User Manual

Version V1.1-20211109



User Manual For Tersus GNSS Center

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Revision History

Version	Revision Date	Change Summary
1.0	20200909	Initial release
1.1	20211109	Upgrade section 2.3.3&3.4



Table of Content

Revision History1
Table of Content2
List of Figures4
List of Tables6
1. Introduction7
1.1 Overview7
1.2 Features7
1.3 System Requirements8
2. Functions9
2.1 Config window9
2.1.1 Connection9
2.1.2 Working mode11
2.1.3 Save option17
2.2 Interface and functions18
2.2.1 Menu bar
2.2.2 Tool bar
2.2.3 Skyplot view26
2.2.4 Signal strength view
2.2.5 Map view
2.2.6 Console window28
2.2.7 Command window29
2.2.8 Trajectory view
2.2.9 PVT views
2.2.10 Status bar
2.3 Tools
2.3.1 Tersus Download



	2.3.2 Tersus GeoPix	.34
	2.3.3 Tersus Rinex Converter	.35
	2.3.4 Tersus Update	.35
3. (General operations	.37
3	3.1 Connect to a BX RTK board	.37
3	3.2 Configure RTK board with commands	.38
3	3.3 Data logging	.40
3	3.4 Convert Raw Data into Rinex	.42
4	Terminology	.44



List of Figures

Figure 1.1 Tersus GNSS Center main interface	7
Figure 2.1 Connection config – serial connection	10
Figure 2.2 Device manager	10
Figure 2.3 Connection config – demo file	11
Figure 2.4 Base mode configuration	12
Figure 2.5 Options for RTCM2	12
Figure 2.6 Options for RTCM3	13
Figure 2.7 Options for CMR	
Figure 2.8 Output options	14
Figure 2.9 Change to rover mode	14
Figure 2.10 Configure COM1 for rover mode	15
Figure 2.11 Configure COM2 for rover mode	15
Figure 2.12 Configure USB for rover mode	16
Figure 2.13 Configure FILE for rover mode	16
Figure 2.14 Save option config	17
Figure 2.15 Tersus GNSS Center main interface	
Figure 2.16 Set environment preferences	20
Figure 2.17 Position summary	
Figure 2.18 Auto base station list	21
Figure 2.19 Fixed position for base station	22
Figure 2.20 Data recording status	22
Figure 2.21 Tersus Rinex Converter	
Figure 2.22 Position averaging for base stations	23
Figure 2.23 Tersus download	24
Figure 2.24 Update firmware	25
Figure 2.25 GeoPix main interface	25
Figure 2.26 Skyplot view	26
	4 / 45



Figure 2.27 Signal strength view	27
Figure 2.28 Google map	28
Figure 2.29 Baidu map	28
Figure 2.30 Text console window	28
Figure 2.31 Track info window	28
Figure 2.32 Log window	29
Figure 2.33 Command window	29
Figure 2.34 Trajectory view	30
Figure 2.35 Heading info	31
Figure 2.36 Velocity info	31
Figure 2.37 Altitude info	31
Figure 2.38 UTC time	31
Figure 2.39 Indicators	31
Figure 2.40 Connection status	32
Figure 2.41 Tersus download	33
Figure 2.42 GeoPix main interface	34
Figure 2.43 Tersus Rinex Converter	35
Figure 2.44 Update firmware	36
Figure 3.1 Connection configuration	37
Figure 3.2 Command prompt and text console	38
Figure 3.3 Save Received Data option	40
Figure 3.4 Choosing saved data location	41
Figure 3.5 Converting data	43



List of Tables

Table 1 System Requirements for Tersus GNSS Center	8
Table 2 Indicators description	31
Table 3 Common used RTCM messages	39



1. Introduction

This user manual introduces how to use Tersus GNSS Center software.

1.1 Overview

The Tersus GNSS Center is a configuration tool for Tersus GNSS products. This software integrates configuration, monitoring, data logging, firmware upgrade and other useful tools. With Tersus GNSS Center, you can communicate over the on-board serial ports, key in commands to configure the board, upgrade firmware, store data, playback data, convert data to RINEX format, display rover's trajectory in Google / Baidu map, calculate the average position of the base station, view status of the board and positioning results.



Figure 1.1 Tersus GNSS Center main interface

1.2 Features

Tersus GNSS Center has following features:



- Communicate over the on-board serial ports
- Key in commands to configure the board
- Upgrade firmware
- Store data, playback data
- Convert data to RINEX format
- > Display the rover's trajectory in Google / Baidu map
- Calculate the average position of the base station
- View status of the board and positioning results

1.3 System Requirements

Tersus GNSS Center is to run on a wide range of different computer configurations. The systems requirements are listed as below:

Operating System	Microsoft Windows 7, 8, 10 (32-bit and 64-bit)				
Hardware	Minimum	Recommended			
Processor	Intel Core i3	Intel Core i5			
RAM	4GB	8GB			
Hard disk	10GB	1TB			
Graphics card	Direct X9 compatible	Direct X9 compatible 2GB			
	integrated graphics discrete graphics				
Internet Connection	Ability to originate both http an	d https (SSL) connections			

Table 1 System Requirements for Tersus GNSS Center



2. Functions

This chapter describes the detailed operations of Tersus GNSS Center

Before using Tersus GNSS Center software, ensure one BX board or one receiver of David series GNSS Receiver is powered up and connected to the computer via serial port. The physical connection refers to corresponding user manual which can be downloaded from Tersus website https://tersus-gnss.com/document.

2.1 Config window

When launching Tersus GNSS Center, the config window pops up automatically. This window can also be found in the menu bar Tools -> Config.

2.1.1 Connection

Under the connection tab, there are two options:

1) Serial

If choosing Serial as connection type, choose the right port when a Tersus GNSS board or receiver is connected to computer via serial port. The baud rate is 115200 bps by default. It is not recommended to change baud rate. The serial port can be found in the windows device manager.

The 'Save Received Data' function is turned on by default. It can be turned off manually.



Connection Type:	Serial		~	
Serial Setting				
Port:	~	Save Recei	ived Data	
		() ON	OOFF	
Baud Rate:	115200 ~		-	
- Working Mode				
	angele Working Mode			
Command C	onsole Working Mode			
Command C Base Station	n Config Mode	:		
Command C	n Config Mode			
Command C Base Station	n Config Mode In Mode			
Command C Base Station Rovel Station	n Config Mode In Mode			

Figure 2.1 Connection config - serial connection

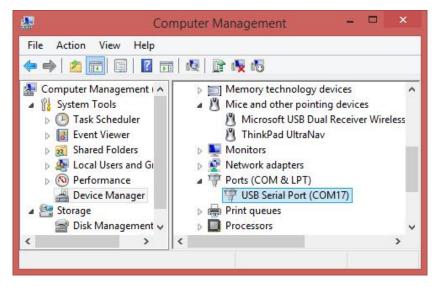


Figure 2.2 Device manager

2) Demo file

If choosing demo file as connection type, click the file path and choose the demo file, selecting loop can play the demo repeatedly, then click [OK] to start playing demo file. The demo file can be .dat format files.



Connection Type:	Demo File	~	
Serial Setting Port:		Save Received	Data
Baud Rate:	115200 🗸	OON	OFF
Demo File Settin	9		
Input File :			
Play Speed			Loop

Figure 2.3 Connection config – demo file

2.1.2 Working mode

There are three working mode to choose: command console working mode, base station config mode, and rover station mode.

1) Command console working mode

This mode is the major mode that is introduced in this user manual.

2) Base station config mode

If choosing base station config mode, it pops out below config window. Configuring parameters for base station by selecting in drop-down options is another method which is different from command configuration.

You can fill in the coordinates of the base station or tick Posave on to enable auto base station.



at	Lng		Height(MSL)	Туре
				Degree 🗸
) Use fix p	positon	Auto Base	on	
	ISS Messages Ou	tput		
COM1 None	ORTCM2	ORTCM3		Detail
COM2	○ RTCM2	● RTCM3		Detail
USB				
None	○ RTCM2	ORTCM3		Detail
ata Recordin	g Mode			
() Auto	Manual			Detail
thers				
Antenna He	ight 0.0000	00 Metre		

Figure 2.4 Base mode configuration

For differential GNSS message output, you can configure RTCM2, RTCM3 or CMR message for the current communication port. Click [Detail] to configure corresponding message types.

Extended Base Station	RTCM22	OFF	~
GPS Reference Station Parameter	RTCM3	OFF	~
Uncorrected Raw Measurement	RTCM1819	OFF	~
Finish Default S	etting	Cancel	

Figure 2.5 Options for RTCM2



elect Option	For RTCM3										>
Station Info			1)						RTCM1005	OFF	
			Antenna Heio	ht					RTCM1005		~
			1002010000	nc						ontime 10	- 2.0
Extended A									RTCM1007	OFF	~
			ce Station De	scription					RTCM1008	OFF	~
Receiver an			The second						RTCM1033	ontime 30	200
GLONASS L	.1 and L2 (Code-P	hase Biases M	essage					RTCM1230	ontime 30	~
Ephem Info	o 										
GPS Ephen	nerides								RTCM1019	OFF	~
GLONASS B	Ephemerid	es							RTCM1020	OFF	1
BDS Ephen	nerides								RTCM1042	OFF	`
Observable	s										
MSM4, GPS	Code, Pha	ase and	d CNR Measur	ements					RTCM1074	ontime 1	~
MSM4, GLO	NASS Cod	e, Pha	se and CNR M	leasureme	ents				RTCM1084	ontime 1	~
MSM4, BeiD	ou Code,	Phase	and CNR Mea	surement	S				RTCM1124	ontime 1	~
RTCM1001	OFF	~	RTCM1012	OFF	~	RTCM1013	OFF	~			
RTCM1002	OFF	~	RTCM1071	OFF	~	RTCM1081	OFF	~	RTCM1121	OFF	~
RTCM1003	OFF	~	RTCM1072	OFF	~	RTCM1082	OFF	~	RTCM1122	OFF	~
RTCM1004	OFF	~	RTCM1073	OFF	~	RTCM1083	OFF	~	RTCM1123	OFF	V
	OFF	~	RTCM1075	OFF	~	RTCM1085	OFF	~	RTCM1125	OFF	V
RTCM1009			RTCM1076	OFF	~	RTCM1086	OFF	~	RTCM1126	OFF	~
RTCM1009 RTCM1010	OFF	~		1111111							

Figure 2.6 Options for RTCM3

Station Info Base station position	CMRRE	F OFF	~
Base station description information	CMRDE	SC OFF	~
Observables			
Base station satellite observation info	rmation CMROB	S OFF	~
Base station position information (low	rate) CMRPL	US OFF	~

Figure 2.7 Options for CMR

For data recording mode, you can choose auto or manual, click [Detail] to configure corresponding output options.



Output Config								
RANGECMP(B)	OFF	~	RANGE(B)	OFF	~			
GPSEPHEM(B)	OFF	~	GLOEPHEMERIS	OFF	~	BDSEPHEMERIS(B)	OFF	~
BESTPOS(B)	OFF	~	BESTXYZ(B)	OFF	~	BESTVEL(B)	OFF	~
THISANTENNA(B)	OFF	~	MARKTIME(B)	OFF	~			
Fi	nish				Canc	el		

Figure 2.8 Output options

You can also set antenna height under Others. Click [Config&Save] to finish the base mode configuration.

3) Rover station mode

If choosing rover station mode, it will pops out a notice to confirm this action.

Connection Type:	Serial	~		
Serial Setting Port:	COM5 ~	Save Receiv	ed Data	
Baud Rate:	115200 ~	ON		
Terus GNSS Cente	er tion will restart the	urrent run status, a	are you sure?	×
? This act	ion will restart the	Yes	are you sure? No	
Command Co	tion will restart the operation will restart the operation of the operatio	Yes		
? This act	tion will restart the onsole Working Mode n Config Mode	Yes		

Figure 2.9 Change to rover mode



In the rover mode configuration interface, you can configure rover's output from COM1/COM2/USB/File.

NMEA Ou Global Pos	sitioning System	Fix	Data			GPG	GA	ontin	ne 1 🗸	1
GPS Satel	lites in view					GPG	SV	OFF	~	1
Actual tra	ck made good a	nd	speed	over gr	ound	GPV	TG	OFF	~	1
GPZDA	OFF ~	GF	GRS	OFF	~	GPR	мс	ontin	ne 1 🗸	ĺ
GPHDT	OFF ~	GF	GSA	ontime	e 5 🗸	GPN	ITR	OFF	~	1
GPGLL	OFF ~	GF	GST	OFF	~					ľ
Other Ou			-							
RANGE	ontime 5	~	BINA	RY ~	BESTPO	S	ontime 1	~	BINARY	ī
BESTVEL	OFF	\sim	BINA	RY ~	BESTXY	z	OFF	~	BINARY	
RANGECM	P OFF	~	BINA	RY ~	PSRDOP		OFF	~	BINARY	
PSRXYZ	OFF	\sim	BINA	RY v	HEADIN	G	OFF	~	BINARY	
SATVIS	ontime 5	~	BINA	RY ~	TRACKS	TAT	OFF	~	BINARY	
MARKTIM	E OFF	~	BINA	RY 🗸	MARKPC)S	OFF	~	BINARY	

Figure 2.10 Configure COM1 for rover mode

Global Posi	tioning Sy	stem Fø	Data			GPG	GA	OFF	~	1
GPS Satelli	tes in viev	v				GPG	SV	OFF	~	1
Actual trac	k made g	ood and	speed	over gr	ound	GPV	TG	OFF	~	1
GPZDA	OFF	~ G	PGRS	OFF	~	GPR	MC	OFF	~	1
GPHDT	OFF	↓ G	PGSA	OFF	~	GPN	ITR	OFF	~	1
GPGLL	OFF	Ģ	PGST	OFF	~					1
Other Out			1		DECTE -	_			[
RANGE	OFF	~	BINA	RY ~	BESTPO	S	OFF	~	BINARY	
BESTVEL	OFF	~	BINA	RY v	BESTXY	Z	OFF	~	BINARY	
RANGECM	OFF	~	BINA	RY ~	PSRDOP		OFF	~	BINARY	
PSRXYZ	OFF	~	BINA	RY ~	HEADING	G	OFF	~	BINARY	
SATVIS	OFF	~	BINA	RY ∨	TRACKS	TAT	OFF	~	BINARY	
MARKTIME	OFF	~	BINA	RY ~	MARKPO	S	OFF	~	BINARY	

Figure 2.11 Configure COM2 for rover mode



	tioning System	Fix Data		GPO	GGA	ontin	ne 1 🗸 🗸	
GPS Satelli	tes in view			GPC	SSV	ontin	ne 1 🗸 🗸	
Actual trac	k made good a	nd speed	l over gr	ound GPN	/TG	OFF	~	
GPZDA	OFF ~	GPGRS	OFF	✓ GPF	RMC	OFF	~	Ì
GPHDT	OFF ~	GPGSA	OFF	V GPI	ITR	OFF	~	1
GPGLL	OFF ~	GPGST	OFF	~				1
Other Out	10 million (1990)			Generalise v				
RANGE	ontime 1	BINA	RY ~	BESTPOS	OFF	~	BINARY	,
	OFF	V BINA	RY ~	BESTXYZ	OFF	~	BINARY	
BESTVEL				PSRDOP	OFF	~	BINARY	
BESTVEL RANGECMP	OFF	V BINA	RY V	FUIDOF		0.0		-
	OFF OFF			HEADING	OFF	~	BINARY	2
RANGECMP			RY ~			~	BINARY BINARY	

Figure 2.12 Configure USB for rover mode

Global Posi	put tioning System	Fix Data		GPG	GA	OFF	~
GPS Satelli	tes in view			GPG	SV	OFF	~
Actual trac	k made good a	nd speed	l over gr	ound GPV	TG	OFF	~
GPZDA	OFF v	GPGRS	OFF	✓ GPR	мс	OFF	~
GPHDT	OFF ~	GPGSA	OFF	- GPN	TR	OFF	~
GPGLL	OFF ~	GPGST	OFF	~			
Other Out				n en anna a			
RANGE	OFF	~ BINA	RY ~	BESTPOS	OFF	~	BINARY
BESTVEL	OFF	V BINA	RY v	BESTXYZ	OFF	~	BINARY
RANGECMP	OFF	✓ BINA	RY ∨	PSRDOP	OFF	~	BINARY
PSRXYZ	OFF	V BINA	RY ∨	HEADING	OFF	~	BINARY
SATVIS	OFF	✓ BINA	RY V	TRACKSTAT	OFF	~	BINARY
MARKTIME	OFF	BINA	RY V	MARKPOS	OFF	~	BINARY

Figure 2.13 Configure FILE for rover mode

After setting all required parameters, click [Config&Save] to finish the rover mode configuration.



2.1.3 Save option

Under the save option tab, the output directory can be set, the data format options can be checked according to different requirement. The log option is .log by default.

Ou			
Ou	1.0.10		
	tput Setting		
O	utput directory	c:\TersusData\	
	ve Option		
	Raw data(.	rs)	
	NMEA only(nmea)	
	Binary data	onlu(bin)	
		orny(.only	
	an a		
Log	g Option		

Figure 2.14 Save option config



2.2 Interface and functions

The main interface of Tersus GNSS Center is shown as below.

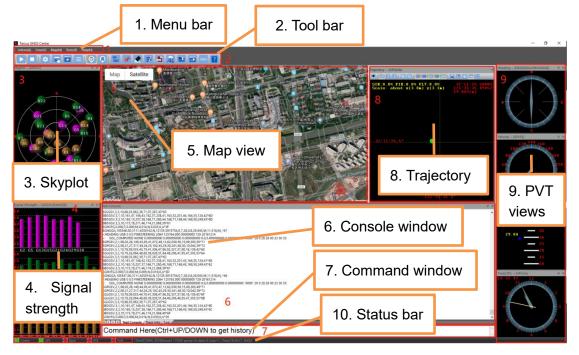


Figure 2.15 Tersus GNSS Center main interface

2.2.1 Menu bar

The menu bar includes below options:

1) Action

Under the action tab, it has three options: play, stop and quit.

2) View

Under the view tab, it has three options: windows, status bar and skin. For windows, you can check which window to display. For status bar, you can check to display status bar or not display this bar at the bottom. For skin, you can choose from seven skin types for this software.

3) Map

Under the map tab, it has two options: Google map and Baidu map.



4) Tools

Under the tools tab, it has three categories:

- a. Config, References, and Restore Layout;
- b. Show position summary, auto base station list, pin output, and erase Trajectory;
- c. Data recording, RINEX converter, Position averaging, Download File, Update Firmware, and GeoPix. These are useful tools for different applications.
- 5) Help

Under the help tab, it shows the Tersus GNSS Center version.

2.2.2 Tool bar

The tool bar shows different tools in icons.

Play: play demo file like a video, or enable the serial port connection.

Stop: stop playing demo file, or disable the serial port connection.

2

Config: configure connection and save option, details refer to section 2.1.

Environment preferences: set environment preferences as shown below. You can switch google map URL, set Baidu map option, set map option with GCJ-02, set satellite color, set trajectory view display colors, set limit for tracing point clear interval, set limit for output session interval, and set text console clear interval.



Google Map L				2	
⊖ Google.cr	ı			● Go	ogle.com
Baidu Map Op					
Disable B	009 Conve	ert			
GCJ-02 Cover	ter(Map O	ption)			
Auto	OD	isable	(Enable	
Satelite Color					
Reset	GPS	GLONASS	BDS	GLA	QZSS
Background	— ~			-	
Foreground					
Trajectory Vi	aw Dienlay				
	1		ED/	FLOAT	OTUER
Reset	SINGLE	DGPS	FIX	FLOAT	OTHER
Dot Color	—		~		
Limit					
Trac Point Cle	ear Interva	l (Hour)		ſ	8
Output Sessi	on Interva	(Hour)		[8
		10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -		l	
TexConsole C	lear Interv	/ai (Count)			50000
	1			1	I
Apply		OK			Cancel

Figure 2.16 Set environment preferences

Restart the app to restore: restore to the default display after restart.

Position summary: shows the summary of position parameters including status, differential angel, satellite numbers, HDOP, ground speed, ellipsoidal height, longitude, latitude, UTC time, date and quality indicator.

Parameter	Value	Option
Status		
Diff. Age		
Sat. Num.		
HDOP		
Ground Speed		
Ellipsoidal Height		
Longitude		
Latitude		
Time(UTC)		
Date		
Quality Indicator		

Figure 2.17 Position summary



2 Google map: click it to display in google map.

Baidu map: click it to display in baidu map.

list Base network for posave: it pops out the Auto Base Station List window

to set PosAve on or off and show the base station position network as below.

ption	ange(0: disable, default:	:30) m	
			Modify
OPosAve On	O PosAve Off		·
Base Station P	osition Network		
Select All	ostorraction		
LAT	LNG	HEIGHT(Ellipsoidal)	MarkID
Refresh	Add	Delete	Mark In Map

Figure 2.18 Auto base station list

If a base is setup with command POSAVE, according to its original definition, after a power cycle, the fixed position may be different even if the receiver is installed at the same point. Auto base station list function is for the users who need the base to keep the same fixed position after a power cycle.

Fill the valid position range, check PosAve On, and click [Modify]. It is recommended that valid position range is >20m. After the specific time (in the example, 0.01 hour is 36 seconds), the base is fixed with the 36 seconds averaging position. Click [Refresh], the fixed position is displayed as below.



ption		72	_	
lid Position Range(0): disable, default:30)	20	m	1
PosAve On	O PosAve Off	0.0100		Modify
ase Station Position]Select All	n Network			
Base Station Position Select All LAT	n Network	HEIGHT (Ellipsoid	dal)	MarkID

Figure 2.19 Fixed position for base station

After a power cycle, if the base is moved less than 20m away from the last position, it would fix with the same position. In the above example, latitude keeps 31.19042830, longitude keeps 121.59319162 and ellipsoid height keeps 37.4168.

Pin output: pause the message output in text console window.

Clear the trac point both in trajectory and map: click it to clear the track point both in trajectory and map.

Data recording: view data recording status shown as below. This function is only available after configuring raw data storage command. Only when turning on the raw data recording, it will show the data recording status.

close
0.00
3729268
Recording

Figure 2.20 Data recording status



Convert to RINEX 2.10/3.02/3.04: click this icon to view below setting window.

Source File:						Open
Save Path:						Save as
			Options			
ource Format:		~	Station Name:			
			Maker Number:			
inex Version:	3.02	~	Time interval(sec):		~	
	• ~		Time start(GPST):	2017/07/01 00	:00:00	
т		-	Time end(GPST):	2019/12/25 08	:30:41	
		5		GPS 🛛 GLO Output .pos File	BDS	⊠ GAL
	ex Converter V3.6 2018 Tersus GNSS		Proces	ssed Epoch:		AboutBPE

Figure 2.21 Tersus Rinex Converter

All Position averaging for base stations: set input and output parameters for

position averaging.

Input	g for base stations			
Min Sam	oler Number(100~1	0000)	Max distance de	viation(1~10m)
3000	~		3	
Output				
Averag	ing Begin:		End:	
Averag	ing Begin:			fix position
Averag Lat/Lor		O DDmm.mr		
Lat/Lor		O DDmm.mr		

Figure 2.22 Position averaging for base stations

Download SD/EMMC file: download data files from internal storage of the



receiver to the computer.

	c: \TersusData \201	91225			Select	Vie
Auto Create F	RINEX File(\$Download	Path/RINEX) after	download			
Media		FreeSpace		КВ	SelectAll	
FileName		UTC Time	Size(Byte)	status	Station ID	

Figure 2.23 Tersus download

Update firmware: upgrade firmware using serial port.



11.1.2.0					
Update Setting					
Port:	СОМЗ 🗸	Baudrate:	460800 ~	Advance Setting	
Version:3.1					
	ΤĘ	R	SV	JS	
	TĘ	R	SV	JS	

Figure 2.24 Update firmware

GeoPix: launch GeoPix software to process GNSS observations.
--

orking director	ry (Picture Dir)	*Base	Data			*Rover Data			
12									
HEM						Offsets between ca	mera center and	phase cente	r
		n			g	FRD (CM)			
		c				O MRK File			
	osition (check it when base data file)	DEG ODMm(DD Heig	MM.mm) ODMS ght(Ellipsoid)	(DD,MM,SS) Metres	Use Event N	fark UTC Time to repl	ace Capture Tim	e of the pictu	ires
FileName	CreateTime	ModifyTime	Capture Time		UTC TIME	Latitude	Longitude	Altitude	Po
					<			_	>
									-
	•				Map Use Go	ogle.com OMa	p Use Google.cr	n O Baidu	Мар
		-	Latitude						
		Tagged	Latitude						
		Original	Longitude						
		Tagged	Longitude						
		Original	Altitude						

Figure 2.25 GeoPix main interface



About version: view Tersus GNSS Center version.



2.2.3 Skyplot view

The Skyplot view displays the number of GNSS systems (GPS / GLONASS / Beidou / Galileo / QZSS) being tracked by the board or receiver and their elevation / azimuth angle. The different GNSS constellations are distinguished with different colors, which can be configured in Tools - > Preference. The satellite PRN are marked in the figure with capitalized character 'G', 'R', 'B', 'E', 'J' referring GPS, GLONASS, Beidou, Galileo and QZSS constellation respectively. The figure is expressed in polar coordinate system with its direction refers to the azimuth angle and radius refers to its zenith distance (90-elevation angle in degree). Please note the view works only when GPGSV message is logged.

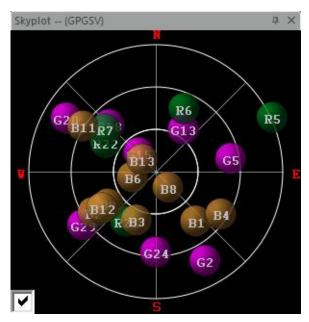


Figure 2.26 Skyplot view

2.2.4 Signal strength view

The Signal strength view shows the signal noise ratio of different frequencies of corresponding GNSS systems (GPS/GLONASS/Beidou/Galileo/QZSS). The



horizontal axes represent the number and the PRN. The vertical axes represent the carrier to noise ratio (C/N0) in dB/Hz. Note: the receiver is capable of tracking multiple frequency signals for some constellation, check the box at the bottom left corner to present the C/N0 of different frequency signals. Please note the view works only when GPGSV message is logged.

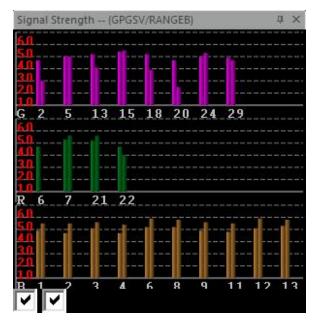


Figure 2.27 Signal strength view

2.2.5 Map view

The map view can be chosen from flat map or satellite map. The map source can be selected from Google map or Baidu map.

Note: In Mainland China it only supports Baidu map, needs proxy network to access Google map.





Figure 2.28 Google map

Figure 2.29 Baidu map

2.2.6 Console window

The console window has three tabs: Text Console, Track Info and Log.

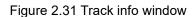
The Text console window provides a way for users to communicate directly with the board. Commands can be sent to the board using this window and all ASCII-format messages are displayed. When binary format data is received, the Text console window will show a summary of the binary data, including message type and data length. If the unrecognizable characters are received, they will be considered as error log and shown in Log view.



Figure 2.30 Text console window

The track info window provides the coordinates at a frequency of 1Hz.

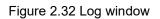
d Cons	sole									
.19043	6185	000	121	.593	197	779	6667	7 34	.596	
.19043	6491	667	121	.593	19	784	3333	3 34	.678	
.19043	6700	000	121	.593	19	787	3333	3 34	.751	
.19043	6931	667	121	.593	19	791	5000	34	.815	
.19043	7111	667	121	.593	197	788	0000	34	.864	
.19043	6841	667	121	.593	19	774	8333	3 34	.868	
.19043	7170	000	121	.593	19	776	6667	7 34	.931	
.19043	6861	667	121	.593	19	777	5000	34	.919	
.19043	7166	667	121	.593	19	791	0000	34	.977	
19043	6075	000	121	503	10	790	666	7 24	061	
	19043 19043 19043 19043 19043 19043 19043 19043 19043	190436185 190436491 190436700 190436931 190437111 190436841 190437170 190436861 190437166	190436185000 190436491667 190436700000 190436931667 190437111667 19043711060 19043681667 190437166667	190436185000 121 190436491667 121 190436700000 121 190436700000 121 19043711667 121 190436841667 121 190436841667 121 190436861667 121 190437166667 121	190436185000 121.59 190436491667 121.59 19043670000 121.59 190436931667 121.59 19043711667 121.59 19043711667 121.59 190436841667 121.59 190436861667 121.59 19043766667 121.59	190436185000 121.59319 190436491667 121.59319 190436700000 121.59319 190436931667 121.59319 190438931667 121.59319 19043841667 121.59319 19043841667 121.59319 19043681667 121.59319	190436185000 121.59319779 190436491667 121.59319784 190436700000 121.59319784 190436931667 121.59319781 190437111667 121.59319778 19043641667 121.59319774 190437160667 121.59319777 190437166667 121.59319777	190436185000 121.593197796667 190436491667 121.59319787333 190436700000 121.59319787333 19043691667 121.593197815000 190437111667 121.593197788030 19043671667 121.593197776833 19043716667 121.593197775000 190437166667 121.59319775000	190436185000 121.593197796667 34 190436491667 121.59319784333 34 190436700000 121.593197873333 34 190436931667 121.593197915000 34 190437111667 121.59319788000 34 19043711667 121.59319778833 34 190437166667 121.593197775500 34 190437166667 121.593197775000 34	190436185000 121.593197796667 34.596 190436491667 121.593197796667 34.596 190436700000 121.593197873333 34.678 190436931667 121.59319780000 34.84 190436841667 121.593197780000 34.84 190437110600 121.593197766667 34.931 190437170000 121.593197775000 34.919 190437170000 121.593197775000 34.919





The log window lists output messages of ASCII or abbreviated ASCII format.

ф >
^
10



2.2.7 Command window

The command window is to input/type commands. Press Enter to send the commands to the boards or receivers. Press Ctrl + Up/Down to get history commands.

Command Here(Ctrl+UP/DOWN to get history)

Figure 2.33 Command window

2.2.8 Trajectory view

The Trajectory view provides real-time graphic plotting of the current horizontal position (longitude and latitude). Different solution status are presented in different colors, which are defined as:

- SIN (Single point positioning solution)
- DIF (DGPS solution)
- FLT (RTK float solution)
- FIX (RTK fixed solution)
- OT (others solution status , e.g. Dead Reckoning or invalid solution)

You can turn on certain type of solution status via tool bar. Please note the view works only when GPGGA message is logged.



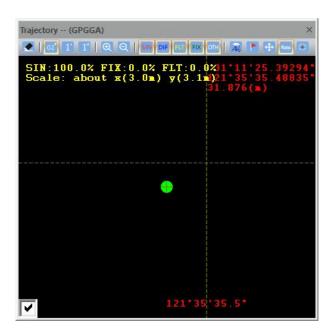


Figure 2.34 Trajectory view

2.2.9 PVT views

The PVT views display the detailed PVT information including heading, position, velocity and time (UTC). Please notice that the unit of velocity is km/h and that of attitude is meter. The time system is UTC time and the time shows in the figure may be different from your local time. Please note these views work only when GPGGA, GPRMC and GPVTG message is logged.



Heading -- (HEADI... 4 ×



Figure 2.37 Altitude info



Figure 2.36 Velocity info



Figure 2.38 UTC time

2.2.10 Status bar

Tersus GNSS Center indicates the working status of the board or receiver with a group of indicators and connection status on the status bar at the bottom of the main interface.



Figure 2.39 Indicators

Indicator	Status	Description
Comm	Red	Tersus GNSS Center is not connected to the board
	Green	Tersus GNSS Center is well connected to the board
GPS	Red	No GNSS signal is received
	Green	GNSS signal is received
Base	Red	No data from base station is received
	Green	Data from base station is received
RTK	Red	No RTK solution received

Table 2 Indicators description



	Yellow	RTK Float solution
	Green	RTK Fix solution
WiFi	Red	Onboard Wifi is not connected
	Green	Onboard Wifi is connected

[Port]COM5, [DCB]baud=115200 parity=N data=8 stop=1, [Time]04:56:52, [NO]0

Figure 2.40 Connection status



2.3 Tools

Besides Tersus GNSS Center, there are other four tools integrated into the Tersus Tool Suite software package: Tersus Download, Tersus GeoPix, Tersus Rinex Converter and Tersus Update.

2.3.1 Tersus Download

Tersus Download is to download data files from internal storage of the receiver

to the computer. You can click the icon 🔛 in the tool bar or click Tools ->

						D
DownloadFile	or	double-click	the	desktop	shortcut	TersusDownl oad

to launch the

software. TersusDownload X c:\TersusData\20191225 DownloadPath Select View Auto Create RINEX File(\$DownloadPath/RINEX) after download Media FreeSpace KB SelectAll FileName UTC Time Size(Byte) status Station ID

Figure 2.4	1 Tersus	download

deletefile

Stop

Hide Window

Download

Refresh

Make sure the receiver is connected to the computer through the serial port, click [Refresh] to view the files in the internal storage of the receiver, click $_{33/45}$



[Select] to choose download path, and click [Download] to download files to the designated folder of the computer.

2.3.2 Tersus GeoPix

Tersus GeoPix is a software for processing GNSS observation data collected by UAVs and ground base stations, and tagging EXIF coordinate information of

EVENT moment photos. You can click the icon

in the tool bar or click



Tools -> GeoPix or double-click the desktop shortcut TersusGeoPix to launch the software.

/orking director	ry (Picture Dir)	*Base	Data			*Rover Data			
HEM		n				Offsets between ca	mera center and	phase center	
Input Base Po no position in Lat	sition (check it when base data file) Lon	DEG O DMm(DD Heig	MM.mm) ODMs pht(Ellipsoid)	(DD,MM,SS) Metres	Use Event M	fark UTC Time to repl	ace Capture Time	e of the pictu	es
FileName	CreateTime	ModifyTime	Capture Time		UTC TIME	Latitude	Longitude	Altitude	Pos
					<				3
					Map Use Gr	ogle.com O Ma	ap Use Google.cn	🔿 Baidu	Мар
		Tagged	Latitude Latitude Longitude						
		Tagged	Longitude Altitude						
		Tagged	Altitude						

Figure 2.42 GeoPix main interface

The detailed usage of GeoPix refers to the User Manual for UAV PPK Solution which is available on <u>www.tersus-gnss.com/product/uav-ppk-solution</u>.



2.3.3 Tersus Rinex Converter

Tersus Rinex Converter is a tool to convert the logged binary observation data into RINEX3.02/3.04 or RINEX2.10 format. You can click the icon in the tool bar or click Tools -> RINEX Converter or double-click the desktop shortcut

Tersus Rinex C	Converter				
Source File:					Open
Save Path:					Save as
E. I.			Options Station Name:	[]	
ource Format:		~	Maker Number:		
nex Version:	3.02	~	Time interval(sec):	v	
	• ~		Time start(GPST):	2017/07/01 00:00:00	
т	ERSU		Time end(GPST):	2019/12/25 08:30:41	
1				GPS	⊠ GAL

Figure 2.43 Tersus Rinex Converter

The detailed usage of Tersus Rinex Converter refers to section 3.4 Convert Raw Data into Rinex.

2.3.4 Tersus Update

Tersus Update is a tool to upgrade firmware for Tersus GNSS products via serial ports. You can click the icon in the tool bar or click Tools ->Upgrade 35/45





Firmware or double-click the desktop shortcut **TersosUpdate** to launch the software.

Update Setting Update File:]]
Port:	COM3 v	Baudrate:	460800 ~	Advance Setting	
Version:3.1					
	TĘ	R	SV	JS	
	TE		SV	JS	

Figure 2.44 Update firmware

Select the upgrade file, select port and baud rate, and click [Next]. After the firmware is upgraded successfully, it will prompt a windows indicating successful update. Click [OK] and [Finish] buttons to close the firmware upgrade windows, the receiver will reset automatically.

Take BX306 board for example, download the latest firmware file from Tersus official website, and put it in the designated folder of your computer. Launch the Tersus Update software, select the firmware file (.bin format), port, baud rate as 115200 and click [Next] for the firmware update. Details refer to section 3.2 in *User Manual for BX Series GNSS Receiver*.



3. General operations

This chapter describes generation operations of Tersus GNSS Center software.

3.1 Connect to a BX RTK board

Before connecting the board with Tersus GNSS Center, please make sure the board is powered up and physically connected to the computer via its serial ports. The detailed to establish a physical connection between the board and PC can be found in the User Manual for BX series board or David series receiver. (Available at <u>www.tersus-gnss.com/document</u>). The following steps show how to connect the Tersus GNSS Center software to the board:

- Launch Tersus GNSS Center, the Config dialog pops up automatically. The dialog can also be found in menu bar Tools -> Config.
- 2) Choose Serial as Connection type and choose the correct port. The baud rate of the board is 115200 by default and changing baud rate is not recommended. The serial port can be found in your windows device manager.

Serial Setting Save Received Data Port: COM3 • Baud Rate: 115200 • Demo File Setting Input File : Play Speed Apply Ok	Connection Type:	Serial	*
Input File : Play Speed Loop	Port:		
Apply Ok Cancel	Input File :		
	Apply	Ok	Cancel

Figure 3.1 Connection configuration



3) Click [OK] to establish the connection. If the connection is established, the COMM indicator on the status bar will turn to green.

3.2 Configure RTK board with commands

Before starting field work, configure the RTK board or receiver with the Tersus GNSS Center software.

The board or receiver can be configured with commands which you can key in via the **Text Console** window of Tersus GNSS Center.

Text Console	×
\$GPGGA,070332.00,,0,00,0.0,*63	
\$GPGGA,070333.00,,,,,0,00,0.0,,,,,,*62	
\$GPGGA,070334.00,,0,00,0.0,*65	
\$GPGGA,070335.00,,,,,0,00,0.0,,,,,,*64	
\$GPGGA,070336.00,,0,00,0.0,*67	
\$GPGGA,070337.00,,,,,0,00,0.0,,,,,,*66	
\$GPGGA,070338.00,,,,,0,00,0.0,,,,,,*69	
\$GPGGA,070339.00,,0,00,0.0,*68	
\$GPGGA,070340.00,,,,,0,00,0.0,,,,,,*66	
\$GPGGA,070341.00,,,,,0,00,0.0,,,,,,*67	
\$GPGGA,070342.00,,,,,0,00,0.0,,,,,,*64	
\$GPGGA,070343.00,,,,,0,00,0.0,,,,,,*65	
\$GPGGA,070344.00,,,,,0,00,0.0,,,,,,*62	
\$GPGGA,070345.00,,,,,0,00,0.0,,,,,,*63	
\$GPGGA,070346.00,,0,00,0.0,*60	
\$GPGGA,070347.00,,,,,0,00,0.0,,,,,,*61	
\$GPGGA,070348.00,,,,,0,00,0.0,,,,,,*6E	
\$GPGGA,070349.00,,,,,0,00,0.0,,,,,,*6F	
\$GPGGA,070350.00,,,,,0,00,0.0,,,,,,*67	
\$GPGGA,070351.00,,,,,0,00,0.0,,,,,,*66	
\$GPGGA,070352.00,,,,,0,00,0.0,,,,,,*65	
\$GPGGA,070353.00,,0,00,0.0,*64	
\$GPGGA,070354.00,,,,,0,00,0.0,,,,,,*63	-
	12.
Text Console Track Info Log	
Command Here	*
	*

Figure 3.2 Command prompt and text console

3.2.1 Configure the board into base station mode

Commands for base station mode:

fix position 31.1874808 121.58111234 41.4618 log com2 rtcm1074 ontime 1 log com2 rtcm1084 ontime 1 log com2 rtcm1124 ontime 1 log com2 rtcm1005 ontime 10 saveconfig



These commands fix the coordinate of the base station and configure RTCM message to be transmitted. The coordinates are expressed in degree/meter. After each command is sent, the board will automatically acknowledge a '>OK', which means the configuration takes effect. If no acknowledge is received, please refer to 'trouble shooting' section in the user guide or contact Tersus Technical Support. If the base station coordinate is unknown, you can get it by averaging the point position solution for a while.

Table 3 Common used	RTCM messages
---------------------	---------------

Message type	Message Name
1074	Full GPS Pseudoranges and PhaseRanges plus CNR
1084	Full GLONASS Pseudoranges and PhaseRanges plus CNR
1124	Full BeiDou Pseudoranges and PhaseRanges plus CNR
1033	Receiver and Antenna Descriptors
1005 or 1006	Station Description

3.2.2 Configure the board into rover mode

Commands for rover mode:

fix none interfacemode com2 automatic automatic on log com1 GPGGA ontime 1 saveconfig

The rover can automatically recognize the RTCM message and compute RTK solution, so what you need is to make sure the rover position is not fixed, the serial port is in correct mode and it output RTK solution as normal.

After configuration, you can see that the board outputs empty NMEA sentences as the GNSS antenna are not connected to the board.

Details of commands and logs could be found in *Log&Command Reference for Tersus BX GNSS OEM boards*. (Available at

www.tersus-gnss.com/document).



3.3 Data logging

Tersus GNSS Center allows user logging the raw observation, ephemeris or RTK solution to PC. The procedure of data logging is as follows:

- Configure the board output according to your requirement with Tersus GNSS Center. (Details of commands and logs could be found in Log&Command Reference for Tersus BX GNSS OEM boards, available at www.tersus-gnss.com/document).
- 2) Make sure the Save Received Data option in Config window is turned on. Then go to Save Option tab to configure the save directory and log information. Tersus GNSS Center allows to save NMEA data only, binary data only and save all received data. The error messages, e.g. corrupted NMEA sentences, unrecognizable characters will be saved in log file for error diagnosis.

opportio						
Johnecuo	n Save Option					
		7			-	
	Connection Type:	Serial		~		
	Serial Setting		Save	e Receiv	ed Data	
	Port:	COM5				
	Baud Rate:	115200	न ⁽) ON	OOFF	
	budu Kute.	115200	<u> </u>			
	Working Mode					
		onsole Working Mor	ie			
	Command C		le			
	 Command C Base Station 	Config Mode	de			
	Command C Base Station Rovel Statio	n Config Mode n Mode	le			
	 Command C Base Station 	n Config Mode n Mode	le			
	Command C Base Station Rovel Statio	n Config Mode n Mode	le			
	Command C Base Station Rovel Statio	n Config Mode n Mode	le			

Figure 3.3 Save Received Data option



Conn	nection Save Option	
	Output Satting	
	Output Setting	
	Output directory c:\TersusData\	
	Save Option	
	⊠Raw data(.trs)	
	NMEA only(.nmea)	
	Binary data only(.bin)	
	Log Option	
	✓ Log(.log)	

Figure 3.4 Choosing saved data location

3) When Tersus GNSS Center is configured well, it will log received data once the serial connection is established. Tersus GNSS Center will create a sub-directory in the output directory named with the date (in yyyymmdd format) and save the data of each connection with a single file named with the starting time (hhmmss.trs or hhmmss.nmea).



3.4 Convert Raw Data into Rinex

The receiver independent exchange format (RINEX) is commonly used in post GNSS data processing missions. Tersus GNSS Center allows user to convert the logged binary observation data into RINEX3.02/3.04 or RINEX2.10 format. Here is guidance for the conversion:

- 1) Select **Tools -> RINEX Converter** to initiate the Tersus RINEX Converter.
- 2) Click [Open] to select the logged binary observation file. An alternative way is drag the file onto the text box. The output RINEX file will be stored in the same directory as the binary file. You can also change it by click [Save as]. Please note that the output RINEX file name is the same as the binary file as well by default.
- 3) Choose the source format according to your board/receiver type. It also supports converting RTCM3.2 messages into RINEX as well, but an approximate UTC time of start logging need to be provided.
- 4) A Station Name should be extracted from the source file before the conversion. If the Time Interval option is ticked, the converter also allows to downsampling the observation data.
- Click **Process** and the RINEX files will be found in the folder of Save Path.
 There are four kinds of RINEX files, including:
 - .yyo file observation file
 - .yyn file GPS ephemeris file
 - .yyg file GLONASS ephemeris file
 - .yyc file Beidou ephemeris file
 - .yyl file Galileo ephemeris file
 - .yyq file QZSS ephemeris file
 - .yyp file All ephemeris file

Note: *yy in file extension is two digits of year.



R Tersus Rinex C	Converter		×
Source File:		Open	
Save Path:		Save as	
		Options	
Source Format:	~	Station Name:	
		Maker Number:	
Rinex Version:	3.02 ~	Time interval(sec):	
		Time start(GPST): 2017/07/01 00:00:00	
	X_l	Time end(GPST): 2019/12/25 08:30:41	
IE	RSUS	Constellation: GPS GLO BDS GAL	
	ex Converter V3.6 2018 Tersus GNSS	Processed Epoch: Process Quit AboutBPE	
		CIUCESS QUIL ADOUBLE	

Figure 3.5 Converting data



4. Terminology

BDS	BeiDou Navigation Satellite System
CMR	Compact Measurement Record
eMMC	Embedded Multi Media Card
GLONASS	GLObal NAvigation Satellite System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
PC	Personal Computer
РРК	Post-Processing Kinematic
PPS	Pulse Per Second
RINEX	Receiver Independent Exchange format
RMS	Root Mean Squares
RTK	Real-Time Kinematic
RTCM	Radio Technical Commission for Maritime Services
USB	Universal Serial BUS
UTC	Universal Time Coordinated

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