blade control/machine control device.

Press and Hold the Machine Control Icon or from the Main Menu Select the Devices Menu or press '9' on the keyboard.

```
                    Device Menu

              Set the Parameters this program needs
                  to control external devices.

Set the Enablement ... =YES
Choose the Kind of Control ... =DAC 7000
Setup ...
Minimum Vehicle Speed for Blade Control =5
Move Manually ...
Show input messages.
Show Last Blade Command.
Enter a command ...

Toggle use in Application Menu        =OFF
Toggle "DP:1000" msg stops blade      =OFF
Run the DACCFG Utility
UP   Response Definition
DOWN Response Definition
Groups of Settings ...

Quit this menu.                                 devicesmenu
```

Internal Use	Used to send a command-line to the device or software.
Set the Enablement	Sets Machine Control ON or OFF. Must be =YES for Machine Control to function.
Choose the Kind of Control	Choose the type of Machine Controller. Speak to the manufacturer of the Machine Controller with questions.
Setup	Setup the Machine Controller. Allows you to set COM port and other options. Speak to the manufacturer of the Machine Controller with questions.
Minimum Vehicle Speed	The minimum speed (in feet or meters per minute) the machine must be travelling for Machine Control to function. Often set to a low number so Machine Control will automatically stop when the Machine is motionless.
Move Manually	Used to manually activate the Machine Control. Useful for testing/troubleshooting the Machine Control.
Show Input Messages	Shows the current message strings from the Machine Controller. Useful for testing/troubleshooting.
Show Last Blade Command	Shows the immediately previous command sent from AGPS-DitchPro™ to the Machine Controller. Useful for testing/troubleshooting.
Enter a Command	Allows you to enter a command to send to the Machine Controller. Command must be in the data-string type used by the Machine Controller. Useful for testing/troubleshooting.
Run DACCFG Utility	(If using DAC7000/8000) Will launch the Configuration program.
UP Response Settings	Allows you to adjust the UP response settings of the Machine Control. Please speak to an AGPS Technical Specialist before changing these settings.
DOWN Response Settings	Allows you to adjust the DOWN response settings of the Machine Control. Please speak to an AGPS Technical Specialist before changing these settings.
Groups of Settings	Allows you to save different groups of UP/DOWN Response Settings

46

AGPS DITCH PRO

Parameters Menu

The Parameters Menu is where you adjust how the profile is designed. There are two Parameters Menus: An Essentials menu useful during operation and an advanced menu useful during setup or for more complex operations.

Essentials Parameters menu:

 Press and Hold the Menu Icon and select 'Parameters'.

Optimum Depth	The Depth you wish the ditch could be.
Minimum Depth	The depth at which the program will display a warning that the ditch shallow. The program WILL violate Minimum depth.
Absolute Minimum Depth	The depth at which the program will display an error that the ditch is too shallow.
Maximum Depth	The Maximum Depth of the ditch. The program will never go beyond this value.
Optimum Depth Increment	How much the Optimum Depth will be changed by pressing the optimum depth adjustment buttons or using / or \ on the keyboard.
Start Distance	How far after the start point of the ditch the program will meet optimum depth. This helps stop the ditch from rapidly coming up to grade when there is a very deep starting point. Default is 10 feet.
Minimum Slope	The minimum slope you want for the ditch. The program will never violate Minimum Slope.
Maximum Slope Change	The Maximum Slope the profile will be allowed to change at each point. Default is 2.0%
Maximum Slope Rest	The Maximum Slope of the ditch after the Start Distance. A lower number will keep the slope more constant, but may then affect the depth of the ditch.
Minimum Slope Increment	How much the Minimum Slope will be changed by pressing the minimum slope adjustment buttons or using / or \ on the keyboard.

AGPS DITCH PRO

Advanced Parameters Menu
From the Main Menu Select the Parameters Menu.

```
                        Parameters Menu

                         Ditch Parameters
                      (Scroll to see more options)

 OFF    Toggle Simulate-Non-Advanced Mode                    OK
 OFF    Toggle Surveying Backwards                           ✓
 0.00   Steering Look-Ahead Distance
 OFF    Toggle Paths along Grid Lines                        CANCEL
 OFF    Toggle Smoothing All, not just near flat             ✗
 0.02   Vertical Error Tolerance in "GOOD" msg
 0.10   Total Latency for look-ahead
10.00   Minimum Auto-Capture Distance
 5.00   Max Distance to Line for AutoCapture
 1.00   Survey-Pass offset from the ground
 0.20   Dist. blade moved by keys (PageUp,etc)
 0.10   Optimum-Depth-Increment upon  / or \
 0.10   Minimum-Slope-Increment upon  / or \
10.00   Start-Distance      of Ditch
10.00   Maximum-Slope-Rest   of Ditch (after start)
 0.05   Minimum-Slope        of Ditch <<<<<
 0.30   Maximum-Slope-Change of Ditch (smooth)
 6.50   Maximum-Depth        of Ditch.
 0.05   Optimum-Depth        of Ditch <<<<<
 0.00   Minimum-Depth        of Ditch (Warnings)
-9.99   Absolute-Minimum-Depth      (Errors)


Groups of Settings ...
Quit this menu and Restart Pass.
Quit this menu.                                            peparmsmenu
```

|	
Toggle Simulate-Non-Advanced Mode	Turning this on will make AGPS-DitchPro™ reduce options to simulate AGPS Ditch Basic™
Toggle Surveying Backwards	Turn on if the machine drives backwards (Reverse) to survey.
Steering Look-Ahead	How far the program looks ahead for guidance.
Toggle Paths along Grid Lines	The program will always snap the path to the nearest grid line.
Toggle Smoothing All	Will make the designed plan smoother (less abrupt grade changes)
Vertical Error Tolerance	How far from 'On Grade' before the program tells you UP/DN.
Total Latency for look-ahead	How quick the Instrument (GPS) responds, so how far ahead the program looks. Most modern GPS systems have a very low latency (10 hz). Default is 0.1
Minimum Auto-Capture Distance	How often the program will capture a point. A lower number means that the program will capture a point more often. Default is 10
Max Distance to line	AGPS-DitchPro™ will stop or start automatic control and flip between a top and side view of the ditch when you are this far from the designed path.
Survey-Pass offset	How high above the ground the blade is held for a survey pass. Typically the distance of the blade-tip to the ground when the blade is raised all the way up.
Dist. Blade moved by Keys	How much the page-up/page-down keyboard buttons or the vertical lightbar chevrons offset the blade when pressed. Default is .2. Note that the up/down keyboard arrows and inner chevrons are always half of this value.
Optimum-Depth-Increment	How much the Optimum Depth will be changed by pressing the optimum depth adjustment buttons or using / or \ on the keyboard.
Minimum-Slope-Increment	How much the Minimum Slope will be changed by pressing the minimum slope adjustment buttons or using / or \ on the keyboard.

Start Distance	How far after the start point of the ditch the program will meet optimum depth. This helps stop the ditch from rapidly coming up to grade when there is a very deep starting point. Default is 10 feet.
Maximum Slope Rest	The Maximum Slope of the ditch after the Start Distance. A lower number will keep the slope more constant, but may then affect the depth of the ditch.
Minimum Slope	The minimum slope you want for the ditch. The program will never go underneath this value.
Maximum Slope Change	The Maximum Slope the profile will be allowed to change at each point. Default is 2.0%
Maximum Depth	The Maximum Depth of the ditch. The program will never go beyond this value.
Optimum Depth	The Depth you wish the ditch could be.
Minimum Depth (warnings)	The depth at which the program will display a warning that the ditch is getting too shallow. The program WILL, however, violate Minimum depth.
Absolute Minimum Depth (error)	The depth at which the program will display an error that the ditch is too shallow.
Groups of Settings	Enters a menu where you may Save (and name) the current group of Parameters, or Fetch one previously saved.
Quit menu and Restart pass	Quits the menu and recalculates the current DCH Pass with the new parameters.

Pass Menu

The Pass Menu controls the pass type.
From the Main Menu Select the Pass Menu or press 'P' on the keyboard.
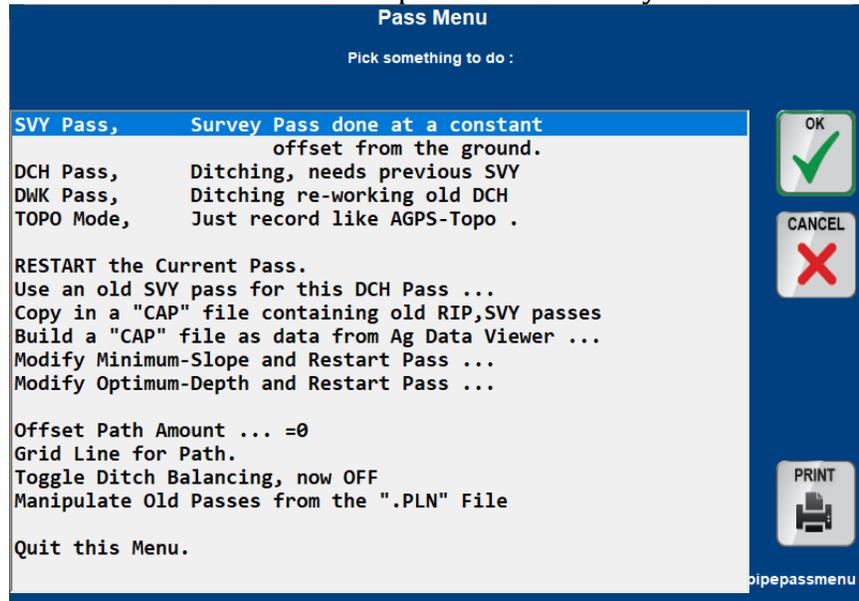
	Survey	A pass to survey the ditch line. The survey is done with the blade at a constant height above the ground. The program subtracts the height from the collected data points. Followed by a Lay Pass. The Menu Bar is colored Light Blue when in Survey Mode.
	Ditch	A pass done where the ditch is cut. Requires a Survey Pass. The Menu Bar is colored Green in Ditch Mode.

//AGPS DITCH PRO

|		
	Ditch Rework	Recalls a previously surveyed and designed ditch. Defaults to the Nearest previous ditch when selected. Requires use of control points for day-to-day accuracy of GPS. The Menu Bar is colored Dark Blue when in DWK Mode.
	Topo	Capture Topography points like you were ditching a line but without a survey or ditch pass. Usefull for capturing previously cut ditches. The Menu Bar is colored Yellow in Topo Mode.
	Restart Pass	Clears the Ditch Design. Press Capture to redesign the current run.
	Use old SVY	Recall a previously recorded Survey a Ditch pass
Copy in a CAP File		Load another file containing SVY or RIP passes.
Build a CAP File		Build a Captured Data File from Ag Data Viewer. Contact your Ag Data Viewer Technician for questions.
Modify Minimum Slope		Change the Minimum Slope and restart the pass.
Modify Optimum Depth		Change the Optimum Depth and restart the pass.
Offset Path Amount		Offset the path of the machine (useful if the GPS Antenna is not centered).
Grid Line for Path		Select the closest grid line as the survey path.
Ditch Balancing		Default=OFF Allows the program to adjust Optimum Depth and/or increase Minimum Slope until the cut/fill is balanced on the ditch.
Manipulate Old Passes		Lists passes in the .pln file, allowing you restore/plot a profile line. Also possible by touching the line on the top view.

Miscellaneous actions

Miscellaneous actions that can be performed.
From the Main Menu Select the Miscellaneous Actions.
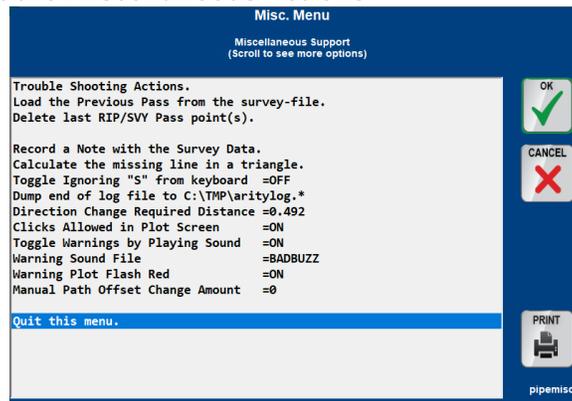
|	
Load the Previous Pass	Loads the previous pass that was done.
Delete the last RIP/SVY pass point	Deletes the last RIP/SVY pass point (i.e. you accidentally lowered the GPS antenna during a run and want to delete the bad point)
Record a Note	Records a note that goes with the survey file.
Calculate the missing line	If working with previous topo, will calculate a missing line from a triangle as close as mathematically possible.
Toggle Ignoring "S"	Toggle ON to ignore the "S" key. Some tablet's software send keys for events.
Dump end of log file	Saves the end of the program log for sending to a Tech for troubleshooting.
Direction Change	Distance travelled before heading direction changes.

Clicks Allowed in Plot	Toggle OFF to ignore touch/click in the plot window. (Accidental touch)
Toggle Warnings	Toggles a warning sound that plays if there is an error (i.e. bad GPS signal)
Warning Sound	Change the warning sound file.
Warning Plot Flash Red	Toggle OFF to stop red flash (for photosensitive epilepsy)
Manual Path Offset	Specify the Horizontal distance to offset the Path when the Horizontal Light Bar arrows are touched, or 0 to disable.

Quit this Application

All of the actions that can be performed before quitting the program.

Press the Red X in the upper right corner of the program or select 'Quit this Application' from the Main Menu or press 'Q' on the keyboard.
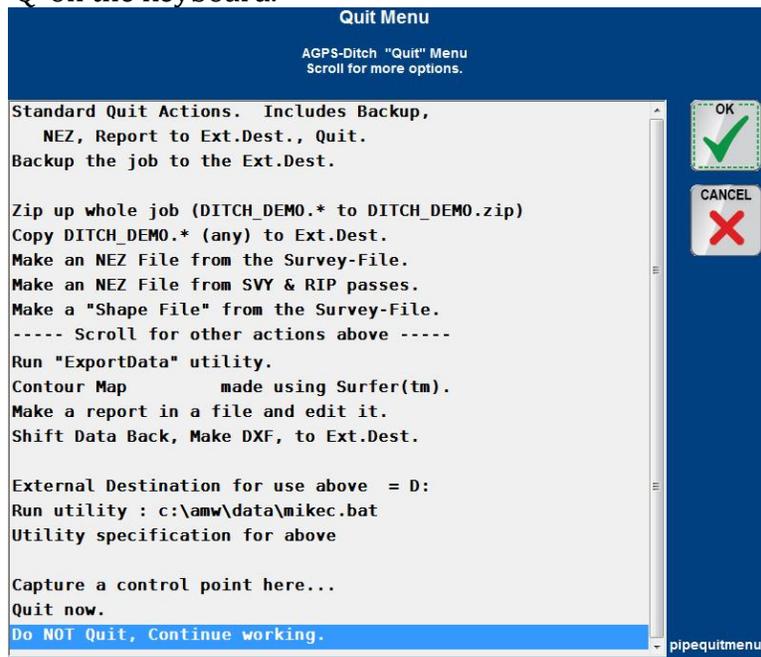
Standard Quit Actions	Creates a backup, NEZ, distance report of the job, exports it to the external destination (typically USB Drive) and quits the program
Backup Job	Creates a Backup of the job to the external destination (typically USB Drive).
Zip up whole job	Creates a .zip file to the external destination (typically USB Drive).
Copy JOBNAME	Copies any file with the jobname (e.g. JOBNAME.svy; JOBNAME.ctl; etc.) to the external destination (typically USB Drive).
Make an NEZ File	Creates a Northing-Easting-Elevation (NEZ) file out of the survey file.
Make an NEZ File from SVY and RIP passes	Creates a Northing-Easting-Elevation (NEZ) file out of the SVY and RIP data.
Make a 'Shape File'	Creates a .shp file out of the survey file.
Run Export Data	Runs the Export Data Utility. See Exporting Data on page 39.
Contour Map	Create a Contour Map out of the topography information (Requires Surfer™ software)
Make a report	Creates a report of distance recorded within each ditch.
Shift Data Back	Shifts the data back the offset amounts, creates a .dxf file (Auto CAD™ file type) and exports it to the external destination (typically USB Drive).
External Destination	Defines the drive letter for the External Destination.

Run Utility	Runs the defined utility. The utility may automate the steps you want to do to quit a job.
Utility Specification	Specifies the Utility to be used in the 'Run Utility' command.
Export to Road	If you have purchased the "Terrace & Waterway Bundle" this option allows you to design the cross section to continue in AGPS-Station.
Capture a Control Point	Captures a control point. See Collecting a Control Point on page 38.
Quit Now	Quits AGPS-DitchPro™ and takes you to the AGPS Main Menu.
DO Not Quit	Takes you back to the AGPS-DitchPro™ Working Screen.

AGPS DITCH PRO

UTM Zones and State Plane

UTM Zone (Universal Transverse Mercator (UTM) geographic coordinate system) and State Planes are coordinate systems to help GPS signals be more accurate in the real world. UTM is a world-wide system that takes earth curvature into account, State Plane 'ignores' earth curvature.

UTM Zones

State Plane

SPC Zones - 2004