Javad Mobile Tools

for Android

Version 4.5

July, 2022

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1. Preface

The materials available in this User Manual (the “Manual”) have been prepared by Javad GNSS for owners of Javad GNSS products. It is designed to assist owners with the operating of the Javad Mobile Tools Software and its use is subject to these terms and conditions (the “Terms and Conditions”).

Note: Please read these Terms and Conditions carefully.

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About this Manual

This Manual is designed to help you get familiar with the Javad Mobile Tools User Interface and introduce you to the JAVAD Mobile Tools main features.

Screen Captures

This Manual includes sample screen captures. Your actual screen can look slightly different from the sample screen due to the receiver you have connected, operating system used and settings you have specified. This is normal and not a cause for concern.

Technical Assistance

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer. Alternatively, request technical support using the Javad GNSS World Wide Web site at: www.javad.com. To contact Javad GNSS Customer Support, use the questions button available at www.javad.com.

2. Introduction

Javad Mobile Tools (JMT) is an application for android-based smartphones and tablet devices designed to manage the Javad GNSS receivers' hardware, for post-processing using NGS OPUS service and Javad DPOS. It allows RTK base and rover configuration. It can be connected to the Javad GNSS receivers via Bluetooth, Wi-Fi or network receivers.

2.1. Javad Mobile Tools for Authorized Receivers

Javad Mobile Tools for authorized receivers (JMT-R) is a free version of Javad Mobile Tools that works only with authorized receivers (that have a special OAF-option). The option can be obtained from any Javad dealer or Javad GNSS directly. All functionalities of Javad Mobile Tools are available only for receivers with this option.

Note: Please keep in mind that even payable JMT requests the OAF option to work with TRIUMPH-3 receiver.

3. Installation

The JMT software can be purchased and installed from the Google Play or using this link.
The JMT-R software can be installed for free from the Google Play following this link.
This manual is related to version 4.x and previous version 3.9.x of JMT-R software in the Google Play with following this link.
The software can be installed on all Android devices working with the same Google ID.

Note: The '15 minutes try', and money back options are available for all Google Play Market applications.

3.1. Initial Screen Option

JMT can be viewed in two ways, from the home menu screen or from the map screen. From the home menu screen, JMT shows a list of commands. From the map screen, JMT shows all commands from left drawer menu.
At initial startup, JMT asks the user to select this option. This initial setting can be changed any time with "View Menu" item in the settings screen.

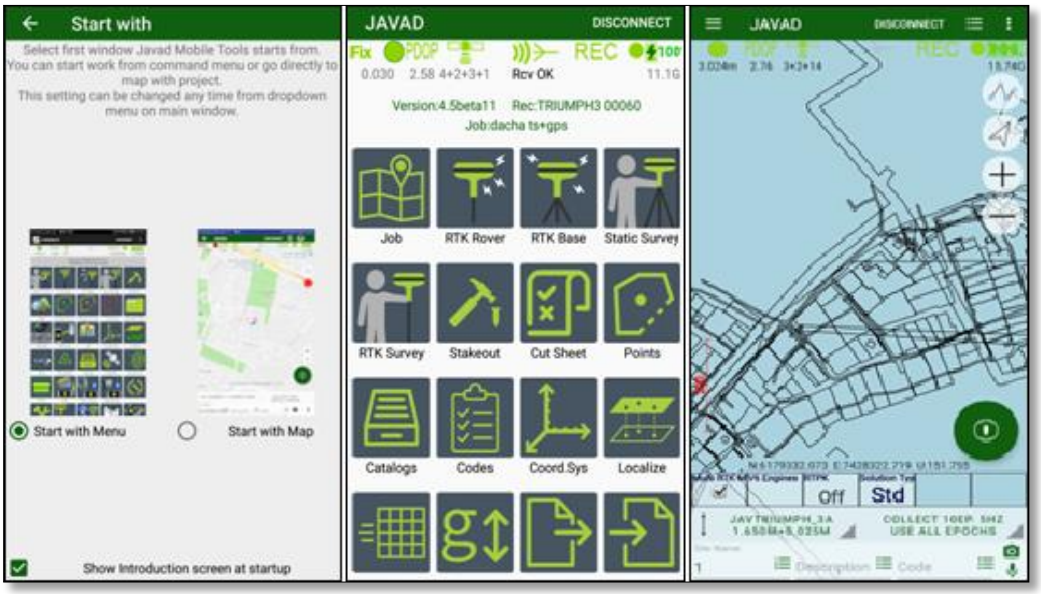


Figure 1: Initial Screen Option Selection (Left), Home Menu (Middle), Map Screen (Right)

3.2. Map Screen

Most of the space in the map screen is dedicated to the map with user data or a list of points. The user may switch from the map screen to a list of points and back using the icons (Illustrated below).

	Switch to a List of Points Screen
	Switch to Map Screen

Objects displayed on the map screen can be selected within the map provider screen (illustrated below).

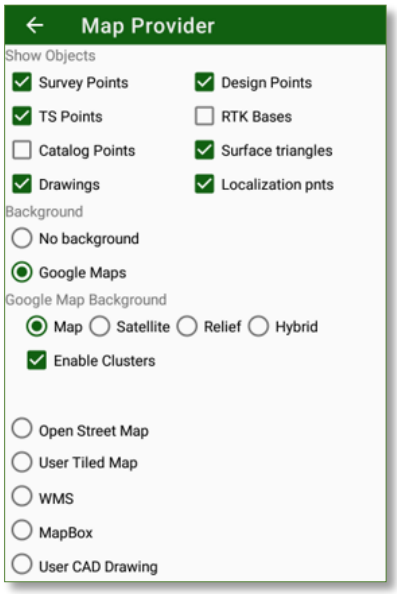


Figure 2: Map Provider Screen

3.2.1. Map Tools

There are several tools on the map screen, accessed by clicking on the tools icon located on the upper-right of the map screen. Each tool option (illustrated below) allows the user to manipulate the map screen. These tools can be used to create, verify and annotate map data. Zooming functions and current position are located near the bottom of the screen.

	Tools Icon (from Map Screen), Connect Point Icon. Connects points on map (existing or clicking). Click this icon a second time to complete.
	Text Color Icon.
	Measure Icon. This allows for measurements of distance and azimuth. Measurements are shown on the top of the screen. Click on the more button for further information contained within the selected object.
	Measure Perimeter / Area Icon. This allows for measurements of perimeter and area. Measurements are shown on the top of the screen. Click on the more button for further information contained within the selected object.
	Coordinates Icon. Click on a point or a position on the map to view the coordinates. A design point may be created as well.
	Text Label Icon. This allows for a label to be included on the map. Font size is dependent on current map scale.
	Delete Icon.
	COGO Traverse Icon. This will compute a new point with given distance and direction or with given angle related to a line defined by two points.
	COGO Distance – Distance Icon. This will compute an intersection with two distances to two points. Most likely two points will be computed, click on preferred point to select.
	COGO Perpendicular Icon. This will compute a new point from two selected points and a perpendicular distance from the second selected point.
	Draw Circle – two points Icon. This will draw a circle given a selected center point and entered radius value.
	Draw Circle – three points Icon. This will draw a circle given three selected points.
	Draw Arc – three points Icon. This will draw an arc given three selected points.
	COGO Intersection Icon. This will compute a new point with four selected points defining two lines.

3.3. GNSS Receiver Connection

To connect a GNSS receiver, simply click on the CONNECT button (circled below).

Figure 3: Connect Button

3.4. Status Bar

More information will be shown on screen after a successful GNSS receiver connection in the form of a status bar. The solution type, accuracy, number of satellites, correction quality, data logging and battery status are shown in the status bar (illustrated below).

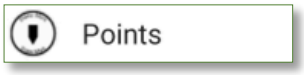
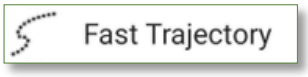
Figure 4: Status Bar

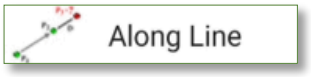
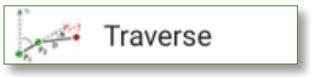
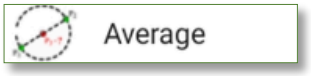
3.5. Start / Stop Survey

The large circle is used to start / stop survey (illustrated below). Upon storing a point, the point ID, description and code can be set. In stakeout modes, the user can select and navigate between targets. Pressing the survey button will begin the stakeout routine with a result report when completed.

Figure 5: Survey Button

Long – pressing on the circle survey button shows a drop-down menu to select the survey function (illustrated below).

	Points Survey. Different types of survey settings are available (filtering by solution type, auto-completion, confirmation mode, 5Hz mode). This includes verify mode survey, lift & tilt survey and normal point survey.
	Trajectories Survey. This allows for surveying trajectory objects. Filtering by solution type and minimal vertex distances are available.
	Fast Trajectories Survey. 10Hz surveying with minimal data. The result is stored in the database at the end of the survey. This feature is reliant on GNSS Receiver options (10Hz).
	Stakeout Point Survey. This allows for stakeout of point objects selected from a list, map or coordinate.
	Stakeout Line Survey. The allows for stakeout along or across a line defined with two points or a point with direction.
	Stakeout Surface Survey. The allows for height differences between loaded design surface and current height.

	OffLine Survey. Offset Survey.
	Along Line Survey. Offset Survey along a line.
	Intersection Survey. Offset Intersection Survey.
	Traverse Survey. Offset Traverse Survey.
	Perpendicular Survey. Offset Perpendicular Survey.
	Average Survey. Average two measurements (e.g., to survey tree).

3.6. Organize View

The screen view can be organized using the organize view command from the menu.

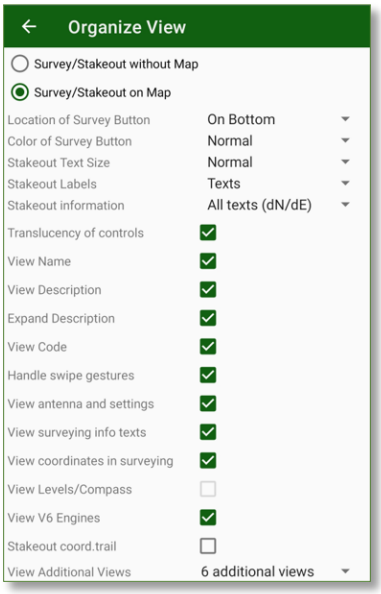


Figure 6: Organize View Screen

3.6.1. Survey / Stakeout without Map

This allows both survey and stakeout routines to run without the map. This option is preferred for android devices with a small screen or low resolution.

3.6.2. Survey / Stakeout on Map

This allows for survey and stakeout routines to run with the map.

3.6.3. Location of Survey Button

The use may select the location of the survey button, either top or bottom of the screen.

3.6.4. Color of Survey Button

This allows for a selection of colors for the survey button.

3.6.5. Stakeout Text Size

The text size used in stakeout routines may be selected with this option. Larger text size may be preferred in very bright environments.

3.6.6. Stakeout Labels

This allows for stakeout label selection. The stakeout labels may be either text or icons (to save space).

3.6.7. Stakeout Information

The stakeout options may be either icons or text. Icons take up less room and can be useful for those familiar with the stakeout labels.

3.6.8. Translucency of controls

For better visibility, the translucency of the controls may be selected.

3.6.9. View Name

This allows for the map object name to show on the screen.

3.6.10. View Description

This allows for the map object description to show on the screen.

3.6.11. Expand Description

This allows for the map object's full description to show on the screen.

3.6.12. View Code

This allows for the map object code to show on the screen.

3.6.13. Handle Swipe Gestures

Some survey controls may be shown or hidden on the screen with swipe gestures. Swiping toward the center of the screen will hide where a swipe towards the perimeter of the screen will show controls.

3.6.14. View Antenna and Settings

Both the antenna and settings buttons can be enabled or disabled on-screen. Disabling these allows for more space on the screen.

3.6.15. View Surveying Information Texts

This will show or hide surveying information on-screen.

3.6.16. View Coordinates in Surveying

This will show or hide coordinate information on-screen.

3.6.17. View Levels / Compass

This will show or hide level and compass information on-screen.

3.6.18. View V6 Engines

This will show or hide controls for the V6 engines on-screen.

3.6.19. Stakeout Coordinate Trail

This will show or hide coordinate trail on-screen.

3.6.20. View Additional Views

The user may customize information on the screen, called views. The views are small rectangles. Up to 6 additional rectangles can be selected. Click on a rectangle to view the information options available, select preferred option or select none to set an empty view for that rectangle.

None	Point Name	Last Names	Descriptions	Compass Levels	Tilt Correction	JPS File Recording	Debug Mode
Last Descriptions	Code	Last Codes	Take Photo	Solution Type	PDOP	HRMS	VRMS
Record Audio	Reference Frame	RTCM3 Coord.Sys.	Antenna	Course	Azimuth	Collect Time	Coordinate System
Antenna Height	Epoch Filter	HRMS Filter	VRMS Filter	Elevation Mask	Prev. Point Distance	Distance to Point	Height Filter
PDOP Filter	Min. Trajectory Length	Occupation Time	Verification Mode	Multi RTK Mode	V6 Engines	Min. Engine Count	Reset RTK
Confirmation	5Hz Mode	Compass	Levels	RTK Computation Mode	Hybrid RTK	Start / Stop RTK	Sat. Systems
				RTPK	IMU	IMU Angles	Survey Settings

Figure 7: Additional Views

3.7. Point List

Switching to the point list view allows for viewing survey, design or TS points. RTK Bases can also be selected with menu commands. The selected viewing mode is highlighted by a black menu item (illustrated below).

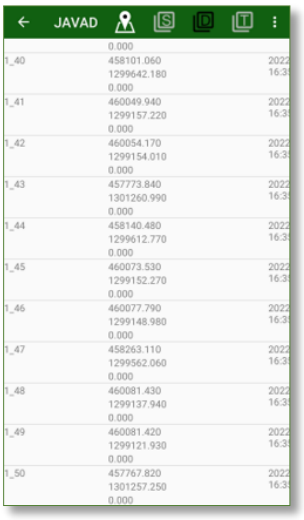


Figure 8: Point List - Design Points

The user may exit the point list view to the map view by clicking on the map menu item.

3.7.1. Point List View Options

The point list view can be augmented with the view command.

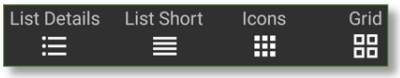


Figure 9: Point List View Options

3.7.1.1. List Details

This will show point list details.

3.7.1.2. List Short

This will show point list in a short format.

3.7.1.3. Icons

This will show point list in an Icon form.

3.7.1.4. Grid

This will show point list as a grid.

3.7.2. Export Point List

Check boxes appear near each item in the list with action icons on the top. Selected check box items can be exported using the export action item on the top. If no items are selected all points will be exported.

3.7.3. Import Design Points

Design points can be imported using the import action item on the top or type them manually using the '+' button shown on the bottom.

3.7.4. Point List Search

On the list, points can be filtered with the search command. An edit box appears then allows for a search term to be entered and filter the point list. For example, a search for point attributes containing '331' is illustrated below.

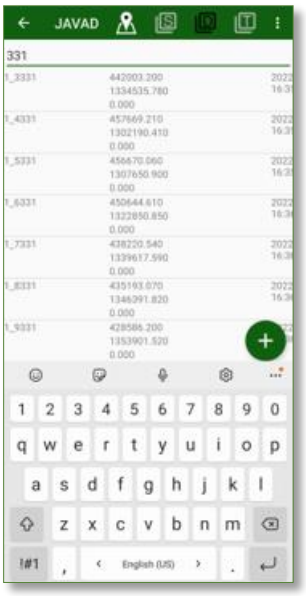


Figure 10: Point List Search for '331'

3.7.4.1. Point List Search Results Sorting

The point list can be sorted with the sort button. Point list sorting can be by name, by time, by code, by comment (description) or by distance.

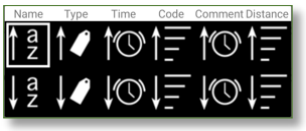


Figure 11: Point List Search - Sorting Options

3.8. List Item Control

Previously, list items were controlled with 'i' buttons located on the left side on-screen. The user interface now allows for an edit dialogue to open when clicking on a list item. Several options can be selected and activated with a long click. The new and old list item control methods can be selected in settings / type of lists (illustrated below).

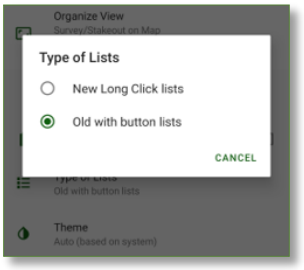


Figure 12: List Item Control

3.9. Drawer Command Menu

All other command routines may be accessed and run by a drawer menu. The drawer menu options are the same as the home menu screen.

Category	Option	Description
Project	Job	Shows a list of jobs; allows for job creation, job modification and job sharing.
	Coordinate System	Shows a list and selection of coordinate systems.
	Localize	Allows for the localization routine.
	Geoids	Shows a list of available geoids. Geoids can downloaded to JMT as well.
	Catalogs	Allows control points to be organized into catalogs.
	Codes	This will operate a list of codes. Codes may be created manually or imported.
	CoGo	Shows a list of Coordinate Geometry (CoGo) routines.
RTK	RTK Rover	This starts / stops a receiver in RTK rover mode.
	RTK Base	This starts / stops a receiver in RTK base mode. Corrections can be sent via UHF / Cell / RCV / WIFI / LAN.
post-Processing	Static Survey	This starts a post-processing data collection routine (static, kinematic or stop-and-go). During the routine, antenna height, site name(s) and descriptions can be entered for post-processing using Justin software, Giodis software, Javad DPOS service, or NGS DPOS service.
	Receiver Files	Shows a list of logged receiver files. This allows for file import / export and file deletion.
	Process	This will send a selected file to Javad DPOS or NGS OPUS servers for processing. JMT will receive results and automatically store position in the catalog.
Receiver	Satellites	This shows a skyplot. This also allows for satellite and satellite signal tracking for use in RTK modes.
	Corrections	Shows RTK correction status.
	Power	Shows power and charging details of the connected GNSS receiver.
	Calibrate Levels	This will calibrate the compass and levels for Triumph-1M / Triumph-2 and the gyroscope for Triumph-3. This is blocked for other receivers.
	Control	Shows a list of GNSS receiver-specific commands.
	Terminal	Allows for entering GNSS receiver-specific commands via Terminal window.
	Reconnect WIFI	This allows the GNSS receiver's WIFI programming for connection to the android device. External WIFI access points can be set, or the android device can be set for mobile access.
Devices	Radio	Allows for radio firmware to be updated.
	Rangefinder	This allows for a connection with a rangefinder (Bosch GLM100C, GLM50C, GLM 120C and Leica D510) for an offset survey. During an offset survey, distances by the rangefinder will transmit via Bluetooth to edit boxes showing the device is connected.

	TS Exchange	This allows for data exchange with total stations via Bluetooth.
	Quattro / Duo	This is for sigma receivers with these board types. This allows setup of sigma and duo parameters and monitor angles computed.
	J-Tip	Allows for connection with a J-Tip device via Bluetooth and find magnetic targets.
	Spectrum	This allows for current spectrum status.
	NMEA Output	Enables selected NMEA output messages on a selected port.
Exchange	Export	This allows data export routines.
	Import	This allows data import routines.
	Exchange	This allows data exchange routines.
	Cutsheet	This allows cutsheet options.
…	Settings	This allows for a list of settings.
	Services	This allows for a list of services.
	User Manual	This will load the user manual.
	Dealer Map	This will show a dealer map for a selected area.
	Turn Off	This will turn off the connected device.

4. JMT Data Folder Options (First Run or after Update)

JMT stores all data within a subfolder of internal storage. The folder path is specific for each android device. No application can access data of other applications and no unused data remains after an application is uninstalled. Due to these android rules, only JMT can access the data stored within its folders. Android file browsers will not be able to access JMT files. However, JMT can access data within android file browsers given user access permission. Upon running JMT for the first time (or after an update), the user will be asked if JMT can access previous data (illustrated below).

Figure 13: Previous Data Access

If the user has previous data, select 'Find Previous Data /storage/.../Javad'. The user will then be directed to select the previous Javad folder and allow JMT access.

If the user does not have any previous data, select 'No previous data'. The user will then be directed to specify the folder to store JMT data. Google alerts the user to select scopped or shared storage. Scopped storage means only JMT can access the data whereas shared stored allows apps other than JMT to access the data with decreased performance (illustrated below).

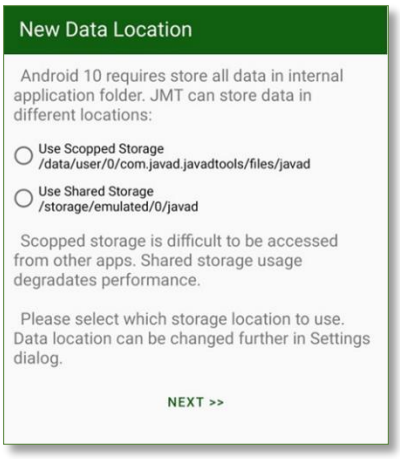


Figure 14: New Data Location

The selected folder may be changed by using settings / data location at any time. Please note that changing the data folder affects *all* the data. It is recommended that all data be backed up prior to changing the data folder to prevent data loss.

5. Jobs

Upon startup, JMT opens the most recent job or starts a new job if a first run. The current job may be changed, modified or deleted via the jobs screen. With any given job, a set of data (including raw .jps files, database files, and related files) is stored in a folder. Data backup can be completed by moving or copying the folder. Every job includes all points, trajectories, drawn lines, stations and measurements. The control points are stored in catalogs independent of the selected job. Each catalog file has its own coordinate system and only one catalog is accessible from other screens.

5.1. Job Selection

Jobs may be searched for and selected using the search filter. Stored jobs may also be seen on a map or a calendar (illustrated below).

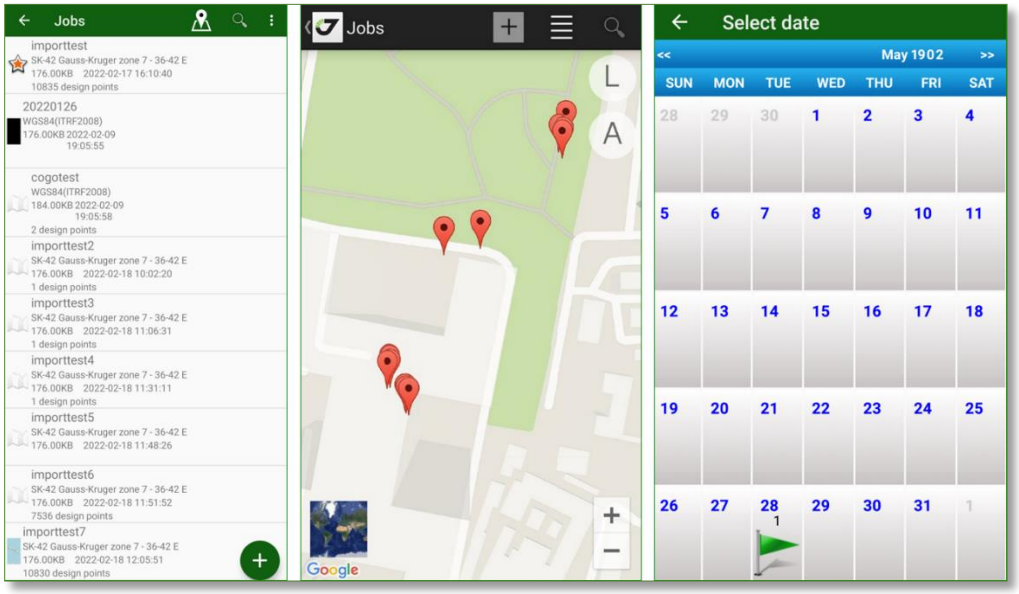


Figure 15: Job Selection (List, Map, and Calendar)

6. Points

Points are categorized as survey points, design points and TS (total station) points. Each category is shown on the top of the screen with icons (S = Survey, D = Design, T = Total Station).

Figure 16: Point Icons

6.1. Point Selection

Points can be selected, modified or deleted. Points may be searched for and selected using the search filter. Survey point metadata can be modified with the addition of coordinate recompilation if the antenna type and height is modified.

6.2. Export Points

Points of all types may be exported to custom format text files.

6.3. Import Points

Points may be imported from different formats starting from simple PNEZ to custom format text files. JMT allows importing points in the following formats:

- PNEZ
- MapInfo / Tab
- Google KML
- ESRI ArcGIS SHP
- LandXML
- AutoCAD DXF / DWG
- NetCAD
- Digitals
- Panorama
- Credo
- Leica GSI
- Sokkia SDR33
- RW5
- Custom Format

7. Catalogs

A catalog is a set of job independent points with its own coordinate system. Points may be selected from the current catalog for localizations, to start an RTK base session, etc.… Catalogs were designed to contain control points, but may for any user-specified reason. Catalog selection can be made from the list view or map view. Control points may be created, edited or deleted from this screen. When creating a new catalog, the coordinate system is set and all points in each catalog are in the same coordinate system shown in parathesis below the catalog name (illustrated below).

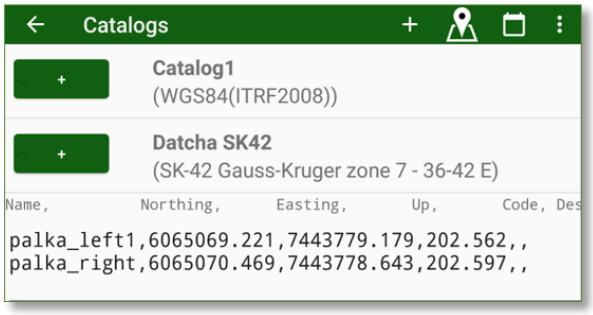


Figure 17: Catalogs

7.1. Catalog Points

Points contained within a catalog will be displayed in a comma delimited format:

- Name, Northing, Easting, Up (Elevation), Code, Description

Points can be created by entering coordinates, or copy / paste from other documents. Data can also be imported / exported with standard JMT formats.

8. GNSS Receiver Connection

JMT offers several connection methods from the android device to the GNSS receiver.

Connection Method	Description
Previous Connection	Connection is made via saved previous connections.
Bluetooth	Connection is made via Bluetooth between the android device and the GNSS Receiver.
WIFI	The android device is the mobile hot spot for the receiver connection.
WIFI (Mobile Access Point)	The android device and the GNSS Receiver are connected to the same WIFI access point (mobile WIFI router or an office WIFI access point).
Network	Internet connection to the remote receiver connected to the internet directly or via NetHub.
Emulator	Connection is made to an emulated GNSS Receiver for learning / instruction of JMT software.

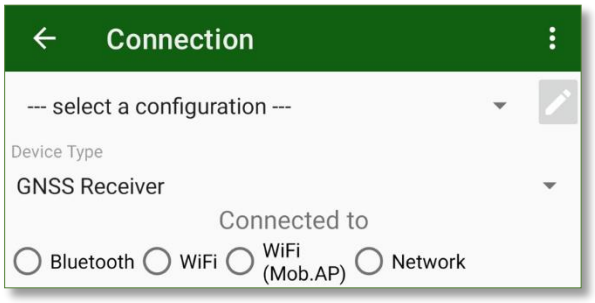


Figure 18: GNSS Receiver Connection

8.1. Previous GNSS Receiver Connections

Previous connections can be selected from the '--- select a configuration ---' drop-down menu. Previous connections are added to this list.

8.2. Bluetooth GNSS Receiver Connection

A Bluetooth connection can be established by selecting 'Bluetooth' and highlighting the preferred GNSS Receiver from the list. The paring code (1234 by default) is entered, and the connection is made. The connection is saved to the previous connections list.

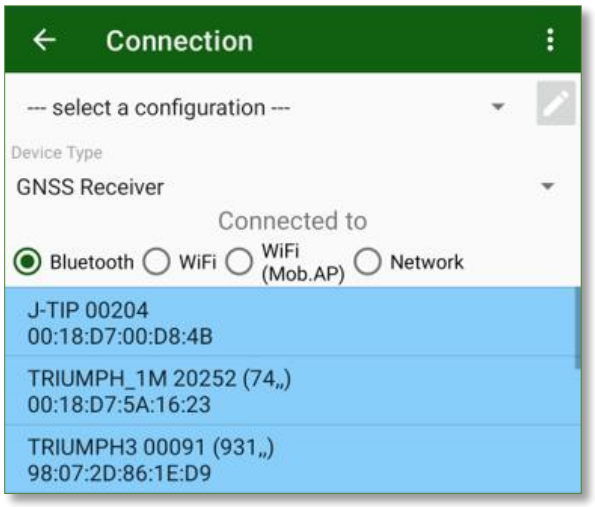


Figure 19: GNSS Receiver Connection via Bluetooth

8.3. WIFI GNSS Receiver Connection

The WIFI GNSS Receiver connection is slightly longer in range and requests the GNSS Receiver configuration upon connection. GNSS Receivers should be previously configured (via Bluetooth or NetHub).
A WIFI connection can be established by selecting 'WIFI' and highlighting the preferred GNSS Receiver from the list. The WIFI password is entered, and the connection is made. The connection is saved to the previous connection list.

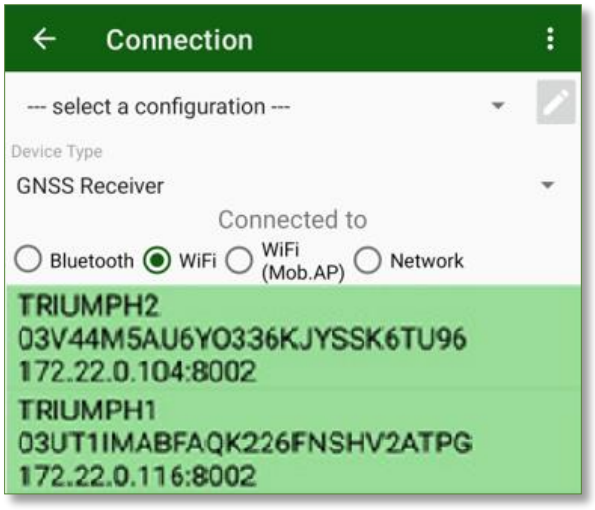


Figure 20: GNSS Receiver Connection via WIFI

8.4. WIFI Mobile Access Point GNSS Receiver Connection

A WIFI Mobile Access Point connection can be established by selecting 'WIFI (Mob. AP)' and highlighting the preferred GNSS Receiver from the list. The WIFI password is entered, and the connection is made. The connection is saved to the previous connection list.

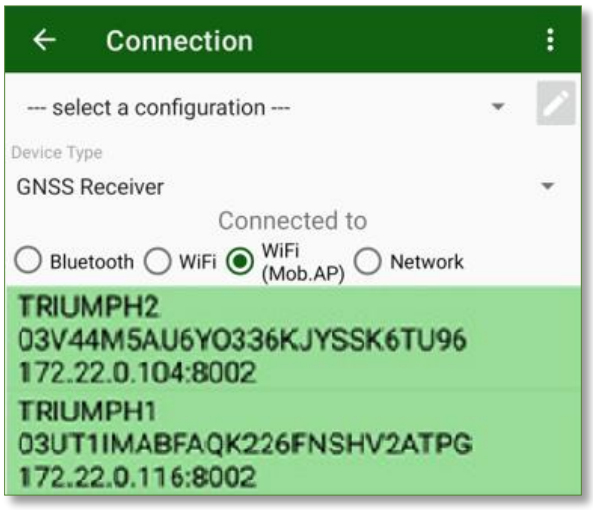


Figure 21: GNSS Receiver Connection via WIFI Mobile Access Point

8.5. Network (Remote Receiver) GNSS Receiver Connection

A Network connection can be established by selecting 'Network'. Enter the GNSS Receiver's IP address, port, login and password. Click on the 'Connect' button and the connection is made. The connection is saved to the previous connection list.

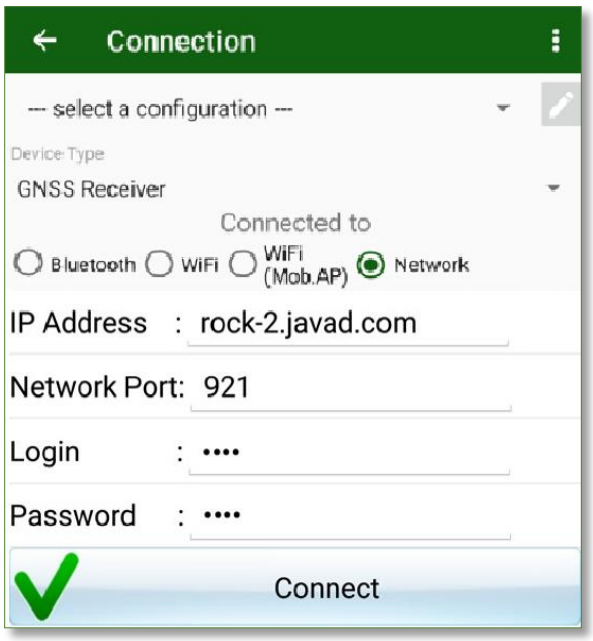


Figure 22: GNSS Receiver Connection via Network (Remote Receiver)

8.6. Network (NetHub) GNSS Receiver Connection

If a GNSS Receiver does not have a public static IP address to connect to, a GNSS Receiver connection can be made using NetHub software. The GNSS Receiver needs to be connected to the internet for the NetHub software connection. Select 'Network' and enter the NetHub Service's IP address and port. For login, type 'nethub' for the prefix and the receiver's name. For example, if the receiver's name is 'TR_103', type 'nethub:TR_103' in the login area. The receiver's name is set in NetHub software. The password area may be left blank. Click on the 'Connect' button and the connection is made. The connection is saved to the previous connection list.

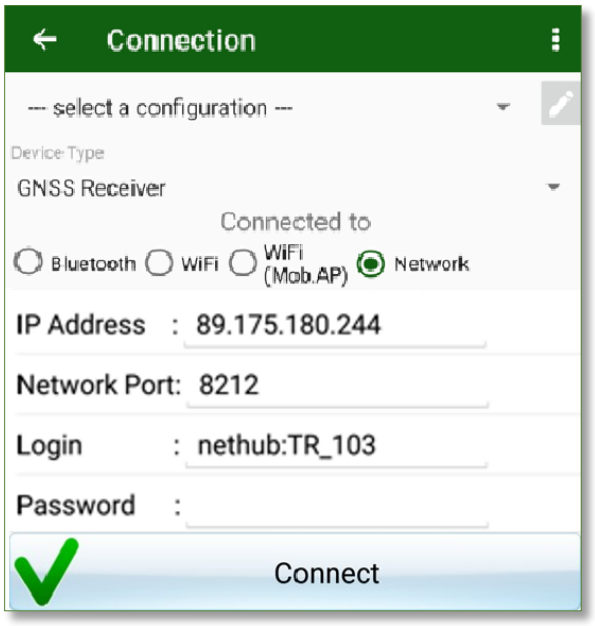


Figure 23: GNSS Receiver Connection via Network (NetHub)

8.7. Emulator GNSS Receiver Connection

JMT allows for use of an emulated, or simulated, GNSS Receiver. Select 'GNSS Emulator' as the device type and click the 'Connect' button.

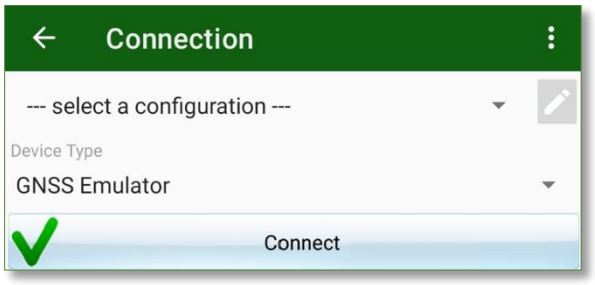


Figure 24: GNSS Receiver Connection via Emulator

8.8. Modify Previous Connections List

To rename or delete previous GNSS Receiver Connections, click on the edit icon.

Figure 25: Edit Previous GNSS Receiver Connection List

The list of previous connections is shown. Select the connection and either the ‘Rename’ or ‘Delete’ button to modify the previous connection.

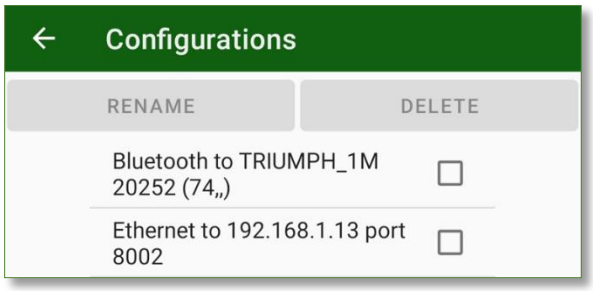


Figure 26: Rename or Delete Previous Connections

8.9. Connected GNSS Receiver Status

Once connected, the GNSS Receiver status bar is shown near the top of the screen.

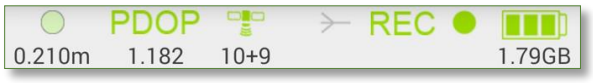


Figure 27: Connected GNSS Receiver Status Bar

Information included in the status bar:

- Precision of current position
- PDOP
- Satellites used in current position (GPS + GLONASS + Galelio + BeiDou + QZSS + SBAS + IRNSS respectively)
- Corrections
- Data Logging details
- Connected GNSS Receiver battery status
- Connected GNSS Receiver available free memory

Further details for each item can be viewed by clicking on the item’s icon.

8.9.1. Satellite Detail

Clicking on the Satellite icon will open a satellite menu. The user may switch between Satellite Table, SkyPlot and Systems / Signals menu items.

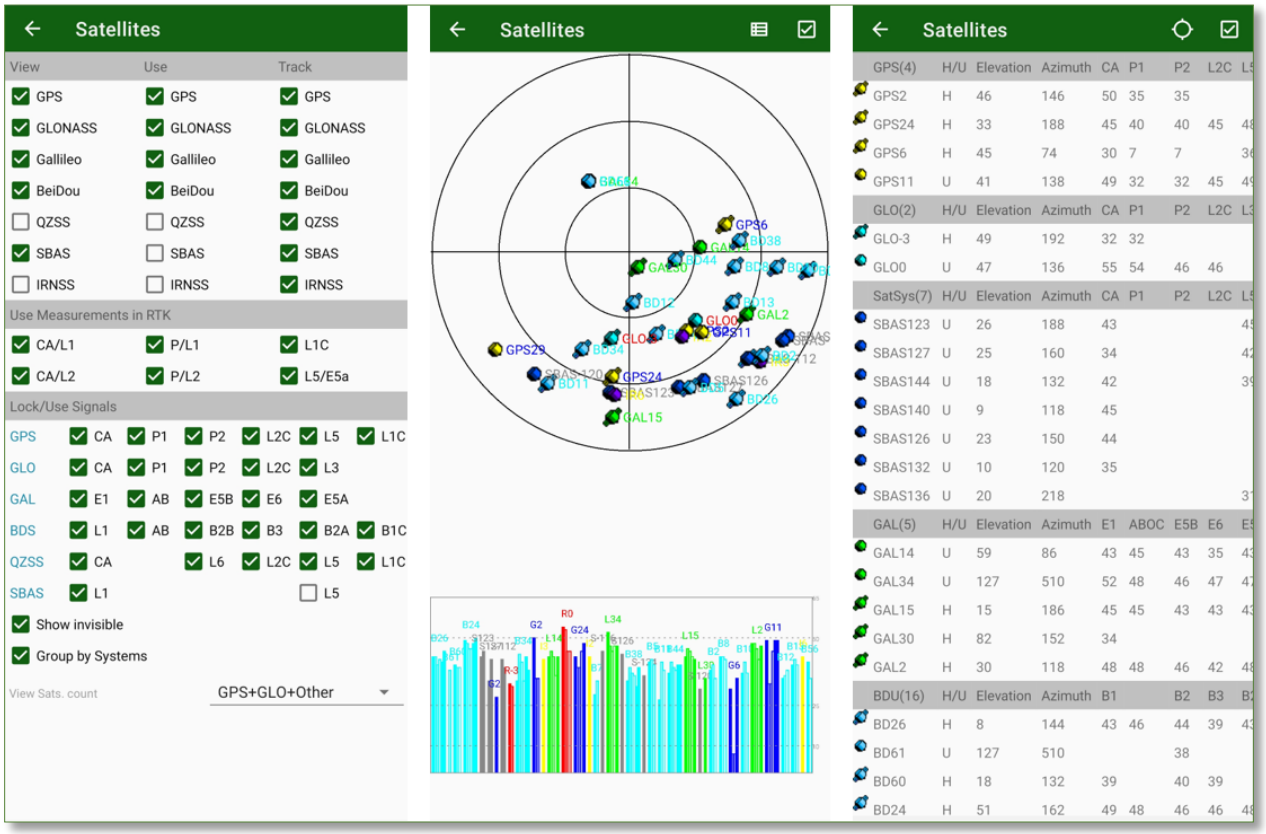


Figure 28: Satellite Menu (Left), Sky Plot (Center), Satellite Table (Right)

From the Satellite Menu, Constellations may be enabled / disabled in each column (View, Use, and Track). Measurements used in the RTK position solution may be enabled / disabled as well as specific Constellation signals.

- 'Show invisible' allows for the sky plot and table to show untracked satellites.
- 'Group by Systems' allows for grouping satellite constellations together in the table.
- 'View Sats. count' allows for the order of satellites shown on the status bar to be selected.

8.9.2. Corrections Detail

Selecting the Corrections icon will open the corrections screen. The corrections screen allows viewing of the current corrections status.

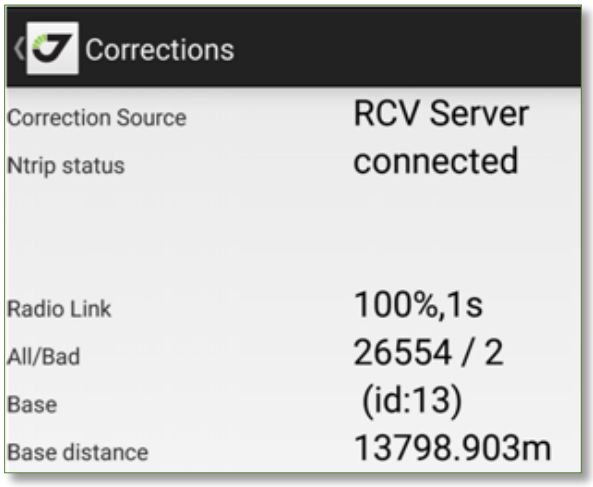


Figure 29: Corrections Screen

The details shown in the corrections screen are:

- Correction source
- Correction [type] status
- Radio link
- All / Bad showing the number of all corrections received and the number of bad or broken corrections.
- Base [ID]
- Base Distance

8.9.3. Power Detail

Tapping on the Power icon will open the power settings screen. If the receiver supports the power status display, setting the battery status / charging, enable / disable output power to serial ports, enter sleep mode or power off the receiver is possible.

Note: The GNSS Receiver may also be powered off when exiting JMT using the Exit item from the Home Menu screen.

Figure 30: Power Settings Screen

The details shown in the power settings screen are:

- External
- Board
- Battery A
- Charger
- Battery Charging Mode
- Enable Power Output
- Enable Low Power Mode
- Power Off
- Sleep Mode

8.9.4. Recording Detail

Clicking on the Recording icon will open the file manager screen.

9. Static Survey

To begin a static survey (usually for post-processing requirements), click on the Static Survey icon in the home menu screen or select it from the list in the map screen. This will open the static survey screen.

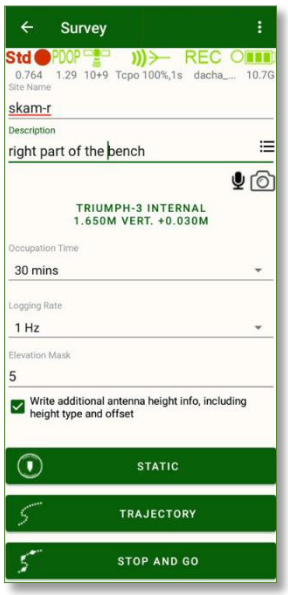


Figure 31: Static Survey Screen

Options for a static survey include:

- Site Name
- Description
- Audio Notes
- Photos
- Occupation Time
- Logging Rate
- Elevation Mask
- Write additional antenna height info, including height type and offset
- Static
- Trajectory
- Stop and Go

For static survey, ensure to have the correct antenna height by tapping the antenna icon to avoid using the antenna height used in previous routines. Start the static survey by clicking on the 'Static' button. This will open the Static Survey Status screen.

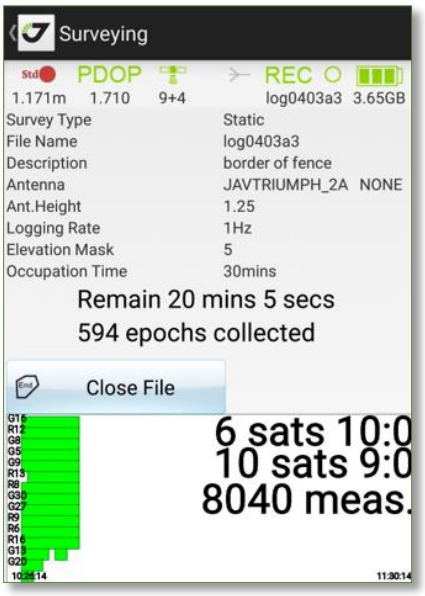


Figure 32: Static Survey Status Screen

JMT programs the GNSS Receiver to close the static survey automatically. This is to avoid the need to monitor the device during the static session. The graph shown on the bottom of the screen shows logged data for each satellite. A blank or white gap will show when that signal was lost / regained during the survey. For a static survey the minimal interval in the graphs is 30 seconds.

10. Trajectory Survey

Start a Trajectory survey by clicking on the 'Trajectory' button. During this type of survey event marks may be logged in the raw file by selecting the 'Event' button.

11. Stop and Go Survey

Start a Stop-and-Go survey by clicking on the 'Stop and Go' button. This type of survey allows for several sites in one file. The length of the stop-and-go survey should be at least 30 minutes with each point observation period a minimum of 1 minute. Site surveying will begin once the 'Point' button is clicked, and surveying will end with a second click of the 'Point' button. Another way to end the surveying is to select a different type of surveying (Trajectory or Static).

12. File Management

The file manager can be opened by selecting the File Manager Item from the Home or Map screen. In the file manager screen, the list of files will be shown. Searching and sorting the list is similar to jobs, points, catalogs, etc.

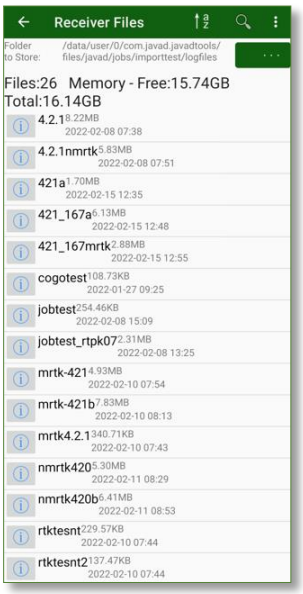


Figure 33: File Manager - Receiver Files

12.1. Delete File

Tapping on the icon of the file name, a list of actions will appear. To delete the file, select the delete action.

12.2. Restore File

Deleted files may be restored. Select ‘Deleting Mode’ from the menu. This mode allows viewing of recently deleted files. To restore a deleted item, select the file and tap the restore action. To return to ‘Normal Mode’ select the menu item a second time.

13. OPUS and DPOS Processing

Files downloaded from the GNSS Receiver (.jps) can be processed by NGS OPUS (USA) or Javad DPOS (USA and where DPOS servers are present). Select 'Process' from the drawer menu or home screen and the list of downloaded files (to the android device) will be shown. Select the preferred file by clicking on the icon near the file name, this will open a file options menu.

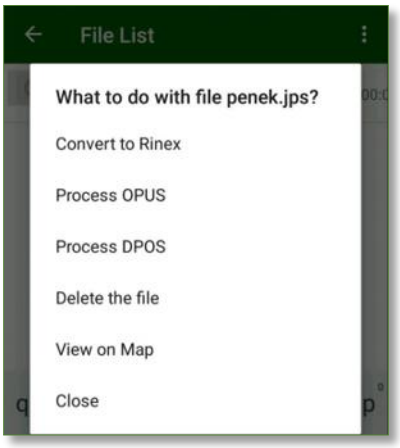


Figure 34: Downloaded File Options

Options include:

- Convert to RINEX
- Process OPUS
- Process DPOS
- Delete the file
- View on Map
- Close

13.1. OPUS Processing

Select ‘Process OPUS’ to begin the routine. JMT will read the raw file and input the data to the OPUS servers. Enter the antenna height if needed and select either Rapid Static (>2-hour dataset) or Static (>2-hour dataset). Set the Project ID and enter in the preferred response email address. If jmt@javad.com is used as the email address, JMT will automatically receive and store the response when received. Results may be stored as Catalog points if preferred.

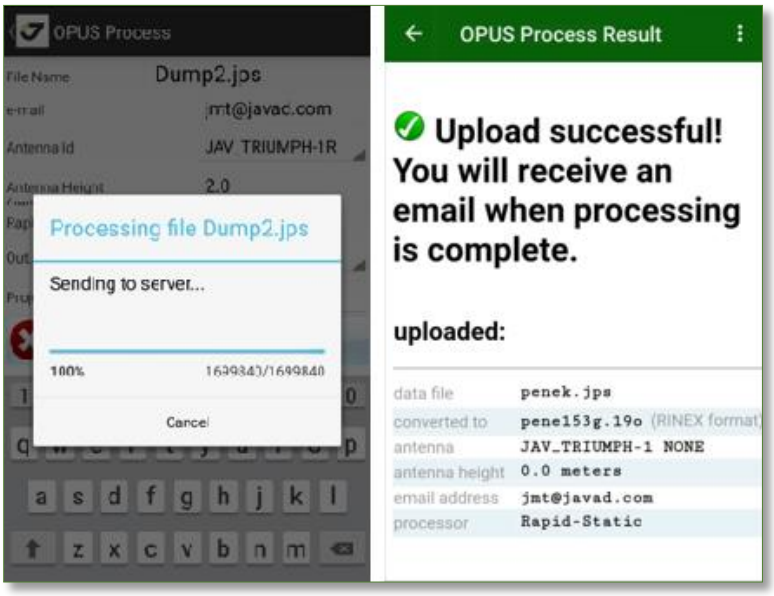


Figure 35: OPUS Processing Routine

The results may be viewed by selecting the file and selecting ‘View OPUS‘ from the command menu.

13.2. DPOS Processing

DPOS Processing follows the same steps, but with a few added options. Select ‘Process DPOS’ to begin the routine. DPOS allows for a selected network to use for the process (JMT will analyze the file and suggest the nearest). DPOS results are immediate and can be stored as Catalog points if preferred.

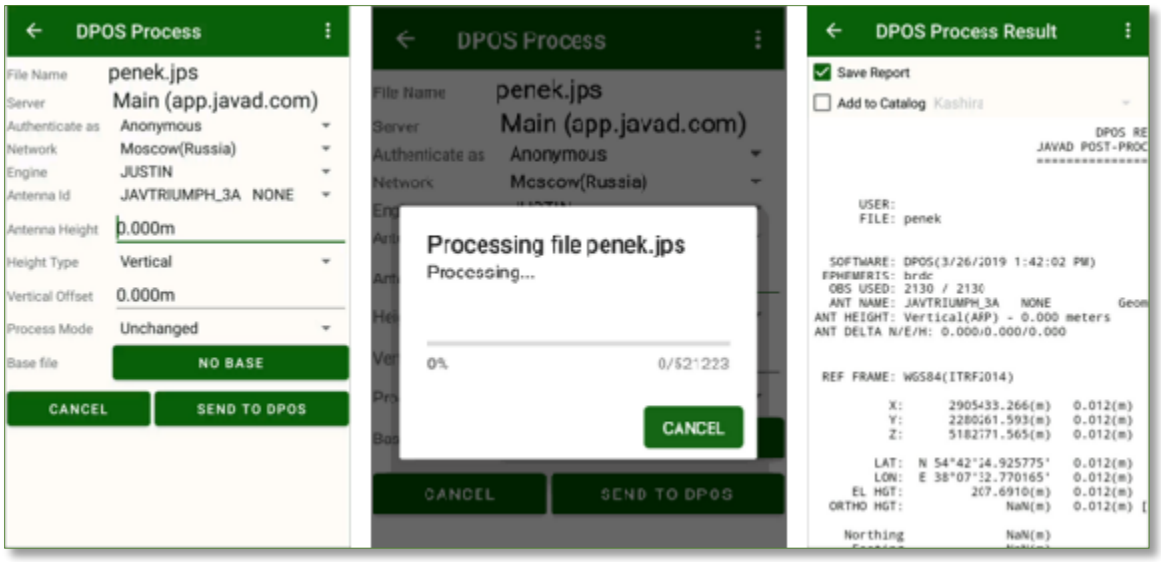


Figure 36: DPOS Processing Routine

For Javad DPOS processing, the user can select the antenna height (slant or vertical) and vertical offset. The results may be viewed by selecting the file and selecting ‘View DPOS‘ from the command menu.

13.3. VB – RTK

VB – RTK is the process of recomputing rover coordinates to fit with a post-processing solution (OPUS or DPOS). To run this routine, select ‘VB – RTK’ from the post-processing results report.

13.4. Hybrid RTK

Hybrid RTK is a process of recording data for a specified time period on a point to post-process in real-time. The Hybrid RTK process is helpful when in an occluded environment with minimal satellite tracking. This process is activated for each survey point and a file is amended with this data. The file includes both the job and point name. The user may control the status of Hybrid RTK in Additional View Hybrid RTK item found in the Organize View dialog check box (long click an item in the Additional View and select Hybrid RTK). When using this routine, the user will see either time remaining (from user-specified time period) or ready status.

Figure 37: Hybrid RTK Status

Once all points are surveyed using Hybrid RTK, the logged files can be downloaded to the android device. At the end of the job, after stopping the RTK Base, JMT will suggest downloading the RTK Base files and run a processing routine (OPUS / DPOS). Once both

Base and Rover files are downloaded, precise positions can be computed for the rover via CORS station data. The Base position can also be computed via CORS station data and then used to further process the Rover positions.

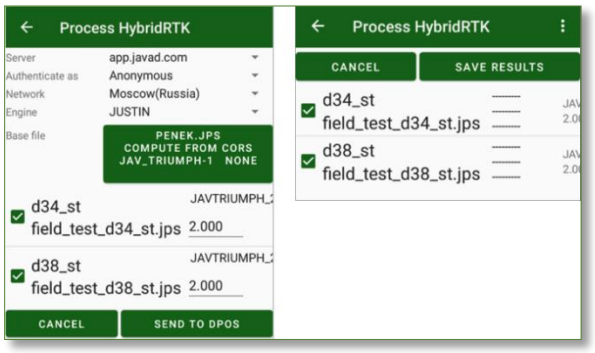


Figure 38: Hybrid RTK Processing

Press ‘Save Results’ to set coordinates for the points.

14. RTK Setup

The JMT software configures Javad GNSS receivers to operate in RTK mode for survey / stakeout routines. In general, the order of operations for RTK setup are:

- Create a job
- Select coordinate system
- Localization (if applicable)
- Configure RTK Base
- Configure RTK Rover

Each of these steps are outlines below.

14.1. Create a Job

To create a new job, use the Job item from the home menu or from the map screen. Tap the '+' button to enter parameters for a new job.

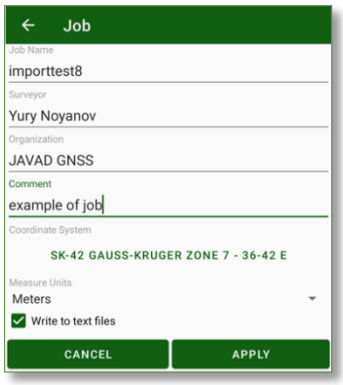


Figure 39: New Job

Enter in the Job Name, Surveyor, Organization and any desired Comments. Select a preferred coordinate system (outlined in further detail below) and units for the new job. Enable 'Write to text files' to save this information to text files in addition to the job database. Job Name, Surveyor, Organization and Comments may be edited at any time by using the Edit command.

14.2. Select Coordinate System

Clicking the Coordinate System button enters the Coordinate System Favorites (CS Favorites) screen. This screen shows the saved subset of JMT's coordinate system database preferred by the user. The coordinate systems selected are downloaded to JMT, please ensure the android device is connected to the internet to successfully add a coordinate system to the list. Coordinate systems may also be added directly to the javad/geodata folder if preferred.

Figure 40: Coordinate System Favorites

14.2.1. Define New Coordinate System

To define a new coordinate system, tap the '+' button on the top. The list of available coordinate systems for selection will appear from the following categories:

- Predefined coordinate system
- New local coordinate system
- User defined coordinate system
- Read coordinate system from the GNSS receiver
- Import coordinate system

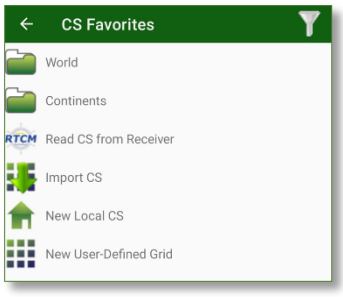


Figure 41: Define New Coordinate System

Each of these categories are detail below.

14.2.1.1. Predefined Coordinate System

Select the 'World' or 'Continents' folders for these types of coordinate systems. Each selected coordinate system will allow for entering both the name and the height (or geoid) type. Selection of available transformation will be shown (if applicable) along with the coordinate system epoch to fully customize the coordinate system for the user. This coordinate system may be saved to the CS Favorites list by clicking on the 'Add to favorites' button.

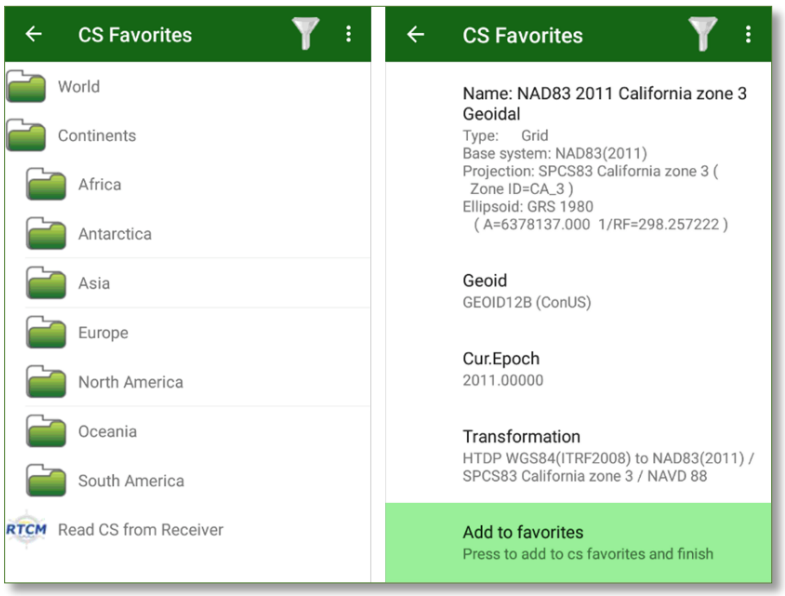


Figure 42: Predefined Coordinate System Selection

14.2.1.2. New Local Coordinate System

To create a new local coordinate system, click on the ‘New Local CS’ button. Enter the name of the system and click on ‘Add to favorites’ to include this new system in the CS favorites list.

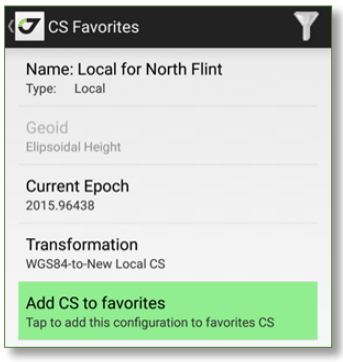


Figure 43: New Local Coordinate System

The localization procedure for the new coordinate system will be completed later from the Job dialog.

14.2.1.3. User Defined Coordinate System

To create a user defined coordinate system, click on the ‘New User-Defined Grid’ button. Enter in user defined data in the following parameters:

- Name
- Ellipsoid
- Projection type and parameters
- 7 datum parameters (3 offsets, 3 rotations and 1 scale) either typed or from a list
- Datum direction (WGS84 -> CS or CS -> WGS84)
- Geoid (or remain ellipsoidal)

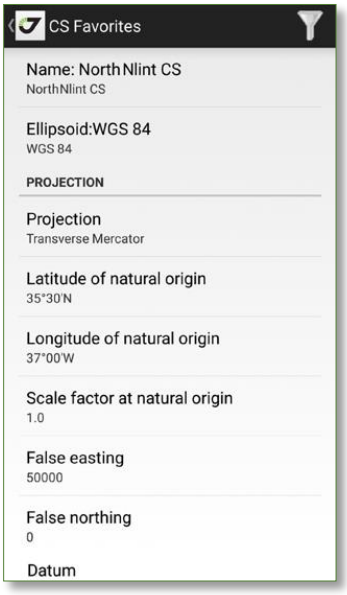


Figure 44: User Defined Coordinate System

Click on ‘Add to favorites’ to include this new system in the CS favorites list.

14.2.1.4. Read Coordinate System from GNSS Receiver

Many VRS networks transmit coordinate system parameters. Javad GNSS receivers can read these transmitted parameters and create a coordinate system for use. To read coordinate system parameters from a VRS connect the GNSS receiver to the VRS network and wait for corrections to be received. Select the 'Read CS from Receiver' button and the screen with the transmitted parameters will show. Select a preferred name for the system and click on 'Add to favorites' to include this system in the CS favorites list.

Note: The GNSS receiver will retain this coordinate system until restarted.

14.2.1.5. Import Coordinate System

Coordinate systems created by other Javad field software (Tracy, J-Field, or Justin) may be imported. Select the 'Import CS' button to perform this operation.

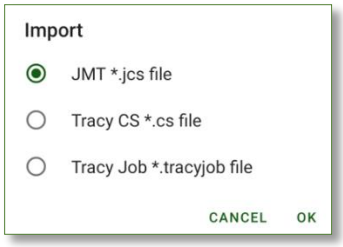


Figure 45: Import Coordinate System

Click 'OK' to complete the import process.

14.3. Localization

Localization allows for calculating the local transformation parameters between two coordinate systems and is defined by sets of points with coordinates in both systems. Surveyed coordinates and design coordinates from a catalog can be used to define a localization. JMT computes the localization using four horizontal (rotation, scale, offset north and offset east) and three vertical parameters (delta height, north inclination and east inclination).
To start the localization routine, select localization from the home menu or map screen. Parameters may be typed manually or entered in by identical points. The identical points screen shows the list of pairs of designed and surveyed points. To add a new pair of points, select the '+' button shown on the top of the screen. To select or modify points, tap the button in the identical point line. To delete a point, click the red check mark shown on the left.
The identical point can be used for plane and height computation, for plane-only computation, or for height-only computation selectable via drop-down menus by each point. Residuals for each identical point are shown (a large residual indicates low quality or an error). JMT can automatically find matching sets of identical points; select the first point manually and use the 'AutoFind' feature.
After the parameters have been entered, JMT will modify the coordinate system script in the job file with the localization parameters.

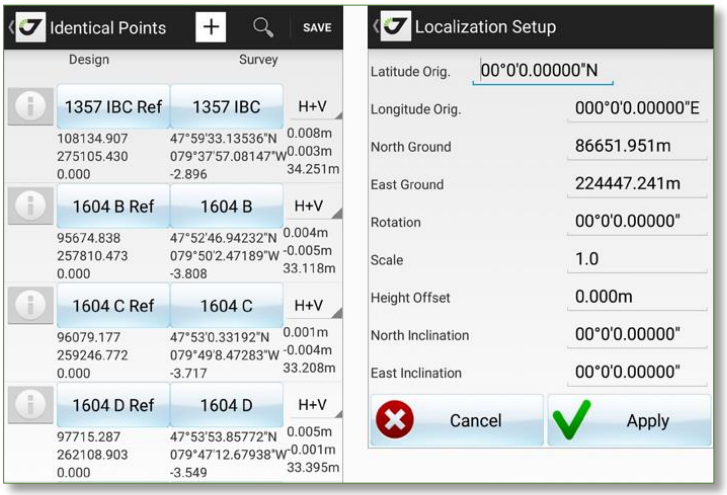


Figure 46: Localization - Identical Points

14.3.1. Import Localization

JMT software can import localizations from a Trimble. dc file, Carlson .loc file or Tracy.lp file by selecting Menu / Import and selecting the preferred format type.

Figure 47: Import Localization

14.4. Configure RTK Base

To configure a Javad GNSS receiver as an RTK base, tap the RTK Base item from the home menu or map screen. Enter the following parameters:

- Station Name
- Station ID
- Antenna Type
- Antenna Height
- Height Type
- Height Unit
- Base Position
- Reference Frame
- Correction Source
- File Logging

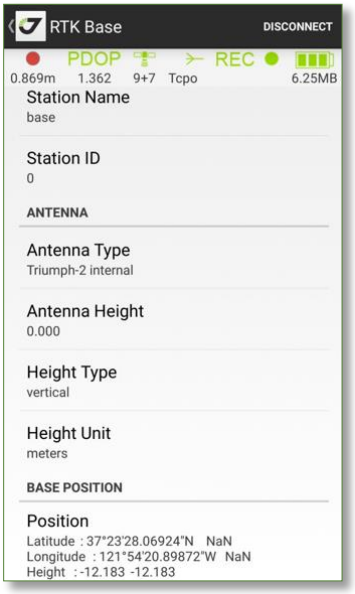


Figure 48: RTK Base Parameters

All RTK Base parameters do not need to be entered each session. Modifications of the antenna height and location may be all that is required.

14.4.1. RTK Base Location

To set the RTK Base location, select from the following options:

- Get From Receiver
- Get From Catalog
- Set Coordinates

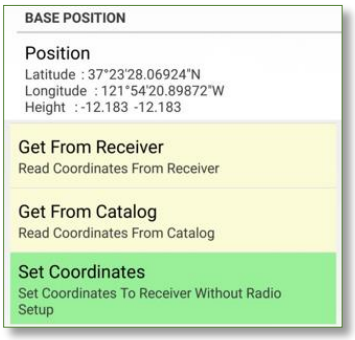


Figure 49: RTK Base Location Options

14.4.2. Raw File Logging

To enable recording, select ‘On’ in the Enable Recording option.

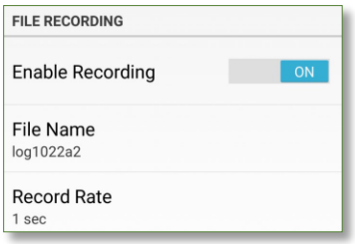


Figure 50: Raw File Logging

14.4.3. Correction Source

A new correction source may be created by selecting one of the following options in the Corrections list:

- FH Radio
- UHF Radio
- RCV Base Item

This brings the user to the new correction source screen where selections for the radio type and correction style are located. To modify the correction source, tap the button near the description.

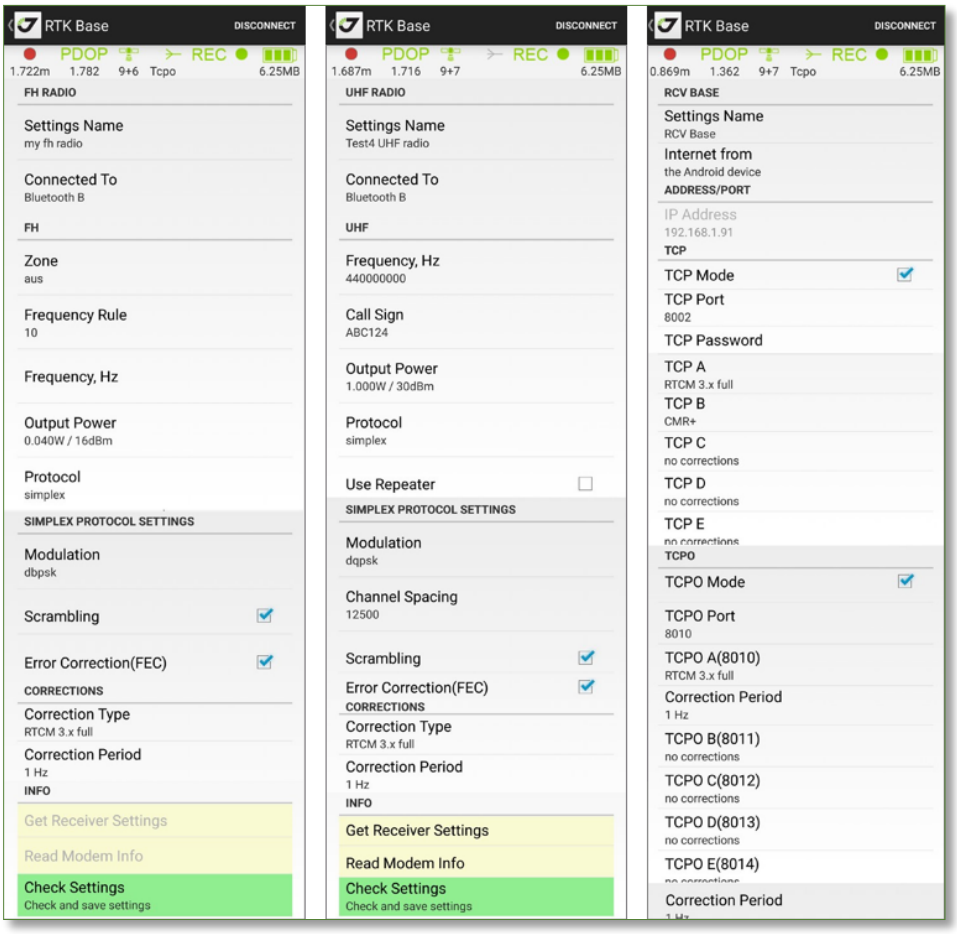


Figure 51: RTK Base Correction Source

14.5. Configure RTK Rover

To configure a Javad GNSS receiver as an RTK rover, tap the RTK Rover item from the home menu or map screen. A 'Reconfigure Rover' option is presented to allow selections of all RTK Rover parameters.

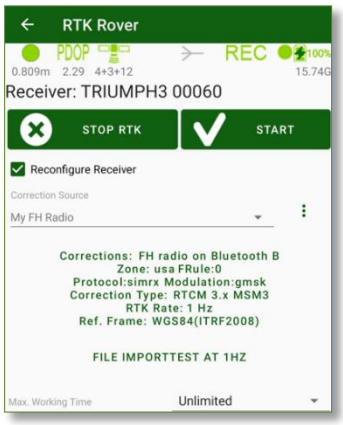


Figure 52: RTK Rover Configuration

14.5.1. Correction Source

The user may select a new correction source and all its parameters by clicking on the 'New xxxx' button and the 'Correction Settings' button.

14.5.2. Data Logging

Click on the current raw data file to set the name. The settings available are:

- Receiver File Logging
- File Name
- Logging Rate
- Elevation Mask
- Store Base Corrections
- Write Additional Antenna Height Information, Including Height Type and Offset

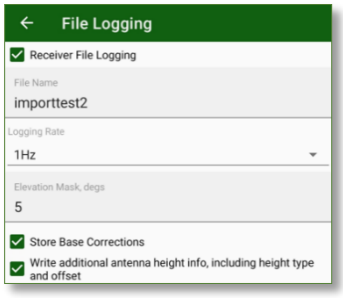


Figure 53: RTK Rover Data Logging

14.5.2.1. Receiver File Logging

This check mark allows for data logging.

14.5.2.2. File Name

Enter the preferred file name for data logging.

14.5.2.3. Logging Rate

Data logging rate may be selected using the drop-down menu.

14.5.2.4. Elevation Mask

This allows for selection of the elevation mask.

14.5.2.5. Store Base Corrections

This check mark allows for base corrections to be stored in the logging file. This allows for post-processing without the separate base file using Justin software.

15. RTK Survey

With RTK configured, there are several types of RTK Survey available. A long click on the big circle button shows the RTK survey types. The available RTK survey types are:

- Points
- Trajectories
- Fast trajectories
- OffLine
- Along line
- Intersection
- Traverse
- Perpendicular
- Stakeout point
- Stakeout line
- Stakeout surface

15.1. Survey Settings

The survey settings button will allow for setting or viewing the settings allowed during RTK survey routines.

Figure 54: Survey Settings Button

There are several settings available.

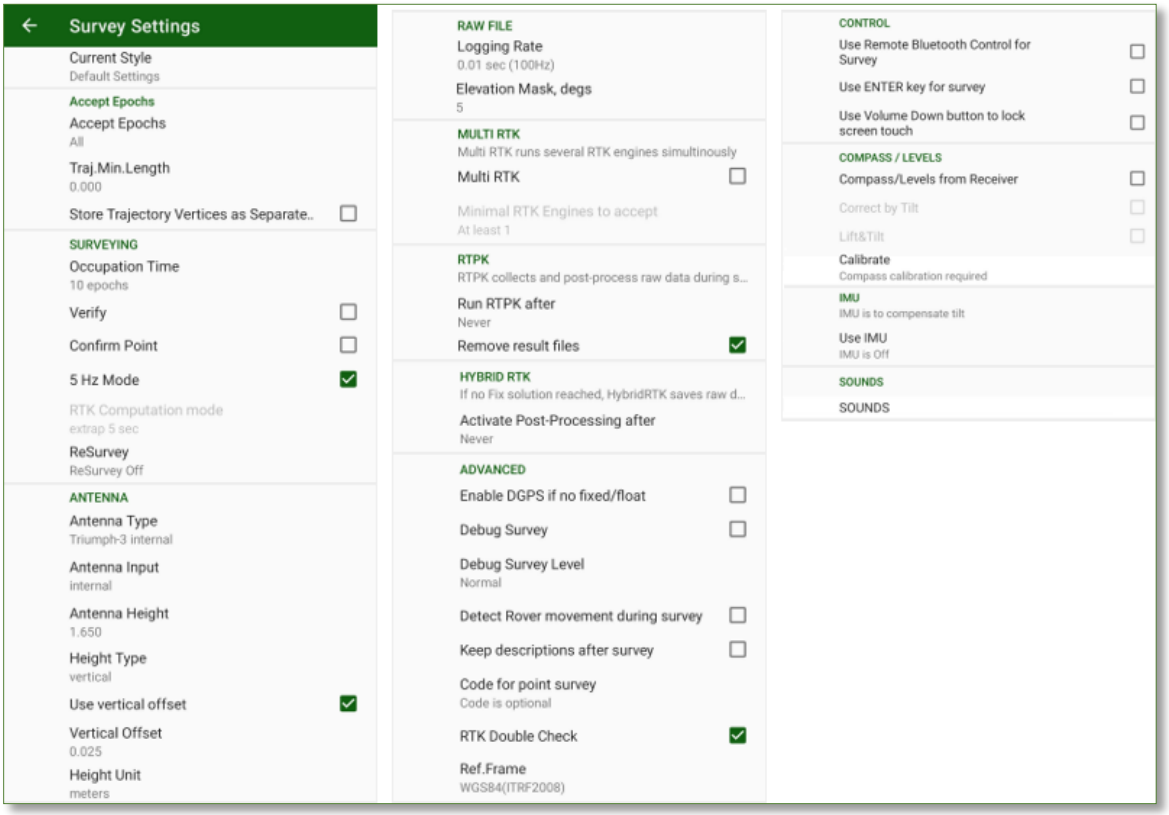


Figure 55: Survey Settings

15.1.1. Current Style

This allows the user to save a configuration of survey settings to easily select for each survey routine.

15.1.2. Accept Epochs

This allows for the type of epochs used in the survey routine (All, Float and Fixed, or Fixed only). Clicking on this option allows for further filter options using HTMS, VRMS, PDOP or Height difference.

15.1.3. Trajectory Minimum Length

This allows the user to filter the trajectory length.

15.1.4. Store Trajectory Vertices as Separate Points

By default, trajectories are stored as vertices. The user may select trajectories to be stored as points if preferred.

15.1.5. Occupation Time

This allows for selection of occupation time during a survey routine.

15.1.6. Verify

This will enable / disable verify mode surveying. In verify mode, JMT will make 3 observations with 10 epochs each and then check results. The results must be within a 0.100m range for verification. This allows for more robust coordinates in the survey routine.

15.1.7. Confirm Point

This enables / disables a confirm point screen. The confirmation screen shows all information about the surveyed point.

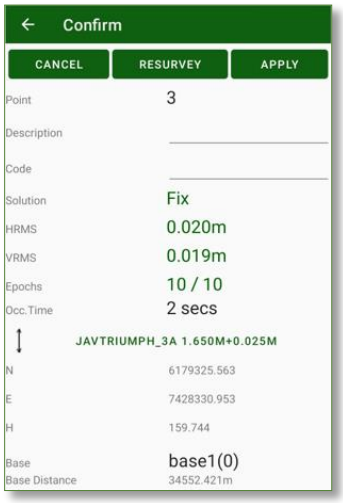


Figure 56: Point Confirmation Screen

15.1.8. 5 Hz Mode

This allows JMT to store data at a 5Hz rate (5 times per second). The GNSS receiver must have this option purchased for this option.

15.1.9. ReSurvey

This allows the user to automatically repeat the survey.

15.1.10. Antenna Type

This allows selection of the antenna type.

15.1.11. Antenna Input

This allows selection of the antenna input.

15.1.12. Antenna Height

This allows the user to enter the antenna height.

15.1.13. Height Type

The height type (vertical or slant) may be entered here.

15.1.14. Use Vertical Offset

This allows a vertical offset.

15.1.15. Vertical Offset

This allows the vertical offset to be entered.

15.1.16. Height Unit

This selects the unit used in height measurements.

15.1.17. Logging Rate

This allows selection of the logging rate.

15.1.18. Elevation Mask, degs

This allows selection of the elevation mask.

15.1.19. Multi RTK

This allows for viewing the RTK engines in the surveying screen.

15.1.20. Minimal number of RTK engines to accept

To avoid blunders, a minimum of 3 engines is recommended.

15.1.21. Run RTPK after

This enables / disables RTPK mode activation (On / Off).

15.1.22. RTPK Comparison mode

This allows comparison for first fix used, compare both RTK and RTPK fixes or use only RTPK. RTPK is another RTK engine inside the Javad GNSS receiver. It uses a different method of computation, like post-processing. JMT will collect data for an selected period and compute a result. JMT can control RTPK settings. A minimum time of 1 minute is recommended.

15.1.23. Debug Survey

This option is used for support purposes.

15.1.24. Detect Rover movement during survey mode

This will alert the user during a survey routine if rover movement is detected.

15.1.25. Keep descriptions after survey

This will save the point descriptions in the logging file, otherwise it will be cleared.

15.1.26. Code for Point Survey

This enables / disables code storing in point survey routines.

15.1.27. RTK Computation Mode

This allows for selection of RTK computation mode (Extrapolation or Delay).

15.1.28. RTK Double-Check Mode

This will improve RTK robustness and will require more resources.

15.1.29. Compass / Levels Option

These allow for tilt compensation, so the user does not need the level on the pole. This lowers accuracy (up to 5 cm).

15.1.30. Calibrate

The allows for calibration of the levels and compass on the GNSS receiver.

15.1.31. Lift & Tilt

This enables / disables lift and tilt mode. This mode allows the user JMT to start measurements when the pole is vertical and to stop measurements when the pole is tilted. This allows for survey routines without touching the screen.

15.1.32. Use IMU

This option is available with the Triumph-3 GNSS receiver and allows for tilt compensation during survey routines. The 100Hz OAF option needs to be purchased to use this feature. In IMU mode the surveyor places the pole on a ground marker and tilts the pole. JMT will compute the point on the ground. There are two methods of IMU surveying. These are:

- Fixed Tip
- Moving Tip

15.1.32.1. Fixed Tip IMU Surveying

In this method, the surveyor places the pole on the ground point and presses the green circle button. This will initialize the IMU. The pole needs to be static during the initialization period (the screen will show the user a ‘do not move’ message). Once initialization is competed, the surveyor can tilt the pole and allow JMT to compute a tilted position. RTK Fixed mode is preferred during this routine.

15.1.32.2. Moving Tip IMU Surveying

In this method, all actions in the GNSS receiver can be used in parallel. This allows the surveyor to tilt the pole and press the green survey button and wait for JMT to calculate the point.

15.1.33. Sounds

This enables sound configuration, either a beep or voice. Each survey observation has an associated sound. Actions, such as connection lost or solution type can be announced when changed. Each sound can be changed within the sound settings dialog.

15.2. Point Survey

Standard point surveying can be done with just pressing the green circle button. JMT will start collecting data. Pressing the green circle button a second time will stop data collection. During data collection, JMT will show the user the number of observations accepted and rejected. Each observation type (accepted / rejected) has a different sound. After data collection, JMT will increment the point name for the next set of observations. The point description will be cleared for the next point (unless “Keep descriptions after survey” is checked in Survey Settings).

15.3. Trajectory Survey

A long press on the green circle button allows for a menu of survey routines to show. Trajectory survey will allow JMT to collect epochs as trajectory vertices. The epochs can be filtered by type, RMS, or PDOP. If an observation does not fit the selected criteria it will be rejected. Minimal distances between observations may be selected allowing for surveying at any speed. A second press of the green circle button stops the trajectory survey and will increment the trajectory name.

15.4. Fast Trajectory Survey

This allows JMT to store trajectory data at up to 10Hz.

15.5. OffLine Survey

This defines a line with two intermediate points and sets two distances along the line and across the line to a computed point.

15.6. Along Line Survey

This defines a line directed to a computed point and measures the distance from the second point to the computed point.

15.7. Intersection Survey

This measures two distances from two intermediate points to a computed point.

15.8. Traverse Survey

This defines a line with two intermediate points and sets an angle and distance form the line to a computed point.

15.9. Perpendicular Survey

This defines a line with to intermediate points and measures distance (left or right) form the line to a computed point.

15.10. Rangefinder Utilization During an Offset Survey

Laser rangefinders can be used via Bluetooth communication. To connect a rangefinder, select the rangefinder option from the home menu or map screen. This allows, during an offset survey, typing a measure type in the edit box (Along, Offset, Distance, Distance 2), then measure distance with the connected rangefinder. Pressing the Bluetooth button on the rangefinder will transmit the data to JMT to the text box.

15.11. Stakeout Point

This mode allows JMT to navigate to a selected point.

15.12. Stakeout Line

This defines a line with two points and defines a target with distances along or across the line. JMT navigates to this point and shows distances along and across the line.

15.13. Stakeout Surface

With an imported surface file, JMT will show the height difference between the loaded surface and the current observation.

15.14. Stakeout Screen Options

The stakeout screen includes three adjustable lines of stakeout controls:

- Target button with Next and Nearest buttons
- Antenna and Stakeout/Survey Settings buttons
- Additional view with selectable view button

The controls can be configured with Organized View options, available from the home menu screen or map screen.

15.15. Stakeout Screen

Under the controls, texts with coordinates and current progress are located. There are two circle buttons. The big circle button will start / stop the survey routine and allow for survey routine selection by a long press. The smaller circle button with Sigma will turn on / off averaging mode. The left side shows the current coordinates. Several details are shown on the right. These are:

- DTT (distance to target)
- NTT (north distance to target)
- ETT (east distance to target)
- Cut or Fill (height distance to target)
- Current Course
- CTT (course to target)
- Forward or Backward (distance along line)
- Left or Right (distance across line)

15.16. Stakeout Routine

To start a stakeout routine, long press the green survey button and select a stakeout type. Then select a line, a point, or a surface. Point selection can be made by tapping a point on the map, from the list command, or from the coordinate command. Line selection can be made by line command. Surface selection can be made with DXF/DWG file with triangles or from a file with points. Once the target is set, tap the 'i' icon and select a stake command. Select the menu item and in the position dialog type coordinates, use 'Cur.Pos' button to set current position. The Next button will switch the target to the next point in the list. The Nearest button will find the nearest point in the list to the current position.
The user will see a red line between the current position and the target position. If in stakeout line routine, the user will see two points (1st for beginning point, 2nd for ending point) linked with magenta line. If in stakeout surface routine, the user will see triangles and the current triangle is marked in blue.
The user will see the bulls-eye control as well. This control shows the current position with a colored circle and the target with red crossed circle icon and points around them. The color denotes the solution type (green = fixed, yellow = float, red = standalone). The current position and the target are connected with a grey arrow. A second arrow, shown in blue, denotes the current direction of movement. Once the user changes directions to match the blue and grey arrows, the arrow turns green. Then, the user may move along the green line to the selected target.

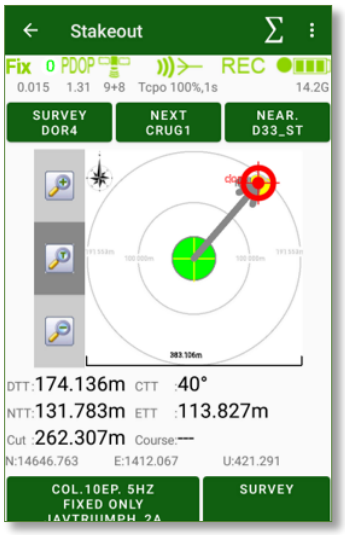


Figure 57: Stakeout Screen

15.16.1. Stakeout with Sun Direction

JMT shows the Sun icon in the bulls-eye screen, allowing the user to orient the current position with the sun. This allows the user to rotate to the sun or shadow and see the target position orientation.

15.16.2. Stakeout with Position Tail

JMT can show the previous position's tail. The newer positions are darker, and the older positions fade to invisible. This allows the user to orient themselves based on previous positions.

15.16.3. Visual Stakeout

The Javad Triumph-3 allows for augmented reality stakeout (visual stakeout). This feature is available on devices with AR support. A list of devices can be found here.
To perform a visual stakeout:
Setup the GNSS receiver as RTK Rover and wait for an RTK Fixed solution.

1. Select a stakeout point for the target.
2. Click on AR Item for Visual Stakeout.
3. Initialize the device's camera, pointing it to a horizontal surface.
4. Initialize the GNSS receiver's compass by moving it several meters.
5. Follow the blue line direction to reach the target.

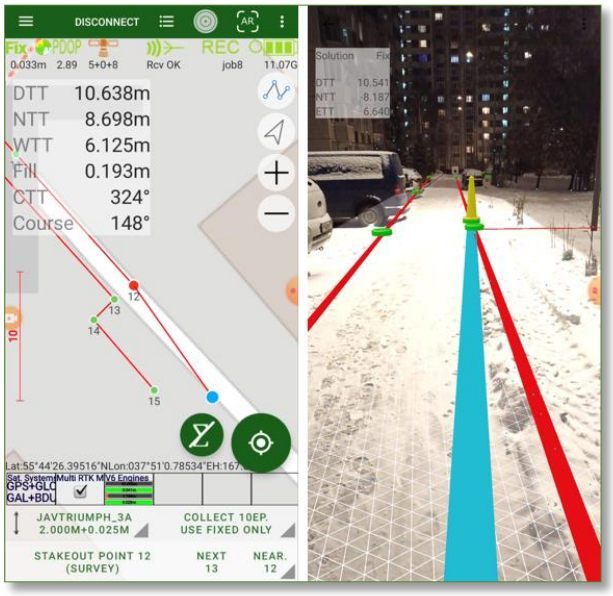


Figure 58: Visual Stakeout

15.17. Cutsheet Stakeout Report

When a stakeout routine is completed, a stakeout report (Cutsheet) can be shown. The user can go to the list of points and select the cutsheet item or go directly by using commands.

Figure 59: Cutsheet Report

The user can see a list of staked point with the design name, surveyed name, coordinates and distances between the design and surveyed positions. The report can be exported using the export command.

16. Background Map

Select map provider from the menu to open the map provider screen.

Figure 60: Map Provider Screen

The user may select the background map from Google Maps or Open Street Maps. A custom raster user map may be imported for selection as well.

17. Import

Design points can be imported from a text file. JMT can also import CAD / GIS formats. To start the import routine, switch to points, design points, and select import. This can also be initiated by selecting the import item from the home menu screen or map screen.

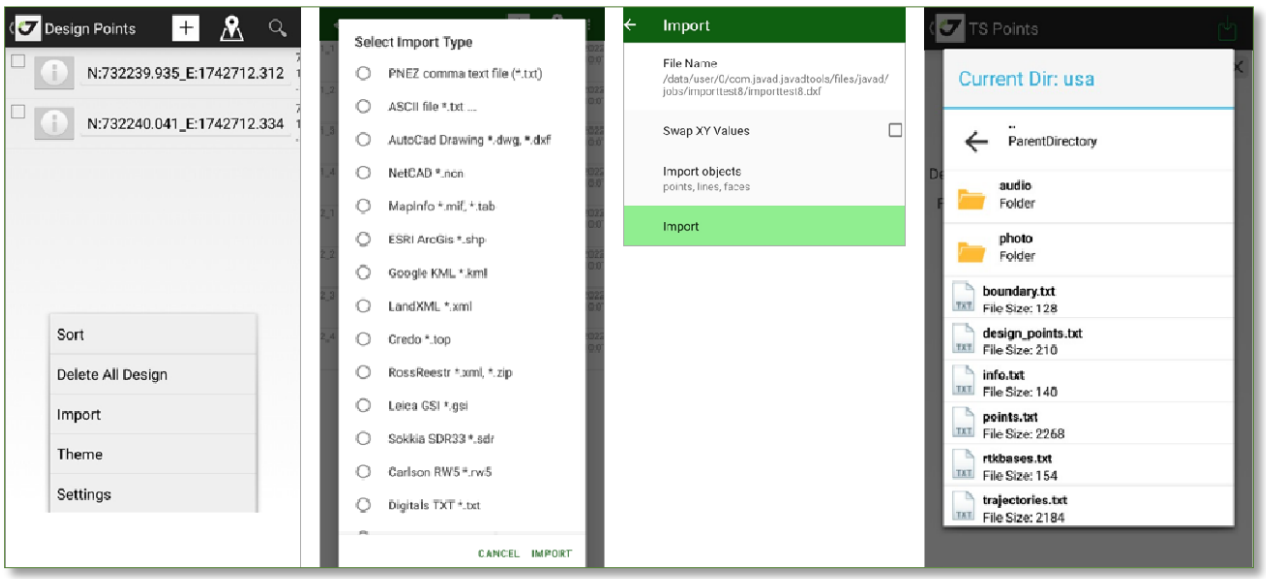


Figure 61: Import

18. Export

The export routine can be accessed by the home menu or the map screen. Single or sets of points can be exported from a long click on a point and clicking on the check mark. This routine starts with a file format selection.

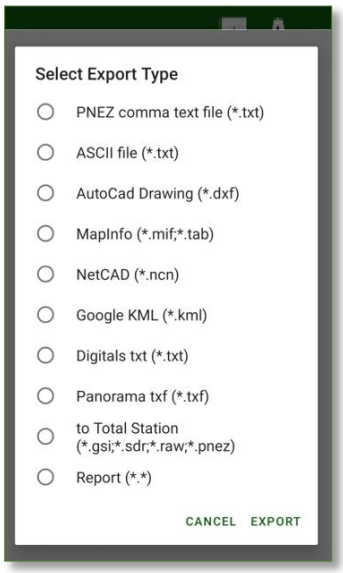


Figure 62: Export

Exported files from JMT can be of two types: Javad or System. This selection dictates sharing properties on the android device. Javad allows the exported file only to be accessed by JMT whereas System allows the exported file to be accessed from any app on the android device (email, instant messages, etc.).

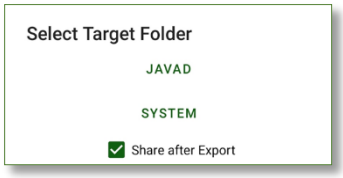


Figure 63: Export File Sharing

Unique settings for exporting the selected file. Exporting a PNEZ (comma delimited text file) does not ask the user for any additional settings and simply exports the surveyed points in a comma delimited file. Other formats will ask the user what items to export (illustrated below).

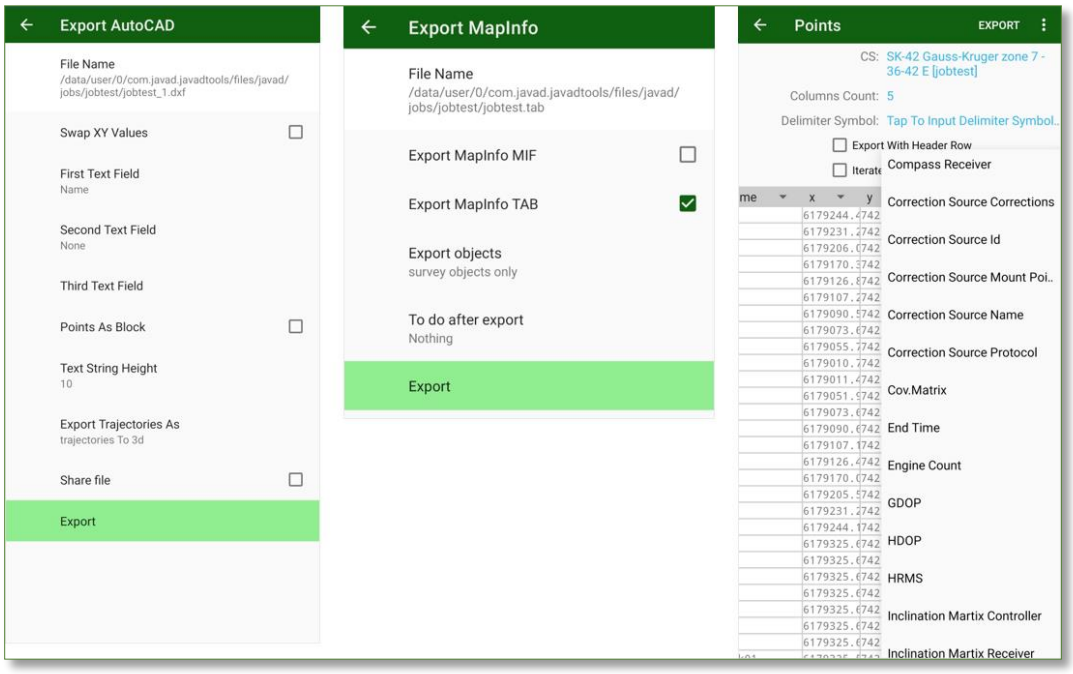


Figure 64: Export File Options

For custom text files, the user can define a format for export (number of columns, delimiter and columns with list headers). The coordinate system can be changed and JMT will recompute point coordinates prior to file export.

18.1. Job Exchange

The job exchange routine can be initiated via the share job item from the home menu or map screen. The user will then select a method to share a job (email, Skype, Dropbox, OneDrive, etc.).

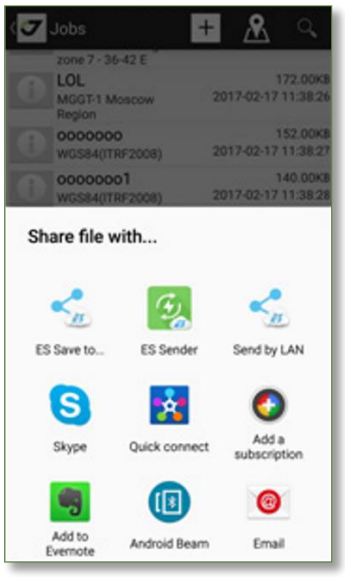


Figure 65: Job Exchange Sending Options

Job exchange between two android devices is possible given they are on the same network and JustinLink exchange is turned on for both (in Services dialog). The receiving android device uses the receive job item from the home menu or map screen. The receiving android will then see the available devices on the same network along with associated files.

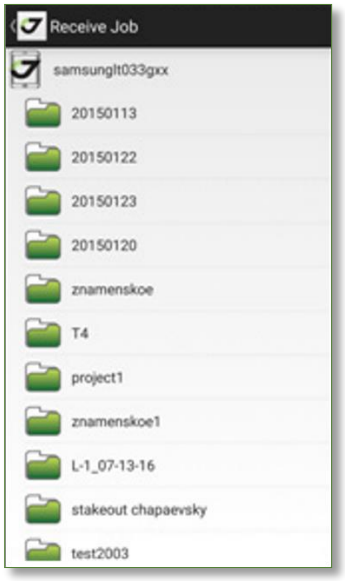


Figure 66: Job Exchange Receiving

Data exchange between android devices is further described in later sections.

18.2. Export CAD / GIS

Exporting .dxf formats allows for selection of labels for each point. Up to 2 labels can be added. X and Y coordinates may also be inversed.

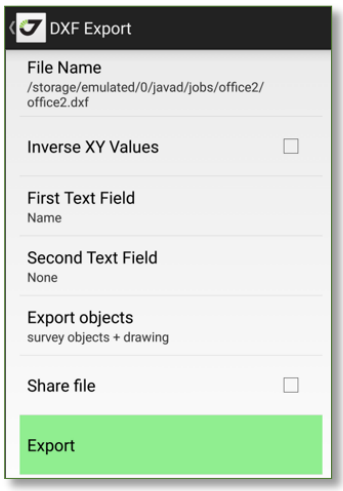


Figure 67: .DXF File Export Options

18.3. Export Report

Results from surveying may be exported in a custom format, such as a Word document. To initiate this routine, select the report option from the export item found in the home menu or map screen. Selecting Stimulsoft report template allows the user to create a custom report. This can be done via .rmt file or .json file. A custom .rmt file can be created and .json data used for a final report. JMT will process the data to generate the final report and convert it to a specified format (.pdf, Word, Excel, PowerPoint, etc.). This can be saved (default location is in the job folder).

18.4. Export to Total Station

Many survey tasks need to use a total station along with a GNSS receiver. Data can freely transmit to / from a total station via Bluetooth. The following data formats are supported:

- Leica .gsi
- Sokkia .sdr33
- Raw .rw5

Data may be exported to a total station by the following steps:

1. Select export type ‘to Total Station (*.gsi, *.sdr, *.rw5)
2. Select file format
3. Select ‘Export’ under ‘To do after report’.
4. Select ‘Send to Total Station’
5. Select ‘Export’

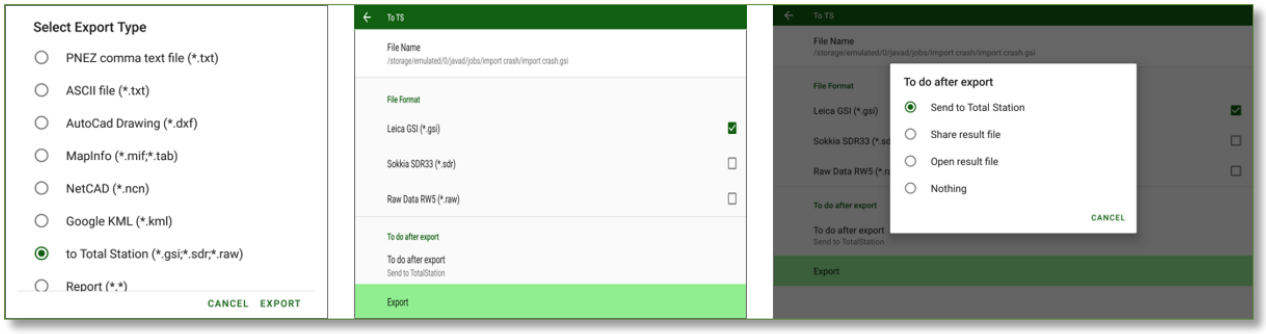


Figure 68: Export to Total Station

Alternatively, data can be transferred from Total Stations to JMT via USB Drive.

18.5. Data Exchange Between Android Devices

Jobs, points, survey settings, catalogs, correction sources, coordinate systems and files can be exchanged between android devices via the exchange item from the home menu or map screen.

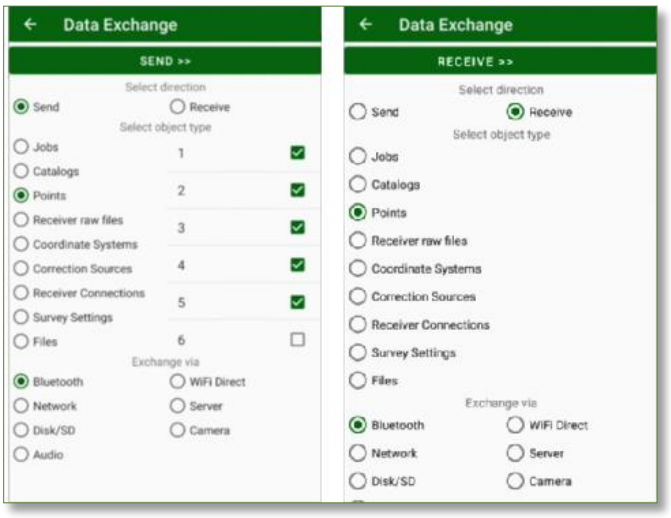


Figure 69: Data Exchange

18.5.1. Data Options

Sending options include:

- Jobs
- Catalogs
- Survey points
- Design point
- Receiver raw files
- Coordinate systems
- Correction sources
- Receiver connections
- Survey settings
- Files

18.5.2. Sending Methods

Sending methods for the data exchange include:

- Bluetooth
- WIFI direct
- Network exchange (devices in common network)
- Network server
- Disk or SD card
- QR-Code with camera
- Audio

Click on the send or receive button to activate the routine.

19. CoGo

Coordinate geometry (CoGo) can be performed in JMT. These allow for computations to produce and save new points or obtain values (distances, area, etc.).

Figure 70: CoGo Options

There are six groups of CoGo tasks with subroutines. These are shown below.

1. Base tasks
    - Direct
    - Inverse
    - Traverse
2. Offset tasks
    - General offset
    - Along-line offset
3. Intersection tasks
    - Distance – Distance intersection
    - Two-line intersections (by 4 points)
    - Diagonal intersection (by 4 points)
    - Three distances from three points intersection
    - Intersection of two perpendicular lines defined by three points
4. Stake tasks
5. Divide line tasks
    - Divide line with offsets
    - Stakeout curve
    - Three-point arc computation
    - Area / Perimeter / Volume
    - Area / Perimeter
    - Volume
    - Recompute area by moving hinge
    - Recompute area by moving edge
    - Compute parameters of a triangle

6. Several points tasks
    - Move point by dN, dE, dH
    - Move pints by distance and angle
    - Move pints by angle around a point
    - Compute average coordinates of set points
    - Compute isolines

When a CoGo task is selected a corresponding dialog appears. Point selections can be made by typing values or by pressing buttons. On the bottom of the screen is a create button for the computed point where the name may be entered.

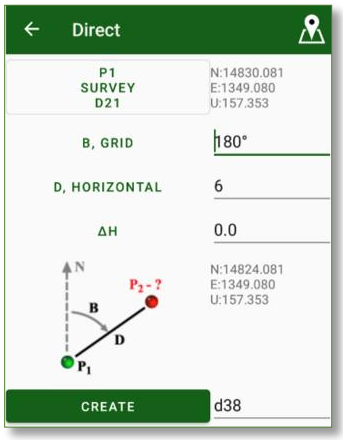


Figure 71: CoGo – Direct

The user may select the P1 button to select a point from list or map. Once the create button is pressed, the user may save the report to file.

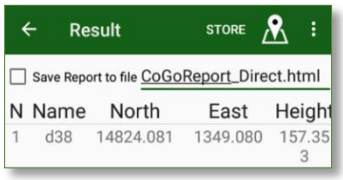


Figure 72: CoGo Point Creation

The user may press the icon to open the map with data. The user may press the 'STORE' button to create a new design point (or set of points) to complete the CoGo task.

20. Codes

Codes allow the user to share control points between jobs without typing them each time after a new job creation or without importing them from a file. To operate with control points, use the following dialog.

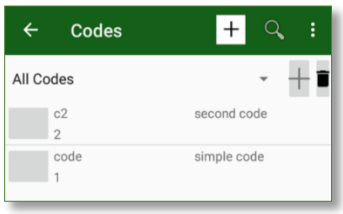


Figure 73: Codes

Add a new code by pressing the '+' button.

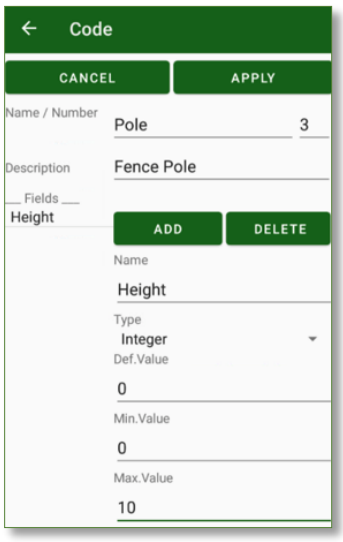


Figure 74: New Code

The new code screen allows the user to enter the name, description and number. Codes may have attributes (fields). To add a field, simply enter in the name, type, def. value and range values and click on the add button. A field can be of any of the following types:

- String
- Integer
- Number
- List

String values allow for the maximum length to be specified. Both integer and number types allow for the minimum and maximum lengths can be specified. The list type contains list values. Codes may have signs assigned. Signs can be custom and added to the javad/codesigns folder. It is suggested that the name of the sign be the same as the name of the code.

Codes may be imported / exported in several formats (illustrated below).

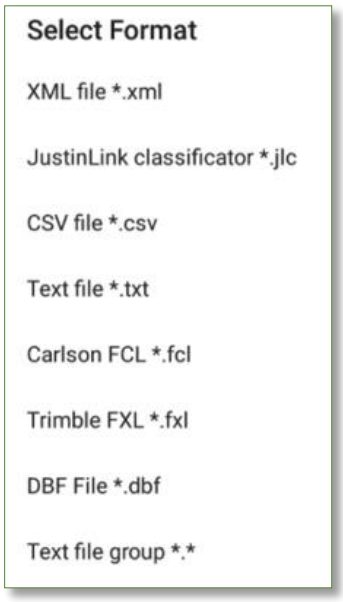


Figure 75: Code Import / Export Formats

Once a code is created, they can be assigned to surveying objects. Code controls may be turned on via the view code item from the organized view screen. The code may be selected by typing or via the code dialog.

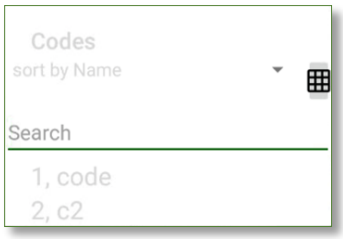


Figure 76: Code Dialog

Another way to select a code is via Grid control. This will show codes in a grid and selection is made by clicking the preferred grid item.

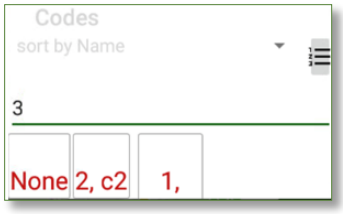


Figure 77: Code Grid

21. Compass and Level Calibration

The Triumph-3 GNSS receiver has an internal gyroscope and inclinometer, the Triumph-2 and Triumph-1M GNSS receivers have an internal compass and levels. These assist the user by showing direction and tilt correction. JMT software allow for calibration via the calibrate item, found in the home menu or map screen.

Figure 78: Calibration

The calibration screen shows the status of the compass and levels. It allows calibration of both the compass and levels and adjustment of the levels with offsets.

21.1. Compass Calibration

Initialize the compass calibration by pressing the 'Start Compass Calibration' button. The procedure request movement of the GNSS receiver in each axis (X, Y, Z) for one minute.

Figure 79: Compass Calibration

21.2. Levels Calibration

Initialize the levels calibration by pressing the ‘Start Levels Calibration’ button. The procedure requests the GNSS receiver to be placed on a flat and level surface. Follow the on-screen instructions to complete.

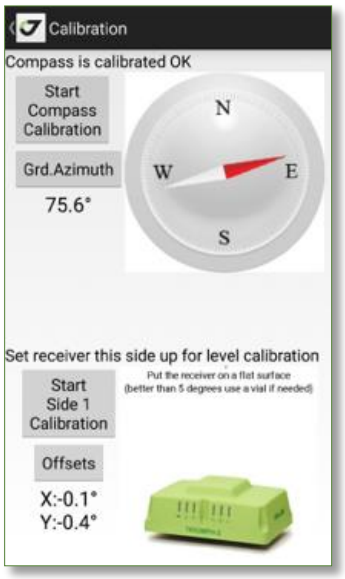


Figure 80: Levels Calibration

21.2.1. Removing Levels Offsets

Removing the levels offsets can be done by placing the GNSS receiver on a flat and level surface, tapping the ‘Offsets’ button and the levels will be set to zero.

21.3. Gyroscope Calibration

Initialize the gyroscope calibration via the calibration screen. Place the GNSS receiver on a flat and level surface and press the ‘Start Gyroscope Calibration’ button. Follow the on-screen instructions to complete. The process takes about a minute.

Figure 81: Gyroscope Calibration

22. J-Tip

JMT allows for use of the J-Tip accessory. J-Tip is a magnetic locator. The J-Tip screen on JMT produces a sound for searching magnetic marks. The first screen allows for a Bluetooth connection to the J-Tip accessory. After JMT connects, the next screen allows for gain and sensitivity controls for the J-Tip accessory.

23. Terminal Window

The terminal window allows for low-level commands to be directly sent to a SIGMA receiver with Quatro and Duo boards. The Terminal window is not available for other devices. The terminal window allows for extended control of the GNSS receiver by sending GREISS commands and receiving responses. The terminal can send script files and save the commands/responses to a log file.

Note: A detailed description of receiver commands is available here.

Figure 82: Terminal Window

24. Receiver Control

For low-level receiver actions (reset, factory defaults, update firmware, etc.), the control item found on the home menu or map screen can be utilized.

Figure 83: Receiver Control

This allows for:

- Clear NVRAM – to reset all nvram and reset all receiver settings to factory default.
- Clear File System – to reformat the file system and remove all receiver raw .jps files.
- Reset Receiver – to automatically turn off, then on the GNSS receiver.
- Save Receiver Settings – to save all receiver settings in a text file in a NetView file format.
- Restore Receiver Settings – to load a text file of receiver settings and apply.
- Update Firmware – to update firmware via the Internet or file.
- Update OAF – to update the GNSS receiver's authorization options via the Internet or file.

24.1. Update Receiver Firmware

The GNSS receiver's firmware may be updated via the Internet or file. Select update from the file item from the home menu or map screen and select the firmware file. If the selected file is newer than the one currently installed on the GNSS receiver, the file uploading will start.
To select a file via the Internet, go to the Javad website. There may be multiple firmware builds available, generalized by stable and latest. After the selected file is downloaded, the file uploading will start.

Figure 84: GNSS Receiver Firmware Update

24.2. Update GNSS Receiver Options (OAF)

A user with limited access to the full capabilities of the Javad GNSS receiver may need to update the OAF (options authorization file). By default, the GNSS receiver options are disabled and need activation. Activation is done via uploading an OAF file from a local dealer or the Internet. Tap the update from file button and select a. jpo or .opt file. The file name must correspond to the GNSS receiver identifier. Uploading the OAF via the Internet follows the same rules.
Tap the update from internet button to upload an options file from the Internet.

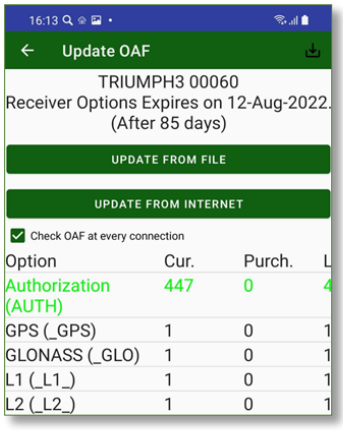


Figure 85: Update OAF

25. Services

There are several services which work in the background. They can be stopped or configured using the services item from the home menu or map screen.

25.1. JustinLink

The JustinLink service allows a PC with JustinLink installed to connect to the android device on the same WIFI network. The service may be augmented via the JustinLink Exchange tab.

Figure 86: Services – JustinLink

25.2. OPUS Mail Reader

This service is a mail service to read and import NGS OPUS responses from post-processing file uploads. The service may be augmented via the OPUS Mail Reader tab.

Figure 87: Services – OPUS

25.3. Mock Location

This service replaces the android device's position from the internal GNSS to that of the Javad GNSS receiver. This is much more accurate and precise than any android's internal position. The replaced position may be used for other android applications (CAD / GIS).

Figure 88: Services - Mock Location

26. Wizard

JMT software contains a wizard to familiarize the user with a GNSS receiver setup. The wizard will assist with the GNSS receiver setup in three categories:

- Post-processing data collection
- RTK survey
- RTK stakeout

Follow the on-screen instructions to complete any of these setups.

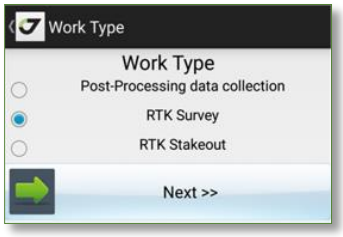


Figure 89: Wizard - Work Type

27. Debug

JMT allows for debugging logging for support purposes. The data may be raw data or JMT related debugging data. To turn on collecting raw data file with corrections from the RTK base, go to RTK rover->File logging and set the receiver file logging and store base corrections check marks. The file will begin data collection. To stop data logging, stop the rover and download the file to share with support.

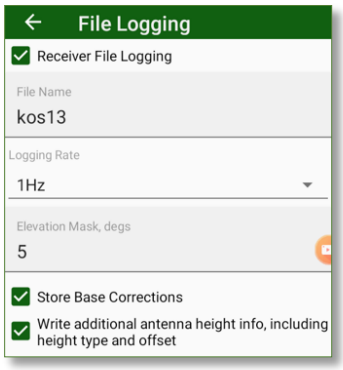


Figure 90: Debug Logging

Other JMT-related debugging information may also be logged. To activate logging, go to survey settings and set the 'Debug Survey' check mark. JMT starts logging a text debugging file in the job folder. The file is called 'debugsurvey.txt'. The file can then be shared with support and developers to find and fix issues seen by the user.

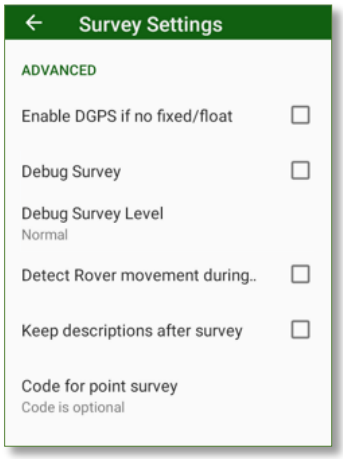


Figure 91: Debug Survey / Survey Level

All data may be logged for maximum support debug mode. This may be activated in settings. Go to the settings screen and enable all required check marks. Click start debug to start. To stop logging and send data, click stop debug and then send debug or the stop and send debug button. The files will be zipped and sent using another android app (email, Skype, instant messaging, etc.).

28. Startup Resets

If the user finds JMT consistently crashes at start-up, a reset is available. Hold volume down (or down arrow button for Victor-2) while JMT is starting. A reset menu will appear.

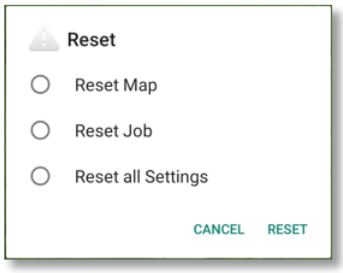


Figure 92: Startup Reset Screen

Reset Map – to reset the map of current job to Google or OSM map.
Reset Job – to reset current job to a new job.
Reset all Settings – to reset all settings to factory default.

Click ‘Reset’ to continue with the selected reset type or ‘Cancel’ to cancel the operation.

29. Dealer Map

If a user would like to find a dealer near the current location, JMT offers a Javad dealer map.

Figure 93: Dealer Map

30. User Manual

The JMT user manual (this document) may be downloaded to read on the android device. Use the user manual item from the home menu or map screen to download the manual to the android device. This manual will be stored on the android device for use at any time.

Figure 94: User Manual Download

31. JMT Exit

To exit JMT software use the turn off command from the home menu or map screen.

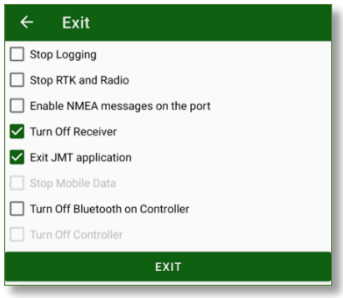


Figure 95: JMT Exit Options

- Stop Logging – to stop logging to the GNSS receiver and exit.
- Stop RTK and Radio – to power off the radios and switch the GNSS receiver from RTK mode and exit.
- Enable NMEA messages on the port – to enable NMEA messages to the connected port. This allows for the android device to use a 3rd party software running on NMEA data (GIS applications).
- Turn Off Receiver – to turn off the GNSS receiver and exit.
- Exit JMT application – to exit JMT software.
- Stop Mobile Data – to turn off mobile data (only available on the Nautiz X8 devices).
- Turn Off Bluetooth on Controller – to save power, JMT can turn off Bluetooth after use.
- Turn Off Controller – to power off (only available on the Nautiz X8 devices).