



QUICK START GUIDE TO THE TRIUMPH-LS WITH J-FIELD 2.0

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This **Quick Start Guide to the TRIUMPH-LS** contains the basic information a user new to J-Field, the field software of TRIUMPH-LS and VICTOR-LS, needs to know to get started working quickly. **It is important that new users to J-Field read and understand the information in this manual before attempting to use J-Field. To obtain good results and RTK solutions, it is most critical to understand the RTK Verification and Validation process and settings.** More information and details are provided in the **User's Guide to the TRIUMPH-LS**. J-Field also contains its own ever-growing on-board manual with context sensitive help files



for various screens. Press the hardware **(Help)** button to learn more about each screen.



J-Field is rapidly being developed with new updates typically being released monthly; because of this, screenshots and features in this guide may appear differently from the latest version of J-Field. Be sure to check www.javad.com/jgnss/ and the user forum at <http://support.javad.com> frequently to stay current on all of the breaking news and innovative developments from JAVAD GNSS. Details about new features can also be found in the **Application Notes** accessed from the **Support** menu.

Central to J-Field are four key concepts, briefly introduced here and that are discussed more fully in their respective sections:

Project - A user-defined job identifier with its own database file and folders for storing data

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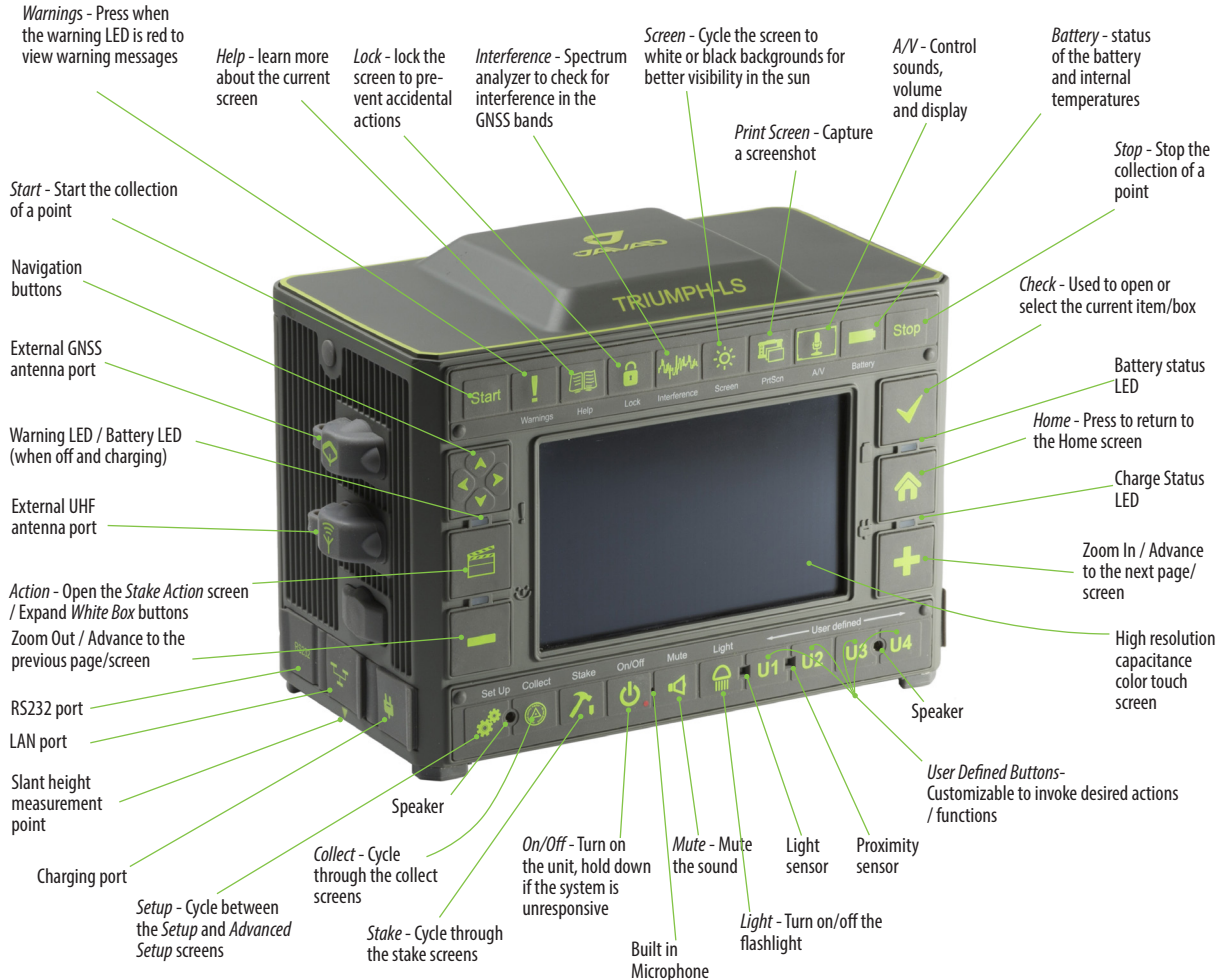
Page - Each *Project* has 10 pages that can contain points and lines and can be toggled on or off similar to CAD layers. Each *Page* has the option of having its own coordinate system.

ShapeTags - User-defined tags for points that can be assigned to create lines between points with like *ShapeTags*

Codes - Each point has a *Code* field to store commonly used point descriptions. Once a *Code* has been created, it can be recalled from the *Codes Library* or from the *Favorite Codes* list.

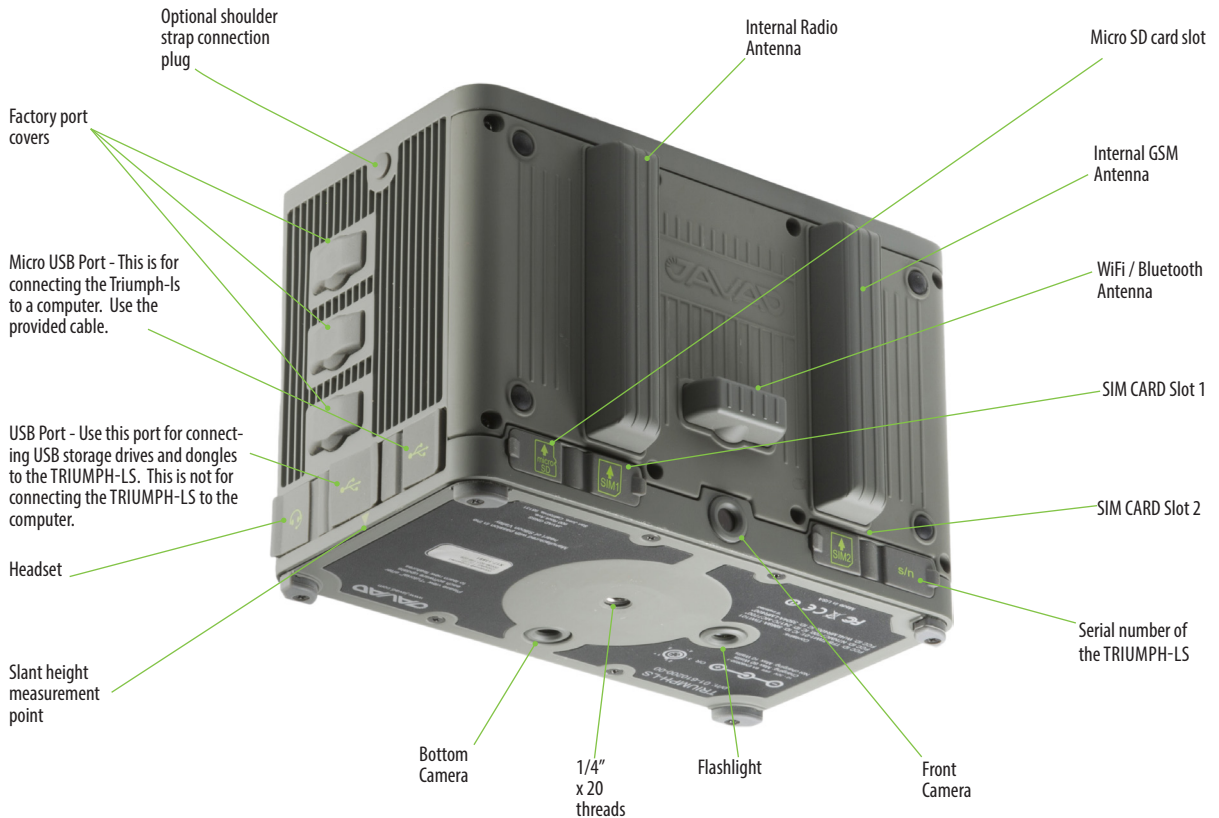
Anatomy - Exterior of TRIUMPH-LS

Top, Left and Front Faces



Anatomy - Exterior of TRIUMPH-LS

Bottom, Right and Back Faces



UHF antenna 400-470 MHz,
2.5dB, RT Angle, SMA (optional,
if UHF module is installed)

TRIUMPH-LS

AC Power Cable

Ext Power/Charger

AC Power Adapter

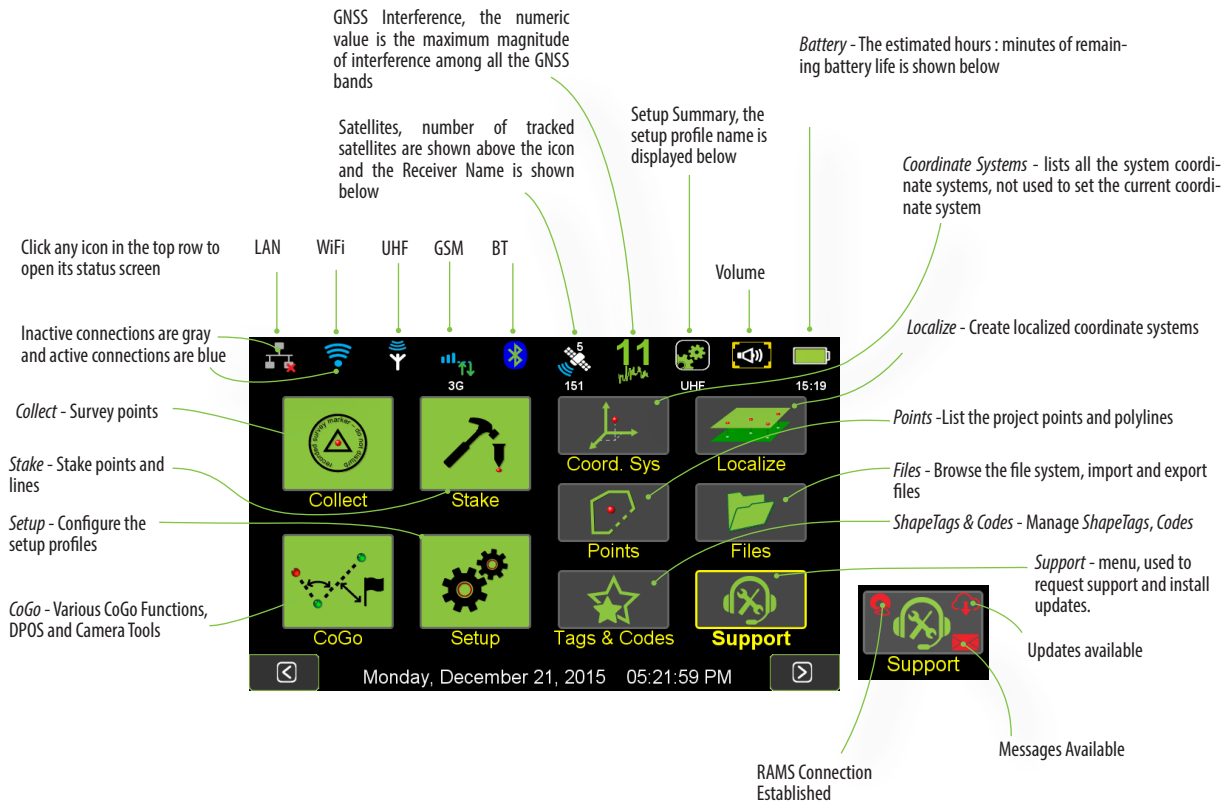
Power Cable

Extension and
not included

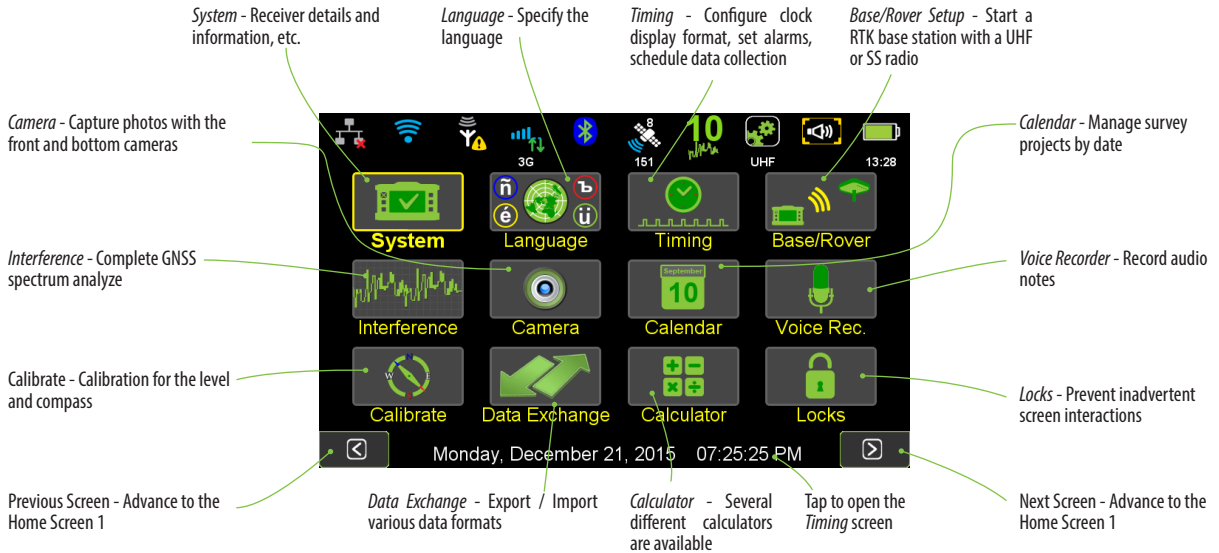
Charging kit

Shown assembled while the TRIUMPH-LS is being

Screen Anatomy - Home Screen 1



Screen Anatomy - Home Screen 2



Charging the Batteries

The TRIUMPH-LS AND VICTOR-LS come from the factory with the batteries charged and ready to use so you can begin exploring its interface and familiarizing yourself right away while reading this manual.



Lithium Ion batteries should not and cannot be charged when their temperature is above 40° C (104° F). They charge faster when they are cool. Therefore, it's best that you turn off the unit when charging. Charging the unit when it's on will cause it to charge more slowly (up to 40° C) due to its increased temperature.

Some of the cables and their connectors used in charging the equipment may not be familiar to you. ODU style connectors are superior for a broad range of industrial power, communications and data applications that demand a precision-engineered, secure and robust solution.

When charging your receiver, be sure to line up the red dots on the connector and the charging port on the LS. Note

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that the four LEDs have different meanings when the LS is on from their meanings when the unit is being charged. When the unit is on, you'll want to pay attention to the upper left LED as it alerts you of an immediate issue.

Anytime the TRIUMPH-LS displays this LED as red, press the warnings key to learn more and take any necessary corrective measures.

Help & Support

J-Field contains its own ever-growing on-board manual with context sensitive help files for various screens. Press the hardware **Help** button to learn more about each screen. Contact information of the Live Technical Support team members are listed in Support>Live Technical Support. You are also encouraged to submit your feedback and questions to the user's forum located at <http://support.javad.com>.

Turning on The TRIUMPH-LS

Powering the TRIUMPH-LS on is pretty straightforward with the underlying operating system; Windows Embedded Compact 7.0, loading first and then J-Field subsequently booting up.



There are occasions when the system might freeze. Should you experience this, simply depress the power key and hold down until the unit powers off, about 10 seconds. Any data collected up to that point will be saved.



Calibration

The TRIUMPH-LS is an advanced scientific surveying instrument. It is highly sensitive to its environment and includes a built-in

magnetometer and 3-axis accelerometer.

For the visual stakeout features and the *Ahead/Back* and *Right/Left White Boxes* in the *Stake Action* screen to work correctly, the electronic compass readings need to be accurate. It is recommended to check the compass calibration before beginning work at a new location. To check the calibration, rotate the TRIUMPH-LS 360° and observe the compass readings in the *Collect* or *Stake Action* screen. There should be no twitching, quick jumps, or reversals of the displayed bearing or azimuth, just as a real compass would perform. If this is not the case, the compass needs to be recalibrated or it may not be in a suitable environment for its use. Follow the instructions on the screen to calibrate the compass. When calibrating the compass, choose an area removed from overhead power lines, parked automobiles and other ferrous materials which cause magnetic disturbance. The electronic compass works in areas that are electromagnetically uniform.

The **Level** calibration typically only needs to be preformed once. Follow the instructions on the screen to calibrate the level.

The level sensors are sensitive to the internal temperatures of the TRIUMPH-LS. To fine tune the level calibration, a **Level Offset** calibration needs to be preformed. It is located in the *Action Setup* menu. It is necessary to reperform this calibration as the internal temperature of the TRIUMPH-LS changes. If the **Correct For Tilts** option is enabled and the 10

most accurate positions are desired, it is essential to monitor the **Level Offset** calibration and recalibrate when necessary.

The **Camera** needs to be calibrated if you intend to use the camera's *Visual Angle* or *Camera Offset Survey* tools. This only needs to be done once.



Updates

Keeping your TRIUMPH-LS up to date is nearly effortless; however, you do need to ensure that you have Internet access in order to download the firmware and software updates.

The TRIUMPH-LS will automatically detect nearby WiFi networks. To see the detected networks, as well as their respective signal strength, tap on the *WiFi* icon in the top row of icons on the Home screen and then at the bottom of that screen tap on *Network*. Select the desired access point, tap on *Connect*, enter the case sensitive password, if any, and the connection should be established. Once connected to a WiFi network it will be remembered and added to the Favorites and the connection to it will become automatic when it is detected.

If you do not have WiFi or for some reason are unable to connect to it, but do have a wired local area network, you can connect the TRIUMPH-LS to your network using a cable connected to the LAN port and your network interface card or router. A wireless network can also be used if you have an installed SIM card data plan with sufficient data.

Once connected to the Internet, J-Field will automatically check for updates. The Support button will be displayed
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with the update symbol (cloud and down arrow) and a sound will be played periodically when a new update is available.



Points

Tap on this icon to review points, alignments, trajectories in J-Field.

Survey	Design	Polyline	Trajectory	DPOS
+	-	-	-	-
1 Stone	Name	05/11/2016 03:06:08	1	
2 Stone	Date (Local)		DefCode	
5 Stone	Description	Stone		
6 Stone	Page	Page2		
9 Stone	CS	NAD83(2011) / Ohio South NAVD 88		
10 Stone	North	475899.8590ft		
11 Stake	East	1778475.1139ft		
12 Stake	Up	0.0000ft		
13 Stone/IP	Epoch	2010.0000		
	Coords	SRV: no DSN: yes BS: no		
	Images	0		

Points Screen Displaying Design Points

Each point record can have up to five types of coordinates that are displayed in the *Edit Points* screen:

- Design Coordinates** - Imported and manually entered coordinates are populated into this field and stored in the *Project's* database file with their native coordinate system as was selected when they were imported.
- Survey Coordinates** - These are coordinates determined from GNSS observation. All surveyed points are stored with *Survey Coordinates* with WGS84 (ITRF 2008) coordinates.

- Base Station Coordinates** - When a point is surveyed with RTK corrections, the base station coordinate is saved.
- Survey Shifted Coordinates** - When a point's base station coordinates have been adjusted or shifted, the shifted survey coordinates are displayed along with the unadjusted survey coordinates (*Survey Origin*).
- Base Station Shifted Coordinates** - When a point's base station coordinates have been adjusted or shifted, the shifted base station coordinates are displayed along with the unadjusted base station coordinates (*Base Station Origin*).

Name	DefCode	10	Design
Code	Stone		
Description			
Page	Page1		
CS	NAD83(2011) / Ohio South NAVD 88		
North	723966.5781ft		
East	1784466.4132ft		
Height	1104.2217ft		
Epoch	2010.0000		
Images	0		
Audio	0		
Raw GNSS	0		
Additional Information			
DSN-SRV	Distance	ΔN	ΔE
SRVs	6.33ft	-6.26ft	0.95ft
			ΔU
			-16.4ft

Edit Point Screen Displaying a Point with Each Type of Coordinate

In addition to these coordinate types, all post-processed DPOS and Real-Time Shifted coordinates are also stored in the database. These will be discussed more in the DPOS section of this manual.

Screen Anatomy - Points Screen

Object Type - The radio button selects which type of object is displayed in the list: Survey Points, Design Points, Polylines (and lines) or Trajectories.

Add - The add button allows new points to be added; with the Survey option selected you will be taken to the Stake Action screen.

Edit - The edit button opens the Edit Points screen (shown on the previous page) to allow the various parameters of the point to be modified.

Delete - The delete button deletes the selected object. A Long Click (tap and hold) on this button deletes all objects currently shown in the list, i.e. taking into account the general filter and name filter.

Esc - Escape to the previous screen

Filter - Filter button (see next page)

Type Filter - Type Filter button (see the following pages)

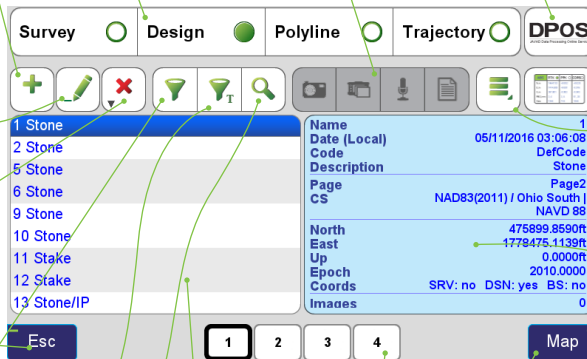
Name Filter - Name Filter button (see the following pages)

List - Point Codes and Descriptions can be displayed beside the Point Name. Formatting options are found in Additional Actions>Settings>Columns>Name. Options also exist here to display icons when the point is "Shifted" and when it has "JPS" GNSS data. The "Type Filters" column option will display Solution Type, Process Type and Base Type abbreviations beside the point names.

DPOS - The DPOS button opens the DPOS screen that allows raw GNSS data to be submitted to the JAVAD Data Processing Service. Base station data can be processed with CORS data to obtain real geodetic positions and rover data can be processed with both the base station data and CORS data.

Photo, Screenshots, Audio & Notes - These buttons are active when a point has photos, screenshots, audio or notes associated with it. Tapping these buttons will preview the associated file.

Processed Point Info - This button opens the Processed Point Info screen. Here post-processed coordinates from DPOS can be compared to RTK coordinates and the desired coordinate can be selected for every point.



Additional Actions - Various additional actions are available from this menu (see following the pages).

Point Information Panel - Information about the selected point is displayed here. Alternative templates for this panel are available by choosing Additional Actions>Settings>Info. The Default template is currently shown. Tapping this panel opens the Base-Rover Statistics screen.

Map - Opens the map with the currently selected point highlighted in the map

Page Numbers - Chages which page of the list to view

Point Filters

Points are displayed in the coordinate system of the *Current Page* in the CoGo functions and in the map. All new *Survey Points* and points created with the CoGo functions are created in the *Current Page*. The *Current Page* can be

selected by tapping  (Filter Button) to open the *Filter* screen. The First row displays buttons for each of the 10 pages. The *Current Page* is highlighted green while visible pages are shown with bold numbers and hidden pages are shown with small gray numbers. Tap a page button to toggle it between visible and hidden. Objects in hidden pages are not display in the list of objects or on the map.

Pages

0

1

2

3

4

5

6

7

8

9

In Current Project

In All Projects

Distance Filter

from Current Position

100.0 ft

Additional Filters

code, description, date

Sort by Distance

Alphabetical

Chronological

Hide Staked

Hide Vertices

Hide Bases

Cancel

Reset filters

OK

Filter Screen - Current Page is 1, Page 0 is hidden

The *Pages* screen can be open by tapping *Pages*. It displays the page names and allows it to be edited along with the coordinate system and color.

Pages

Page0		Edit		Page5		Edit	
Page1		Edit		Page6		Edit	
Page2		Edit		Page7		Edit	
Page3		Edit		Page8		Edit	
Page4		Edit		Page9		Edit	

Page1: NAD83(2011) / Ohio South | NAVD 88

Cancel

OK

Pages Screen - Current Page is 1, Page 0 is hidden

The *Current Page* is set with the toggle on the left while the visibility of *Pages* are controlled with the check box options on the right.

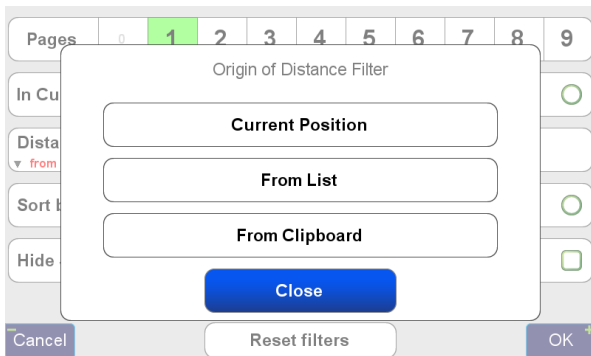
The *In All Projects* toggle will display points from all projects. This is usually not recommended as it will slow J-Field down if many points exist.

Points can be sorted in the displayed points list by *Distance*, *Alphabetical* or *Chronological*. Notice the down arrow in the corner of the *Distance Filter* button. Holding this button down will initiate a *Long Click* and present additional options for the *Distance Filter*.

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Points

13




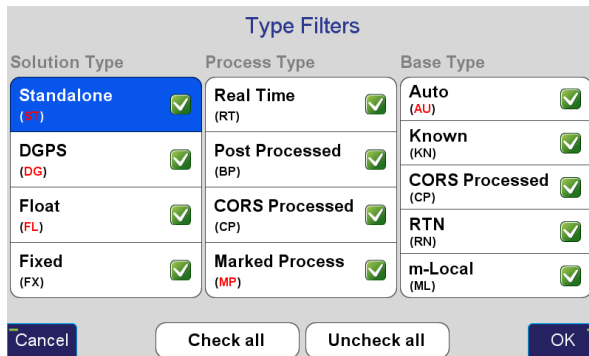
Origin of Distance Filter Options

Hide Staked hides points that have already been staked. A point is considered staked after it has been staked with a surveyed coordinate accepted for it.

Hide Vertices hides points created from imported lines from being displayed in the point's list. J-Field defines lines as connections between points so every line must have points at its vertices. For this setting to be applied the *Hide Line Vertices* option must be checked in the *Common Settings* screen when AutoCAD, DGN or Shapefiles are imported.




The  (*Type Filter*) opens the **Type Filters** screen. It allows points to be filter by *Solution Type*, *Processing Type* and *Base Type*.






Type Filters Screen





The  (*Name Filter*) button enables/disables the name filter. When it is on, four additional fields are shown to the

right: one text field and three switches captioned  [...]



,  and . Enter the search text in the text field and specify which switches are active (activated switches have a light blue background while deactivated switches are white):

 looks for names which begin from the search string;


 looks for names which contain the search string in the middle, but do not begin or end with it;

 looks for names which end with the search string.

Activating more than one switch combines the results:

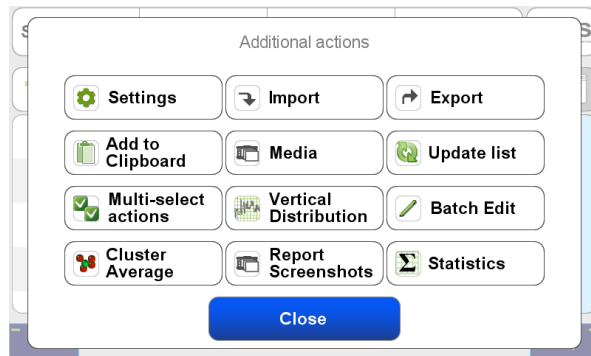
activate  and  searches for names which either begin with the search string or contain it in the middle.

To search for a range of numbers use the format of *number1..number2*. This format matches names which contain numbers in range between *number1* and *number2* (in the position defined by switches). E.g. if you enter *3..9* (assuming all switches are on), it will match names *3*, *Stake04a*, *Pt9*, but not names *14* or *Point19a*.

The  (*Additional Actions*) icon contains a list various options, settings and functions related to the *Points* screen. More information about the items contained in this menu can be found in each of the actions' Help screen. Of particular interest are *Settings* and *Cluster Average*.

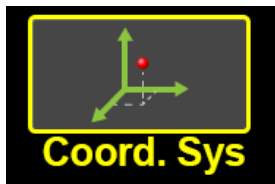
Settings has options to allow the *Point Name*, *Code* and *Description* to all be displayed in the left panel of the *Point* screen rather than just displaying the *Point Name*.

Cluster Average finds groups of points in a cluster and creates an averaged point from the group.



Additional Actions screen

The information panel (the right blue panel) may contain more text than fits in its view. If this is the case, tap and drag the panel to scroll its contents.



Coordinate Systems

The *Coordinate Systems* screen allows you to quickly access and create new coordinate systems based on the predefined systems with just a tap on this icon.


It is important to note that this screen does not set the current coordinate system for the *Project*. To change a *Project's* coordinate system choose *Project>Edit Current Project>Project Coordinate System* in the *Stake and Collect Prepare* screens. Each page in the *Project* can then also have separate coordinate systems, set from the *Page* and *Coordinate System* boxes in these screens.

Current Project	All Projects	Default
<div> <div>NAD83(2011) / Ohio South NAVD 88</div> <div> <div>Grid System</div> <div>NAD83(2011) / Ohio South NAVD 88</div> <div>Epoch 2010.0000</div> <div>Geodetic Datum</div> <div>Semi-major axis 6378137.000m</div> <div>Inverse flattening 1 / 298.257222101</div> <div>Prime meridian 00°00'00"</div> <div>HTDP WGS84(ITRF2008) to NAD83(2011) / NAVD 88 / SPCS83 Ohio South zone</div> </div> </div>		
<div> <div>Esc</div> <div>Select</div> </div>		

Coordinate System Screen

Adding a State Plane Coordinate System

To add a new coordinate system that is currently not listed in the *Coordinate System* screen when the *All Project* button

is selected at the top of the screen, tap the  (Add) button to open the *Coordinate System Catalog*.

Coordinate System Catalog

Near Me

Filter

Global

Regional

WGS 84

PZ-90

North America

Europe

WGS 72

WGS 72BE

Oceania

Unknown

RTCM 3.x

Back

Coordinate System Catalog Screen

When selecting a Regional system for your project from the vast catalog, filter the choices to just those relative to your geographic location by checking the *Near Me* box. Select your Region, Country and type of coordinate system:

United States (USA)

SPCS(NAD27)

SPCS(NAD83 2011)

UTM(NAD27)

NAD27

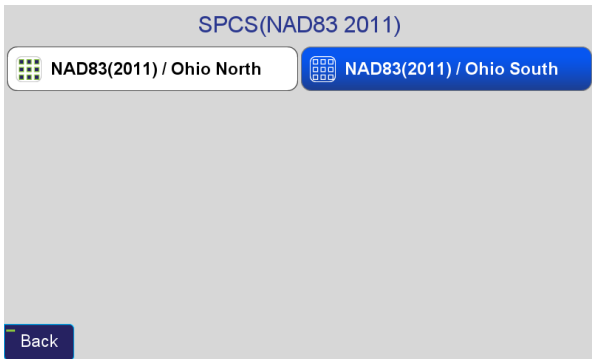
NAD83

NAD83(2011)

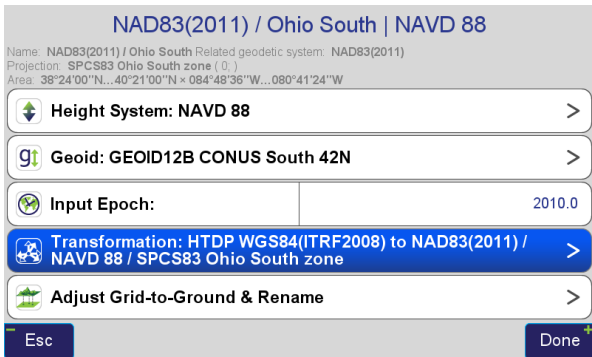
NAD83(HARN)

NAD83(NSRS2007)

Back



Select the appropriate *Height System*, *Geoid*, *Input Epoch* and *Transformation*. The typical coordinate system configurations for a US State Place Coordinate System is shown:




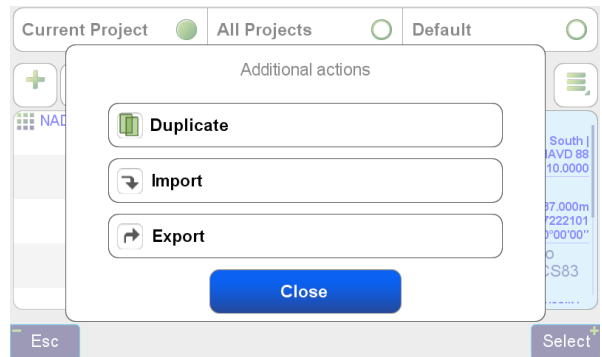
For latitudes south of 42N, “Geoid12B CONUS South 42N” should be chosen and for latitudes north of 40N, “Geoid12B CONUS North 40N” should be chosen.

It is important to remember that GNSS distances measured in State Place Coordinate Systems may not match measured ground distances exactly and typically need to be scaled to ground. For this reason you may wish to create an adjusted grid-to-ground coordinate system. Alternatively, the CoGo functions in J-Field have the ability to display and input ground distances while still working in an unmodified State Place Coordinate Systems (see the CoGo chapter of this manual for more information).

Creating an Adjusted Grid-To-Ground Coordinate System

With your state plane coordinate system selected in the *Coordinate System* screen click the *Additional Actions*

button  and tap **Duplicate** to create a copy of this coordinate system. The duplicated system will be created with the date appended to the end of its name:



Current Project

All Projects

Default

+

✖

NAD83(2011) / Ohio South | NAVD 88

NAD83(2011) / Ohio South | NAVD 88...

Grid System

NameNAD83(2011) / Ohio South | NAVD 88 2015-12-03 15.52.31

Default nameNAD83(2011) / Ohio South | NAVD 88

Epoch2010.0000

Geodetic Datum

Semi-major axis6378137.000m


Inverse flattening1 / 298.257222101

Prime meridian00°00'00"

HTDP WGS84(ITRF2008) to NAD83(2011) / NAVD 88 / SPCS83

Esc

Select

Now highlight the duplicated system and tap the  edit icon and choose **Adjust Grid-to-Ground & Rename**:

NAD83(2011) / Ohio South | NAVD 88 2015-12-03 15.52.31

Adjust Grid-to-Ground & Rename

Grid System

NameNAD83(2011) / Ohio South | NAVD 88 2015-12-03 15.52.31

Default nameNAD83(2011) / Ohio South | NAVD 88

Epoch2010.0000

Geodetic Datum

Semi-major axis6378137.000m

Inverse flattening1 / 298.257222101

Prime meridian00°00'00"

HTDP WGS84(ITRF2008) to NAD83(2011) / NAVD 88 / SPCS83 Ohio South

Esc

Adjust Grid-to-Ground & Rename

NameNAD83(2011) / Ohio South | NAVD 88 2015-12-03 16.40.55

PROJ

DFLT

North Origin0.0 ft

East Origin0.0 ft

North Ground0.0 ft

East Ground0.0 ft

Rotation0°0'0.0"

Scale Difference0.0 ppm

North Inclination0.0 °

East Inclination0.0 °

Vertical Offset0.0 ft

Cancel

OK

Adjust Grid-to-Ground & Rename Screen

Tap the **Default** button  to change the coordinate system name to the default name:

Adjust Grid-to-Ground & Rename

NameNAD83(2011) / Ohio South | NAVD 88

PROJ

DFLT

North Origin0.0 ft

East Origin0.0 ft

North Ground0.0 ft

East Ground0.0 ft

Rotation0°0'0.0"

Scale Difference0.0 ppm


North Inclination0.0 °

East Inclination0.0 °

Vertical Offset0.0 ft

Cancel

OK

Tap the position icon  beside East Origin to set origin point in the grid system for the transformation. Here the base station coordinate is chosen from the points List:

By default the ground origin point will be populated with the same coordinate and the **Scale Difference** is populated with the grid-to-ground scale factor calculated from that point. The scale factor rounded to the nearest part-per-million (ppm) is automatically appended to the coordinate system name:

You may also wish to round the scale difference to the nearest ppm by tapping its button and entering that value. In this screen options exist to enter a new factor as a Ratio


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Scale Difference: +50.0 ppm

Factors		7	8	9		
Ratio		4	5	6	1/x	
MS	MR	1	2	3		
Esc	Clr	<	+/-	0		>
						OK

The *Factors* button will allow you to use the CoGo Scale Factor function to calculate a new scale factor if desired.

These settings will create an adjusted state plane coordinate system scaled around the base station and the base station coordinate will not change. This is useful for projects that have ground distances as would be measured with a total station and state plane coordinate system bearings since the rotation is set to 0. The coordinates will be very close to the real state plane system so that orthographic imagery and state plane referenced contours or elevation models can be loaded into your CAD drawings. You should be cautious when giving these coordinates to others as they may confuse them for real state plane coordinates. To solve this problem you may wish to subtract 100,000 from the *North* and *East Ground* coordinate values to create a (100,000 100,000) offset from the real state plane system. This can be done by tapping the *North Ground* and *East Ground* boxes.

Tap the  button to add the current project's name to

the beginning of the coordinate system name:

Adjust Grid-to-Ground & Rename

NameProject1 - NAD83(2011) / Ohio South | NAVD 88 GRD: 50ppm

North Origin723889.5487 ft

East Origin1784473.7876 ft

North Ground723889.5487 ft

East Ground1784473.7876 ft

Rotation0°0'0.0"

Scale Difference50.0 ppm

North Inclination0.0 "

East Inclination0.0 "

Vertical Offset0.0 ft

Cancel

OK

Press *OK* and then *Apply* to create this coordinate system:

Current Project

All Projects

Default

NAD83(2011) / Ohio South | NAVD 88

Project1 - NAD83(2011) / Ohio South...

Grid System

NameProject1 - NAD83(2011) / Ohio South | NAVD 88 GRD: 50ppm

Default nameNAD83(2011) / Ohio South | NAVD 88

Epoch2010.0000

Geodetic Datum

Semi-major axis6378137.000m

Inverse flattening1 / 298.257222101

Prime meridian00°00'00"

HTDP WGS84(ITRF2008) to NAD83(2011) / NAVD 88 / SPCS83

Esc

You can now use this coordinate system as the *Project Coordinate System* or just for some *Pages* if you choose.

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Coordinate Systems

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Files and Data Exchange

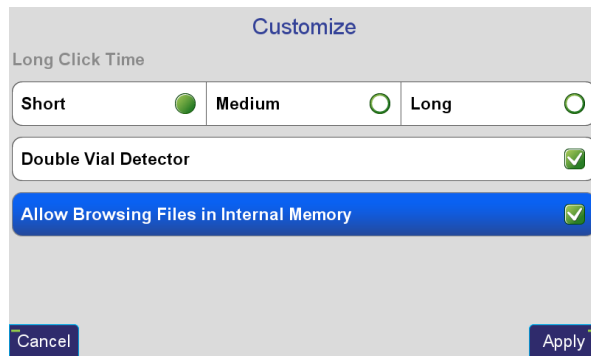
Data transfers between the TRIUMPH-LS and your PC are facilitated through using either a USB cabled connection, a USB flash drive, a cloud drive or a network drive. Using a cloud drive or USB flash drive are the simplest and recommended methods to transfer data between your PC and J-Field.

Data Base Structure and Customize Screen

Each J-Field *Project* has a “data.db” file stored in its project folder found in “Internal Memory\ VS Data\Maps”. All the points and lines for a project are stored in this file. By default, the Internal Memory is hidden. To allow it to be visible in J-Field you can enable this option from *System>Customize*.

The **Long Click Time** setting in the *Customize* screen controls how long a button must be held down to register as a *Long Click*. Some button in J-Field perform two actions with the second action being initiated with a *Long Click*. Buttons with these second actions typically display a small down arrow in their bottom left corner.

Check the **Double Vial Detector** option if you are using the Javad rover rod with a double leveling vial. This allows the downward facing camera to detect both vials.

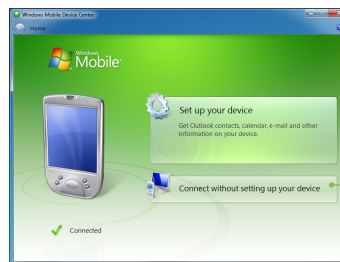


Customize Screen

Working with WMDC

Using the provided micro USB Cable will allow you to browse the contents of the TRIUMPH-LS using Windows Mobile Device Center (WMDC); take care not to delete system files!

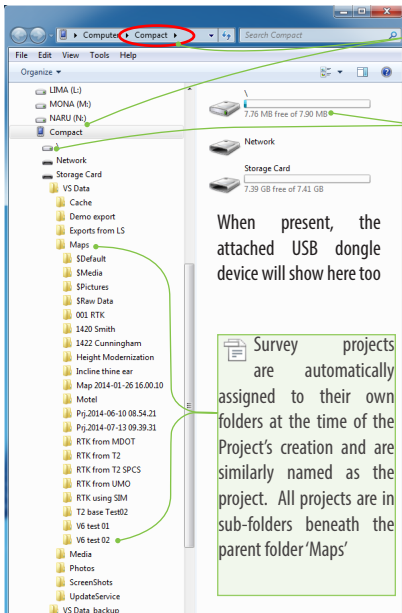
The first time that you connect the two devices, Windows will install Windows Mobile Device Center, a pretty straightforward process largely tailored to other types of mobile devices.



Click on 'Connect without setting up your device'



Click on 'File Management',
and then 'Browse the
contents of your device'



This is how the
TRIUMPH-LS is seen by
Windows

Windows operating
system, J-Field, support
files etc. are in the root
directory.

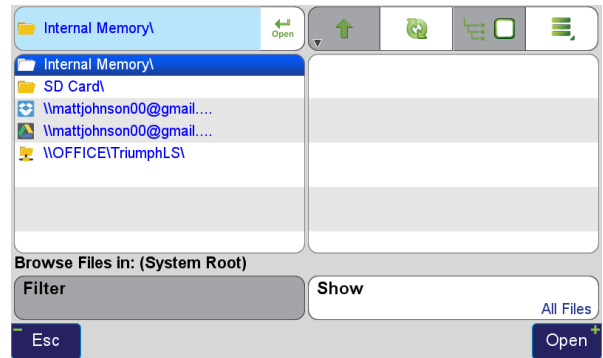
When present, the
attached USB dongle
device will show here too

Survey projects
are automatically
assigned to their own
folders at the time of the
Project's creation and are
similarly named as the
project. All projects are in
sub-folders beneath the
parent folder 'Maps'

Good practice is to use
the provided microSD
card for survey-related
data storage including
Media, Photos,
Screenshots and
Spectrum data.

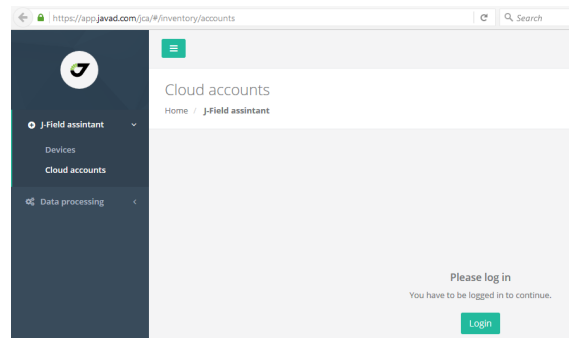
Mounting a Cloud Drive

J-Field supports [Google Drive](#) and [Dropbox](#) cloud drives.

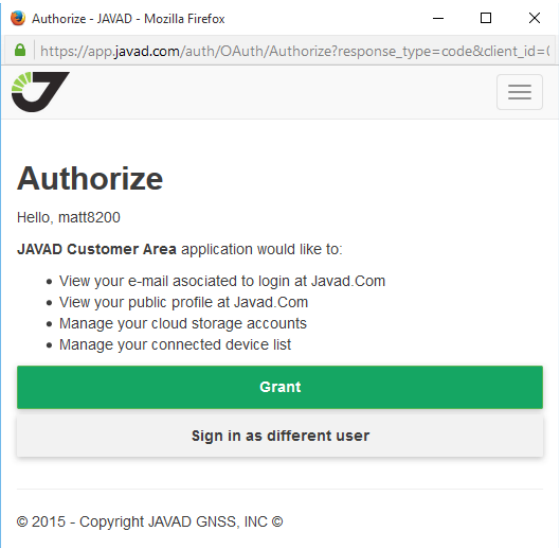


*Files>Browse Files screen showing mounted Google Drive,
Dropbox and a shared network folder.*

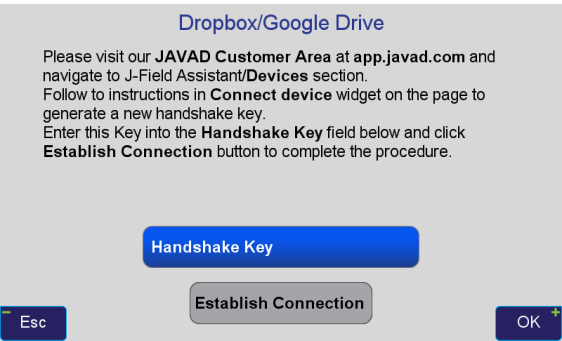
To mount a cloud drive navigate to <https://app.javad.com/jca/#/inventory/devices> and login from your PC's browser. If you have not setup a Javad.com login, you will need to do so.



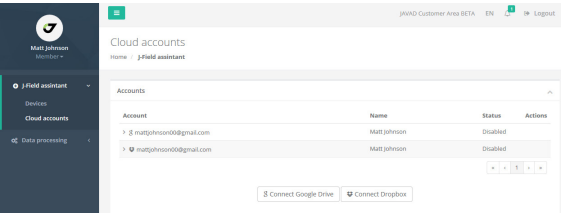
After signing in you will be prompted to Grant access.




Click Generate Key and a new alphanumeric key will appear. In J-Field open System>Dropbox/Google Drive and tap Handshake Key to enter this key. Then click Establish Connection. Note that J-Field needs to have an Internet connection established during this process.



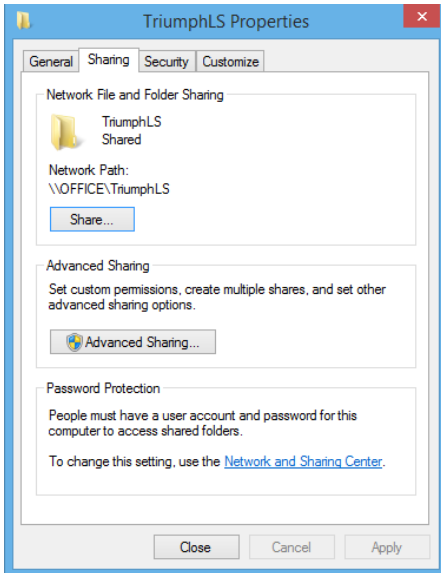
Once this is completed, return to your web browser and select Cloud accounts in the left pane. Then click Connect Google Drive or Connect Dropbox. You will be prompted for your credentials for these accounts.



After these steps are completed open Files>Browse Files and click the context menu icon  and choose Mount Cloud Drive. You should see your Google and Dropbox accounts listed if you completed the previous steps correctly. Choose the desired account and press OK.

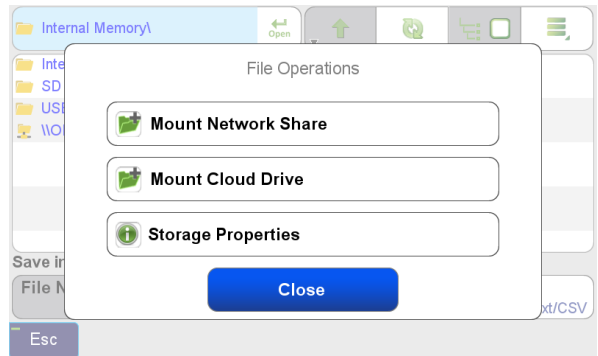
Mounting a Shared Network Folder

Mounting a shared network folder allows files to be transferred to and from J-Field while it is connected to a local network. First a folder from a PC connected to the same local network as the TRIUMPH-LS needs to be created.

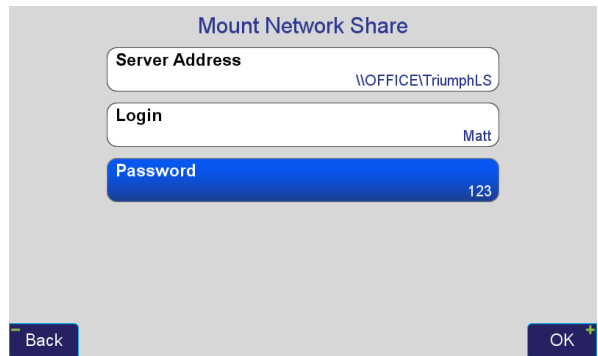


Here the folder TriumphLS was created on the Desktop. Right clicked on it, selected Properties and then enabled Sharing in the Sharing tab.

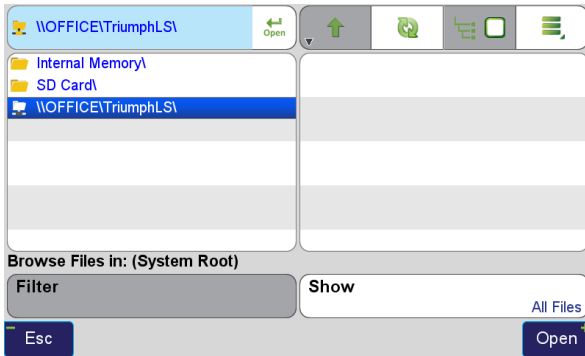
Then in the Browse Files screen, choose Mount Network Share from the File Operations menu when you are in the System Root directory.



Then enter the network path as shown above along with your Windows account name and password.



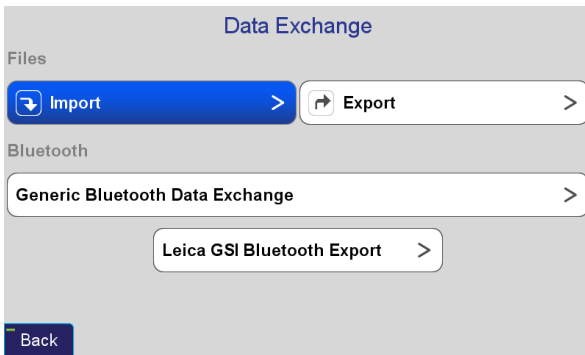
Press OK and you should now see this folder shared in the Root Directory where it can be used to import and export files.




Note that if an error message is received while trying to read the network shared folder, it may be necessary to reboot the TRIUMPH-LS to resolve this. This is a known issue with the Windows operating system in the TRIUMPH-LS.

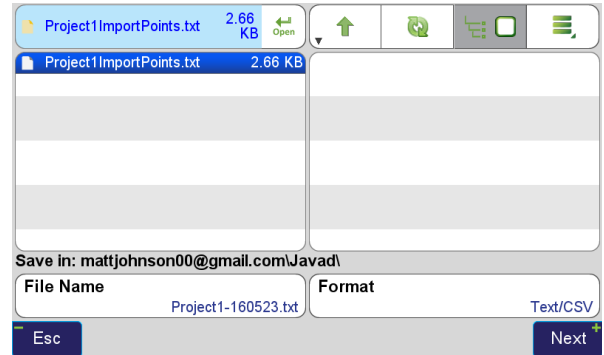
Importing Points From a Text File

To import points from a text file open the *Data Exchange* screen from the *Home Screen 2* or from *Files>Data Exchange*.



Data Exchange Screen
www.javad.com

Navigate to the location where your file is located using the  to go up a directory and *Open* to open a folder. Then select and highlight the text file to open and choose *Open*. (Notice the down arrow in the corner of the *Navigate Up* button. Holding this button down will initiate a *Long Click* and navigate to the system Root directory.)



Open File Screen - Filtered to show only text files

If your text file is configured with the standard format of “PointName, N, E, H, Description” you should configure the import settings as shown below if they are not presently configured this way. The preview should display if the format is being interpreted correctly.

Import file: Project1\ImportPoints.txt

Presets

Field Sep. , ☒ Other ☐ - Skip Lines 0 +

Tab ☐ ; ☐ (Choose) Name Prefix Name Suffix

	Name	N/Lat	E/Long	U/Alt	Description
1	1	487816.24640	1901853.46907	897.26800	Pipe
2	2	487777.03647	1902044.48630	897.26800	Pipe
3	3	487762.35158	1902255.37564	897.26800	Pipe
4	4	487749.39629	1902585.12124	897.26800	RR SpikeOak...
5	5	487737.78938	1902660.53324	897.26800	Pipe
6	6	487578.59067	1902837.65239	897.26800	Pipe

Back Next

If the preview is correct, press **Next**.

Import file: Project1\ImportPoints.txt

Units ft

Points in file: 10

Coordinates range: N: (485995.38ft - 487816.25ft)
E: (1901712.92ft - 1903697.44ft)
H: (655.31ft - 897.27ft)

Import into Page: Page1 With Default Code DefCode

Coordinate System: NAD83(2011) / Ohio South | NAVD 88

Point names are OK.

Back Import

A summary screen will be displayed. The points will be imported into the selected *Page* and be imported to the coordinate system of that *Page*. Tap **Import** to finish importing the points.

Exporting Points To a Text File

To export points to a text file open the Data Exchange screen and choose the *Export* option. Choose the format of the file type you wish to export with the box in the lower right corner, in this case **Text/CSV**. Navigate to folder you wish to save the file. Click the **Next** button to proceed or enter a new file name if desired. If you desire to change the default filename of the file to be created, you may do so by clicking on the filename box displayed to the right of **Save File in This Folder**.

Open

Save in: USB Device\Javad\

File Name Project1-160523.txt Format Text/CSV

Esc Next

Save File Screen - Set to save a txt file in the USB drive

The *Export Formatting* screen will be displayed. It should have the default configuration to export a "PointName, N, E, H, Description" file with the description field being a merged field J-Field's *Code*, *Attributes* and *Description* fields. These fields are merged together with the use of *Sep. 2* (Separator 2) set to be a space. By default, fields are separated with *Sep. 1*, typically set to be a comma. Highlighting a field from the box on the left side of the screen and tapping *Sep. 2* will add a plus sign after the field name to indicate that it will be separated with *Sep. 2*.

Export to file: Project1-160110.txt Presets

Export Range Project Output points: 8

Coordinate System
Project1 - NAD83(2011) / Ohio South | NAVD 88 GRD: 50ppm

Description + + - ↑ ↓

Name	Attribute 2 +	Sep. 1	,	Sep. 2	Spc
N	Attribute 3 +	Decimals	3	Header Line	<input type="checkbox"/>
E	Attribute 4 +	Decimals, °	10	More Settings	>
H	Attribute 5 +				
Code Name +	Description +				
Attribute 1 +					

Back Next

Export Formatting Screen with Default Formatting Shown

The plus and minus buttons are used to add and remove fields while the up and down arrows will change the order of fields. *Presets* allows configurations to be saved and recalled. Options are displayed to set the number of *Decimals* exported and whether to export a *Header Line*. *More Settings* opens the *Export CSV Settings* screen where options exist to specify how to format cut and fill values and *Surveyed Design Points*.

Export CSV Settings

Format Lat/Long ☐ **Custom Cut/Fill Prefix** ☐ **Cut** c **Fill** f

Append Unit Names to Header ☐ **Quote Fields with Quotes** ☐

Horizontal Length Units Custom (U.S. Survey Feet) **Vertical Length Units** Custom (U.S. Survey Feet)

☒ **Export Surveyed Design Points as Separate Points**
Add 1000 to Design Point Names Numeric Value

Do Not Write Code If It Is "DefCode" ☒

Back Export

Export CSV Settings Screen

Use Export Range to choose which points to export.

What to Export

All Project Points <input checked="" type="radio"/>	By Page <input type="radio"/>
By Page and Code DefCode <input type="radio"/>	List (points: 10) <input type="radio"/>
Trajectory as Points (not selected) <input type="radio"/>	All Page Trajectories as Points <input type="radio"/>

Page Page2

Design Points ☐ **Surveyed Points** ☒ **Surveyed Design Points** ☐

Esc Output points: 8

What to Export Screen

After the settings and points to export have been selected, tap *Next* to preview the formatting and points before pressing *Export* to create the file.

Export File Preview

```
100,590058.680,1846652.741,717.964,IPF 1/4
101,590061.089,1846592.985,717.897,Pipe 1/2
102,589941.448,1846586.316,718.265,Pipe 1/2 Pinch
103,589938.850,1846646.255,717.952,Pipe Bent
104,590055.424,1846737.442,716.407,Pipe 3/4 Pinch
105,590051.676,1846822.644,715.361,IPF 7/8
106,589934.906,1846731.623,716.550,Pipe 3/4 Pinch
107,590044.731,1846992.639,714.718,Pipe 1/2
```

Back Export

Export File Preview Screen

Exporting Photos, Screenshots, GNSS Data and Project Archives

To export media files that include photos, screenshots, audio files and raw GNSS data files choose the *Project Archive File (ZIP)* format option in the *Save File* screen. A full *Project Archive* can also be exported with this option. A Project Archive contains all the files necessary to restore the project if it becomes corrupt or deleted. It can also be used to copy the project to a different TRIUMPH-LS.

Save File in: USB Device\

↑

📷

📄

☰

Save File in This Folder

Project1-160111.zip

Filter

(Empty)

Format
Project Archive Fil...

Esc

New

Save File Screen - Set to save a Project Archive file in the USB drive

After tapping *Save File in This Folder* or the *New* button you will be presented with options to specify what type of files to export in the *Export Project Archive* screen. Use the *Full* option to create a backup that can be restored. The *Only Media* option will export only the filetypes chosen. Press *Create* to export the files which will all be contained in a zip file.

Compress to file: Project1-160111.zip

Full

Only Media

Comment

Include

Photos

Audio

Raw Files

Created archive will contain only media files. It cannot be used with "Unpack archived project" command.

Esc

Create

Export Project Archive Screen - Set to export only photos (screenshots included) and raw GNSS files

Exporting A Project Report

A report of the Project can be exported in HTML or PDF format by choosing *HTML* or *PDF* format in the *Save File* screen. The report will contain the selected points with all the details and statistics about that point. The *Text & Images* will be included if this option is checked. A number of options exist to format the PDF or HTML report:

Export to file: Project1-160111.pdf

Export Range

Project

Output points: 8

Coordinate System

Project1 - NAD83(2011) / Ohio South | NAVD 88 GRD: 50ppm

Text Only

Text & Images

Images Only

Image Types

>

Size

Letter

Portrait

PDF Open Password

Page Numbering

Page 7 of 100

Back

Export



ShapeTags & Codes

Create and manage your own library of *Codes*; alphanumeric textual assignments

to points. *Codes* can quickly be recalled from the *Favorite Codes* screen, eliminating the need to type in a point description for each surveyed point. In addition, each *Code* can have up to five *Code Attributes* fields. An example of a *Code* is “IPF” (Iron Pin Found). It can then be setup with *Code Attribute* fields of “Size”, “Cap” and “Status” which allow these attributes to be entered and stored with each point. Choose *Tags & Codes>Manage Codes* to access the library of *Codes*.

Code: Corner
Number: 1
Category: Monument
Description:

Create
Edit
Delete

Category to show
Monument

DefCode	Corner	Hub	IPF	IPS
Mag Nail	Magnetic Reading	Monument	Nail	Pipe
Post	Spike	Stake Set	Stone	

Back

Manage Codes Screen

Tap *Create* or *Edit* to make a new *Code* or edit an existing one. A *Symbol*, *ID*, *Category* and *Code Description* can be assigned each *Code*. If a *Symbol* is associated with a *Code*, points with that code will have the *Symbol* displayed on the map. The *ID* field is a numerical field that is not used in J-Field but is an export option for text files and may be

useful with other software packages. The *Category* can be used as a filter in the *Manage Codes* screen.

Edit Code

Code
IPF

Symbol

ID
1

Category
Monument

Code Description

Size	< E M P T Y >
Cap	< E M P T Y >
Status	< E M P T Y >
< E M P T Y >	< E M P T Y >
< E M P T Y >	< E M P T Y >

Back

Update

Edit Code Screen

ShapeTags can be assigned to points during data collection to enable the automated drawing of lines between points with like *ShapeTags*. For example, you may want to create a *ShapeTag* of “Fence”. When collecting a point along a fence, select the “Fence” *ShapeTag* to be assigned with that point. This will cause a line to be drawn on the map between that point and the previous point that also has the “Fence” *ShapeTag*.

ShapeTags are associated with a chosen *Code* when a new *ShapeTag* is created. When a *ShapeTag* is then selected to be assigned to a point, by default, the *Code* field for that point will be populated with the associated *Code*.



Setup

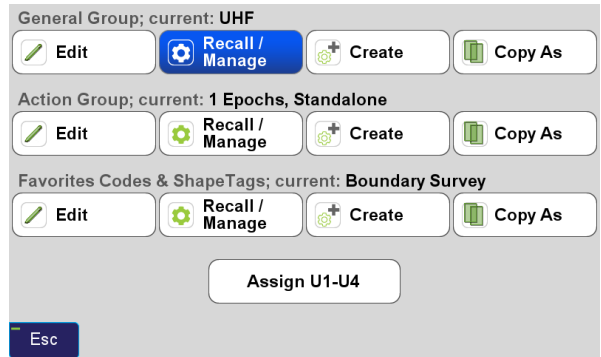
J-Field's settings are divided into 3 profile groups: the *General Group*, *Action Group* and *Favorite ShapeTags and Codes*. These groups exist so that different settings groups can quickly and easily be saved and recalled.

The **General Group** profile stores the settings for RTK corrections, i.e. the configurations for UHF radios or connection parameters to a RTN. The **Advanced Settings** are also stored in the *General Group* and are found as an option in the first setup screen of the *General Group*, they include the settings for the displayed units. Tap *Edit>Advanced* to access them.

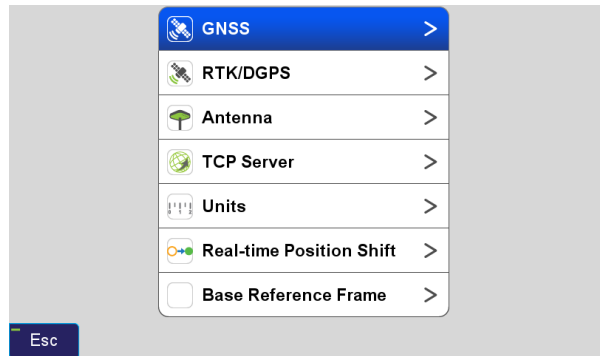


The *(Set Up)* will quickly open the *Setup* screen; pressing it twice opens the *Advanced Settings* Screen.

As an example, to configure a new RTN setup you would tap **Create** to create a new *General Group* profile and then follow the screen prompts to enter the communication parameters and settings. See *Appendix A: Creating a RTN Profile* for detailed instructions on setting up a RTN. **Copy As** creates a copy of the existing profile but prompts you to enter a new name for the new profile.



Setup Screen



Advanced Settings Screen

Tapping the **Recall / Manage** button will open a list of profiles shown on the left side of the **Profiles** screen. Details of that profile are displayed in the information panel (the blue box on the right side of the screen). Across the top from left to right are buttons to **Rename**, **Delete**, **Search**, **Sort Alphabetically**, **Sort by Date**.

General Profiles

AB
✖
🔍

A
⬇
⬆

Factory Defaults

ODOT VRS

> UHF

Name	UHF
Last Time	01/14/2016 18:15:42
Mode	Rover
Ref. Frame	NAD83(2011)
Channel	UHF
Protocol	JAVAD
Frequency	451.80000
Rcv. Format	RTCM 3.0

Cancel
Recall

General Group Profiles Screen

The **Action Group** profile contains the collection settings. These include the RTK Verification and Validation settings and how many epochs to collect. These settings are discussed in the Collect section of this manual. The configuration of the *Stake* and *Collect* Action screens' *User Defined* (whitebox) Buttons are stored in the Action Group profile as well as the U1-U4 hardware button options.

Action Setup (Boundary)

Start with Start Button

Only RTK Fixed

Correct for Tilts

Level Offset

Activate Post-Processing option after 5 min

Stop After 100 epochs

Verify with V6 reset

What To Record >

Revert Code to ShapeTag default

Recall

Esc
OK

Action Setup Screen

The ***Favorite ShapeTags & Codes*** profile stores different list of favorite *ShapeTags* and *Codes*.

Setup Favorites (Boundary Survey)

Favorite Codes >

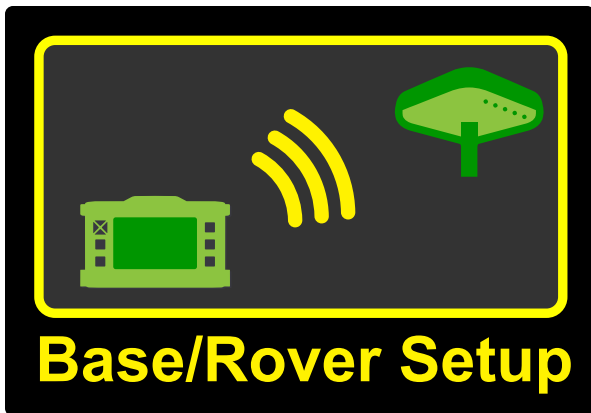
Favorite ShapeTags >

Auto Sequence >

Recall

Esc

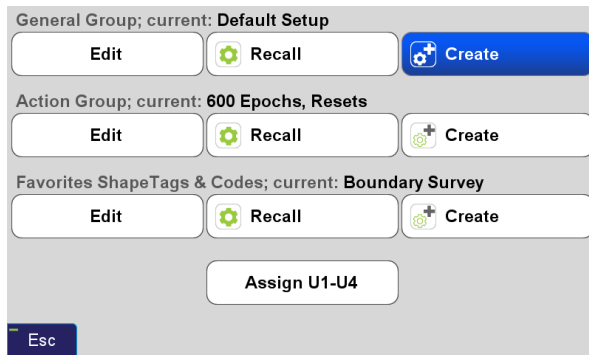
Setup Favorite ShapeTags & Codes Screen



Base/Rover Setup

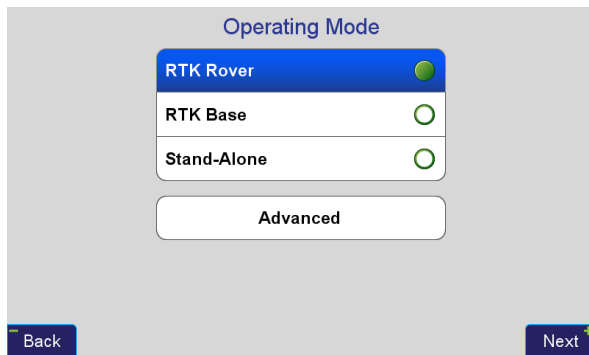
Base/Rover Setup is used to configure and start the transmission of RTK corrections via UHF or FH915 SS (frequency hopping spread spectrum) radios from your Javad Base receiver and radio to your Rover. It reads the communication parameters from a UHF or SS *General Group* rover profile and creates a matching base station profile internally. It then sends that base station profile to the base through the Bluetooth connection.

Before *Base/Rover Setup* can be used a UHF or FH915 SS *General Group* rover profile is needed. If one does not exist yet, open the *Setup* screen and tap *Create* for a new *General Group* profile:



Setup Screen - Creating a new General Group profile

Enter a profile name ("UHF" or "FH915 SS" are suggested) in the next screen and tap *OK*. The next screen will prompt you to select the Operating Mode, choose RTK Rover:



You could tap *Next* and continue to configure all the communion parameters but this is not necessary as they can also be configured with *Base/Rover Setup*. Press *Back* and then *Esc* to return to the Home screen.

Once a UHF or FH915 SS General Group profile has been created and recalled, tap the *Base/Rover Setup* button from the second page of the *Home* screen.

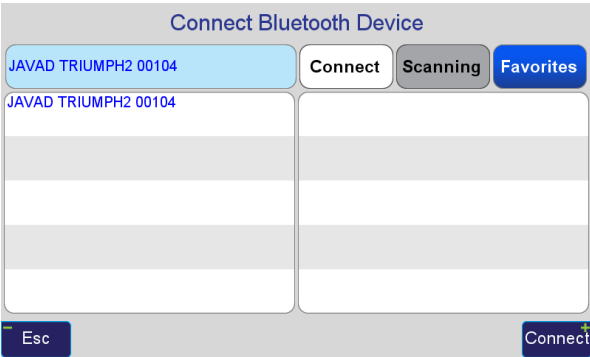
If for some reason the selected profile is not in UHF or FH915 SS mode a message will be displayed indicating so.

Should that be the case, tap *Recall* to select a UHF or FH915 SS radio profile or tap the displayed message to change the current *General Group* profile into a UHF or FH915 SS profile.

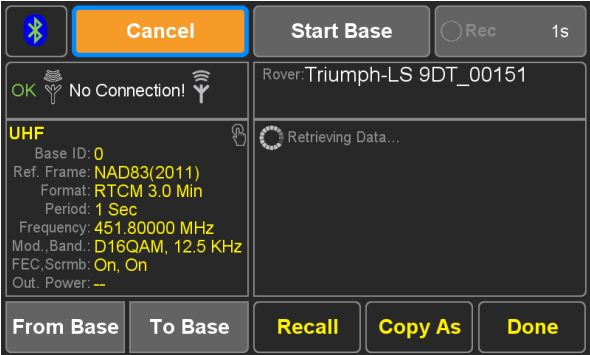
To connect the Base and the Rover via Bluetooth, tap on *Connect*. The external radio, if using one, should be powered on prior to pressing *Connect*. Always have an antenna connected to the radio before powering it on to avoid potential damage to the radio.



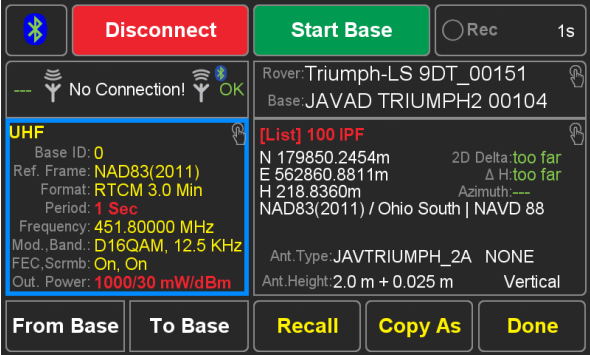
Immediately a scan of available Bluetooth devices will begin and a few seconds later will be completed. Choose the device intended to be used as the Base receiver and tap **Connect**.



Once the Bluetooth connection has been initiated, it will take a few seconds before it has completed. During that interim few seconds, your screen may appear like what is shown on the right.



Once the existing Base and radio parameters have been retrieved the screen should look similar to this. The Rover profile radio parameters are displayed on the left panel while the current Base coordinate is displayed on the right. **Radio parameters displayed in red indicate that there is a different value between the Base and Rover profile. Use *From Base* to update the Rover profile to the parameters from the Base or use *To Base* to send the Rover radio parameters to the Base before starting the Base.**



Tapping the left panel opens the screen to configure the radio parameters. “RTCM 3.0 Min” **Format** should be used to minimize the correction data that must be sent through the radio. To start the base with **5 Hz BEAST MODE** corrections the **Broadcast Period** must be changed to **0.2 seconds**.

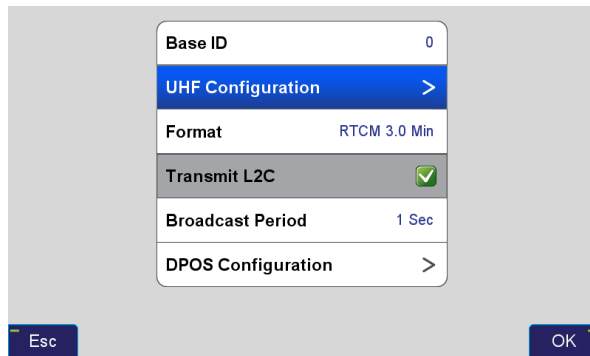
The time required to acquire a fix is inversely proportional to the rate of the corrections. By reducing the time for the RTK engines to fix, RTK *Verification* and *Validation* can be completed much quicker and surveyors can collect points in locations that previously proved to be very difficult and time consuming.

It is important to note that increasing the Broadcast Period, increases the battery consumption of the radio as well as the heat generation inside it. With the HPT435BT you may need to use the modem fan when broadcasting with an output power greater than 4 watts, depending upon the ambient temperature.

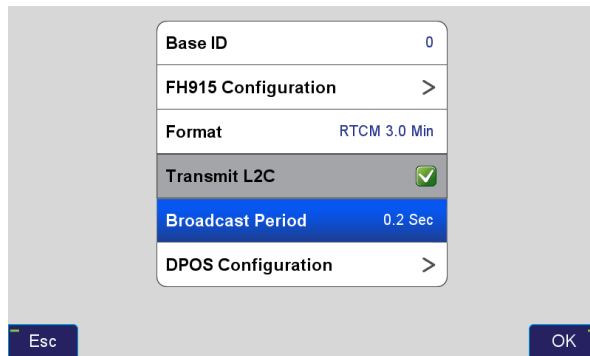
The **Base ID** field limits the Rover from receiving corrections if the Base and Rover profiles do not have the same **Base ID**. It can be left at its default value of 0.

Transmit L2C is always enabled. If for some reason it is not checked, it will become enabled automatically when the Base is started with *Base/Rover Setup*.

To configure the UHF or FH915 parameters tap the **UHF** or **FH915 Configuration** button.



UHF Base Configuration Screen



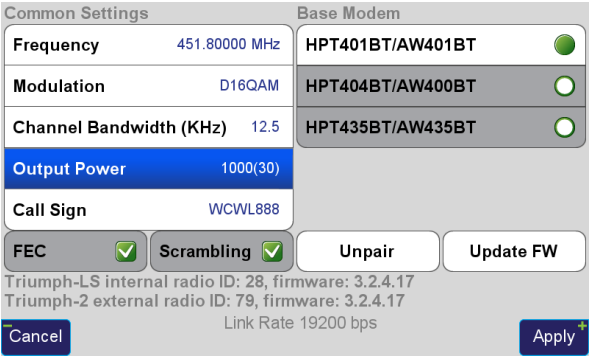
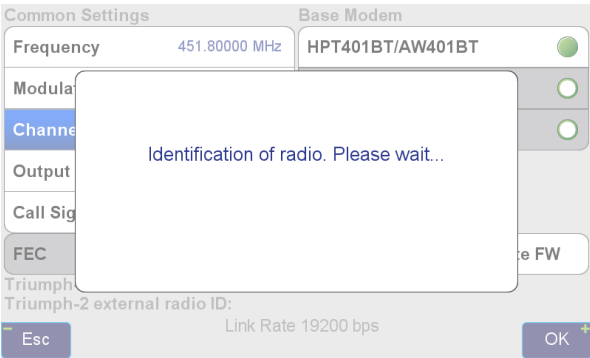
FH915 SS Base Configuration Screen

Tapping the *UHF* or *FH915 Configuration* button will trigger an immediate search for the radio via Bluetooth between the Base and the radio. If a Bluetooth enabled radio is not found to be currently paired to the Base, you will be prompted to pair the radio. This can be done via the Bluetooth option.

For UHF radios the parameters shown to the right need to be configured. The *Frequency* should be one of your FCC licensed (US users) frequencies. A channel with little interference should be chosen. From the *Frequency* selection screen you can *Scan* the displayed channels to check the interference levels.

A *Modulation* (the method the data is encoded in the radio signal) must be selected that has a sufficient link rate to transmit increased data rates with 5 Hz corrections. If *Channel Bandwidth* is limited to 12.5 kHz by a FCC license, **D16QAM** modulation must be used. With 2 Hz corrections (0.5 second broadcast period) D8PSK modulation can also be used. Modulations with greater link rates have decreased receiver sensitivity to demodulate the signal and the downside to choosing modulations with higher link rates is that they are more subject to interference and data loss when the signal is weak. Field test have found that D16QAM modulation decreases the working range of the radio approximately 20% as compared to DQPSK modulation.

Increasing the *Output Power* increases radio range but also increases radio power consumption. With an antenna height 4 m (13.1 ft), D16QAM modulation and a 1 watt



UHF Configuration Screen

output power, 5 Hz RTK corrections can have a stable range up to 4 km (2.5 miles) away when terrain obstacles do not block the signal. A hill or ridge between the Base and Rover will greatly limit the range. The FCC (US) allows up to 35 watts ERP (Effective Radiated Power) to be transmitted. If you have a HPT435BT radio set to output 35 watts and are using an antenna that isn't a unity gain antenna, such as the 5 dBd gain whip antenna, you aren't in conformance with the FCC regulations and terms of your license. With the 5 dBd gain whip antenna, an *Output Power* of 10 watts or less must be used to stay under 35 watts ERP.

Your FCC assigned call sign should be entered in the *Call Sign* box.

The *Unpair* button is used to unpair the Bluetooth connection between the base and Rover. This would only be necessary if you wish to pair a different radio to your Base.

Update FW checks and installs the latest radio firmware. The versions released October of 2015 or later are needed for 5 Hz corrections to work correctly.

FH915 SS Radio Settings

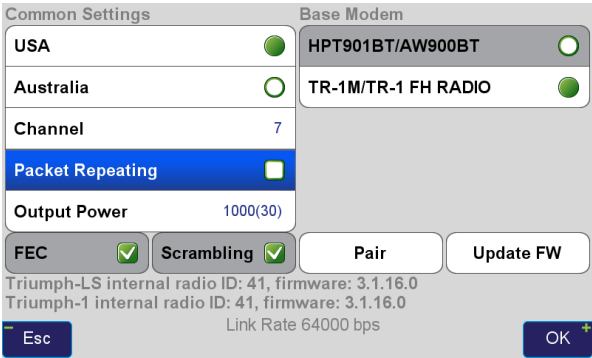
With a *FH915 SS* radio *Packet Repeating* must be disabled when using correction rates greater than 1 Hz.

In the US it may be best to operate on *Channel 7* to avoid interference.

Field test confirm 4 km (2.5 miles) as the range at which stable 5 Hz RTK can be achieved with a *FH915 SS* radio with a 4 m (13.1 ft) antenna height. With 2 m you may achieve up to 2 km (1.2 miles), but it is dependent upon the environment.

UHF Modem Link Rates (bps)

Channel Spacing	Modulation			
	DBPSK	DQPSK	D8PSK	D16QAM
6.25 kHz	2,400	4,800	7,200	9,600
12.5 kHz	4,800	9,600	14,400	19,200
20 kHz	7,200	15,000	22,500	30,000
25 kHz	9,600	19,200	28,800	38,400



FH915 SS Configuration Screen

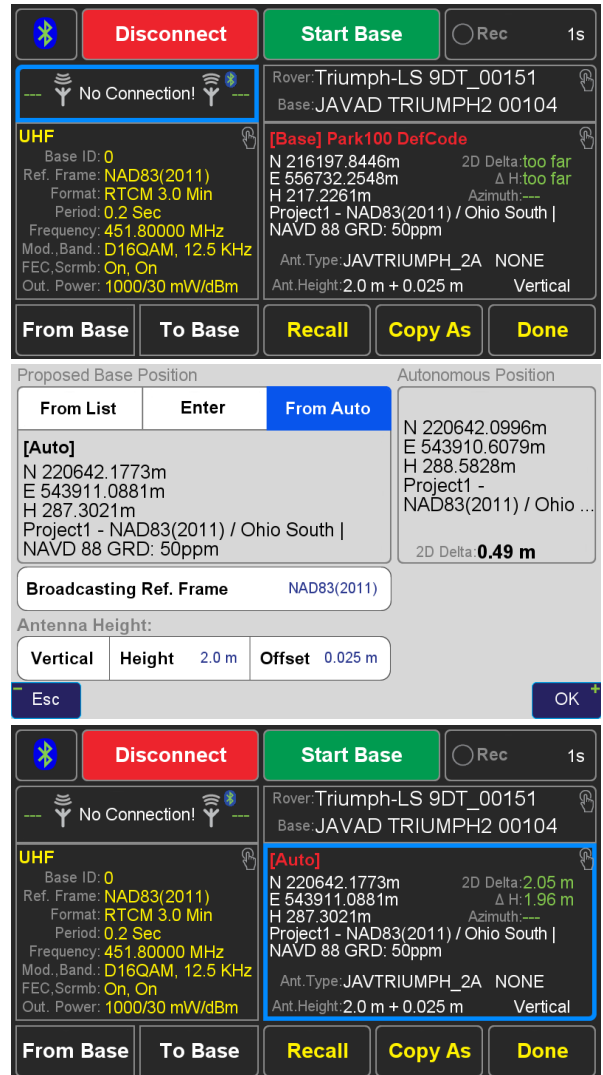
The Base broadcast coordinate should now be set. Tap on the coordinate pane on the right side of the screen.

The *2D Delta* indicates the horizontal distance between the current autonomous position the base is reporting and the proposed broadcast coordinate.

Enter the **Antenna Height** and **Offset**. In this case the Base is on a 2 m pole with the thread adapter that adds an additional 0.025 m. Tap OK once done.

The base station raw GNSS data is always recorded and then transferred to J-Field when *Stop Base* is pressed at the end of a survey session so that it can be sent to Javad's ***Data Processing Online Service***, also known as ***DPOS***. With the *DPOS* tool found in the *CoGo* menu the raw data file can be submitted to *DPOS* and all the survey points from that base station session can be adjusted to their real coordinates so they are no longer based off an autonomous position. The recording interval can be specified along with some *DPOS* options with the ***Rec*** box.

Once the coordinates for the Base have been selected/entered along with *Antenna Height* and radio parameters tap **Start Base**.




Once the Base is broadcasting you can check that the Rover is correctly receiving corrections at the set transmission rate. Open the *Collect* or *Stake Action* screen. The position solution button should display the correct incoming correction rate and the communication button should display a 100% link quality.

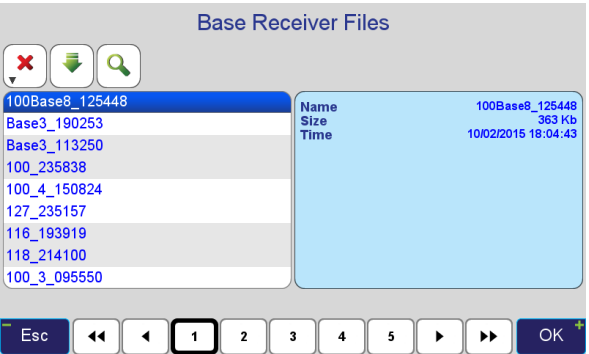
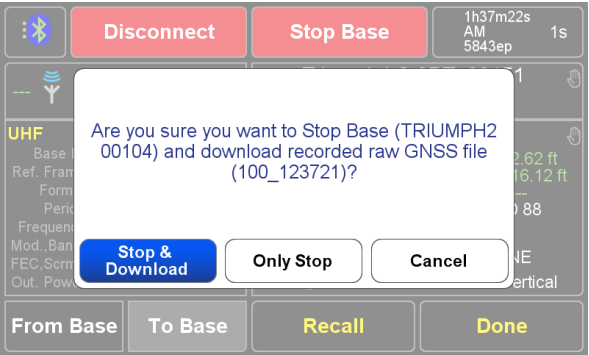
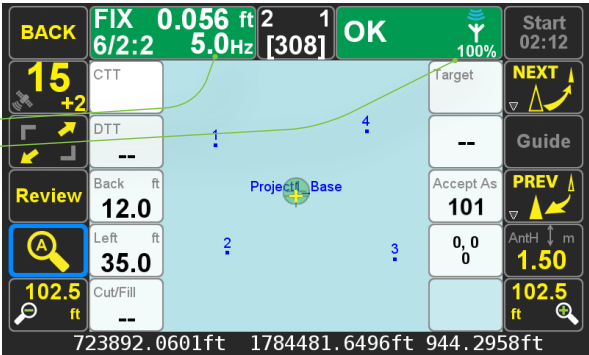
To check that you have started the Base correctly with the correct coordinate, you may wish to stake a point you have previously located if you have one available.

After the Base has been started you can press **Done** to disconnect the bluetooth or alternatively the connection will be disconnected when the distance between the Base and Rover exceeds the range of the Bluetooth communication.

After finishing surveying return to the Base again and open **Base/Rover Setup** to *Connect* again and stop the base with **Stop Base**. This will display a prompt to stop the data transmissions and download the Base GNSS data into J-Field. Choose **Stop & Download**. After the download completes the Base can be powered off, the radio can be powered off while the data is downloading without causing any problems.

Managing Base Files

Base files can be deleted from the base or manually downloaded into J-Field. From the *Base/Rover Setup* screen choose the  button and then the *Mange Base Files* option.



Troubleshooting Starting the Base

If for some reason problems are encountered when trying to start the Base, clearing the Base NVRAM is usually the first recommendation.

How to clear the NVRAM

- 1. Turn the receiver OFF with the ON/OFF button.
- 2. Press and hold the Record button.
- 3. Turn the receiver ON by pressing the ON/OFF button.
- 4. Wait until all the LEDs are flashing yellow (except the battery LED).
- 5. Release the Record button.

If the radio is transmitting, its TX LED should be flashing at the broadcast rate. If the radio is broadcasting but corrections are not being received in J-Field, check the *UHF Status* screen for an “err” listed in the *UHF State*. If an error state is displayed, press **Restore CFG** to restore the factory UHF configuration.

UHF			
Region	ALL	Data RX	RTCM 3.0
Output Power	--	Sent	--
Frequency	451.80000 MHz	Station ID	N/A
Protocol	JAVAD	Distance	N/A, no base coord.
Modulation	D16QAM	LQ, Delay	,
Ch. Bandwidth	12.5 KHz	Data link latency	7.0 sec
FEC, Scrambling	On, 255	Received, Lost	--, 0
Link Rate	19200 bps		
Call Sign	--		
Antenna	Internal		
RSSI	No signal (-147 dBm)		
BER	--		
UHF State	err, freq		
Esc		Configuration >	Restore CFG >

UHF Status Screen - UHF State “err, freq”, Use Restore CFG to repair



Collect

Pressing the *Collect* button opens the *Collect Prepare* screen; pressing *Collect* hardware button twice will open the *Collect Action* screen.



In the *Collect Prepare* screen, the *Project*, *Page*, *Coordinate System*, *ShapeTag*, *Code*, *Code Attributes*, *Point Name*, *Point Description*, *Antenna Height* and collection settings can be setup before beginning data collection for a point.

When collecting points, it is recommended to use the *Code* and *Code Attributes* to store information about the point being collected. The *Description* field can then be reserved for entering additional information about the point. When exporting point coordinates in Text/CSV format, these three fields can be merged into one field so that surveying software can import data with the traditional "Name,N,E,H,Description" format but with the description being the combination of J-Field's *Code*, *Code Attributes* and *Point Descriptions* fields.

The *Review* buttons opens the *Review* screen which is a map of the project. Here linework can be drawn on the map with the CAD functions and point data can be edited.

The *View* button opens a screen to configure what point attributes are displayed on the map and allows some graphical parameters to be customized.

To the right of the *View* button is the *Action Setup* button

which opens a screen to configure the collection settings for points. The RTK Verification and Validation settings are configured from *Action Setup* screen.

Project1	Page2	Project1 - NAD83(2011)...
1. Project	2. Page	Coordinate System
DefTag	IPF	5/8, Smith, ?
3. ShapeTag	Code	4. Code Attributes
101		1.7 m
5. Point Name	6. Point Description	7. Antenna Height
Review	View	Boundary
		09:03
		Next

Collect Prepare Screen



Pressing the *Action* hardware button or *Next* from the *Collect Prepare* screen opens the *Collect Action* screen.

Screen Anatomy - Collect Prepare Screen

The *Project* button displays the name of the current *Project*. Tap it to open an existing *Project*, to create a new *Project*, or to edit the current *Project*'s name or coordinate system.

The *Page* button displays the name of the current *Page*. Tap it to open the *Pages* screen and set the current *Page*, turn on or off *Pages* or edit a *Page* Name or coordinate system.

The *Coordinate System* button displays the name of the coordinate system for the current *Page*. Tap it to change this coordinate system.

ShapeTags can be assigned to points during data collection to enable the automated drawing of lines between points with like *ShapeTags*. "DefTag" is the default *ShapeTag* and does not create lines between points.

The *Point Name* button displays the name that will be assigned to the next surveyed point. After a point is surveyed it will increment to the next available name.

The *Review* buttons opens the *Review* screen which is a map of the project. Here linework can be drawn on the map with the CAD functions and point data can be edited.

Use the *Point Description* field to store additional information about the point.

The *View* button opens a screen to configure what point attributes are displayed on the map and allows some graphical parameters to be customized.

Displays the current *Action Group* profile name group and opens the *Action Setup* screen. The rover icon displays whether tilt corrections are enabled or not (disabled above). The clock icon indicates the *How to Stop?* setting has been set to a fixed number of epochs.

Displays the estimated remaining battery life and is a shortcut to the *Battery Status* screen

The *Code* button displays the name of the *Code* that will be assigned to the next surveyed point. Tap it to choose a new *Code* from your list of *Favorite Codes*.

Up to five variable *Code Attributes* fields can be used to store additional information about a point with this box.

Edit the height of the ARP (Antenna Reference Point).

Takes you to the *Action* screen

Project1 1. Project	Page2 2. Page	Project1 - NAD83(2011)... Coordinate System
DefTag 3. ShapeTag	IPF Code	5/8, Smith, ? 4. Code Attributes
101 5. Point Name	Point Description 6. Point Description	1.7 m 7. Antenna Height
Review	View	Boundary
	09:03	Next

Action Profile Setup

The *Action Setup* screen can be opened by tapping the bottom middle button on the *Collect* and *Stake Prepare* screens. It contains all the settings related to the collection of points.

Action Setup (Boundary)

Start with Start Button

Stop After 100 epochs

Only RTK Fixed

Verifywith V6 reset

Correct for Tilts

What To Record

Level Offset

Revert Code to ShapeTag default

Activate Post-Processing option after5 min

Recall

EscOK

Action Setup Screen - Recommended Settings for Multipath Environments

There several different options to specify when data collection for points starts and ends, the most commonly used options being with the *Start Button* and after a specified number of epochs have been collected. Using a *Start Delay* may be useful if you need to collect a point where you cannot reach the TRIUMPH-LS. You can press Start and then set the TRIUMPH-LS up over the desired point. The starting of data collection will be delayed by the selected *Delay* period.

How to Start?

Start Button

When Lifted

Proximity Sensor

Sensitivity Level5

Start DelayNone

EscOK

How to Start Screen

How to Stop?

Stop Button

When Tilted

After100 epochs

Minimal Duration120 sec

Auto AcceptNo

Auto Re-StartNONE

EscOK

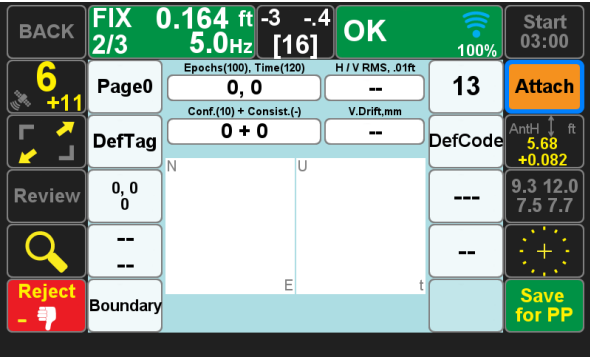
How to Stop Screen - Recommended Settings for Surveying Monuments in Multipath Environments with 5 Hz BEAST MODE Corrections

What To Record presents options to automatically capture raw GNSS data, camera images, voice recordings and screenshots. To process rover data with DPOS, GNSS data needs to be saved at 1 Hz.

Use *Recall* to quickly recall a saved Action Group profile. This

is useful for changing the collection settings for different environments and types of points that need to be collected.

If **Activate Post-Processing** is enabled, raw GNSS data will always to be logged in the background when points are collected. If an RTK solution has not been accepted or rejected after the set period of time, a **Save for PP** option will be presented during point collection to save the GNSS data with the point for post-processing. Rover GNSS data can also be submitted to DPOS if it is recorded with the settings in What To Record.



Save for PP button displayed after a fixed solution was not able to be collected.



RTK Verification and Validation

It is very important that you read and understand the information about **RTK Verification and Validation** contained in this manual.

Verify Settings

Verify with V6 Reset

Verify w/o V6 Reset

Confidence Guard0.131 / 0.23 ft

Confidence Level5

Min RTK Enginesat least 2

Consistency Level10

Alarm on Resets

Max Groups10

Validate Result

with at least 2 engines

Esc

OK

VerifySettings Screen - Recommended Settings for Multipath Environments

When located in difficult environments and under tree canopy, all GNSS receivers are prone to give bad fixed solutions that may appear to be acceptable if they are not verified. Existing methods to verify GNSS solutions include “dumping” the receiver, turning it upside down to cause the RTK engines to reset, and re-observing the point at a later time.

J-Field automates these processes with its built-in software features of *Verify* and *Validate*. **Verify** automatically resets the RTK engines after every fixed epoch is collected in *Phase-1* of its process. Epochs are placed into *Groups* or buckets during *Phase-1*. Once a *Group* has the required **Confidence Level** *Phase-1* is complete.

The **Confidence Guard (CG)** determines the size of the *Group* or bucket. Each *Group* contains all the epochs located within a specified radius (the CG value) from its center and new *Groups* are created as necessary so that all epochs fall into at least one *Group*. Each *Group* has its own *Epoch Counter*, *Confidence Level* and *Elapsed Time*. A point may fall into more than one group. The current best group is shown within [] and others within ().

The number of groups is limited by the Max Groups setting. If this number of groups is exceeded, *Phase-1* will reset and start over. During *Phase-1*, the current best group will be displayed between the square brackets [] while the other groups are displayed between parenthesis ().

During **Phase-2** the engines are not reset and solutions which are located inside the CG of the selected *Group* are added to that *Group* for the remaining number of epochs that user has requested (**Epoch Number, EN**) in the **How to Stop** screen. Solutions which are outside the CG of the selected *Group* will be ignored; the RTK engines are reset if the epoch falls outside a sphere with a radius twice that of the CG. If the number of rejected epochs reaches 30% of epochs collected so far, the whole process will restart.

Validation is the final phase of the process. With this feature enabled the RTK engines will reset one final time at the end of the observation and collect 10 additional epochs. Allowing sufficient time between *Phase-1* and the final *Validation* step will guarantee a bad solution is not allowed to be accepted. From extensive testing in the worst of multipath environments, a bad solution has yet to be accepted when *Verify* and *Validate* are enabled with a **Minimum Duration** of least 180 seconds. This will ensure that at least two separate fixed initiations are acquired at least 2 minutes apart. **Having at least 2 fixed initiations in agreement and acquired at least 2 to 3 minutes apart has**

been found to be the critical requirement to ensure that bad fixed initiations are not accepted. In high multipath environments the Boundary Action Profile should be used to meet this requirement and guarantee a good initiation. You must let entire collection process complete. If the process acquires fixes during Phase-2 and the RTK engines then medietely reset many times, they are not in agreement with the Phase-1 solution. The entire process will eventually reset or you can manually Stop it, Reject the point and then Start again. Alternatively, you may wish to not use the Boundary profile but rather re-observe the point at least 2 minutes later, resetting the RTK engines before collecting the 2nd point.

Confidence Level and *Consistency Level* are counters; the *Confidence Level* of a group increments each time an epoch with a new RTK initiation (Fix) is collected. It increments by values of 1, 1.25, 1.5, 1.75, 2.0, or 2.5 for 1 to 6 fixed engines, respectively. The *Consistency Level* of a group increments with every epoch collected by values of 0, 0.1, 0.25, 0.5, 1.0, and 1.5 for 1 to 6 fixed engines. The set *Consistency Level* must be met before *Phase-2* is allowed to end.

If high accuracy is needed in areas of high multipath and areas with limited views of open sky (under full tree canopy and urban canyon environments), longer observations will improve accuracy. Repeated observation can also be performed later (1 hour or more is recommended) to improve accuracy. These repeated points can then be averaged together with the *Average* function found in *Cogo Tools* or with the *Cluster Averaging* function.

Recommended Collection Settings & Default Action Profiles

Boundary Action Profile - To be used for control and

boundary shots and in high multipath environments (under tree canopy, next to buildings, etc.)

- ◆ Start with Start Button
- ◆ Stop After: 100 epochs
- ◆ Minimum Duration: 120 seconds (increasing this to 180 is preferred in bad locations for additional protection from accepting points with bad fixed initiations and for better post-processing results)
- ◆ Verify with V6 Reset
- ◆ Confidence Level: 10
- ◆ Consistency Counter: 10
- ◆ Min RTK Engines: At least 2
- ◆ Validate Result: with at least 2 engines
- ◆ Correct for Tilts: Off (Rover pole must be plumbed)

Precise Topo - To be used for topographic shots where some multipath may be present. The receiver should still have at least a 50% clear view of the open sky.

- ◆ Start with Start Button
- ◆ Stop After: 10 epochs
- ◆ Minimum Duration: 10 seconds
- ◆ Verify with V6 Reset
- ◆ Confidence Level: 5
- ◆ Consistency Counter: 10
- ◆ Min RTK Engines: At least 2
- ◆ Validate Result: with at least 2 engines
- ◆ Correct for Tilts: Off

Quick Topo - To be used for rapid topographic shots in open sky environments. If it is difficult to obtain 5 engine fixed, the environment may not be well suited for this profile and the *Precise Topo* profile should be used.

- ◆ Start with Start Button or Start When Tilted
- ◆ Stop After: 2 epochs
- ◆ Verify without V6 Reset
- ◆ Consistency Counter: 0

- ♦ Min RTK Engines: At least 5
- ♦ Correct for Tilts: On*

Stakeout - To be used for staking out points (See Stake section of this manual). Staking point in areas of high multipath still requires confirming matching fixed initiations acquired at least 2 minutes apart. The Boundary profile can be used for this. After the location of the point being staked has been verified, *Verify with V6 Resets* can be turned off to quickly fine tune the location on the ground.

- ♦ Start with Start Button
- ♦ Stop After: 30 epochs
- ♦ Minimum Duration: 30 seconds
- ♦ Verify with V6 Reset
- ♦ Confidence Level: 5
- ♦ Consistency Counter: 10
- ♦ Min RTK Engines: At least 2
- ♦ Validate Result: with at least 2 engines
- ♦ Correct for Tilts: Off

In all above cases

- ♦ Accept Fixed Only, RMS: All, PDOP: All
- ♦ Confidence Guard: 0.164 ft

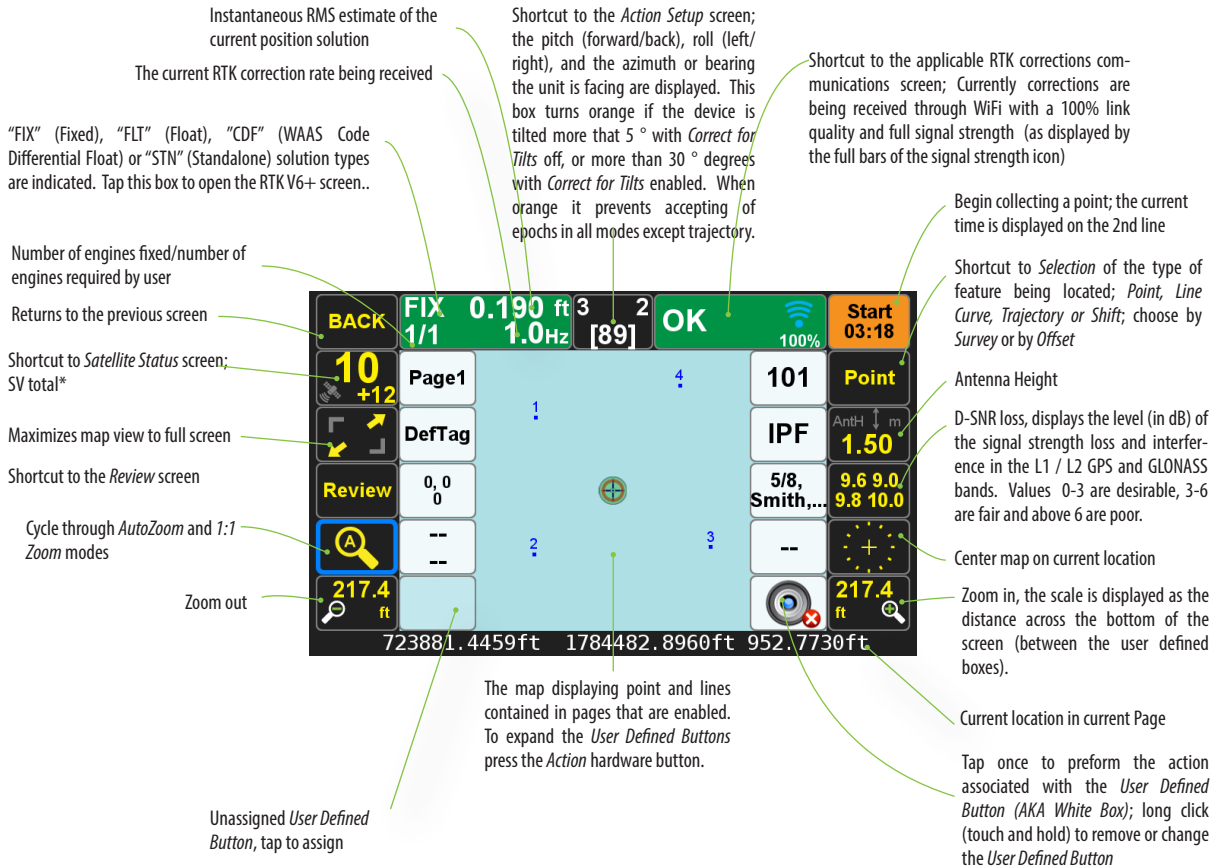
WAAS Float - This profile can be used to quickly collect points with float solutions. SBAS tracking must be enabled to acquire WAAS (Wide Area Augmentation System, available in North America) float solutions. SBAS tracking can be enabled from the *Advanced Setup* menu (press the *Set Up* hardware button twice > *GNSS*).

If you wish to review point statistics or if you wish to edit the ShapeTag, Code, Description and/or Attributes fields after data collection, Auto Accept must be set to Off. If these fields do not need to be changed and you desire fast data collection with the Quick Topo settings, set Auto Accept to On.

*If Correct for Tilts is on, the Level Offsets must be calibrated frequently if accuracies greater than 0.10' are needed.

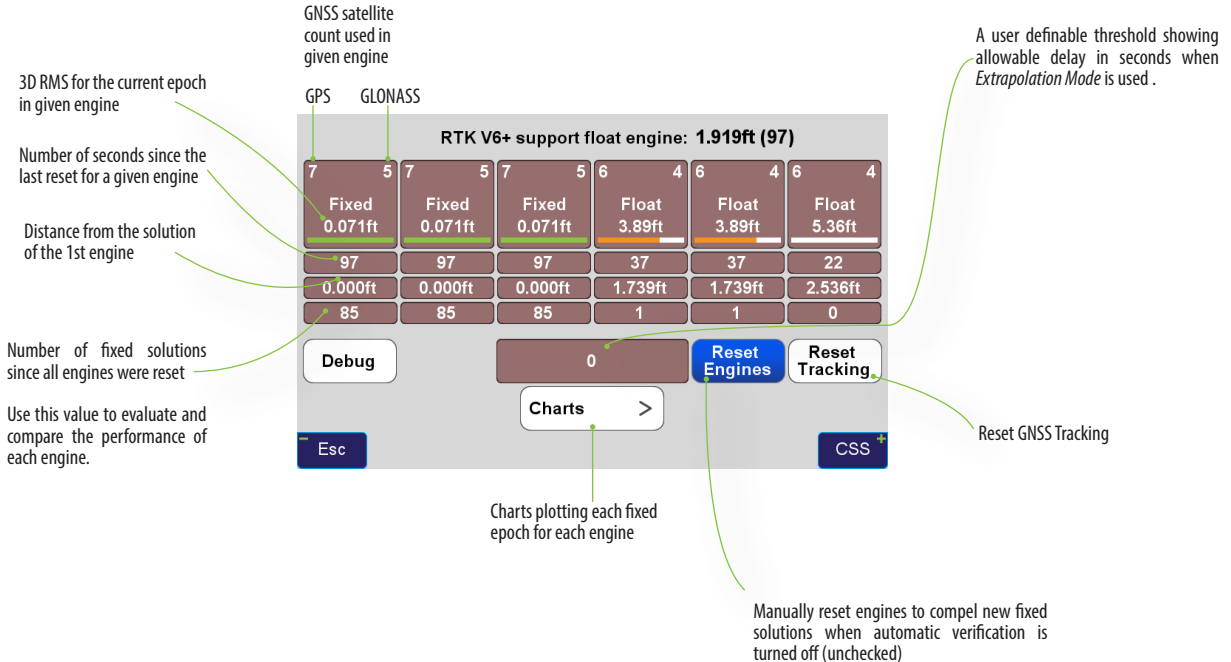
If the point you are attempting to locate is near the edge of a building, tree trunk or other obstruction, it often best to use one of the CoGo Offset functions. When the most accurate measurements are needed, the *CoGo Resection* function found in the *Intersections* menu is recommended.

Screen Anatomy - Collect Action Screen



* Total number of SVs obsored by RTK
Rover may be different from number
of SVs observed by RTK Base

Screen Anatomy - RTK V6



Screen Anatomy - Collect Action Screen

Screenshot after Phase-1 of RTK Verification is Completed

Time: Duration is seconds between the first and last epoch collected

Current epoch count

Current best group in []

Current other groups in ()

Current confidence level

Target confidence level

* At the end of Verify sets values shown are the total RMS of all sets

Horizontal (left) and vertical (right) plots of the collected epochs. Each Group has its own color. These plots currently have 2 Groups.

Activate Post-Processing - 26 epochs of raw data have been saved, 300 are required for the post-processing option

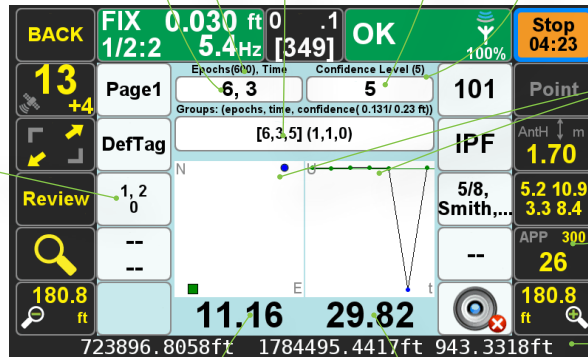
Coordinates of current position

Scales of the plots
Horizontal Vertical

Verify Statistics

of Phase-1 Restarts, # of Groups

of Epochs outside the Confidence Guard during Phase-2

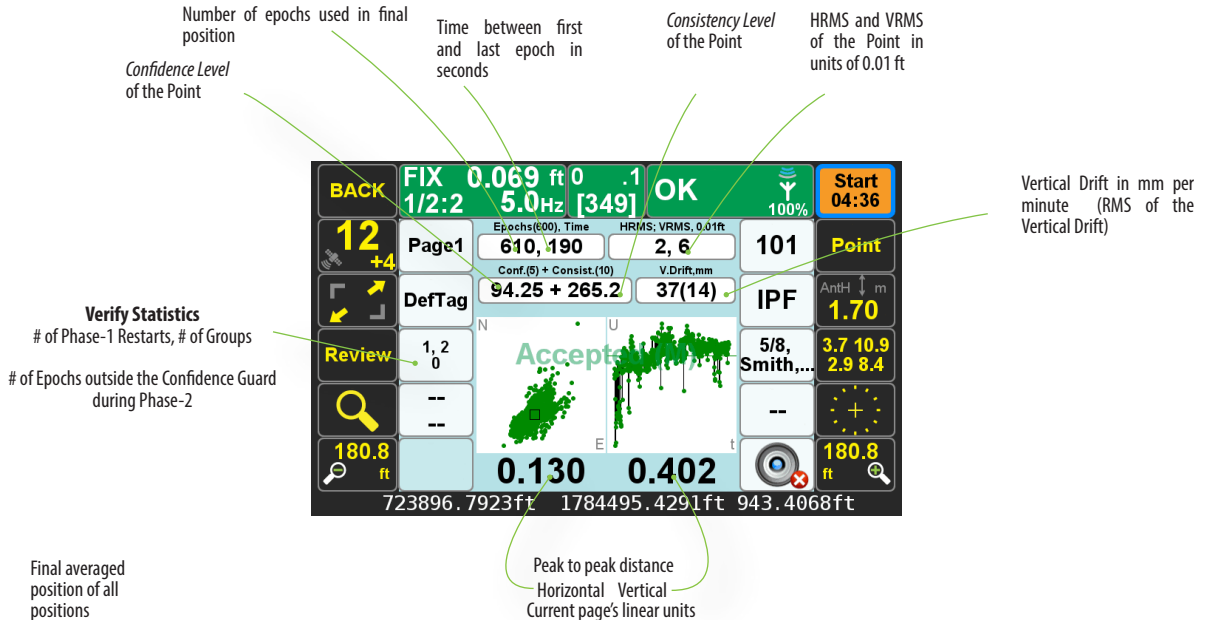


Example One: Phase-1 ONE

This Point was collected in a high multipath environment, several feet away from a 2 story building.

Screen Anatomy - Map Screen

Screenshot after Phase-2 and Validation Phase of RTK Verification is Completed



Example One: Phase-2

This Point was collected in a high multipath environment, several feet away from a 2 story building. The effect of multipath can be seen with the large vertical spread displayed in the vertical plot.

Screen Anatomy - Collect Action Screen with Expanded User Defined Buttons

The *User Defined Buttons* are expanded by pressing the Action hardware button. The most commonly used and recommend User Defined Button options are shown below:

FIX 1/1		0.066 ft		-8 1		OK		100%	
1.0Hz		[94]							
Page Page1				Point Name 101					
ShapeTag DefTag				Code IPF					
Verify Statistics 0, 0 / 0				Attributes 5/8, Smith, ?					
Distance to Last -- / --				Point Description --					
						Photo Record			
101 - IPF -									

Many of the selected options are inputs for the same parameters in the *Collect Prepare* screen. As with every screen, more details can be found by pressing the *Help* hardware button.



Stake

Similar to the *Collect Prepare* screen in appearance and function, the *Stake Prepare* screen allows you to configure the settings for staking points.

Project1		Page1		NAD83(2011) / Ohio South ...	
1. Project		2. Page		Coordinate System	
Points		Create Point		Select Point	
3. Mode		4. Build			
From Map / All		Stake Line		1.7 m	
Sequence				5. Antenna Height	
Review		View		Boundary	
				Next	

Stake Prepare Screen

Additionally, the *Prepare to Stake* screen allows you to define various *Modes* to stake which include a *Points Mode*, several *Alignment Points Mode* and *Alignment Stake-Here Mode*.

Sequence defines the order of the points to be stake. The *From Map* mode is suggested mode for new users. This allows you to pan the map cursor over a point displayed in the map and tap *Next* to select that point to be staked.

Stake Points Mode

Design Points ☒

Skip Already Staked Points ☐

Surveyed Points ☐

Points Traverse

Nearest Point ☐

Optimized Path Length ☐

Alphabetic ☐

From Map ☒

Use All Points On Page ☒

Select Points to Stake ☐

>

Max. Points in Sequence

100

☐

Reset Sequence

Esc

Stake

Stake Sequence Screen

The suggested *User Defined Button* options for new users are displayed in the follow two screenshots.

the staked coordinate or *Reject* to discard them or to adjust the position and try again.

FIX 5/1

0.174 ft

1.0Hz

[87]

OK

100%

CTT	Target 1
DTT 87.1699ft	Stone
Back 56.5996ft	Accept As 101
Left 66.2953ft	Verify Statistics 0, 0 / 0
Fill 74.9294ft	

1

Stake Action Expanded Screen

BACK

FIX 5/1

0.167 ft

1.0Hz

[87]

OK

100%

Start 11:47

7 +14

CTT

1

Target 1

NEXT

Review

DTT

Stone

Guide

211.0 ft

Back

Accept As

PREV

211.0 ft

Left

0, 0

1.50

211.0 ft

Fill

3

211.0 ft

723876.5328ft

1784482.0177ft

954.5062ft

Stake Action Screen

The CTT (Course to Target) *Arrow User Defined Button* option in the top left box displays the direction to the point being staked while the distance to it is displayed in the DTT (Distance to Target) whitebox below it. Further down are the *Ahead/Back* and *Right/Left* boxes that display the distances to the point relative to the TRIUMPH-LS. The *Cut/Fill* option is in the lower right box.

On the right side, the *Target Name* option is used as another method to select the point being staked. When it is added as a whitebox you must choose whether to “Key-in target point name” or “Select target point from list”. Select the option you prefer. Below it are *Point Description*, *Accept As* and *Verify Statistics* whitebox options.

When near the target point being staked tap *Start* to begin collecting data and to average the displayed offset values. When staking a point in a multipath environment, this is an essential step that must be used with *RTK Verification* to ensure the RTK initiation is correct. Choose *Accept* to store

The *Accept As* whitebox is useful if you wish to store the staked coordinate of a design point as new point rather than having it stored in the design point's record. After collecting the staked design point press *Accept As* rather than *Accept* if you desire to store it as a new point.

Real-Time Position Shift

Real-Time Position Shift, allows real-time corrections to be applied to receive base station corrections. A base station can be started with an autonomous position and then corrected by surveying a point with known coordinates. The known point could be a point previously surveyed with a base station setup in a different location. This feature is useful for several scenarios:

- ◆ You need to move or “leapfrog” your base station to extend the radio range into a new area.
- ◆ Your original base station point has been lost.
- ◆ You wish to save time by starting the base station with it mounted to the top of your vehicle. Setting the base station and radio up on the top of vehicle by mounting it a roof rack or using a magnet mount saves time by eliminating the need to setup tripods and can help protect the base station from disturbances or theft in undesirable locations. For the best performance, the base station should be mounted in a near level position so that phase center variations and antenna offsets are correctly applied. If you are parked on a sloped surface, a swivel mount can be used to level the receiver on the top of your vehicle. Your vehicle should be parked on solid ground where it will not move or sink.

The *Real-time Position Shift* function can be accessed from the Advanced Setup menu (press the **Set Up** hardware button twice > **Real-time Position Shift**). In this screen, select a point you have collected RTK coordinates from with an autonomous base station and then the known coordinates of this point. Check the **Apply Shift** and the shift will be applied to all the RTK surveyed points found in the current project collected from this base station. This shift will continue to be applied to all the points surveyed from this base station.

Apply Shift ☒

Undo Shift

RTK from Auto Base	Known Point
<div>100</div> <div>723913.0771ft</div> <div>1784473.0585ft</div> <div>925.2335ft</div>	<div>102</div> <div>723906.1989ft</div> <div>1784481.0042ft</div> <div>953.2972ft</div>

Page Page1

Steel

Back

ΔN:	-6.8782 ft
ΔE:	7.9457 ft
ΔU:	28.0637 ft

Position Shift Screen

Real-time Position Shift can also be accessed from the Collect Action screen by clicking the button below the Start button and changing the collection mode to Shift. In this mode select the *Known Point* and then press *Start* from the action screen to collect a point so that the offset can be calculated. After it has been calculated you will be prompted to apply the shift.

What?

Point ☐

Line ☐

Curve ☐

Traj. ☐

Shift ☒

Enter the coordinates of the point that you know.

Known Point	ΔN:	6.8782 ft
<div>100</div> <div>723913.0771ft</div> <div>1784473.0585ft</div> <div>925.2335ft</div>	ΔE:	-7.9457 ft
	ΔU:	-28.0637 ft

Cancel

Apply Shift ☒

Undo Shift

OK ☒

Then RTK this point to calculate the base shift.
This shift will be applied to all associated shots when "Apply Shift" box is checked.

Position Shift Screen from the Collect Action Screen



Hybrid RTK with DPOS

When a GNSS RTK base station is started by assuming an autonomous position, it is necessary and good practice to later adjust and correct the coordinates with a GNSS solution referenced from known coordinates. J-Field, has the ability to adjust the base station coordinates and associated RTK points surveyed with DPOS (Javad's Data Online Processing Service). Your raw GNSS base station data is sent to the DPOS

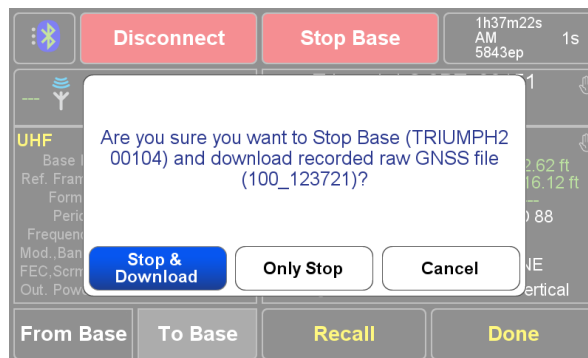
server from J-Field to be processed with CORS (Continuously Operating Reference Station) data. DPOS then sends the adjusted coordinate back to J-Field and J-Field applies the adjustment to the base and rover coordinates.

Now with the introduction of **Hybrid RTK** in **J-Field 2.0**, raw data files from the rover can also be post-processed with DPOS. Your local base station data can be used to post-process base to rover vectors; serving as an additional check for the RTK solutions and as method to obtain accurate solutions in areas where RTK corrections are lost. Rover points with raw GNSS files can also now be post-processed with CORS data.

Recording Raw GNSS Data

Base station data is automatically recorded when a base station is started with *Base/Rover Setup*. After done surveying connect to base in *Base/Rover Setup* and choose Stop Base. You will be prompted with several options. Choose **Stop &**

Download so that the base data is downloaded into J-Field and can later be processed with DPOS.



Base/Rover Setup - Prompt to stop the base and download data

You will be prompted with several options. Choose **Stop & Download** so that the base data is downloaded into J-Field and can later be processed with DPOS.

Rover GNSS data is recorded with points when this option is enabled in the What To Record settings.

On/Off	Settings	Record in	Share
RAW GNSS Data <input checked="" type="checkbox"/>	1 Hz	SD Card	
Front Camera <input type="checkbox"/>	Once at Start	Internal Memory	
Bottom Camera <input type="checkbox"/>	Once at Start	Internal Memory	
Voice <input type="checkbox"/>	3 Sec	Internal Memory	
Screenshots <input checked="" type="checkbox"/>	A1 A2	SD Card	No

Record RTN Base ☐

Esc
OK

What To Record screen - Recording of GNSS Data enabled

Raw data for rover points can also be saved with the *Activate Post-Processing* option found in the *Action Setup* screen.

Action Setup (Boundary)

Start with Start Button	Stop After 100 epochs
Only RTK Fixed	Verify [2] with V6 reset
Correct for Tilts <input type="checkbox"/>	What To Record >
Level Offset	Revert Code to ShapeTag default <input checked="" type="checkbox"/>
Activate Post-Processing option after 5 min	Recall

Esc
OK

Action Setup screen - Activate Post-Processing option after 5 min

When this option is enabled, the (APP) button will be display how many epochs of raw data have been

recorded and how many are required in the Collect and Stake Action screens. Once the required number of epochs



have been met the button changes to display . Then once *Stop* is tapped the *PP Options* button is displayed.

BACK
FLT 1.329 ft³ 5.0Hz [122]
OK
Start 02:53

10
+5

Page2
Epochs(100), Time(120)
3, 69

H/V RMS, 01ft
3, 4

102
Attach

DefTag
Conf.(10) + Consist.(10)
2 + 0

V.Drift,mm
--

DefCode
Anth ft
5.70

Review
0, 6
0

7.0 8.9
6.9 11.6

Reject
-

Boundary
0.071 0.095

--
PP options
Accept

723875.9818ft 1784483.9394ft 954.7210ft

Collect Action screen displaying the PP Options button.

Tapping this button presents the options to save the raw data for post-processing.

BACK
FLT 2.139 ft³ 5.0Hz [122]
OK
Start 02:53

10
+5

Page2
Epochs(100), Time(120)
3, 69

H/V RMS, 01ft
3, 4

102
Attach

DefTag
Conf.(10) + Consist.(10)
2 + 0

V.Drift,mm
--

DefCode
Anth ft
5.70

Review
0, 6
0

7.0 8.9
6.9 11.6

Reject
-

Boundary
0.071 0.095

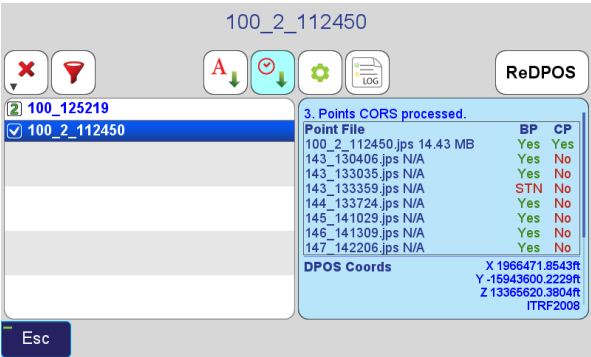
--
PP options
Accept

723875.9818ft 1784483.9394ft 954.7210ft

Collect Action screen displaying the prompt to save raw data.


Processing Raw Data with DPOS

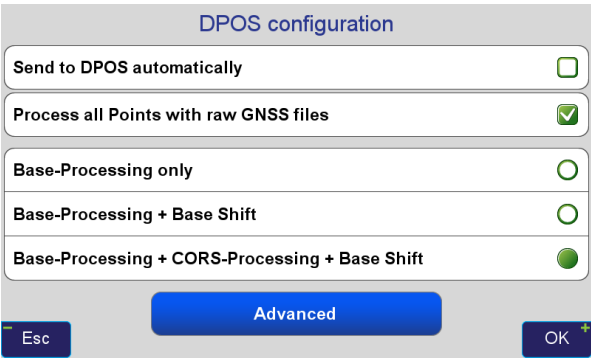
To post-process the data, open the *DPOS* tool found in the CoGo menu and select the base file you wish to process. It can also be open by tapping the *DPOS* button found in the Points screen.



DPOS - The Filter is Applied to Show Current Project Base Files Only

With J-Field connected to the Internet, tap the **DPOS** button to submit the raw data files for the selected base station session to DPOS. The blue information panel displays the status of the selected DPOS session.

The  (configuration) button contains various options for DPOS processing.



DPOS Configuration Screen

Send To DPOS automatically will submit GNSS raw data to DPOS automatically when an Internet connection is available.

Process all Points with raw GNSS files will submit all rover raw data files to DPOS for processing even if they have not been marked for post-processing.

Three processing types exist to determine how to process the data:

- ♦ **Base-Processing** - base and rover raw GNSS data are uploaded to DPOS and base-rover vectors are then processed
- ♦ **Base Shift** - base station data is processed with CORS data; the base station coordinate and survey points collected from the base station session will be automatically adjusted
- ♦ **CORS-Processing** - rover points with raw GNSS files are processed with CORS data (including your base data if this option is enabled in the Advanced settings)

Note that as of J-Field 2.01.523, design points are not adjusted but this feature is planned for the future. All CoGo functions except *Average* create resultant points with design coordinates.

Reviewing DPOS Results

The *Base Rover Statistics* screen can be opened by tapping the blue information panel. An acceptable solution should have a Fixed solution, a 3dRMS of less that 3 cm (0.10') and make use of multiple stations; if this is not the case, the data can be reprocessed again at a later time by pressing the *ReDPOS* button.

Base	GEO: 39°56'46.82228"N 083°00'22.67552"W 612.2249	@2010.00
	GRID: 709313.5946 1826544.1652 723.3067	
Old	GEO: 39°56'46.88473"N 083°00'22.70465"W 601.6008	@2010.00
	GRID: 709319.9271 1826541.9319 712.6825	
	SHFT: 160°34'	6.71 10.62
FIX: Yes	OBS: 4060/4060	2016-01-08 21:57:13 (00:30:30)
HRMS: 0.005	VRMS: 0.006	3dRMS: 0.008
Geometry: 1.015	CORS: COLB,MTVR,OHHO,OHLI	95% Confidence Ellipse
oh: 0.011		
θ: 89°20'35"	σ _a : 0.011	σ _b : 0.005
ANT: HGT:2.025m JAVTRIUMPH_2A NONE		
Point: Park100 DefCode		
Project: LewisRd	Page: Page1	Units: ft

Base Rover Statistics Screen

Full DPOS results can be reviewed in the *Processed-Point*

Info screen by tapping  found in the *Point* screen.

The detailed use of *Processed-Point Info* screen is explained on the following two pages.

Screen Anatomy - Processed Point Info Screen

Example of a Screenshot for a Base Point

Point Name - The name of the current point being reviewed, this box can be formatted to also display the Code and Description with a long click (notice the arrow in the bottom left corner)

The current (radio button is selecting this column) coordinate type for the base and associated rover points is *KNOWN* (base station was started from a known coordinate). If the base station was started from an autonomous position this would be labeled *AUTO*.

The post-processed CORS solution for the base station (currently not selected as the current coordinate)

Use *Previous* and *Next* to cycle through the list of surveyed points

M-Local - The *Multiple Local* coordinate/residuals are displayed in this column. *M-Local* coordinates shift the associated surveyed points with the same base station session to known coordinates. (This point does not currently have *M-Local* coordinates.)

Indicates this is a Base point

Horizontal and Vertical RMS

Number of Epochs / Duration (time between first and last epoch in seconds)

Number of GPS + GLONASS satellites

The current coordinates; the coordinates in the selected column will be used throughout J-Field as the current coordinates. These are the coordinates that will be displayed in map, points list, exports, etc.

Residuals from the current coordinate

Number of stations used in this CORS solution

Base Rover Statistics - View the *Base Rover Statistics* screen for the solution shown in this column.

Info - The info button opens a text report for the post-processed solution shown in this column.

Note, Audio, Screenshots and Photos - Tapping these button will display the point's *Note, Audio, Screenshots or Photos*. These buttons will only be active when the point has these attachments.

Attach - Use this button to attach new media to the point

Map - View this point on the map

Edit - Open the *Edit Point* screen

Delete - Delete this point

Add M-Local - Use this button to add the current displayed point as a *M-Local* point. Once tapped, you be prompted to select or enter a coordinate. The translation from the displayed point (100 in this example) to the enter coordinate will be calculated. Multiple pairs of points can be added in *M-Local* to calculate a best fit translation; hence the term *Multiple Local* (*0-Local* has 0 pairs of points, *1-Local* has 1 pair, *2-Local* has 2, etc.). Select the *M-Local* coordinate (radio button set to this column) for any point to then apply this translation to the selected point and all other associated points with the base station session.

100, Hub					Previous	Next			
Base	AUTO	CORS	0-Local						
		Fixed							
N, ft	-0.773	710518.283							
E, ft	-3.060	1837098.015							
U, ft	+8.901	788.818							
RMS, ft	2.339, 4.103	2.339, 4.103							
Epochs / s									
Sats									
Stat									
Back	Σ	+	Σ	+					

Screen Anatomy - Processed Point Info Screen

Example of a Screenshots for a Rover Point

Base Type - This box is painted green when the current coordinate has the base reference from this type of coordinate. **KNOWN** indicates that the base was started from a known position. If the base station was started from an autonomous position this would be labeled **AUTO**. Tap this button to view the **ABS** coordinates (absolute coordinates, shown in the bottom screenshot).

Base Type - This box is painted red when the current coordinate does not have the base reference from this type of coordinate. **ABS** (absolute) coordinates indicate that the base station coordinates are reference from a CORS adjusted solution or from local control points when the **M-Local** coordinate is chosen. Tap this button to view the **AUTO/KNOWN** referenced coordinates.

RTK Solution with **BCP** (Base CORS Processed) Solution

Base-Rover Post-Processed with **BCP** (Base CORS Processed) Solution

Base-Rover Post-Processed Solution with **KNOWN** Base (current coordinate in this screenshot)

RTK Solution with **KNOWN** Base, tap this box to set the current coordinate to this coordinate. You will be prompted with several options:

Yes, For All - This option select this coordinate type for all points with associated with this base station session.

Yes, For All (Auto RTK/PPK) - This option will use an algorithm to automatically select the best RTK or post-processed coordinate for all points with associated with this base station session.

144, IPF		Previous	Next	
KNOWN	RTK Fixed		PPK Fixed	
N, ft	-0.001		710982.271	
E, ft	-0.028		1837128.016	
U, ft	+0.018		788.981	
RMS, ft	0.027, 0.036		0.023, 0.023	
Epochs / s	11 / 307		1006 / 1023	
Sats	6+7		9+8	
Stat	10 / 0			
Back	Σ		Σ	i

144, IPF		Previous	Next	
ABS	RTK_{BCP} Fixed	PPK_{BCP} Fixed	CORS Fixed	3-Local Calculated
N, ft	+0.031	+0.032	+0.367	-0.054
E, ft	-0.018	+0.010	+1.036	-0.019
U, ft	-0.014	-0.032	-2.285	+0.062
RMS, ft	0.027, 0.036	0.023, 0.023	0.590, 0.492	0.023, 0.023
Epochs / s	11 / 307	1006 / 1023	32 / 1023	1006 / 1023
Sats	6+7	9+8	9+8	9+8
Stat	10 / 0	5	1+4	
Back	Σ	Σ	Σ	i

CORS Post-Processed Solution

M-Local Solution - 3 pairs of coordinates used in this example. This solution is always **M-Local** base-RTK rover solution.


Tap this column to view the setup properties of the calculated **M-Local** for this point

M-Local

M-Local coordinates shift the associated surveyed points with the same base station session to known coordinates. Some possible uses for M-Local include:

- Adjusting an autonomous base station to local control points
- Adjusting an autonomous base station to a post-processed derived position such as OPUS
- Shifting base and rover coordinates to the averaged coordinate of multiple DPOS base station sessions

Adjusting an autonomous base station to local control points

Use the  button found in the *Processed Point Info* screen (see previous two pages) to add the current displayed point as a M-Local point. Once tapped, you be prompted to select or enter a coordinate. The translation from the displayed point (144 in this example) to the selected coordinate will be calculated. Multiple pairs of points can be added in M-Local to calculate a best fit translation; hence the term Multiple Local (0-Local has 0 pairs of points, 1-Local has 1 pair, 2-Local has 2, etc.).

Get from

Survey

Manual

List

Map

Clipboard

North, East, Up

0.0000ft

0.0000ft

0.0000ft

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Save to

Design

Clipboard

Settings

Cancel

Set the known point for "144"

OK

Add M-Local Point Screen - Prompted to select the known coordinate for point 144

Base	Bearing	Distance	North	East	Up
100_2	N19°8'38"E	0.057ft	0.054ft	0.019ft	-0.062ft

Known Points

ΔNΔEΔU

3D 144K

NE 146K

▶ 147K

Surveyed Points

3D 144

NE 146

▶ 147

Unlink

Horizontal

Vertical

Back

Apply

M-Local Screen - 3 pairs of points shown

The M-Local Screen displays the translation along the top row of the screen. Pairs of points can be used Horizontally, Vertically or only as check points. The residuals for each pair of points are shown in the middle of the screen. Be sure to press Apply to save the added points to M-Local and apply the adjustment to the associated base and rover coordinates.

144, IPF	Previous		Next		
ABS	RTK _{BCP} Fixed	PPK _{BCP} Fixed	CORS Fixed	3-Local Calculated	
N, ft	+0.086	+0.086	+0.421	710982.325	
E, ft	+0.001	+0.029	+1.055	1837128.035	
U, ft	-0.075	-0.093	-2.346	788.920	
RMS, ft	0.027, 0.036	0.023, 0.023	0.590, 0.492	0.023, 0.023	
Epochs / s	11 / 307	1006 / 1023	32 / 1023	1006 / 1023	
Sats	6+7	9+8	9+8	9+8	
Stat	10 / 0	5	1+4		
Back	Σ	i	Σ	i	

Processed Point Info Screen - The M-Local coordinate is the current coordinate, 3 pairs of points exist in this *M-Local* setup

If the *M-Local* coordinate is not currently selected (radio button set to its column), select it for any point from this base station session to apply its translation to the selected point and all other associated points with the base station session.

144, IPF	Previous		Next		
ABS	RTK _{BCP}	PPK _{BCP}	CORS	3-Local	
N, ft					
E, ft					
U, ft					
RMS, ft					
Epochs / s					
Sats					
Stat					
Back	Σ	i	Σ	i	


Do you want to select the new coordinate?

No Yes, for ALL


Processed Point Info Screen - Prompt to apply the M-Local coordinates to all the associated base and rover coordinates

Adjusting an autonomous base station to a post-processed derived position such as OPUS

View the base point in the *Processed Point Info* screen and


press the  button. Then choose *Manual* and enter the OPUS coordinates. After pressing OK you will be prompted to enter a point name for the newly entered coordinates. Once satisfied with the results in the *M-Local* screen hit Apply to save and apply the adjustment.

Alternatively, you could create a new design point with the known coordinates of the base station prior to entering the

M-Local screen by tapping the  (Add) button found in the design side of *Points* list and entering the coordinates for the new point.

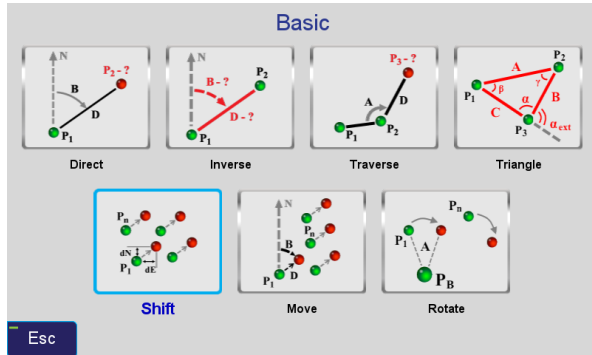
Shifting base and rover coordinates to the averaged coordinate of multiple DPOS base station sessions

First average the base station coordinates from multiple base sessions using the *CoGo Average* function. Next view

each base station point and use the  button to setup the translations to the averaged coordinate for each base station point.

CoGo

Most CoGo (Coordinate Geometry) functions in J-Field are rather self-explanatory after viewing their diagrams. CoGo *Direct*, *Inverse*, *Shift* and *Rotate* are found in the *Basic* group of CoGo functions that will be explained here.



CoGo Basic Functions

In all CoGo function diagrams, labels shown in black are inputs and labels shown in red are the resultant calculations. Input points are displayed in green and red points are resultant points created from the function.

Direct

Direct

P1

103
477444.2827ft
1775414.9944ft
748.7541ft

B, Grid:

N 45°0'0" E

D, Ground:

100.0 ft

Page

Survey

H, Abs

0.0 ft

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P2

DSN

C1
477514.9867ft
1775485.6984ft
0.0000ft

± 0.0034 ft

Esc

Create

CoGo Direct

Direct calculates the coordinate of a new point (P_2) given the coordinate of a known point (P_1), bearing (B) and distance (D) from P_1 .

Notice the vertical line in the white box shown between **H,Abs** and the input "0.0 ft":

H, Abs

0.0 ft

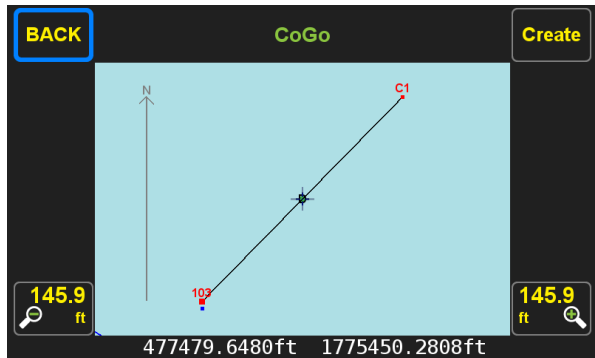
Clicking on the left side of this white box with **H, Abs** will toggle it to the other options of **H, Slope** and **ΔH**

Clicking on the right side of this box will allow for the entry of the value. This functionally is similar in all CoGo menus when you see a white box separated with a vertical line in the middle.

The resultant point is shown in the orange box. Clicking on this box will allow you to edit the Name, Description and

Code of this point.

Once all the inputs have been entered you may tap the diagram to preview the results in the map. If satisfied, tap Create to create the resultant points.



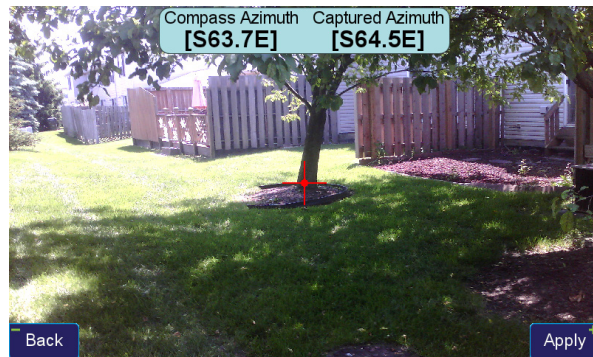
Preview Screen of Cogo Direct

The *CoGo Direct* function can be used to calculate and store an offset point by using the internal compass and camera to determine the offset bearing. To determine the bearing to

an object using the compass tap the **Set by Compass** button in the bearing entry screen. Align the cross-hair at the desired object and press the check hardware button to capture the azimuth and then tap *Apply*. Determine the offset distance to the desired object with a tape measure or laser distance meter. **It is important to check and confirm the compass calibration is working properly before using this feature; recalibrate the compass when necessary. Occasionally, the camera screen may go blank or cause a crash of the system when using this feature or other features of J-Field that use the camera. This is a known problem with the current camera driver. If this happens, reboot the unit. Hold the On/Off button down to power off the system if becomes**

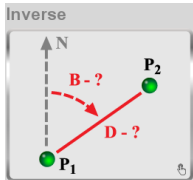
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unresponsive. The accuracy of this offset method is limited by the accuracy of the compass (typically +/- 2 degrees). To determine a much more accurate position from offsets, use the *CoGo Resection* function.



Set By Compass Screen - Determining the Position of a Tree

Inverse



Inverse

Page Survey

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Esc OK

P1	P2
103 477444.2827ft 1775414.9944ft 748.7541ft	104 477417.1785ft 1775404.8173ft 748.6121ft





B, Grid	S 20°34'48.69268" W
D, Ground	28.9546 ft
H, Avg	748.683 ft
ΔX	-7.871 ft
Relative Accuracy:	0.1082 ft

CoGo Inverse - Ground distance is displayed, tap the **D** button to cycle through the other distance type

Inverse calculates the bearing (**B**) and distance (**D**) of a line between two known points (**P₁** & **P₂**).

The  (multi-select) button can be used as a quicker method to select both **P₁** & **P₂** from the point's list.

Survey ☒ Design ☐ All ☐


☒ 101F ☒ 103 ☒ 104 ☐ 105 ☐ 106 ☐ 107 ☐ 108 ☐ 109 ☐ 110

Name	104	103
Date (Local)	09/23/2014 17:18:48	104
Code	Mag Nail	
Page	Survey	
CS	NAD83(2011) / Ohio South NAVD 88	
North	477417.1785ft	
East	1775404.8173ft	
Up	748.6121ft	
Epoch	2014.7285	
Coords	SRV: yes DSN: no BS: yes	
Solution Type	Fixed	
Processing Type	RTK	

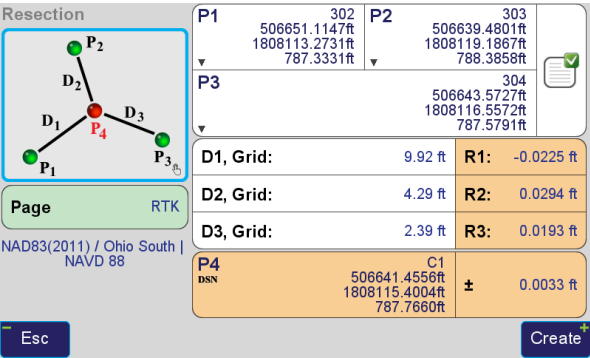
Cancel 1 2 3 4 5 Select

Multi-Select Screen - Selecting Points 103 and 104
66

P₁ & **P₂** can also be entered directly from the keyboard by typing in the point names. To use this option, long click the **P₁** & **P₂** boxes (notice the small arrows in the bottom left corner of these boxes).

Press  to switch the coordinates of **P₁** & **P₂**. Clicking on the right side of output boxes such as **B, Grid** copies the value of the box into the selected clipboard box.

Resection



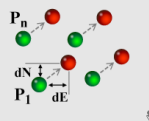
CoGo Resection

CoGo Resection is found in the CoGo Intersections menu and can be used to accurately locate an object that is difficult or impossible to survey directly by surveying 3 points around that object and measuring the 3 corresponding offset distances to it.


In the example shown above, an iron pin at the base of a tree was located by surveying 3 points around the tree. The offset distances of 9.92, 4.29 and 2.39 feet were measure with a tape measure. The small residuals indicate a good solution (R1, R2 & R3 are all less than 0.03').


Shift


Shift



Points 20 points

ΔN: 11.306 ft 

ΔE: -6.477 ft 

ΔH: 0.0 ft 

Action Move Existing Points

± 0.0034 ft

Page Look

Steel


Esc Move

CoGo Shift





CoGo Shift and Rotate are useful for shifting and rotating design points to desired geodetic surveyed locations.

Upon opening the Shift, Move or Rotate functions you will be prompted two options: to *Create New Points* or *Move Existing Points*. The *Create New Points* would need to be chosen if the desire is to shift surveyed points. Surveyed coordinates are blocked as options to be shifted is the *Move Existing Points* option is selected. The *Create New Points* would typically only be desirable and applicable to use if some object needs to be physically relocated in the field and the new location needs to be calculated. To adjust surveyed coordinates from an autonomous base, *Real-Time Position Shift*, *DPOS* or *M-Shift* should be used.

The *Multi-Select* screen is used to select the points to be shifted. To select individual points in this screen, use




the  (*Check Hardware*) button for easier selection of individual points.

Design

1..20


[...] [...] [...]






<input checked="" type="checkbox"/>	1	Name	1	1
<input checked="" type="checkbox"/>	2	Date (Local)	09/26/2014 02:03:45	2
<input checked="" type="checkbox"/>	3	Code	DefCode	3
<input checked="" type="checkbox"/>	4	Description	Stone	4
<input checked="" type="checkbox"/>	5	Page	Look	5
<input checked="" type="checkbox"/>	6	CS	Steel	6
<input checked="" type="checkbox"/>	7	North	475899.8590ft	7
<input checked="" type="checkbox"/>	8	East	1778475.1139ft	8
<input checked="" type="checkbox"/>	9	Up	0.0000ft	9
<input checked="" type="checkbox"/>	10	Epoch	2014.7349	10
<input checked="" type="checkbox"/>		Coords	SRV: no DSN: yes BS: no	
<input checked="" type="checkbox"/>		Images	0	
<input checked="" type="checkbox"/>		Audio	0	
<input checked="" type="checkbox"/>		Raw GNSS	0	

Cancel 1 2 Select

Multi-Select Screen - Selecting points 1 through 20, notice the filter used to filter the list to points 1 through 20, the select all button then is used to select all points

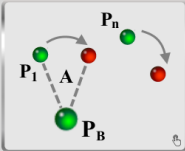
The  (*Delta*) button can be used to calculate the delta between two points, from the first selected point to the second selected point.

The  (*Delta DPOS*) button is used to recall the *DPOS* shift from a base station session. Use this feature to shift design points. (Automatic shifting of design points created from CoGo functions is planned to be implemented in a future version of J-Field.)

Tap the *Move* button once ready to shift the selected points.

Rotate

Rotate



PB


103
477444.3248ft
1775414.9457ft
748.7541ft

Points

20 points

A:

1°49'47.831898"



Page

Look

Action


Move Existing Points

Steel

Esc

Move

CoGo Rotate

CoGo Rotate is very similar to CoGo Shift. Here the  (Delta) button calculates the angle between the first selected points to the second selected point with the selected PB coordinate as the vertex.

Appendix A: Creating a RTN Profile

Open the *Setup* menu and *Create* a new *General Group* profile

General Group; current: UHF

Action Group; current: Boundary

Favorites Codes & ShapeTags; current: Boundary Survey

Enter a name for the new profile

MS ODOT RTN MR

UHF2		TCP John		Nate2		Fast			
1	@2	#3	\$4	%5	^6	(7)8	9	+0
€Q	£W	¥E	?R	<T	>Y	{U	I	[O]P
~A	-S	&D	^F	"G	'H	:J	;K	L	/
↑	Z	X	°C	=V	·B	N	\M	.	Ins
Esc	Clr	# +=	<	↑ Space ↓	>	⌕	⌕	OK	

Select *RTK Rover* as the operating mode

Operating Mode

☒ RTK Rover

☐ RTK Base

☐ Stand-Alone

Select the base reference frame, typically *NAD83(2011) in the US*

Base Reference Frame

WGS84(TRF2008) ☐ NAD83(2011) ☒

NAD83(CSRS) ☐ NAD83(PA11) ☐

NAD83(MA11) ☐ ETRS89 ☐

RTCM3 ☐

Choose *Real Time Network Service* as the correction type

RTK Corrections

UHF ☐

☒ Real Time Network Service

Tap *New* to create a new RTN APN (Access Point Name)

RTN APN

APN(RTCM 3.0,NTRIP Client,WiFi,OFF)

APN(RTCM 3.0,NTRIP Client,WiFi,OFF)

Enter a name for the new APN

MS ODOT MR

1	@2	#3	\$4	%5	^6	(7)8	9	+0
€Q	£W	¥E	?R	<T	>Y	{U	I	[O]P
~A	-S	&D	^F	"G	'H	:J	;K	L	/
↑	Z	X	°C	=V	·B	N	\M	.	Ins
Esc	Clr	# +=	<	↑ Space ↓	>	⌕	⌕	OK	

Select **NTRIP Client** as the APN Protocol

APN Protocol

NTRIP Client

TCP Client

Back Next

NMEA GGA needs to be enabled if connecting to a mountpoint that is a VRS (Virtual Reference Station). Tap **Next**

RTN Mountpoint

Enter Mountpoint or select from Source Table

Mountpoint

ODOT_VRS_RTCM3

NMEA GGA

NMEA Timeout 5 sec

Back Next

Enter the Host Name, TCP Port, Username and Password provided by your RTN administrator

RTN Caster

Host Name 156.63.133.115

TCP Port 2101

Username

Password

Back Next

Select the format of the mountpoint and tap **Next**

Receive Format

RTCM 3.0


RTCM 2.x

JPS

CMR/CMR+

RTCM 2.x (DGPS)

Back Next

Tap the  (list) button to view the list of mountpoints

RTN Mountpoint

Enter Mountpoint or select from Source Table

Mountpoint

NMEA GGA

NMEA Timeout 5 sec

Back Next

Tap **Done** to exit the setup

Done!

Back Done

Find the desired mountpoint and tap **OK**. A mountpoint with RTCM 3 format and both GPS + GLONASS is desirable.

Source Table

Update

Stream	ODOT_VRS_RTCM3, No: 5 ...	Longitude	0.00 deg. East
Mountpoint	ODOT_VRS_RTCM3	Generator	Trimble Pivot Platform
Authent.	Basic	Solution	Network
Format	RTCM 3.1	Compress.	none
Details	1004(1),1005/1007(5),PBS(10)	Fee	No user fee
Carrier	L1 & L2	Bitrate	0 bps
System	GPS+GLONASS	NMEA	1
Country	USA	Misc.	:
Latitude	0.00 deg. North		

< A-D E-H I-L M-P Q-T U-Z >

Cancel OK



900 Rock Avenue, San Jose, CA 95131 USA

Phone: +1(408)770-1770

Fax: +1(408)770-1799

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