User Manual

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User Manual For Nuwa App

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Revision History

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1. Nuwa Brief Introduction

- Introduction
- Main Interface
- Installation

1.1 Introduction

Nuwa is a survey application software based on Android OS (Operating System), designed by and all rights reserved to Tersus Inc. Nuwa is simple, easy to use and has friendly UI (User Interface). It's designed to work with David GNSS receiver specifically, read <u>https://www.tersus-gnss.com/product/david-receiver</u> for more information about David GNSS Receiver.

Main features of Nuwa App:

- All the base/rover configuration can be completed by one click
- Supporting user-defined coordinate system
- Supporting several import/export file formats
- With Nuwa, a David receiver can work as a NTRIP server and upload RTK corrections in real time.
- Supporting text and graphics interface, providing a variety of options; with convenient data sharing capabilities;
- Support for new release detection and online upgrades.

1.2 Installation

Copy the .apk file to an Android device, click it to start installation. The Nuwa icon will be on the desktop after it is installed successfully.

1.3 Main Interface

Nuwa has four main functional groups: Project, Device, Survey and Tools.

While Nuwa is running, slide left or right on the screen to enter other functional groups.



Figure 1.1 Nuwa Main Interface

Status Bar

^{20180508_160037}]: Project Information, the current project is displayed.



]: Device information, click it to check more detail about the David connected.



]: Satellites status, N/A indicates Not Available, satellite positioning status includes: Single, Float and Fixed.



]: Connection status, can be Connect, Connecting or Disconnect.

Menu area

List all the menu items in the current functional group.

Tabs Bar

Four functional groups: Project, Device, Survey and Tools.

2. Project

- Project
- CRS (CooRdinate System)
- Parameters
- Point
- Line
- Import
- Export
- Settings

2.1 Project

This section is used to create a new project, open/delete/edit an existed project.

2.1.1 New

A new project is necessary to manage all the data. Click [Project] - > [New] to go to the following interface.



Figure 2.1 Create Project interface

Figure 2.2 New project created

[Project Name]: input the project name

- [Creator]: input the name of the operator
- [Project Template]: use an existed project settings
- [Coordinate System]: configure a new coordinate system

After a project is created, this project is displayed in the Current Project. Refer to section 2.1.4 for more details about project property.

2.1.2 Open

If there is need to operate in an existed project, find it in the project list and click it. Nuwa prompts to open the project, click [OK].



Figure 2.3 Open an existed project

2.1.3 Delete

Click [Multiselect] at the right side of Project List, select (single select, inverse select or select all) projects to be deleted. After the projects are selected, click [Delete] button to delete them. Nuwa prompts to confirm, click [OK] to complete the deletion.

Note: The current Project cannot be deleted in Nuwa app.



Figure 2.4 Delete Project

2.1.4 Edit Project Property

If a project is opened, the coordinate system can be edited, including ellipsoid, projection method and coordination transformation.

Click the [Current Project] to enter Project Property interface. Click [Edit] to input the ellipsoid parameters, projection type and coordination transformation, refer to section 2.2.2 for details.

← Project		← Project Prop	erty	← Project Pro	operty	
Current Project	20180720_171626 >	Coord System	Project Info	Coord System	Project Info	
Project List Multiselect		Coord System Name : WGS84 Ellipsoid : WGS 84 a : 6378137.0 1/6:00 057232562		Project Name:20180720_171626 Creator:test Creation date:2018-07-20 17:16:26 Storage path: //storage/emulated/0/		
WGS84 test	2018-07-20 17:16:26	Projection method : Trar False North(m) : 0.00000 False East(m) : 0.00000 Central Meridian(*) : 117 Origin Lat(*) : 0.000000 Use seven parameters : Dx(m) : 0.0000 R Dy(m) : 0.0000 R Scale(ppm) : 0.0000000 Use four parameters : N dDX(m) : 0.0000 Rotation Angle : 0.000000 Scale : 1.00000000	nsverse_Mercator 0 2.000000000 00 00 No x(s) : 0.000000 y(s) : 0.000000 z(s) : 0.000000 0 0	Project Par	TersusSurvey/ //20180720_171626/2018 0720_171626.tw ameter QRcode	
Nev	N	Ed	lit	s	hare	
Figure 2.5 Pr	oject List	Figure 2.6 Pr	roject Property	Figure 2.7	Share Project	

Click [Share] to share the project parameters with others.

Figure 2.6 Project Property Figure 2.7 Share Project

Info

2.2 CRS (CooRdinate System)

Nuwa app supports user-defined coordinate system. A user-defined coordinate system can be saved as a template. A CRS can be created, edited and deleted in the CRS management interface.

2.2.1 New CRS

When a new CRS is created, input the coordinate system name, select the right ellipsoid, the projection type and CRS transformation type, refer to the following screenshots:

← Create Coo	ordinate Syst 🚍
Coord System	Input
Ellipsoid	WGS 84>
Projection Type	Transverse_Mercator>
Seven Parameter	
Four Parameter	
Height Fitting	
	ок

Figure 2.8 Create a new CRS

Figure 2.9 Ellipsoid list

[Ellipsoid]: Select the correct ellipsoid parameters, including ellipsoid name, semi-major axis, inverse flattening, etc. There is no need to configure semi-major axis, inverse flattening by further steps.

Note: The default ellipsoid is WGS84

[Projection Type]: Including transverse Mercator projection, UTM projection, Lambert conformal conic projection 1SP, Lambert conformal conic projection 2SP, and etc. Origin latitude, central meridian and other parameters can also be configured in Projection interface.

[Seven Parameter]: Datum transformation is necessary when the source ellipsoid is different from the target ellipsoid. Axis shift, rotation and scale would be introduced in the datum transformation. Bursa-wolf seven-parameter model is used by Nuwa for datum transformation. At least three known points are necessary for accurate transformation. Only X/Y/Z shifts are required if low accuracy transformation is needed, other parameters can adopt the default values.

[Four Parameter]: For the transformation between two planes. X/Y axis shift, rotation and scale are necessary to be input.

[Height Fitting]: currently three algorithms are supported: fixed difference correction, plane fitting and surface fitting.

Click the corresponding items to complete the configuration, refer to the following three screenshots:

← Seven Para	ameter	← Four Para	meter		← ⊦	leight Fitting
Dx(m)	0.000000	dDX(m)		0.0000	A0	0.0
Dy(m)	0.000000	dDY(m)		0.0000	A1	0.0
Dz(m)	0.000000	Rotation Angle	0.0000	000000	A2	0.0
Rx(s)	0.000000	Scale	1.0000	000000	A3	0.0
Rv(s)	0 00000				A4	0.0
Br(c)	0.000000				A5	0.0
RZ(S)	0.00000					
Scale(ppm)	0.0000000000					
	ок		ок			ок
Figure 2.10 S	even Parameter	Figure	2.11	Four	Figu	re 2.12 Height Fitting

- 16 -

Parameter

2.2.2 Edit CRS

Click an existed CRS to enter the Edit Coordinate System interface, refer to the following screenshot:

← Edit Coordir	nate System
Coord System	WGS84
Ellipsoid	WGS 84>
Projection Type	Transverse_Mercator>
Seven Parameter	\rightarrow
Four Parameter	> 🔵
Height Fitting	> ())
C	ок

Figure 2.13 Edit Coordinate System

2.2.3 Delete CRS

The current CRS cannot be deleted. Click [Multiselect] to select the CRS to be deleted and click [Delete] to finish the deletion.

\leftarrow Coordinate System	
Coord System List	Cancel
WGS84.csd	~
BJ54.csd	



Figure 2.14 Delete CRS

2.3 Parameters

Seven Parameter and Three Parameter methods are introduced in this section.

Seven Parameter: this method can cover long distance range, generally more than 50 km.

At least three known points are required in local datum and in WGS-84 system before calculating.

Three Parameter: at least one known point is required. This method can cover short distance range; the accuracy is determined by working area and decreased with the distance.

The following is an example of Seven Parameter. Click [Project] -> [Parameters] to enter the following interfaces.

- Pa	arameters Calcula	tion	← Add Poi	nt
alculate	Type Seve	en parameter 🗦	Source Coord	
covon rofor		at least 2	Point Name	Point1 💡
oints*	ence calculation requires		Lat(°)	31.11366366
) features		Multiselect	Lon(°)	121.41802714
Id	Source Coord	larget Coo	Height(m)	33.
			Target Coord	
			Point Name	CPT3
			N(m)	3443651.4
			E(m)	39876.1
			h(m)	33.
Add	Edit	Calculate		ок

Figure 2.15 Parameters Calculation

Figure 2.16 Add Point for calculation

Select seven parameter for Calculate Type, click [Add] on the bottom left to input the known points. For the Source Coordinate, input Latitude, Longitude and Height by manual input, collected from a David receiver or selected from the control point list. For the Target Coordinate, input the local values from manual input or selected from the control point list.

Manual input

Input the point position according to the format required. The latitude/longitude format can be changed by clicking the U icon on the right.

Control Point

Click [ⁱ⁼] to load control points. Control points can be added by clicking [Add] in the Control Point interface.

Smooth Acquisition

Click [💡] to start smooth acquisition through David receiver.

After points are added, click [Calculate] on the bottom right to do the parameter transformation. The result is shown as below screenshot:

← Result:	
Dx(m)	-30.007731
Dy(m)	-43.482974
Dz(m)	-70.657506
Rx(s)	-1.266068
Ry(s)	-2.440565
Rz(s)	1.498273
Scale(ppm)	3.6787135455
Max.HRMS	1.5829 NO.: 3
Cancel	Apply

Figure 2.17 Parameters Calculation Result interface

2.4 Point

Point library includes survey point library, control point library and stakeout point library. Points can be added into a library. Editing, searching and checking detail information can be done under this Point interface.

A point can be imported into the control point library or the stakeout point library. In the point library interface, slide in the left or right direction to check the point information, such as coordinates, collection time, and etc.

← Poi	nt	Q
Survey Poin	Control Point	Stakeout Point
6 features		Multiselect
id	х	Y
1	/	/
2	/	/
3	3452237.3341	56539.6
4	3452237.3314	56539.6
5	3452237.3345	56539.6
6	3452237.3342	56539.6
Add	Edit	Detail

Figure 2.18 Point Interface

Control point library are used as examples in the sections below:

2.4.1 Add Point

Under the Control Point interface, click [Add] to enter the Add Control Point interface. Choose the coordinate type, input the point name and the coordinate values, or click the upper right III icon to import the survey point directly.

← F	Point		Q	← Add	Control P	oint	:=	← s	urvey Poi	nt	
Survey Pe	oint Contro	ol Point Stake	out Point	Pt			Input	6 features			Multiselect
3 features		Mu	ultiselect					id	Pt	Point Type	e Code
id	Pt	x		Coord Type			NEH >	1	Base_0	Base	
1	TRSA	3452237.32	289	N(m)			Input	2	Base_1	Base	
2	TRSB	3452236.39	975	E(m)			Input	3	PT1	Detail	
3	TRSC	3452236.87	704					4	PT2	Detail	
				h(m)			Input	5	PT3	Detail	
								6	PT4	Detail	
Add	E	dit Imp	port	_	ОК			Add	Edit	Detail	Select
Figure	2.19	Control	Point	Figure	2.20	Add	Control	Figure	2.21	Import	Survey
interfac	e			Point				Point			

2.4.2 Search Point

← Р	oint	С	< ←	Point Query	
Survey Po	oint Control	Point Stakeout Point	Targe	t Points S	Survey Points
3 features		Multisele	ct Query	Condition	
id	Pt	Х		Point Type	Detail
1	TRSA	3452237.3289		D4	Immunt
2	TRSB	3452236.3975		Pt	Input
3	TRSC	3452236.8704		Code	Input
				Base	Input
				Start Time	
				Ston Time	
Add	Ed	it Import	Sel	ect All Inverse	ок

Figure 2.22 Control Point interface

Figure 2.23 Point Query interface

Click the up-right I icon to enter Point Query interface which is shown in the Figure 2.23 above. Target Points can be survey points, control points or stakeout points. Query

condition details are as follows:

[Point Type]: Detail, continuous, input point, calculate or base.

[Pt]: Point name to be queried.

[Code]: Code number.

[Base]: The name of the base.

[Start/Stop Time]: Start and stop time of the points

Click [OK] to search all the points meeting the query conditions.

2.4.3 Edit Point

Choose the points to be edited, and click [Edit] to enter the Edit interface.

Note: There is an exception that in the Survey Point tab, only the code info can be edited apart from the manual input points.

← P	oint		Q	,
Survey Po	int Control	Point	Stakeout Point	
3 features			Multiseleo	ct
id	Pt		х	
1	TRSA	3452	2237.3289	
2	TRSB	3452	2236.3975	
3	TRSC	3452	2236.8704	
Add	Edi	it	Import	

Figure 2.24 Control Point interface

÷	Edit Control Poin	t 🎛
Pt		TRSA
Coord	Туре	NEH >
N(m)		3452237.3289
E(m)		253647.8
h(m)		23.85
	ок	

Figure 2.25 Edit Control Point interface

2.4.4 Import Point

Click [Import] at the bottom right corner, select a customized format in the pop-up list, thereafter select file format and file path to import points.

← Р	oint	С	۹ ج	Import Data		← Import Da	ta
Survey Po	oint Contro	DI Point Stakeout Poin	t Ty	Name, N. E. H		Туре	Point >
3 features		Multisele	ect	Norra Orda N. E. U.		Target Point	Control Point
id	Pt	x	18	Name, Code, N, E, H	0	Target Fonit	control i onte >
1	TRSA	3452237.3289	Fil	Name, B, L, H	\circ	File Format	Name, N, E, H $>$
2	TDOR	3452236 3075	_	Name, Code, B, L, H	0	File Deth	
	TROB	0402200.0570		Name N E H			
3	TRSC	3452236.8704		Name Code N E H			
			- 1	Name B L H	0		
			- 1	Name Code B L H	0		
				CASS	0		
Add	E	dit Import		Import		I	mport
Figure	2.26	Control Po	pint	Figure 2.27 Fo	rmat list	Figure 2.28	Import Data info

interface

2.4.5 Delete Point

Click [Multiselect] in the point interface to enter the following interface. Select the points to be deleted and click [Delete] to complete the deletion.

← Р	C	2		
Survey Po	int Control	Point	Stakeout Poin	t
1 features			Cano	cel
id	Pt		х	
□ 1	TRSA	345	2237.3289	
Select	All Inve	rse	Delete	

Figure 2.29 Delete Point interface

2.5 Line

New lines can be added, existed lines can be searched, edited and deleted.

2.5.1 Add Line

Click [Project] - > [Line] to enter the line interface. Click [Add] to enter the following two interface for Add Line

← Line Q	← Add Line	← Add Line
0 features Multiselect	Line Type Line >	Line Type Line >
Name Start Point End Point Length	Method Two point form >	Method One point + Azimuth + Distance >
	Name Line0	Name Line0
	Start Point	Start Point
	End Point	Start Mileage Input
	Start Mileage Input	Length(m) Input
	Describe	Azimuth(d) Input
		Describe
Add Detail	ОК	ок
Figure 2.30 Line interface	Figure 2.31 Add Line method	Figure 2.32 Add Line
-	1	method 2

Two methods are used to add a line: Two Points and One point + Azimuth +Distance.

• Two Points:

Input the name of the line, then click \coloneqq to import the start point and end point.

• One point + Azimuth + Distance

Input the name of the line, then click \equiv to import the start point from a point library. Input the other information for the line.

2.5.2 Search Line

Click the **Q** icon at the up-right corner, the line query interface is shown as below. Input the search items and tick the item, click [OK] to search the line.

User	Manual	for	Nuwa	App	V1.0
------	--------	-----	------	-----	------

÷	Line Query	y	
Que	ry Condition		
	Name		Input
	Start Point		Input
	End Point		Input
	Lawath	0.0	0.0
	Length	0.0	0.0
_			
		ОК	

Figure 2.33 Line Query interface

2.5.3 Edit Line

In the Line interface, select the line to be edited. Then click [Detail] to enter the edit page, more details about edit refer to section 2.5.1 Add Line.

← Lir	пе		Q	÷	Line Detail	
1 features			Multiselect	Line	Гуре	Line >
Name	Start Point	End Point	Length			
Line0	111	26	11.3137	Meth	od	Two point form $>$
				Name	e	Line0
				Start	Point	111
				End F	Point	26
				Start	Mileage	0.0
				Descr	ibe	
A	dd	Det	tail			ок



Figure 2.35 Line Detail interface

2.5.4 Delete Line

In the Line interface, click [Multiselect] to enter the following interface. Tick the line to be deleted, then click [Delete] to complete deletion.



Figure 2.36 Line interface

Figure 2.37 Tick the line to be deleted

2.6 Import

There are two types of import: Coordinate Import and Other Import. Coordinate import is to import files with .csv and .dat format. Other Import is to import files with .dxf and .shp format. Currently .dxf and .shp files are not supported.

2.6.1 Coordinate Import

Under the Coordinate Import interface, select Type, Target Point library to be added, Data Format, File Format and the file path where the file is located, click [Import] to complete the import.

← Import			← Imp	ort			← Im	port		
Coord Import	Other	Import	Coord Im	nport	Other In	nport	Coord I	mport	Other Im	port
Туре		Point >	Туре			Point >	Туре			Point >
Target Point	Cor	ntrol Point 🗧	Target Point	t	Contr	ol Point >	Target Poi	nt	Contro	l Point >
Data Format	Name ,	Ν,Ε,Η >	Data Format		Name . N	. F. H >	Fil	Point		•
File Format		.csv >	Fi			○ >	Fi Stakeo	ut Point		0
-ile Path			File Path							Ì
Imp	port			Impo	rt			Imp	port	
igule 2.36 ili	nport ii	lienace	Figure	3 2.39 1	mpon	туре	Library	2.40	Target	FUI
← Import			← Imp	ort			← Im	port		
			Coord In	nport	Other In	nport	Coord II	mport	Other Impo	rt
Name, N, E, H			Туре			Point >	Туре			Line >
Name, Code, N,	Е, Н		Target Point	t	Contr	ol Point >	File Format	t		.Inb >
Name, Code, B. I	L. H		Data Format	,	Name - N	. F. H. >	File Path			
Name N F H	L, II		.csv			۲				
Name Code N E H			.dat		_	0				
Name B L H			File Path							
Name Code B L H		0								
CASS		0								
Imp	port			Impo	rt			Impo	ort	
gure 2.41	Data	Format	Figure	2.42	File	Format	Figure	2.43	Import	Lir
otions			options				interfac	е		

2.6.2 Other Import

Under the Other Import interface, select the file type and the file path, click [Import] to import the file. Currently this function is not support and is to be developed.

← Import	
Coord Import	Other Import
File Type	dxf $>$
File Path	
In	nport

Figure 2.44 Other Import interface

← Import	
Coord Import	Other Import
File Type	dxf >
File Path	
dxf	•
shp	0
Imp	port

Figure 2.45 File Type for other import

2.7 Export

Correspondingly there are two types of export: Coordinate Export and Other Export. Coordinate Export is to export .csv files, Other Export is to export files with .kml, .shp and .dxf format.

2.7.1 Coordinate Export

Under the Coordinate Export interface, select Point Type, Date range and Data Format, ensure the File Name and Storage Path is correct, thereafter click [Export] to complete the export. For Data Format, there is a list of options provided to select, and a user-defined format can be created.

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← Export	← Export		← User defin	e
Coord Export Other Export	Name , N , E , H	۲	Name	Input
Point Type	Pc Name , Code , N , E , H	0	Separator	Comma(,) 🚿
Input Control Stakeout	Name, B, L, H	0	Option	Selected
Date	Da Name , Code , B , L , H	0	Name	
	Name N E H	0	Code	>
Data Format Name N. E. H.)	Name Code N E H	0	Ν	<
	Name B L H	0	E	
File Name Export_20180807102229.csv	Name Code B L H	0	h	
Storage Path	SI CASS	0		
Projects/20180803_142251/Export	Pri User defined		Preview	
Export	Export			ок
igure 2.46 Export Interface	Figure 2.47 Data	Format	Figure 2.48	User defin
	options		data	

2.7.2 Other Export

Under the Other Export interface, file format can be KML, SHP or DXF. Type in the export file name and click [Export] to complete the file export.

← Ехро	rt	
Coord Exp	ort	Other Export
File Format		KML
File Name	Expor	t_20180807102229
Storage Path		
/storage/emulate Projects/201808	ed/0/Tersu: 03_142251	sSurvey/ /Export
	Exp	ort





2.8 Settings

Settings interface is shown as below, the function descriptions is as follows.

← Settings	
Coord Display	Degree(DD.DDDDDDDD) >
Length Unit	m >
Area Unit	Square.M >
Normally On	\bigcirc
Update Detection	
Version	1.0.2.3
Zone	(UTC+08:00) >
Language	English $>$
Location Sharing	\bigcirc

Figure 2.51 Settings interface

[Coord Display]: can be selected from degree (DD.DDDDDDDD), DM (DD:MM.MMMM)

or DMS (DD:MM:SS.SS).

[Length Unit]: can be selected from Km, meter, Inch or Feet.

[Area Unit]: can be selected from Mu, Square Km, Square Meter, Hectare and Acre.

[Normally On]: the screen would be always on if it is enabled.

[Update Detection]: Auto update detection is on if it is enabled.

[Version]: the current version of the Nuwa app.

[Zone]: select the time zone according to the current position.

[Language]: support Auto, Chinese, English, French, Spanish, German, Portuguese,

Italian, Russian, Japanese, Korean, Malay, Arabic, Thai, and Turkish.

[Location Sharing]: the location would be shared with other apps if it is enabled.

3. Device

- Connect
- Data Terminal
- Base
- Rover
- Device Info
- Demo

3.1 Connect

There are two ways to enter the Connect interface: Click [Device] -> [Connect] or click

[on the up right corner in the status bar. Screenshots and descriptions are as follows.



Figure 3.1 Device functional group

Figure 3.2 Connect interface

[Device Type]: can be selected from David or NeoRTK2¹.

[Connect Type]: can be selected from USB or Bluetooth

[Connect Config]: shows the device name to be connected

[Ant type]: can be selected from the antenna list, the default is AX3702 (HG). An antenna with user-defined parameters can be used.

Note 1: currently only David is supported. Check with Tersus technical support if more details are needed.

3.2 Data Terminal

In the data terminal interface, the output loggings can be monitored. The data is output in hex format. Click [Paused] to pause the output logging. Click [Clear] to clear the screen. The data can be saved in a txt file. Click [Commands] to output common NMEA loggings.

← Data Terminal	\leftarrow Common Command				
11.518,M,,*53	Common Com	mand			
\$GPVTG,0.000,T,0.000,M,0.008,N, 0.014,K,A*2E	Common Com	manu			
\$GPGGA,081744.00,3111.4255792,N,	GPGGA	GPRMC	GPZDA		
12135.5912693,E,1,28,0.6,30.442,M, 11.518,M,,*5C	GPGST	GPGSA	GPGSV		
\$GPVTG,0.000,T,0.000,M,0.006,N, 0.011,K,A*25	GPVTG	GPHDT	GPNTR		
\$GPGGA,081745.00,3111.4255821,N, 12135.5912666,E,1,28,0.6,30.415,M, 11.518,M,,*52					
\$GPVTG,0.000,T,0.000,M,0.025,N, 0.046,K,A*26					
\$GPGGA,081746.00,3111.4255856,N, 12135.5912661,E,1,28,0.6,30.385,M, 11.518,M,,*58					
Hex Paused Log Clear					
log gpgga ontime 1;log gpvtg ontime 1;					
Commands Send		ок			

Figure 3.3 Data Terminal interface

Figure 3.4 Common Command

3.3 Base

Four default base configurations are provided as in the base main interface. Click [New] to create a new base configuration. Select a configuration file in the Work Mode List and click [Detail] to edit the base configuration. Click [Start] to complete the base configuration.

	← Base		← Create Base	Config	
w	ork Mode List	Multiselect	Startup	Auto start 🗦	
D N	efault:Auto Startup+PDA etwork+Default Server1+RT	CM32	Data Link	Radio >	
D N	efault:Auto Startup+PDA etwork+Default Server2+RT	CM32	Baud Rate	38400 >	
D S	efault:Auto tartup+Ext.Radio+38400+RT	CM32	Differential Format	RTCM3.2 >	
D S	efault:Manual tartup+Ext.Radio+38400+RT	CM32			
	New Detail	Start	0	к	
	Figure 3.5 Base ir	nterface	Figure 3.6 Crea	ate Base Conf	ouration
← Create	Base Config	← Create Ba	se Config	← Create Ba	se Config
Startup	Auto start >	Startup	Manual start 🗦	Startup	Manual start $>$
Data Link	Network >	Base Coordniate	♀ ≔	Base Coordniate	♀ ∷
		Lat(°)	0.00000000	Lat(°)	p.00000000 U
Host	Input IP	Lon(°)	0.00000000 U	Lon(°)	0.00000000 U
Password	Input	Height(m)	0.000	Height(m)	0.000
Mount Point	Input	BLH(WGS84)	O NEH(Local)	BLH(WGS84)	O NEH(Local)
Differential For	mat RTCM3.2 >	Ant Height(m)	Pole 0.0 >	Ant Height(m)	Pole 0.0 >
		Data Link	Radio >	Data Link	Network >
					OK
	UK		UK		
Figure 3.7	Auto start -	Figure 3.8 M	anual start -	Figure 3.9 Mai	nual Start -

Network

The base configuration includes: startup mode, data link, antenna height, differential format and differential format. The details are described as below:

Network

Radio

[Startup]: auto start or manual start

> Auto start: the position of the base is achieved automatically.

Manual start: position points are achieved by averaging collection, loaded from a point library or input manually.

[Ant Height]: antenna type is vertical, slant or pole, antenna height is input manually. [Data Link]: radio or network

- Radio: the corrections are output / input to / from an external radio, baud rate should be selected accordingly.
- Network: the corrections are uploaded / downloaded to / from a NTRIP host. The IP address, port, password and mount point of the host should be input manually.

[Differential Format]: CMR, CMR+, RTCM2.3 and RTCM3.2 are supported.

3.4 Rover

Three default rover configurations are provided in the Rover main interface. Click [New] to create a new configuration. Select a configuration file in the Work Mode List and click [Detail] to edit the rover configuration. Click [Start] to complete the rover configuration.

← Rover	← Create Rover Confi	g	← Create Rov	ver Config
Work Mode List Multiselect	Data Link	Radio >	Data Link	Network >
Default:Ext.Radio+38400				
Default:PDA Network+Default Server1	Baud Rate	38400 >	Protocol Type	Ntrip >
Default:PDA Network+Default Server2			Host	nput IP
			Port	Input
			Username	Input
			Password	Input
			Mount Point	Ipdate SourceTable
			Is VRS	
New Detail Start	ок			ок
Figure 3.10 Rover interface	Figure 3.11 Create	e Rover	Figure 3.12	2 Create Rover
	Configuration -	Radio	Configura	tion - Network

3.5 Device Info

Under the Device functional group, click [Device Info] to check the detailed information about the device connected. Click [Reset] or [Register] to complete related operations

← Device Info			
Device Info			
Туре		David	
SN	(008001174910000170	
Version		0020	
Battery		N/A	
Mode		General	
Register Info	Register Info		
Register State	Effective registration		
Expired Date	0		
FilePath	/storage/emulated/0/ TersusSurvey		
4229748B9D36BD6197823C06CE3200			
Reset Register		Register	

Figure 3.13 Device Info interface

3.6 Demo

This module is to be developed.

4. Survey

- Point Survey
- Point Stakeout
- Line Stakeout
- Static Survey
- Point Correction
- Survey Config
- Base Shift

4.1 Point Survey

The main interface of Point Survey includes: status bar, background map, tools and information.



÷	Point S	urvey	Drawing	Config	Connected
Satellite ¹	7 🕉	Fixed n l	⊘ Netwo _ink1s	rk 🖸 Bat	⊃ N/A tery
E(m) N(m) h(m)	56538. 345223 37.267	9848 86.390	5		
Point T	уре			D	etail >
Point N	lame			PT	1001
Code					>
Ant Hei	ight(m)			Sla	nt 3.0>
State					
Poi	nts	Smo	oth	Surv	rey

....

Figure 4.1 Point Survey – Drawing mode

Figure 4.2 Point Survey – Text mode

Status Bar

[**I** the main interface is shown in text mode or drawing mode, click this icon to switch between the two modes.



]: Survey Configuration, refer to section 4.6 for more details.



]: connection status with a David receiver, refer to Connect for more details.

Satellite^{1,10}]: number of satellite traced, e.g., 29 means 29 satellites are tracked, and

1.10 indicates the PDOP value.



]: satellite position type, includes Single, Float and Fixed.

[Link13]: the upper right word indicates the data link type: radio or network; the lower right time is the latency of the data link.

Battery N/A]: indicates the remaining battery power of David receiver.

Background Map \triangleright

[=]: edit the survey point library.

[^{III}]: click it to switch among none, OSM online map and Google online map.

[+]: zoom in the map.

[=]: zoom out the map.

[]: zoom with the current location at the center.

- [¹]: place all the points in one view.
- \geq Tools

After survey points are collected, information in blue color is displayed at the up left corner. There are two methods to collect survey points:

[]: Auto collect, refer to section 4.6.1 Comm Config for more details.

[[©]]: Manual collect

\triangleright Information Bar

Six information items are displayed, each can be chosen from the 18 items in the following screenshots.



Figure 4.3 Information option list – part 1

4	Solution	0	nnect
Sat	Satellite	\bigcirc	/A
	Time	\bigcirc	
	Speed	\bigcirc	H
	Azimuth	\bigcirc	9
	Ant.H	\bigcirc	
1	RMS	\bigcirc	
-	HRMS	\bigcirc	
*	VRMS	\bigcirc	>
	PDOP	\bigcirc	
No	HDOP	\bigcirc	
HF	VDOP	\bigcirc	4>

Figure 4.4 Information option list - part 2

4.2 Point Stakeout



Figure 4.5 Point Stakeout interface

The above screenshot is the main interface of point stakeout, which is similar to that of point survey. The main steps are as follows:

- Add stakeout point: click rote to enter the stakeout point library, refer to section 2.4 for point library management.
- > Select the point to be stakeout: select the point, then click [Select].
- > The offset between the current point and the target point is displayed on the screen.

The arrow icons 1 and 1 are used to browse the stakeout points in the library.

4.3 Line Stakeout



Figure 4.6 Line Stakeout interface

The above screenshot is the main interface of line stakeout, which is similar to that of point survey. The main steps are as follows:

- Click to enter line stakeout library. Refer to section 0 for editing line library.
- Select the stakeout line, click [Select].
- > The offset between the current point and the target point is displayed on the screen.

The arrow icons 1 and 4 are used to browse the stakeout lines in the library.

4.4 Static Survey

÷	Static Survey	
Interva	al	1HZ >
Cutoff	Angle(°)	5
Ant typ	De	AX3702
Туре	Overtical	●Slant ○Pole
Ant He	eight(m)	1.620
🔽 Sta	rt static survey when th	e device is powered on.
	Start	

Figure 4.7 Static Survey interface

Figure 4.8 Static data recording

[Interval]: selected from 20HZ, 10HZ, 5HZ, 1HZ, etc. The max rate is determined by the device connected.

[Cutoff Angle]: the cut off angle.

[Ant Type]: the antenna type.

[Type]: selected from vertical, slant or pole.

[Ant Height]: the height of the antenna.

After all the parameters are confirmed, click [Start] to start data collection.

4.5 Point Correction

The point correction is to find the mathematical conversion relationship (transition parameter) between WGS-84 and the local plane Cartesian coordinate system. There are three calculation types: four-parameter, height-fitting, and four-parameter + height-fitting.

There are three methods for height-fitting: fixed difference correction, plane fitting and surface fitting.

4.5.1 Four Parameter

At least two paired points are needed for Four Parameter type. Click [Add] to input the original coordinate values and the target coordinate values. Refer to section 2.4 about how to add points in the library.

4.5.2 Height Fitting

The number of points is different when different height fitting methods are used, the details are as follows:

Fixed Difference Correction: at least one paired point is needed.

Plane Fitting: at least three paired points are needed.

Surface Fitting: at least six paired points are needed.

Refer to section 2.4 about how to add points in the library.

4.5.3 Four Parameter + Height Fitting

The number of points is different when different height fitting methods are used, the details are as follows:

Fixed Difference Correction: at least two paired points for local parameter calculation and one paired point for fixed difference are needed.

Plane Fitting: at least two paired points for local parameter calculation and three paired points for plane fitting are needed.

Surface Fitting: at least two paired points for local parameter calculation and six paired points for surface fitting are needed.

Refer to section 2.4 about how to add points in the library.

4.6 Survey Config

During data collection, restrictions are given to solution type and HRMS limits, hence only the data meeting the restrictions can be saved. More details are as follows:

4.6.1 Comm Config

← Survey Con	fig	
Common Config	Disp	lay Config
Solution Limited		Single $>$
HRMS Limited		0.04
VRMS Limited		1.0
Base Move		1.0
Auto Collect	Time	Distance
Time Interval(s)		1
Smooth Epochs		2 >
Survey prompt tone		
Stakeout prompt ton	e	

Figure 4.9 Survey Config – Common Config

[Solution Limited]: includes Single, DGPS, SBAS, Float and Fixed. The solution accuracy (from high to low) is: Fixed > Float > SBAS > DGPS > Single.

[HRMS Limited]: horizontal RMS limit. Data would not be collected if its HRMS is greater than this limit.

[VRMS Limited]: vertical RMS limit. Data would not be collected if its VRMS is greater than this limit.

[Base Move]: If the base moves over this limit, the data collection would not be finished.

[Auto Collect]: data can be collected according to Time or Distance.

If Time is selected, ensure to input the time interval.

If Distance is selected, ensure to input the distance interval.

[Smooth Epochs]: smooth epoch can be 2, 3, 5 or 10 seconds.

[Survey Prompt Tone]: can be enable or disabled.

[Stakeout Prompt Tone]: can be enable or disabled.

[Stakeout Prompt Type]: can be North and South direction or Forward and Backward.

[Ant Type]: Antenna parameters.

[Type]: height type, can be vertical, slant or pole.

[Ant Height]: value of the antenna height.

4.6.2 Display Config



Select the Display Point Type and Display Point Name according to the application. Select Survey Point Number: more than 3000 or under 3000. Click [Survey Point Color] to select a color on the outer ring for the survey points and click the inner pie to confirm the color. Click [Advance] to filter the displayed points.

4.7 Base Shift

When the base is moved or re-configured in auto start mode, base shift should be done to ensure the points collected after the base is moved have the same accuracy as those points before the base is moved. The steps are as follows: Click [Base Shift] to enter the following interface, click the list icon on the right of GNSS

Point and Known Point to select a known point. The base shift is calculated automatically.

The shift is applied to all the points to be surveyed.

÷	Base Shift			
Select	Point			
GNSS F	Point	≣		
Known	Point	:≡		
Result				
Base	Base			
N shift				
E shift				
h shift				
	Calculate			

Figure 4.13 Base Shift interface

5. Tools

- Area Perimeter
- Distance Calculation
- Offset Point
- Rotation Point
- Two Points Intersection
- Four Points Intersection
- Azimuth
- Intersection Angle

5.1 Area Perimeter

This tool is used to calculate area and perimeter. The points can be imported from the point library by clicking the list icon on the upper right corner. The unit is meter for perimeter and square meter for area.

← Area Perimeter 📰		
Coord List	Multiselect	
id	Point Name	Code
1	PT1	
2	PT2	
3	PT3	

Graphic	Calculate
Crapino	

Figure 5.1 Area Perimeter interface

[Graphic]: shows the closed polygon formed by the points.

[Calculate]: calculates the area and perimeter of the closed polygon.

[Multiselect]: enters point edit interface to inverse or delete.

5.2 Distance Calculation

There are two kinds of distance calculation: point to point, and point to line. The points can be imported from the point library.

5.2.1 Point to Point Distance

← Distance Calculation		
Point to point	Point to line	
I L I Know:A A B Calculate	B Two point coordinate e:AB Distance	
Point A	:=	
Point B	:=	
Calculate Result		
Clear	Calculate	

Figure 5.2 Distance Calculation - Point to Point

Import point A and point B from the point library.

[Calculate]: calculate the distance between the two points.

[Clear]: clear the result.

5.2.2 Point to Line Distance

← Distance Calculation		
Point to point	Point to line	
A B Calc	w:A、B、C Three point coordinate :ulate:Distance from point A to straight line BC	
Point A	:=	
Point B	:=	
Point C	:=	
Calculate Result		
Clear	Calculate	

Figure 5.3 Distance Calculation - Point to Line

Import a point from the library to calculate the distance from point A to line BC.

[Calculate]: calculate the distance.

[Clear]: clear the result.

5.3 Offset Point

Given point A, AP's horizontal length L and height H, calculate the coordinate of P. The steps are as follows:

Figure 5.4 Offset Point interface

Figure 5.5 Offset Point calculation result

[Calculate]: calculate the coordinate of point P.

[Clear]: clear the current result.

5.4 Rotation Point

Given the coordinates of point A, B and the rotation angle (clockwise), calculate the

coordinate of point B after rotation.





÷	Result	
Point N	lame	PT1
Code		>
x		1071400.4418
Y		-1786459.5177
z		0.00
	Cancel	Save

Figure 5.7 Rotation Point Calculation result

[Calculate]: calculate the coordinate of point B after rotation.

[Clear]: clear the result.

5.5 Two Points Intersection

There are two types of models listed below:

- Model 1: Given the coordinates of point A and B, the angle α between line AB and AP, the angle β between line AB and AP, calculate the coordinate of point P.
- > Model 2: Given the coordinates of point A and B, the length of line AB and PB,

calculate the coordinate of point P.

← Two Point	Intersection	
A B Calcul	The coordinate of A,B,the angle between A and B,the distance between A and P,and the distance between B and P. late:Point P	
Point A	:=	Pe
Туре	Angle >	ту
α(D)	Input	Di
Point B	:=	Pe
Туре	Angle >	ту
β(D)	Input	Di
Clear	Calculate	

← T\	vo Point Intersection
	Know:The coordinate of A,B,the angle between A and B,the distance between A and P,and the distance between B and P. Calculate:Point P
Point A	:=
Туре	Distance >
Dis:	Input
Point B	:=
Туре	Distance >
Dis:	Input
CI	ear Calculate

Figure 5.8 Two Point Intersection – Angle

Figure 5.9 Two Point Intersection – Distance

[Calculate]: calculate the coordinate of the intersection P.

[Clear]: clear the result.

5.6 Four Points Intersection

Given line AB and CD, calculate the coordinate of the intersection point P.

← Fou	Point Intersection
A C	Know:Point A,B,C,D Calculate:Intersection coordin- ates between AB and CD
Point A	Pt1
Point B	PT2
Point C	Hai 📕
Point D	Mi
Clea	r Calculate

← Result	
Point Name	PT1
Code	>
x	129.9216
Y	448.1081
z	0.00
Cancel	Save

Figure 5.10 Four Point Intersection

interface

Figure 5.11 Four Point Intersection result

[Calculate]: calculate the coordinate of the intersection P.

[Clear]: clear the result.

5.7 Azimuth

Given the coordinates of point A and B, calculate the heading angle of line AB.



Figure 5.12 Azimuth calculation interface

[Calculate]: calculate the heading of line AB.

[Clear]: clear the result.

5.8 Intersection Angle

Given the coordinates of point A, B and C, calculate the angle $\angle ABC$



Figure 5.13 Intersection Angle calculation

[Calculate]: calculate the angle $\angle ABC$.

[Clear]: clear the result.

6. Technical Appendix

6.1 Quick Start

1. Create a new project

Go to [Project] -> [Project], click [New], input the project name, select a CRS or edit with a template CRS, click [OK] to create a project.

2. Connect a device

Go to [Device] -> [Connect], select the device type, connect type, connect config and antenna type, and click [Connect]. Click from the status bar can also connect to the device.

3. Configure the base and the rover

A base transmits RTK corrections to an external radio or to network. The position of the base must be input manually or auto start. Nuwa supports RTK uploading to a NTRIP host, which brings convenience for a number of applications.

A rover receives RTK corrections from an external radio or from network. NTRIP and TCP protocols are supported if corrections are received from network.

All the configuration can be managed, such as created, edited and deleted in Nuwa App. A device can be configured to work as a base or as a rover.

4. Point Correction and Base Shift

The point correction is to find the mathematical conversion relationship (transition parameter) between WGS-84 and the local plane Cartesian coordinate system. There are three calculation types: four-parameter, height-fitting, and four-parameter + height-fitting.

There are three methods for height fitting: Fixed Difference Correction, Plane Fitting and Surface Fitting.

In Auto Start mode, if a base is moved or re-installed, Base Shift is necessary to make the points have the same coordinates before and after the power cycle. Main steps: Go to [Survey] -> [Base Shift], select GNSS points and known points, click [Calculate], the offsets parameters are calculated automatically. The user can apply the parameters on the points to be surveyed. Base Shift also influence coordinates value of other points with this base.

Steps 5 - 8 are action points in fields, select one or more in fields.

5. Point Survey

Go to [Survey] -> [Point Survey] to enter survey interface, which can be in text mode or drawing mode. The main difference between the two modes is whether the drawing is displayed. The configuration refers to section 4.6.1 Comm Config for more details.

Two collection modes: Auto Collect and Manual Collect, refer to section Point Survey for details. All the detailed information about the survey points can be checked in the survey point library.

6. Point Stakeout

Go to [Survey] -> [Point Stakeout] to enter point stakeout interface. Stakeout points must be saved in the stakeout point library before. Select the points to be stakeout and find the target point according to the prompt information by Nuwa, refer to sectionn Point Stakeout for details.

7. Line Stakeout

Go to [Survey] -> [Line Stakeout] to enter line stakeout interface. Stakeout lines muse be saved in the stakeout line library. Select the lines to be stakeout and find all the points on the target line according to the prompt information by Nuwa, refer to section Line Stakeout for details.

8. Static Survey

Go to [Survey] -> [Static Survey] to enter static survey interface. Select the parameters, such as interval, cut off angle, antenna parameters and click [Start], refer to section Static Survey for details.

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9. Export

Go to [Project] -> [Export] to enter export interface. Four file formats are supported: csv, dxf, shp and kml. The data to be exported can be filtered by point type and collection time. Click [Start] after all the options are filled.

10. Import

Go to [Project] -> [Import] to enter import interface, which can be divided into Coordinate Import and Other Import.

Coordinate import is to import points in a CSV file, mainly to import points to a library. Other import is to import the DXF or SHP files for the background. Click [File Path] to input the file directory.

6.2 Static Data Process with David

- 6.2.1 Preparation
 - A David receiver
 - A 2pin-USB power cable
 - A COMM2-7pin-USB & DB9 data cable
 - A USB Type A male to USB Type A male cable or a USB type A male to DB9 male cable
 - A power bank
 - A computer running TersusDownload tool



Figure 6.1 Preparation for Static Data Process

After the static survey in fields is completed, connect the David receiver to the computer

according to the following figure and power on the David receiver.

The USB port is mapped to a serial port (COM9 in the following example) in the computer, which can be checked in the Device Manager.



Figure 6.2 Connections of David, computer and power bank

6.2.2 File Downloading

Open the TersusDownload on the computer:

	General Sector Control Cont	×
TersusDown load.exe	DownLoad Port: DownLoad Speed: use current baudrate(USB:80KB/Second, Serial:8~32 Progress Info: Open Serial Show FileDialog Close Serial Reset Tersus Notice: The software normally retry when failed to download, You also can change the lower speed or confirm the cpu performance when failed to download.	

Figure 6.3 TersusDownload interface

Select the serial port to communicate with the David receiver



Figure 6.4 Download Port options

Select the download speed (the example is using USB port). Select the baud rate if a serial port is used to download the file.

use current baudrate(USB:80KB/Second, Serial:8~32 🗸
use 921600 baudrate to download(32KB/Second)
use 460800 baudrate to download(32KB/Second)
use 230400 baudrate to download(16KB/Second)
use 115200 baudrate to download(8KB/Second)
use current baudrate(USB:80KB/Second, Serial:8~32KB,

Figure 6.5 Download speed options

Click [Open Serial] in Figure 6.3, all the files on the eMMC card of David receiver would be

read and shown in the following figure:

1edia	EMMC	FreeSpace 3438	536 KB	SelectAll	
FileName		LECTime	Size	atatua	
		ore time	Size	status	
00002399.0	AT	20180511 8:36	2080740		
00002400.0	AT	20180511 8:37	77919412		
00002418.0	AT	20180511 9:5	41010692		
00002428.0	AT	20180511 9:20	592912		
00002429.0	AT	20180511 9:23	2422748		
00002430.0	AT	20180511 9:24	2749336		
00002431.0	AT	20180511 9:26	4158664		
00002433.0	AT	20180511 9:31	93232360		
00002455.0	AT	20180514 1:25	101221376		
00002480.0	DAT	20180514 2:5	0		
00002499.0	DAT	20180514 2:39	0		
00002505.0	DAT	20180515 11:23	0		
00002508.0	AT	20180515 11:25	0		
00002511.0	DAT	20180515 11:34	0		
00002512.0	AT	20180515 11:38	0		~
<					>

Figure 6.6 Files read on eMMC of David

Select the DownloadPath, select the files to be downloaded, click [Download] to start downloading:

DownloadPath	0:1			Select	View
Media	EMMC	FreeSpace 343	8536 KB	SelectAll	
FileName		UTC Time	Size	status	^
00002399.0	DAT	20180511 8:36	2080740		
00002400.	DAT	20180511 8:37	77919412		
00002418.0	DAT	20180511 9:5	41010692		
✓ 00002428.	DAT	20180511 9:20	592912	Downloading	
00002429.	DAT	20180511 9:23	2422748		_
00002430.0	DAT	20180511 9:24	2749336		
00002431.	DAT	20180511 9:26	4158664		
00002433.	DAT	20180511 9:31	93232360		
00002455.	DAT	20180514 1:25	101221376		
00002480.0	DAT	20180514 2:5	0		
00002499.1	DAT	20180514 2:39	0		
00002505.	DAT	20180515 11:23	0		
00002508.	DAT	20180515 11:25	0		
00002511.	DAT	20180515 11:34	0		
00002512.	DAT	20180515 11:38	0		~
<					>

Figure 6.7 File selected is downloading

6.2.3 Convert (Rinex)

Open TersusRinexConverter tool:

	🔷 Tersus Rinex	Converter		×
	Source File:			Open
	Save Path:			Save as
TersusRinex -	Source Format:	~ ~	Options Station Name:	
Converter.e			Time interval(sec):	~
xe	TER		Rinex Version: 3.02	~
		~	Constellation: ☑ GPS ☑ GL Processed Epoch:	.0 🗹 BDS
	Tersus Rinex Copyright 20	Converter V2.3 17 Tersus GNSS	Process Quit	AboutBPE

Figure 6.8 TersusRinexConverter interface

Click [Open] on the right side of the Source File, load the downloaded file, select [Precise BX306\316] for the Source Format. Give the Station Name if needed.

🔷 Tersus Rinex Converter	×
Source File: D:\00002428.DAT	Open
Save Path: D:	Save as
Source Format: Precise BX306\316 ~	Options 3 (options) Station Name: PT01 Time interval(sec): 1
TERSUS	Rinex Version: 3.02 V
	Processed Epoch:
Tersus Rinex Converter V2.3 Copyright 2017 Tersus GNSS	Process Quit AboutBPE

Figure 6.9 Process of converting source file to rinex file

Click [Process] to create Rinex file.

Follow the same steps as above to create all the Rinex files needed.

6.2.4 Data Post Processing

Open TERSUS Geo Office software:



Figure 6.10 TERSUS Geomatics Office interface

File Type	Extention	Select Files(S)
RINEX File	*.??O;*.OBS	36166611163(3)
SP3 File	*.SP3	
GNSS Raw File	*.GNS	Select Folder(F)
		Auto
		Cancel(C)

After a project is created, click [Import] -> [Import Files]

Figure 6.11 Import Files in TERSUS Geo Office

Click [Select Files] to load the Rinex files created in section 6.2.3.

Refer to the user manual of Tersus Geo Office for more details on data post processing.

6.3 Point Correction

- 1. [Project] -> [New], input a Project Name, select the proper CRS system.
- 2. [Device] -> [Connect], connect to the David receiver.

← Create Pro	bject
Project Name	20180622_142319
Creator	test
Creation date	2018-06-22 14:23:19
Project Template	\bigcirc
Coordinate System	WGS84.csd>
	ок

Figure 6.12 Create a new project

Figure 6.13 Connect to a David receiver

3. [Device] -> [Rover], configure this David as a rover and ensure the rover can get fixed solution.

User Manual for Nuwa App V1.0

Rover		← Satelliate In	nfo
Mode List	Multiselect	Position Skymap	SNR
补置电台+115200		Fixed 2	2018-06-
手薄网络+默认服务器	<i>i</i> 1		
:手薄网络+默认服务器	2	WGS84 Lat: N31.1	1904098
P		WGS84 Lon: E121	.593198
簿网络+ 协议类型 Ntrip	wait	WGS84 H : 40.3	338m
fault:Ext.Radio+115200		Local N: 3452236	6.8582m
fault:PDA Network+Defa	ault Server1	Local E: 56540.5	5426m
efault:PDA Network+Defa	ault Server2	Local h : 40.33	8m
		Satellite: 28	Spee
New Detail	Start	Diff D	Delay: 2

Figure 6.14 Configure David as a rover

Figure 6.15 Satellite Information

- 4. [Survey] -> [Survey Config], input the correct antenna height.
- 5. [Survey] -> [Point correction], select the proper method to calculate. The following example is using four parameter method.

← Survey C	onfig	
Common Config	Displa	y Config
Auto Collect	Time	Distance
Time Interval(s)		1
Smooth Epochs		2 >
Survey prompt to	ne	
Stakeout prompt	tone	
Stakeout prompt	t ype North and	south dir >
Ant type	A	X3702(HG)>
Type Ov	ertical Slant	e Pole
Ant Height(m)		1.8

Figure 6.16 Survey Configuration

Figure 6.17 Point Correction interface

- Click [Add], input the point name for the Source Coordinate. Select a point with known WGS-84 coordinates, or survey the point directly. Input the known coordinate in the local CRS for the Target Coordinate.
- 7. Click [OK].
- 8. Add the 2nd point with the same procedure as the 1st point.

← Add Point			
Source Coord			
Point Name	Test1	Q	I
Lat(°)	31.19040	990	U
Lon(°)	121.59319	813	U
Height(m)		38	8.533
Target Coord			
Point Name	Те	st1	I
N(m)	3452	236.	8601
E(m)	56	540.	5438
h(m)		40	0.342
	ок		
-igure 6.18	Add Po	int	for

7 I 63 I I FE	9	Multiselect
id	Source Coord	Target Co
1	B:31.190409900 L:121.593198130 H:38.5330	N:3452236.8601 E:56540.5438 H:40.3420
2	B:31.190409880 L:121.593198170 H:38.5380	N:3452236.8601 E:56540.5438 H:40.3420
2	H:38.5330 B:31.190409880 L:121.593198170 H:38.5380	H:40.3420 N:3452236.86 E:56540.5438 H:40.3420

Figure 6.19 Two points added for point correction

9. Click [Calculate] and check the calculation result.

Correction

10. Click [Apply] to add the parameters to the project.

← Result:	
Local Para Result:	
dDX(m) : 4140934.0544	dDY(m): - 90158.6524
Rotation Angle : -6	01332.6868753640
Scale: 0.20394128	380
Max.HRMS	0.0000 NO.: 2
Cancel	Apply

Figure 6.20 Calculation result for point

Figure 6.21 Apply result to the project

correction

7. Terminology

Abbreviation	Definition
CRS	Coordinate System
GNSS	Global Navigation Satellite System
OS	Operating System
PDOP	Position Dilution of Precision
RINEX	Receiver Independent Exchange format
RMS	Root Mean Squares
RTCM	Radio Technical Commission for Maritime Services
RTK	Real-Time Kinematic
UI	User Interface
UTM Projection	Universal Transverse Mercator Projection