CONTENT

Chapter Ⅰ Brief Introduction and Installation

1.1 Brief introduction of software and required configuration of computer

1.1.1 Brief introduction

GPSADJ baseline processing and adjustment software mainly deals with the data of GPS ephemeris, conditions the adjustment of the whole net, draws and controls the outcome of the network.

This software can process static GPS data of SOUTH and RINEX standard format data of various imported GPS receivers.

The software has friendly interface, flow management and operation, and its graphic operation interface and graphic service functions are more outstanding. This software can output and print all kinds of graphs including baseline network, error ellipse, etc.

Compared to previous software, adjustment software has been improved a lot. It is much reliable because it is managed by setting up item file and projects exist in the form of item file. With this software, user can conveniently self-defines ellipsoid projection parameter and choose different coordination system. The whole process, including baseline calculation, net adjustment, etc should be in the professional format file of SOUTH with the postfix of gpsadj,. The software will record all the operation automatically. You may look over previous operation at any time, refer to the result or continue to operate. It is more powerful, more convenient and more automatic in baseline vector calculation, closed-circle searching, net adjustment, etc.

You can set calculation condition and calculation type of any baseline with this software conveniently. The separate synchronous circle, asynchronous circle, and repeated baseline can be searched automatically.

1.1.2 Software running environment and required configuration of computer

1. Software environment
   Operation system: WINDOWS98, WINDOWSME, WINDOWS2000, WINDOWSXP
2. Hardware environment
   CPU: exceed PII MMX200Hz
   EMS memory: exceed 32M (We suggest using 128M.)
   HD: exceed 4G, at least 100M storage space
   LCD screen: 15″ CRT, at least 256 colors, 800*600 resolving power
   Mouse or other equipment

1.2 Installing steps

Double click the pressed package, it will show as follows (fig 1-1).

Fig 1-1 Unpacking

Software will unpack automatically. After finished, it will show a window of installation as follows (fig 1-2).

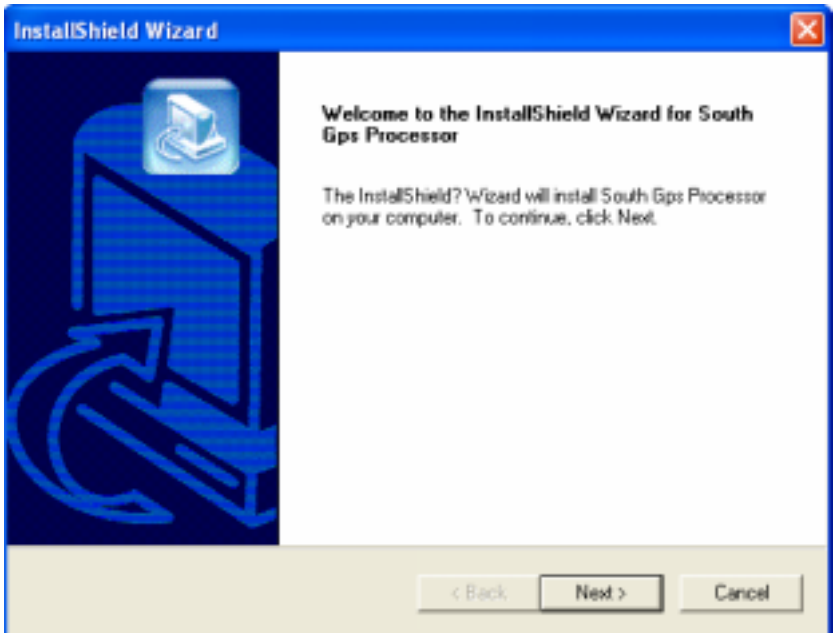


Fig 1-2 Installing message

Please click “next” in the “installation window”, it will show user’s agreement (fig 1-3).

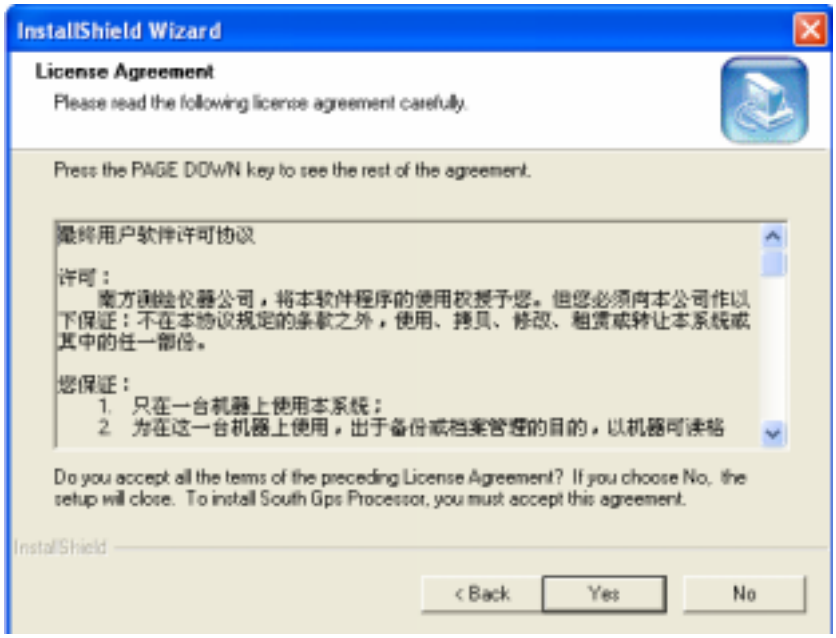


Fig 1-3 Agreement

When you agree with the agreement, please click “YES”, the installation will continue. The path that installs the software into the computer is as follows (fig 1-4).

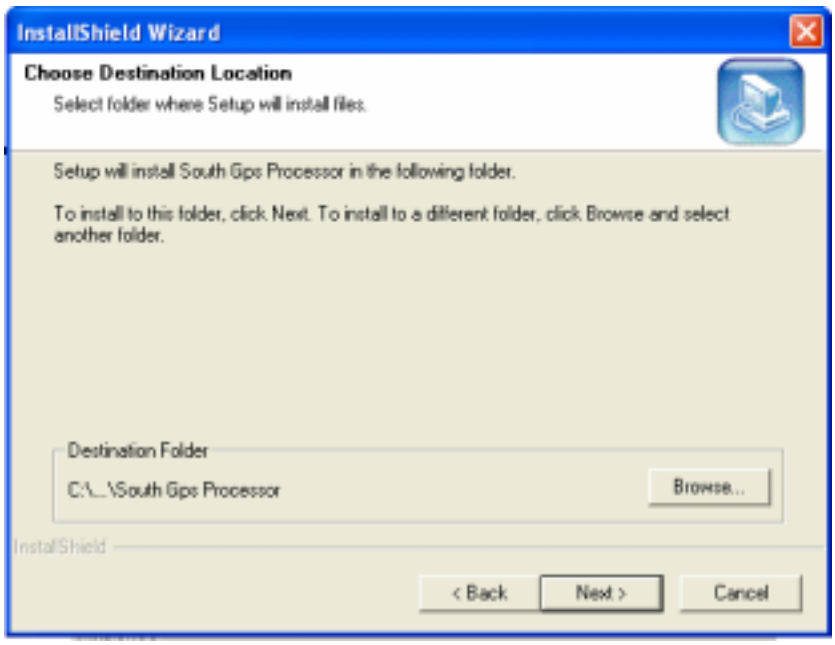


Fig 1-4 Message of installing path

Click “browse” in fig 1-4, you can select the path that installs the software, also you can use the default path “C:\Programe Files\South\GPSSouth”. After selected, please click “next’. Then you will see the course of installing like fig 1-5.

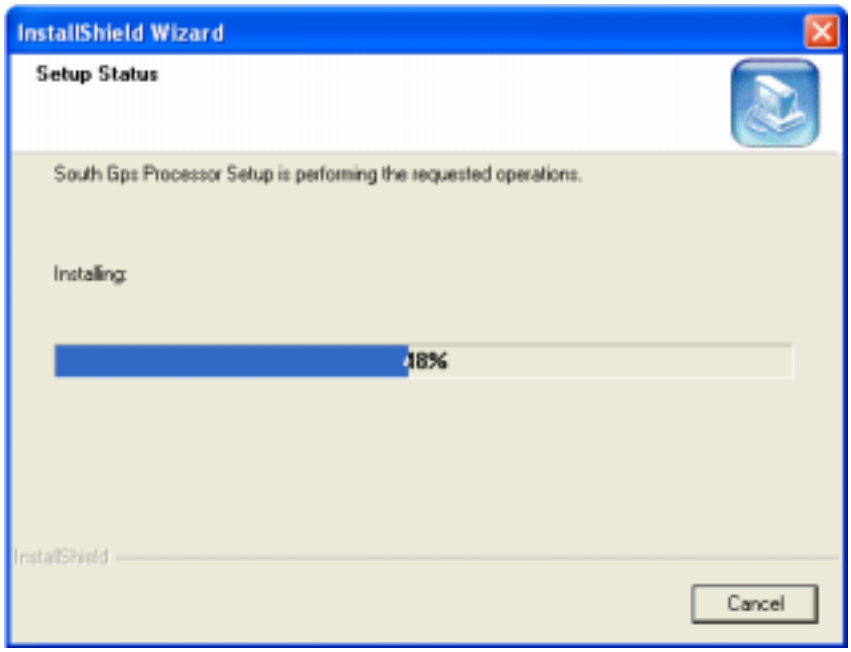


Fig 1-5 The process of installing

When the software is 100% installed, it will show a window like fig 1-6. Please click “finished”.

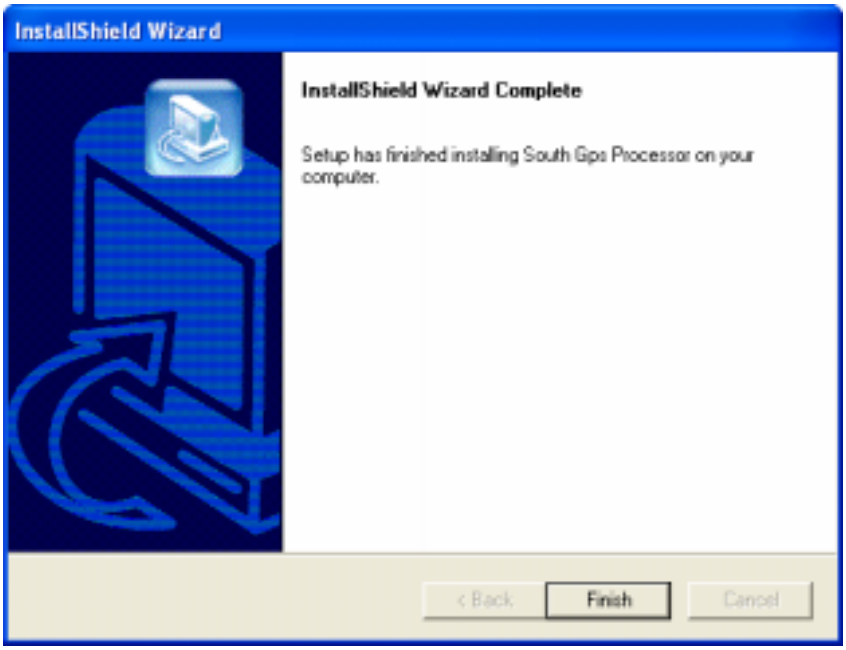


Fig 1-6 Finishing window

After it is completed, it makes a shortcut icon of “South GPS data processing” on computer desk.

1.3 Start-up and the operation steps

Click “South GPS data processing”, it will enter into base line processing software, whose interface is like fig1-7:

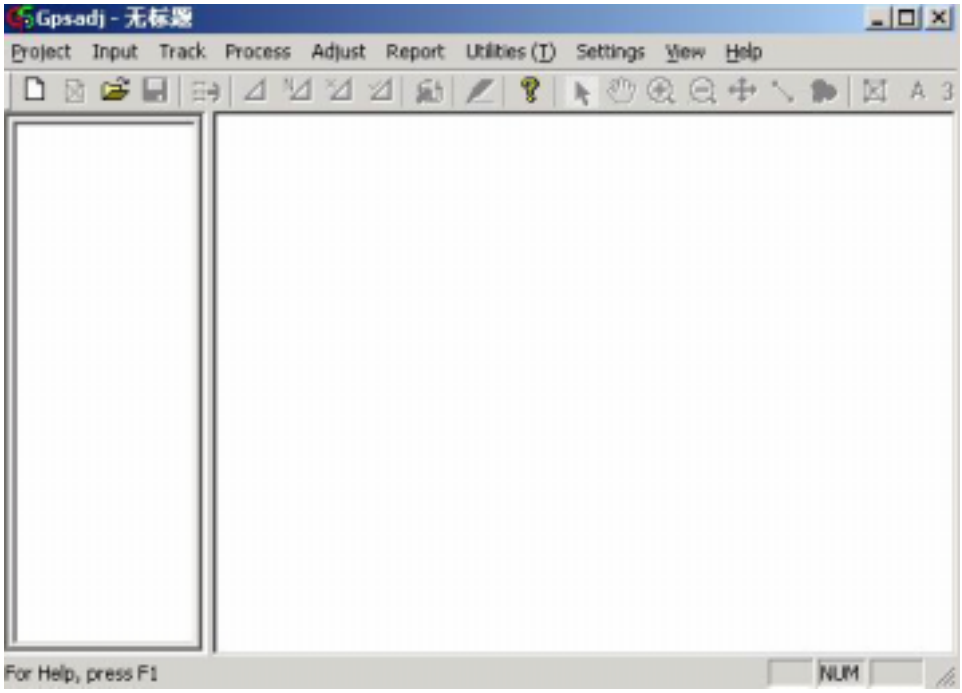


Fig 1-7 Main interface of GPS processing software

The main interface consists of menu bar, tools bar, status bar and current window, and it adopts engineering management mode. So you must create a project as required before you use it. The basic operation steps are as follows:

1. Click “Project”, select “New”, it will show as fig 1-8.

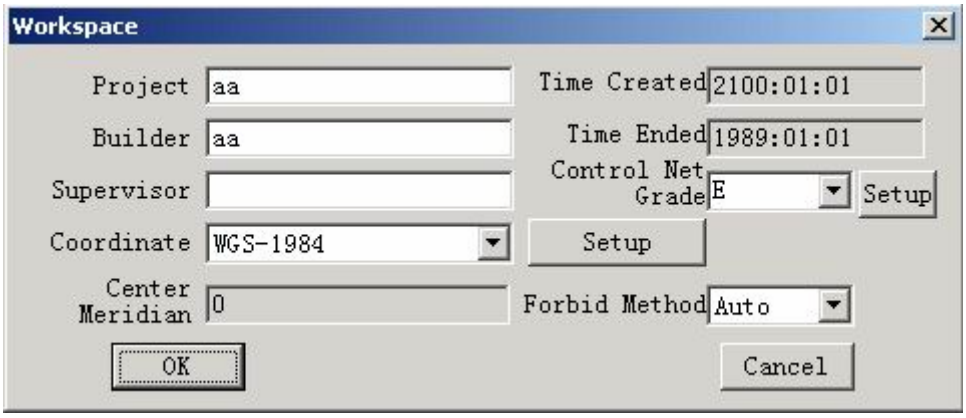


Fig 1-8 Create a project

Please input the project name，builder’s name, and supervisor as required, and choose the coordinates system, the center meridian and baseline forbidding mode, finally click OK. You can also define coordinates system by yourself.

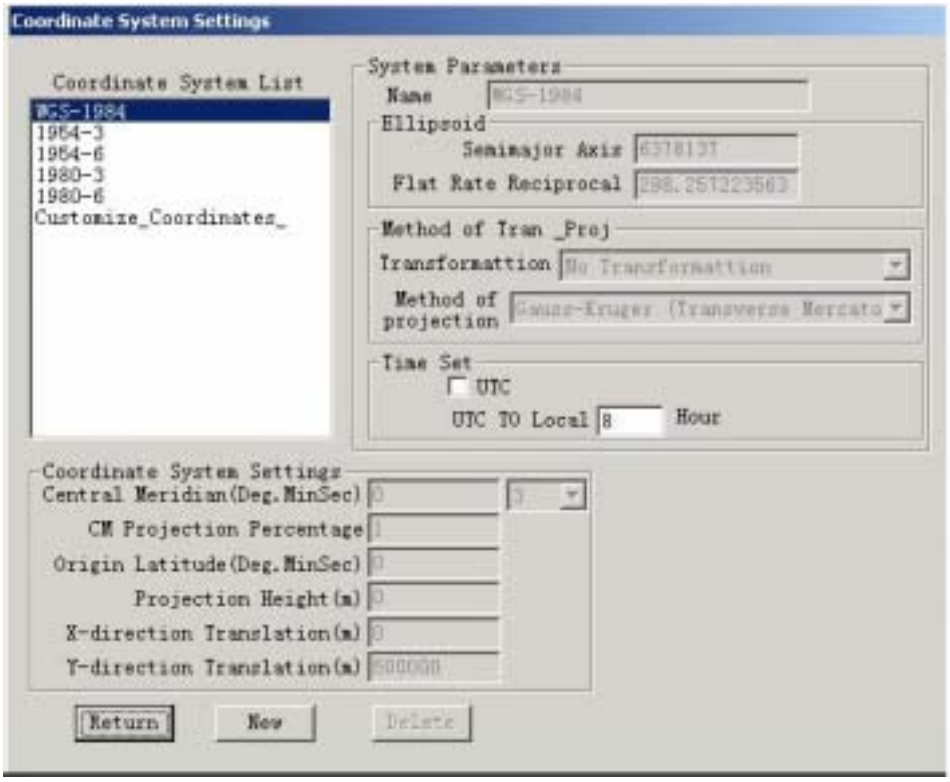


Fig 1-9 Coordinates system setting

In this interface, you can define a coordinates system. You can name the coordinates system, input the ellipsoid parameter and projection setting parameter. After finished, you can use it.

2. Add observed data that collected outside

Please input GPS data which collected outside to the software. These data are in the SOUTH special format of *.sth.

3. Baseline processing

After processing, please check asynchronism and synchronization loop closure error.

4. Condition and adjust the whole net.

5. Check and print the result.

All the above operations will be introduced in details in the following chapters..

Chapter II Software Functions and Menu

2.1 Basic functions and interfaces

GPS ADJ4.0 baseline processing and adjustment software is based on VC++ language. Powerful functions, convenient operations and friendly interface are its main characteristics.

2.1.1 Main functions

1. It can calculate data of all SOUTH GPS receivers. It can also process data that collected from receivers of other brands.
2. It can output different formats of adjustment results conveniently according to different needs.
3. It can process all the baselines automatically, also it can process single baseline manually.

2.1.2 Main interface

The main interface consists of menu bar, tool bar, status bar and current window. Click the status bar, the current window will show the corresponding status of program. After setting up a new program, the main window is as fig 2-1.

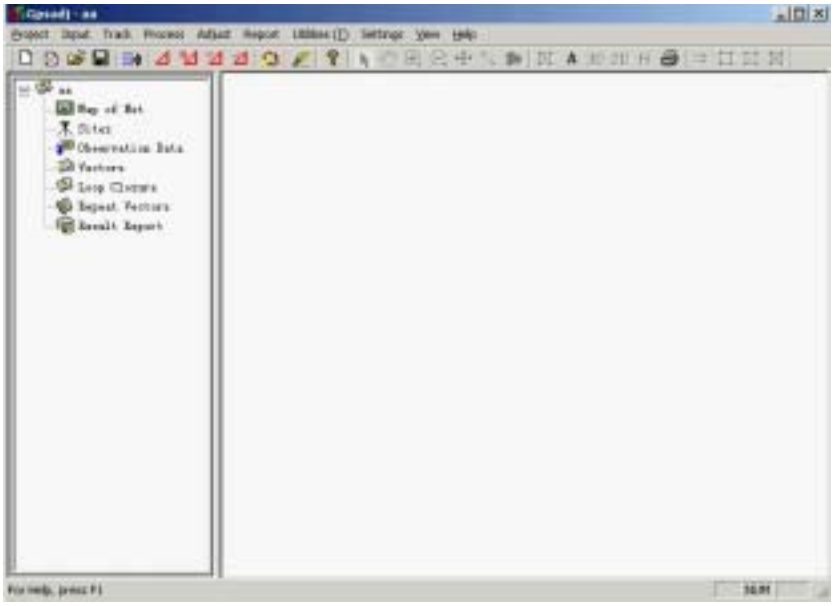


Fig 2-1 Main interface

The status bar in the left part of interface is arranged according to the operation steps of the software.

Map of net: It shows the map of the baseline network and the error ellipse.

Site: It shows the coordinates of every site within WGS-84 coordinates system.

Observed data: It shows detailed information of every raw data file, including the path, name of raw data, name of the site, height of antennae, date of collecting, starting and ending time, and the longitude, latitude and altitude of the site position. Under this status, you can add or delete data file, amend site name and antennae height.

Vectors: You can get some information about the baseline solution, including baseline name, observation band, synchronous observation time, variance, mean square error(error for short), X increment, Y increment, Z increment, length of baseline, relative error, and detailed report of baseline solutions.

Loop closure: You can check information about loop closure, asynchronous loop and minimal unattached closure.

Repeat baseline: You can check the related information of repeat vectors.

Result output: You can check the result and relevant accuracy analysis of free net adjustment, three-dimension conditioning adjustment, two-dimension conditioning adjustment and altitude closure, etc.

The menu bars will be introduced as follows. For tool bars, please refer to Section 2.8**.**

2.2 File

From this section, we will introduce the function of each menu. The file menu is like fig 2-2.

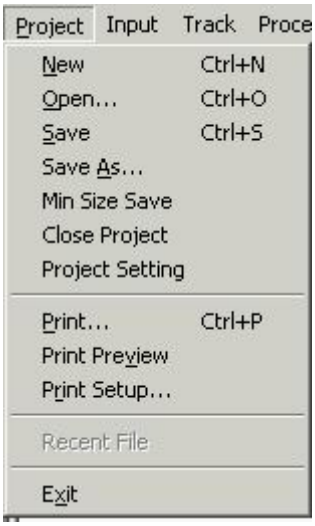


Fig 2-2 File menu

New: create project file

Open: open the saved file

Save: save the current file

Save as: save the current file to other path

Close: close the current file window

Project setting: change information of the project

Print: print the current picture or adjustment result

Print preview: show the file or picture under default printer and default setting

Print setting: set the printer

Recent file: the file that recently be processed

Exit: exit the program

2.3 Input

Input menu is like fig 2-3.

Fig 2-3 Input menu

Add GPS observed data file: You can add new observed data to the new file or the current file. SOUTH format "*.sth" file and standard Rinex 2.0 file can be selected in different paths. Please refer to fig 2-4.

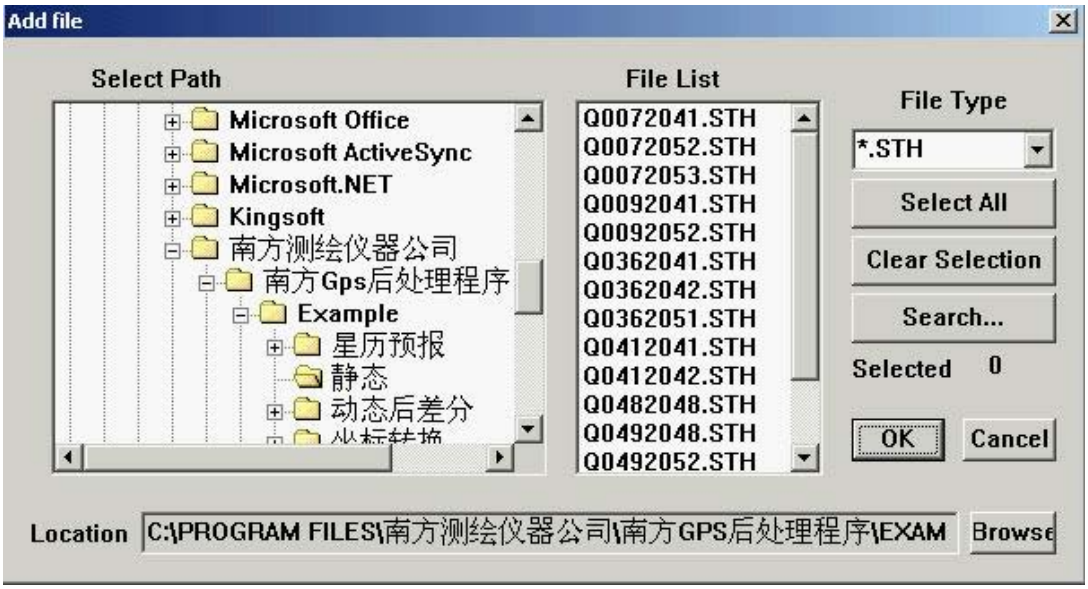


Fig 2-4 Add new observed data

Input station coordinates: when the raw data is needed, click “station coordinates”,. The interface is like fig 2-5.

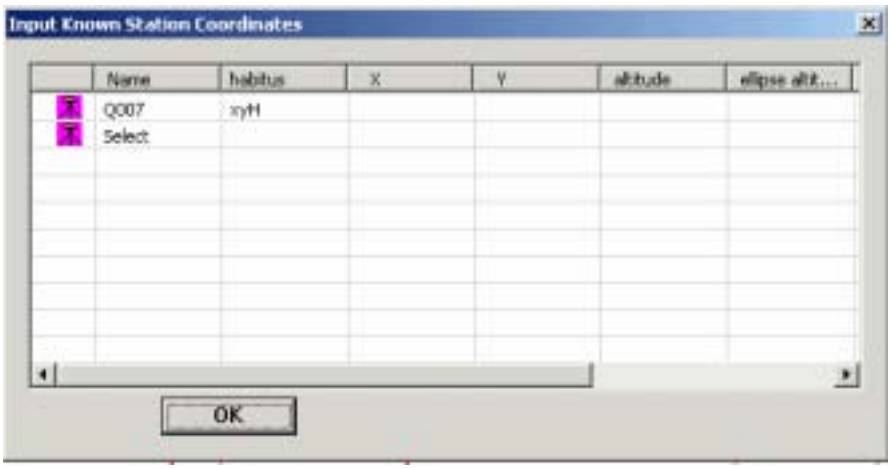


Fig 2-5 Input known coordinates

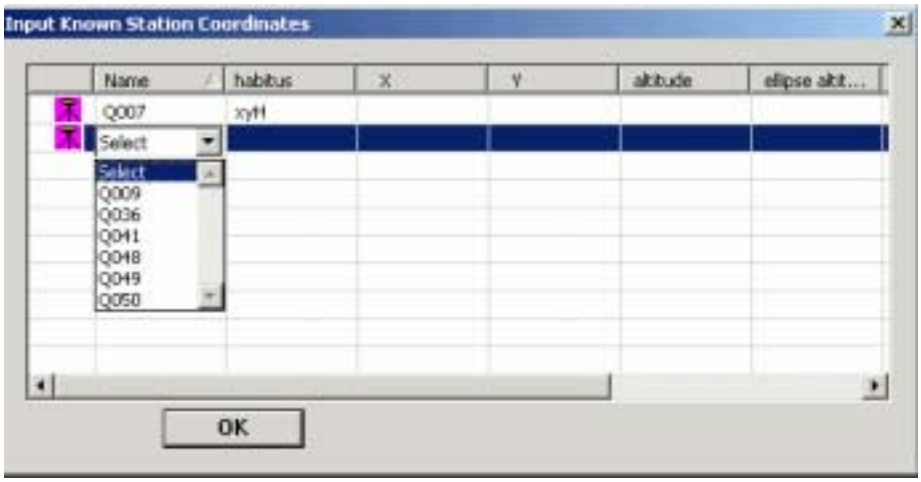


Fig 2-6 Select control points

Then click “status” (fig 2-7):

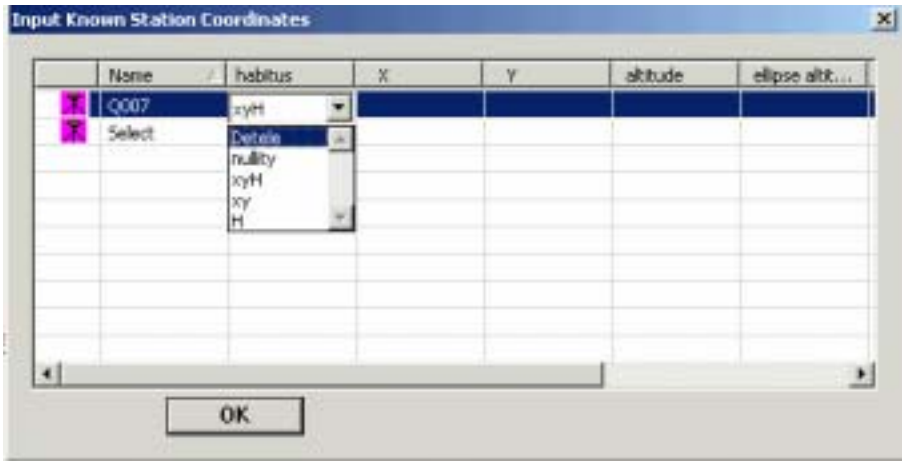


Fig 2-7 Select the status of control points

Input known coordinates (fig 2-8):

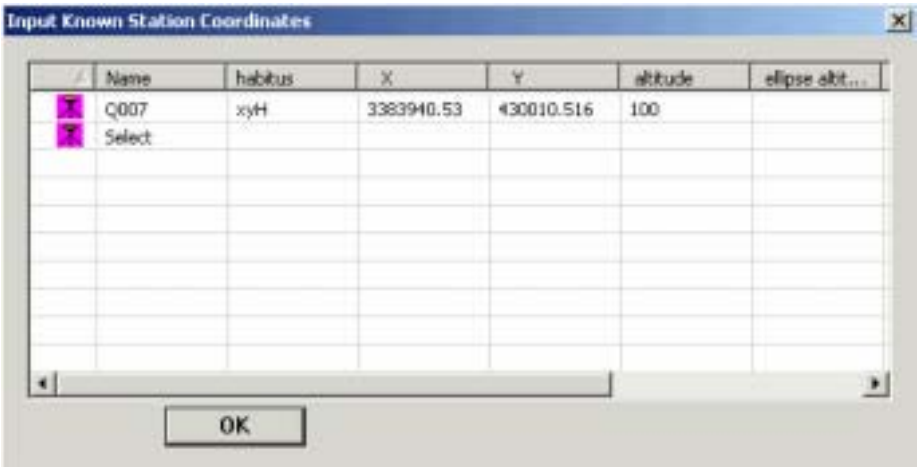


Fig 2-8 Input known coordinates of control points

Repeat the above steps, you can input other known coordinates.

2.4 Process

Process menu is like fig 2-10

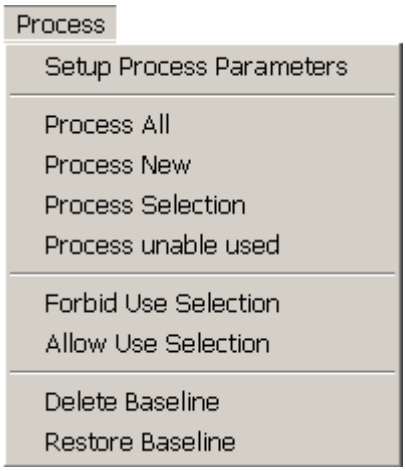


Fig 2-10 Process menu

Setup processing parameters: Before processing, set the conditions of calculation. Click this bar, it will show a window as fig 2-11.

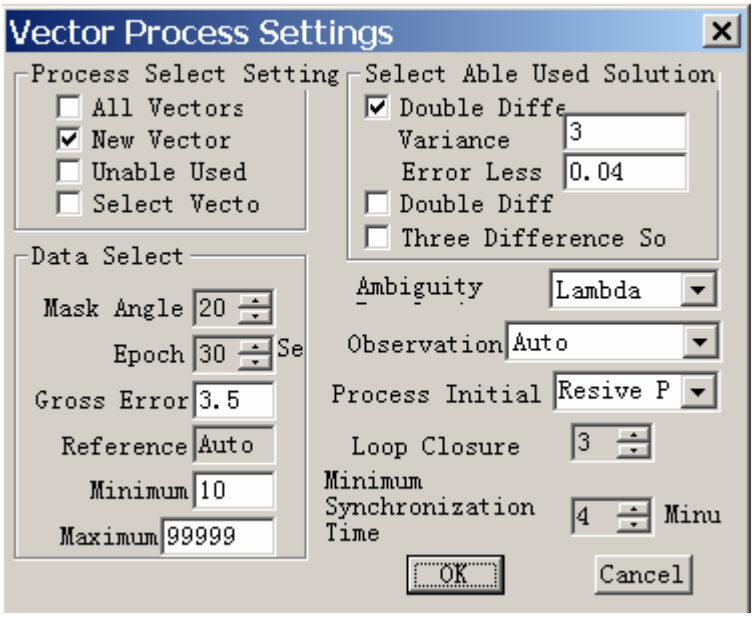


Fig 2-11 Vector process setting

The meaning of each item in fig 2-11 is as follows:

Process select setting:

All vectors: it will calculate all data input. After calculation, the eligible baseline will be red and the ineligible one remains gray.

New vectors: The new vectors will be calculated separately.

Unable used vectors: when you select this, the software will only process the ineligible baseline of last calculation.

Mask angle: it is called mask angle of satellites. We usually set it at 20 degrees. Users can adjust it according to specific need.

Epoch: it is the epoch of calculation. The default value is 5 seconds. You can set it by yourself.

Gross error: The default value is 3.5.

Able used solution selecting: you can select fixed solution, float solution or three difference solution.

Minimum synchronous time: the synchronous baseline whose synchronous observation time is less than the setting value will not be included in calculation.

2.5 Adjust

Adjust menu is like fig 2-12.

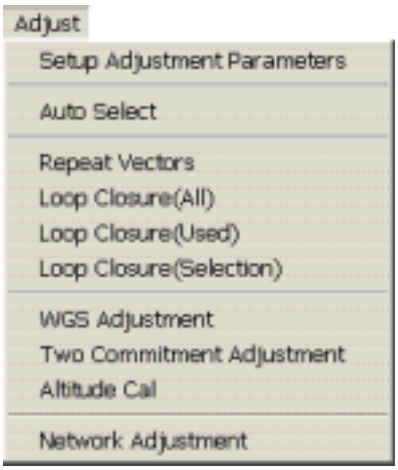


Fig 2-12 Adjust menu

Adjustment parameters setting:

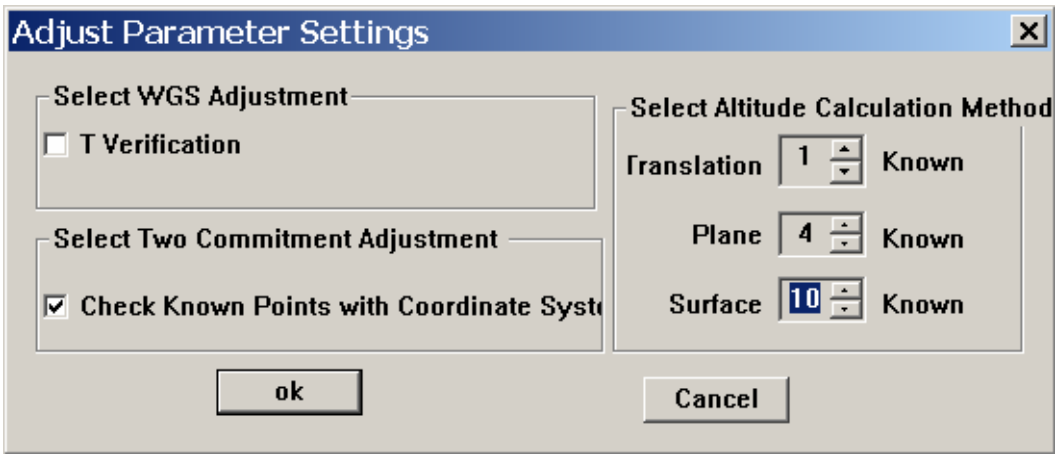


Fig 2-13 Adjustment parameters setting

The setting is checking the match between known coordinates and coordinates system and selecting altitude closure method. When you select “check known points with coordinates system”, if there is big difference between the known coordinates and the system, the software will not adjust. Otherwise, if you do not select it, the software will calculate baselines at any case. The method of altitude closure is to closure GPS altitude control net according to known leveling points.

Auto select：click it after baseline calculating，the software will select the eligible baselines automatically.

Repeated vectors: the software will search the difference of the repeated vectors.

Closure loop error: check the closure loop error including the synchronization loop and asynchronous loop.

Manual calculation: select baselines that need calculating in the net graph or baseline form, then calculate the closure error.

Three-dimension adjustment: it will adjust three-dimension coordinates.

Two-dimension adjustment: it will adjust two-dimension coordinates.

Altitude closure: the software adopts conicoid closure to get height anomaly of every point in order to correct GPS altitude.

Height anomaly is the difference between Geoid and surface of WGS—84 ellipsoid.

2.6 Report

Report menu is like fig 2-14.

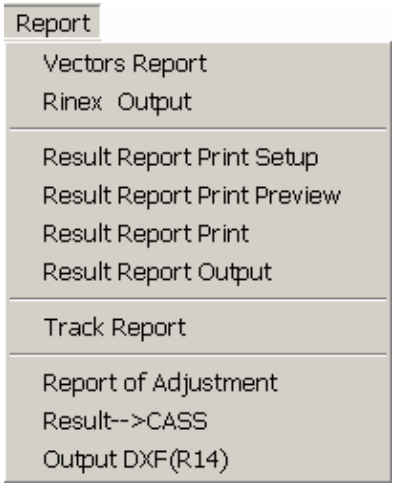


Fig 2-14 Report menu

Vectors output: The calculation result of SOUTH Gpsadj baselines will be exported in the format of txt. You can use other adjustment software to calculate the result. Click “vectors report”, it will show a window like fig 2-15. You can select saving path, then click “output”.

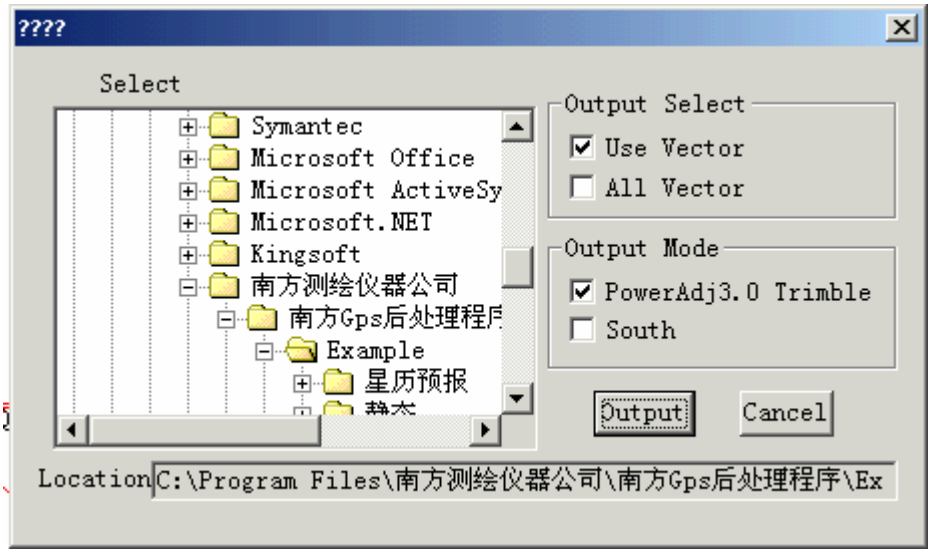


Fig 2-15 Vectors report

Rinex output: It can transform GPS static data to standard Rinex txt format. Click “Rinex output”, you can see a window like fig 2-16.

Fig 2-16 Rinex output path

Report output setting: Click this, you will find a window like fig 2-17. User can set it according to specific needs.

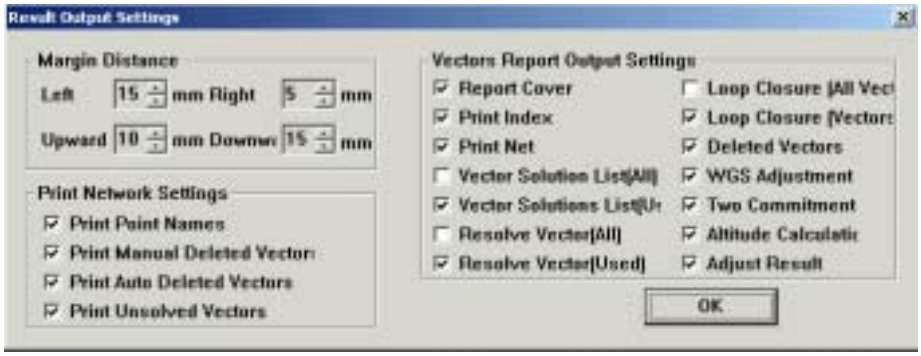


Fig 2-17 Report output setting

Report output preview: preview the network adjustment report before printing.

Report output: print network adjustment report.

Result report (txt format): output result report in the format of txt. Click “Result report”, it will show a file output window, please select the saving path, then click “OK”.

Track report output: it will export the track report. Click “track report”, it will show a window, please select saving path, then click “OK”.

Adjustment report output: it will export adjustment report in the format of txt, as in fig 2-15.

Result → CASS: It will export adjustment report in CASS format, as in fig 2-15.

All the above is to export the calculation result of baseline and adjustment in txt format. After that, the file is saved in your selected path.

Output DXF (R14): it will export the graph of controlling net. Click “output DXF”, it will show as fig 2-18.

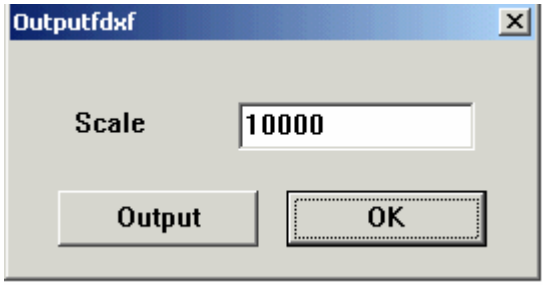


Fig 2-18 Net output setting

Select your needed scale, then click output, see fig 2-19.

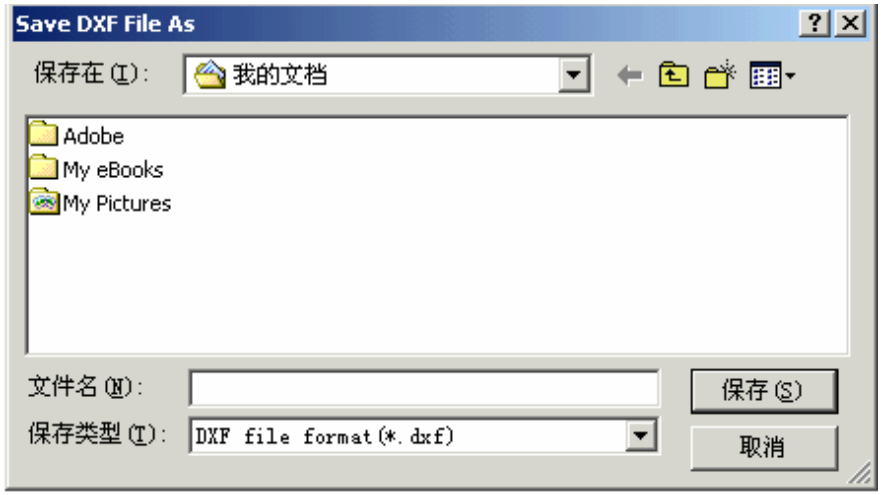


Fig 2-19 File name setting

Please input the file name and saving path.

2.7 Tool

Tool menu is like fig 2-20.

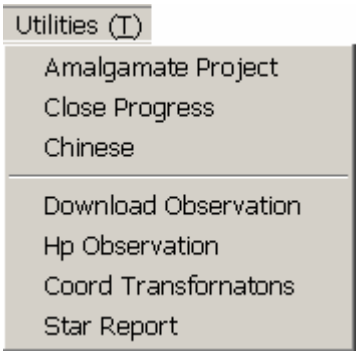


Fig 2-20 Tool menu

In this menu you can see some small tools that are widely used:

Project file combination: combine different project files.

Close progressing bar: close the window that show progress.

Chinese: choose it, then you will enter Chinese interface.

Data download of SOUTH Receiver: please refer to Chapter 6.

Coordinates transform: it can transform space rectangular coordinates, geodetic coordinate system, plane rectangular coordinate system to each other. The interface is like fig 2-21.

Fig 2-21 Coordinates transform

Ephemeris forecast: please refer to 2.10 in this manual.

2.8 View

View menu:

Fig 2-22 View menu

Tool bar:

Shortcut keys for software menus;

 New

 Close

 Open

 Save

 Add GPS observed data

 Process all vectors

 Process new vectors

 Process ineligible vectors

 Process selected vectors

 Track

 Input known coordinates

 About

 Select vectors

 Move

 Zoom in

 Zoom out

 Zoom all

 Distance

 Error ellipse

 Network adjustment

 Auto selecting and adjusting

 Three-dimension adjustment

 Two-dimension adjustment

 Altitude closure

 Print

 Calculate repeated vectors

 Calculate loop closure of all vectors

 Calculate loop closure of used vectors

 Calculate loop closure manually

For status bar, please refer to 2.1 in this manual.

2.9 Setting

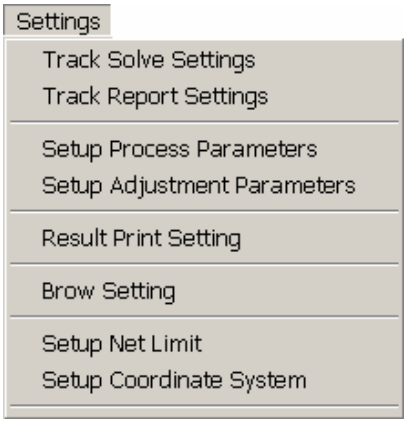


Fig 2-24 Setting menu

Every setting in the menu is introduced in every sub-menu. But the setting in every sub-menu is only effective to the current job, but settings in this menu are effective to any job.

2.10 Help

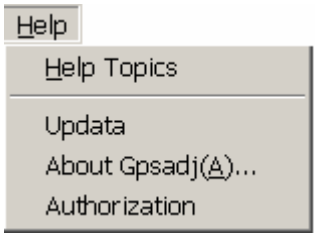


Fig 2-25 Help menu

Help subjects: Click help subjects, it will show a window like fig 2-26 and you can use it according to some tips.

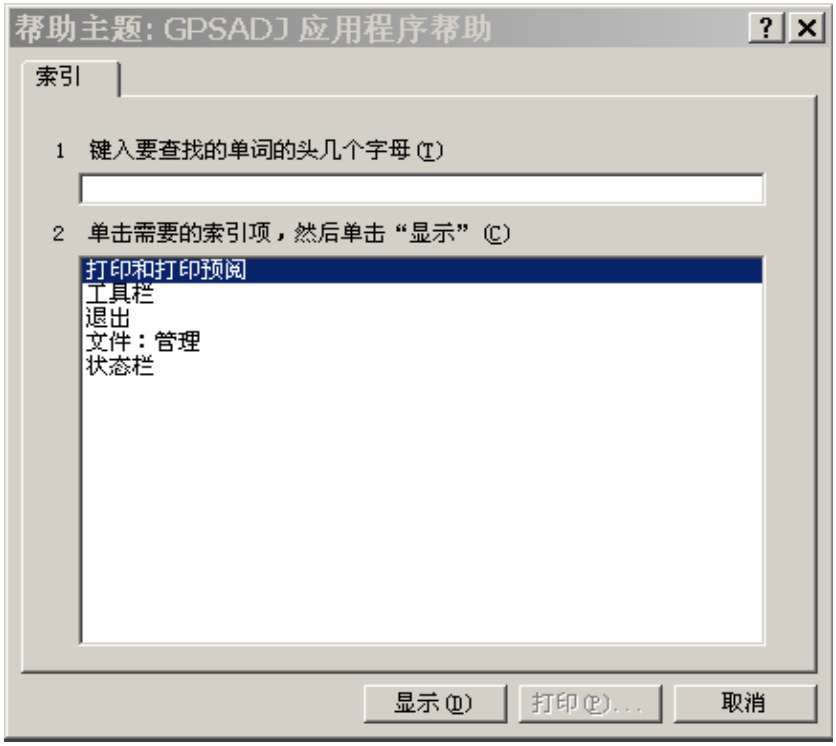


Fig 2-26 Help subjects

Update on line: Click it and it will show a window like fig 2-27.

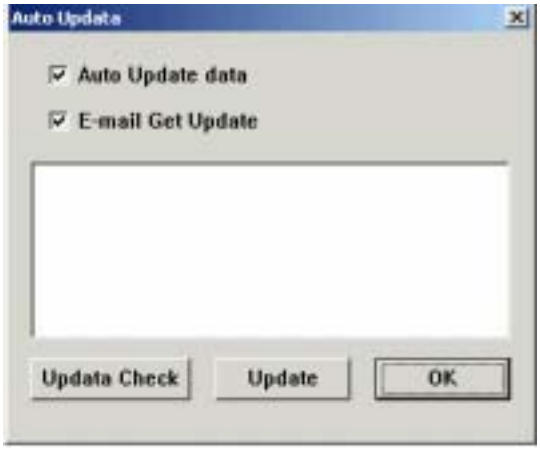


Fig 2-27 Update on line

Click “Update check”, it will show information of updating file.

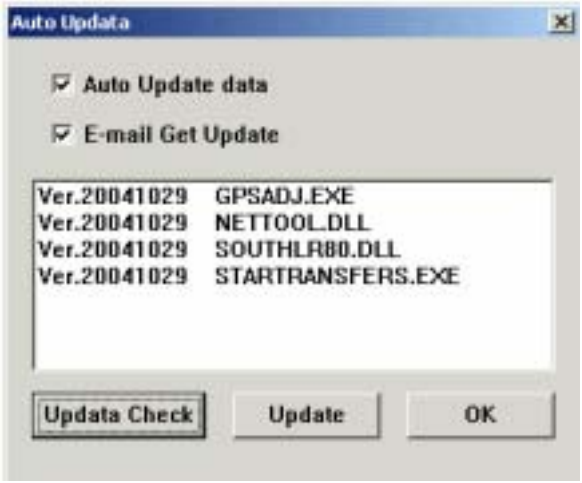


Fig 2-28 Update on line

Click “update”, it will show as fig 2-29 indicating that you have updated successfully. Then please operate according to the tips below.

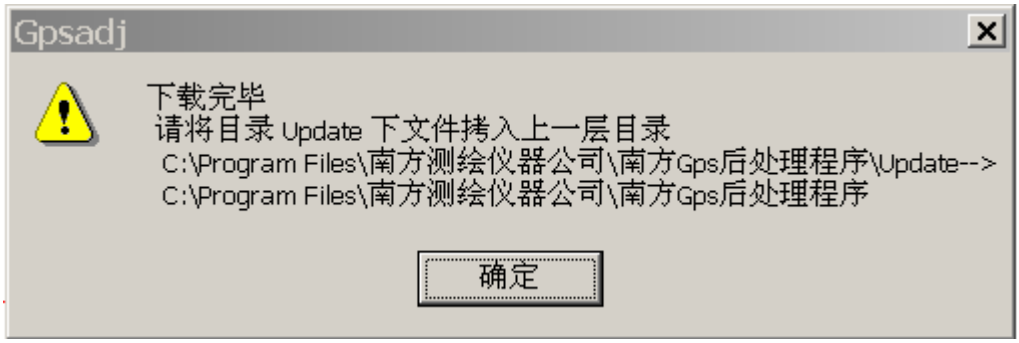


Fig 2-29 Successful update on line

About Gpsadj: Click it and it will show a window like fig 2-30.

Fig 2-30 Version number of the software

Register: Please register the software before using it for the first time. Click “register” and it will show as fig 2-31. Please input user’s name, E-mail address and register code (composed of 16 numbers or letters or their combination). Input register code, then click “register”. This software can not only calculate SOUTH standard data in *.sth format, but also calculate data in other format. However, the calculation result of other format data can not be printed and exported.

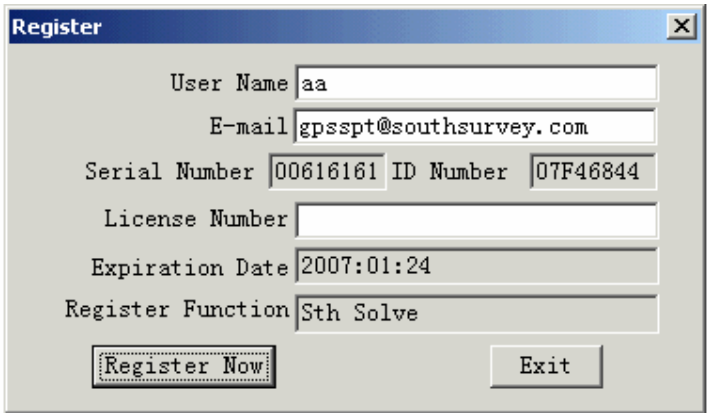


Fig 2-31 Register

2.11 Ephemeris forecast

Ephemeris forecast software under the tool bar is used for forecasting the status of GPS satellites. According to the latest downloaded ephemeris file, the software can forecast satellites status in next 30 days, PDOP value, numbers of satellites, the period that satellites appears, etc. We can choose better period to do field data collection according to the ephemeris forecast. This ensures the quality of the data.

The operation steps are as follows:

At first, please choose “Parameters setting” in the status window on the left.

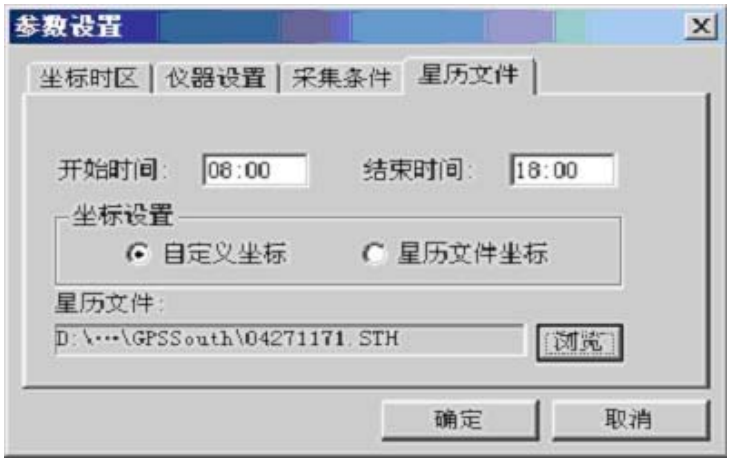


Fig 2-32 Parameter setting

Please set the observation period, such as begin at 8:00 and end at 18:00. Then click “browse” in the ephemeris file bar. When you select the collected ephemeris files, it will show as fig 2-33.

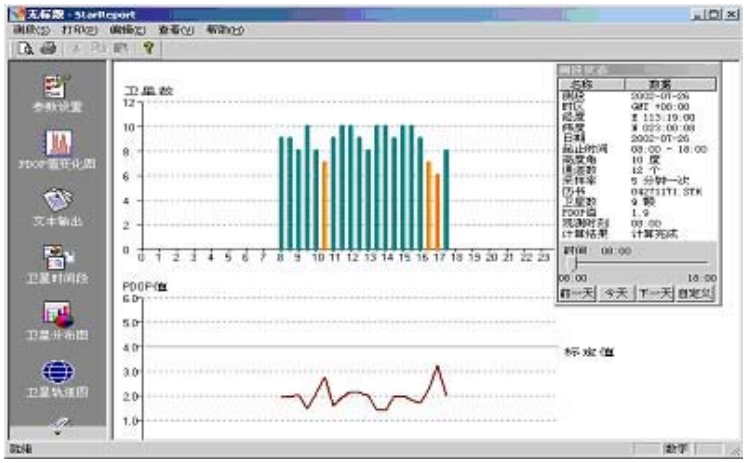


Fig 2-33 Main interface of ephemeris forecast

You can get plenty of information on effective satellites:

1. How many satellites there are in the local sky at any time.
2. PDOP value of the satellites at any time.
3. The period that each satellite appears in the sky.
4. Satellites distribution graph and orbits graph.

Attention: The period of validity of the ephemeris file is 30 days. That is to say, the software can only forecast ephemeris within 30 days from collecting time. When it exceeds 30 days, please collect again or download a new ephemeris file.

Chapter III Typical example

3.1 Basic processing steps

Now we take some control network calculation as example to learn the operations of the software.

3.1.1 New project

When building a project, fill in every item as requested and then click “OK”, see fig 3-1.

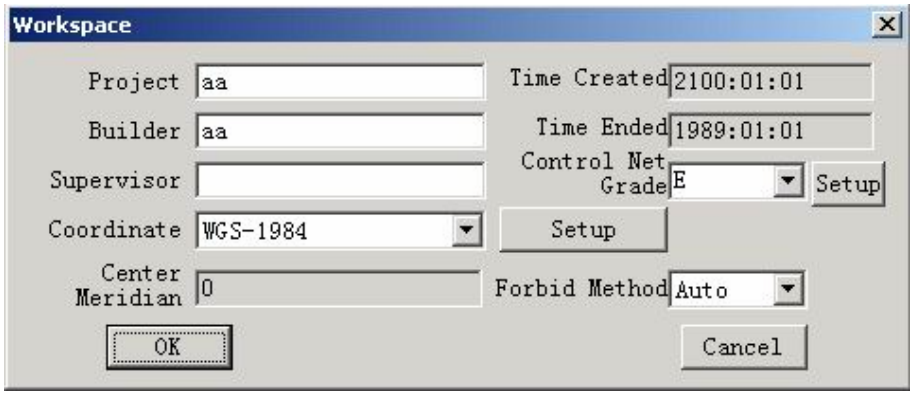


Fig 3-1 Build a project

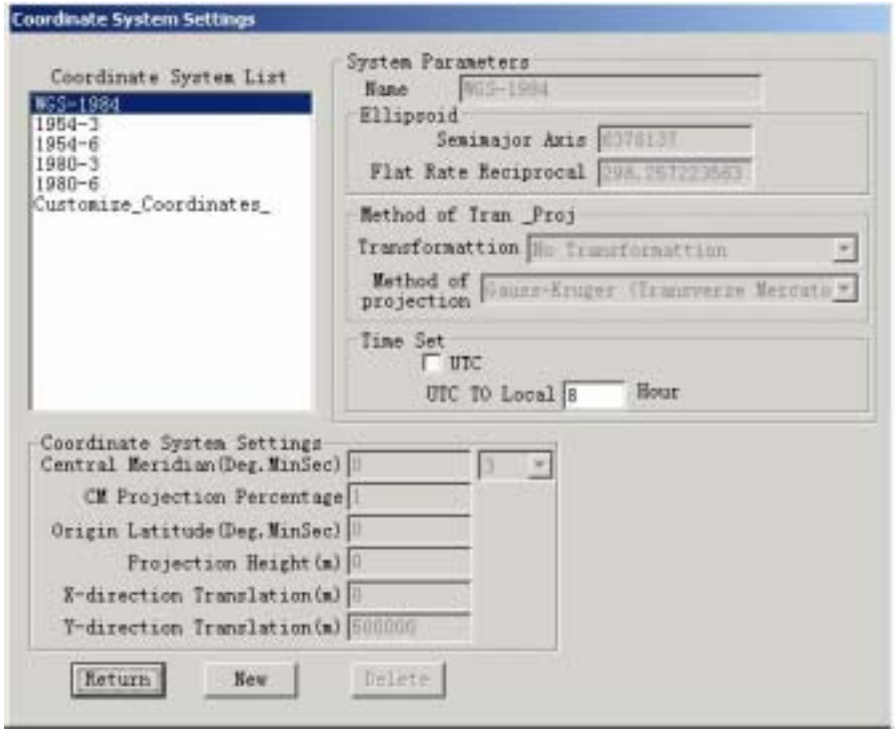


Fig 3-2 Coordinate system setting

3.1.2 Add observed data

Load the collected data into software, click the file one by one, you can also click “Select All”.

Fig 3-3 Data file loading menu

Click “OK” button, it will show data loading progressing bar as fig 3-4.

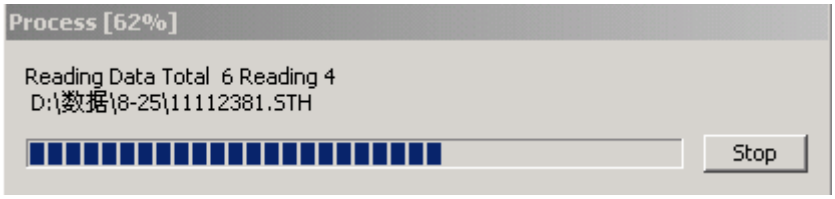


Fig 3-4 Progressing bar

Then wait a moment. After it is completed, the network graph is as fig 3-5:

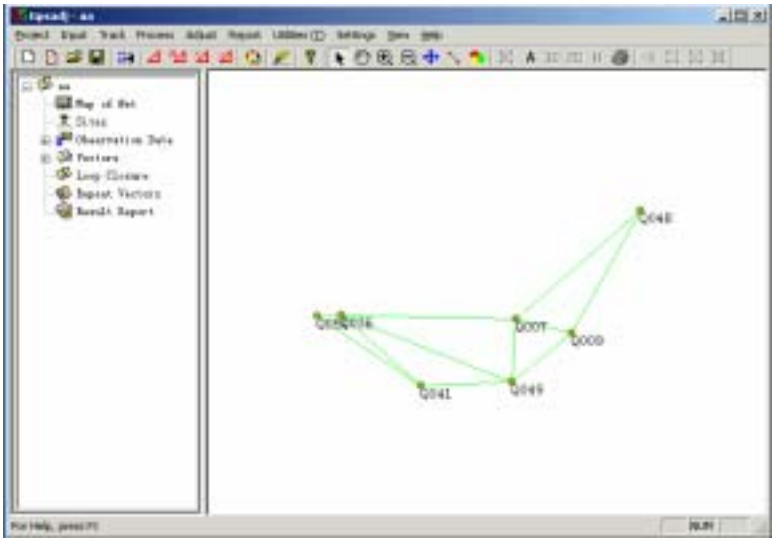


Fig 3-5 Controlling network demo

3.1.3 Process baseline

Select “Process All”, it will show a progressing bar of automatic calculation, as in fig 3-6.

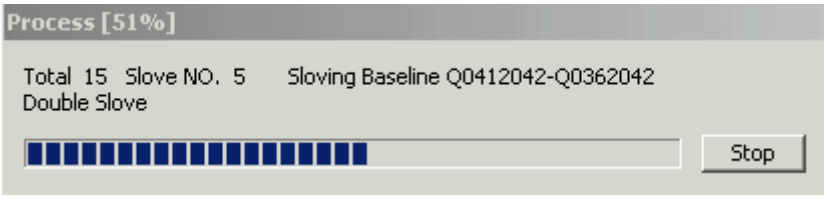


Fig 3-6 Progressing bar

The process may take long, if you want to pause, please click “stop”. After the baseline processing

is completed, the color of controlling network turns from green to red or gray. The baseline whose variance is more than 2.5 (default 2.5) will turn red. It will turn gray if it is less than 2.5. If variance of gray baseline is too low, you can process it again. Now we take baseline “Q009-Q007” for example, select the baseline with double click, it will show a dialog box as fig 3-7. You can set some parameters of baseline calculation.

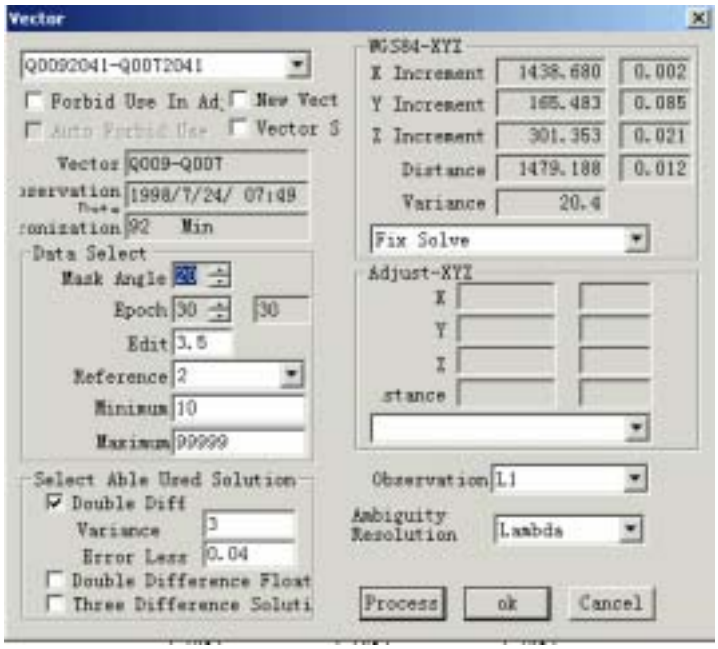
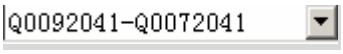


Fig 3-7 Vector information

The meaning and instructions of the settings in baseline processing dialog box is as follows:



: show the currently processed baseline. When there are repeated baselines in “Q009-Q007”, you can choose the repeated baseline that needs revising by clicking the downward arrow, see fig 3-8.

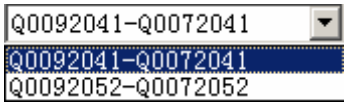
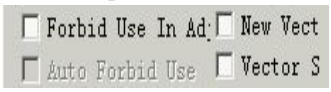
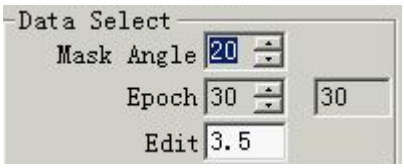


Fig 3-8 Choose baseline

Note：“Q0009” is point name, “204” indicates the surveying date is the 204th day of a year, “1” is the number of period.



Please tick off the small white pane, which indicates that the function has been chosen. “Forbidden” means the current baseline is forbidden. “New” means the current baseline is new. “Selected baseline” means the current baseline is being processed.



The conditions in data selecting is an important factor to recalculate baselines. You can reset altitude closure angle and the epoch interval to recalculate the baseline in order to improve the

variance. In the epoch interval, the first number on the left is calculation epoch and the second is collection epoch. When calculation epoch is less than collection epoch, the software will use collection epoch. Otherwise, it will use calculation epoch. The figure in the “edit” indicates the magnifying modulus of error.

“Eligible solution selecting” is the way to set baseline solution, including dual-difference fixed solution, dual-difference float solution, tri-difference solution. The default setting is dual-difference fixed solution.

If it is still ineligible after calculating by altitude closure angle and epoch interval, please click the status bar and select vectors to see the details of the baseline. For example, click baseline “Q0092041-Q0072041”, you will see the baseline details in the display window (fig 3-9).

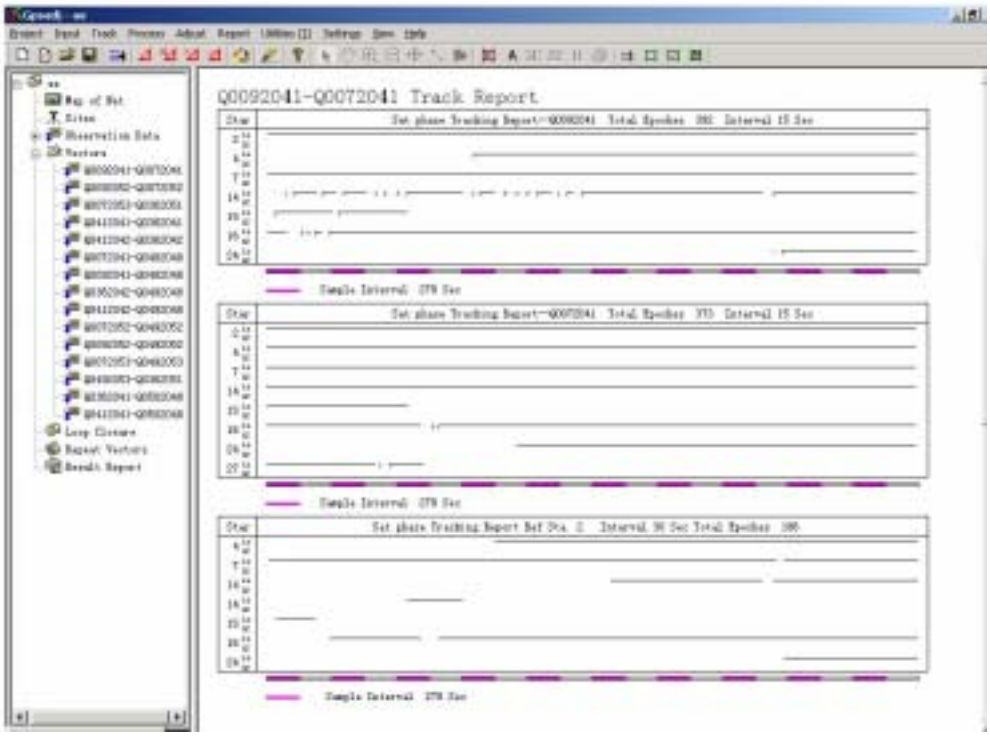


Fig 3-9 Baseline details

When you click “observed data”, it will show all observed data files. Please double click “Q0072041.STH”, it will show a data edition window like fig 3-10. Click  , then press the left key of mouse to circle the broken epoch, it will delete invalid epoch. Click  , it will resume the deleted epoch. After deleting invalid epoch, please recalculate the baseline. If it is still ineligible, please consider measuring the baseline again.

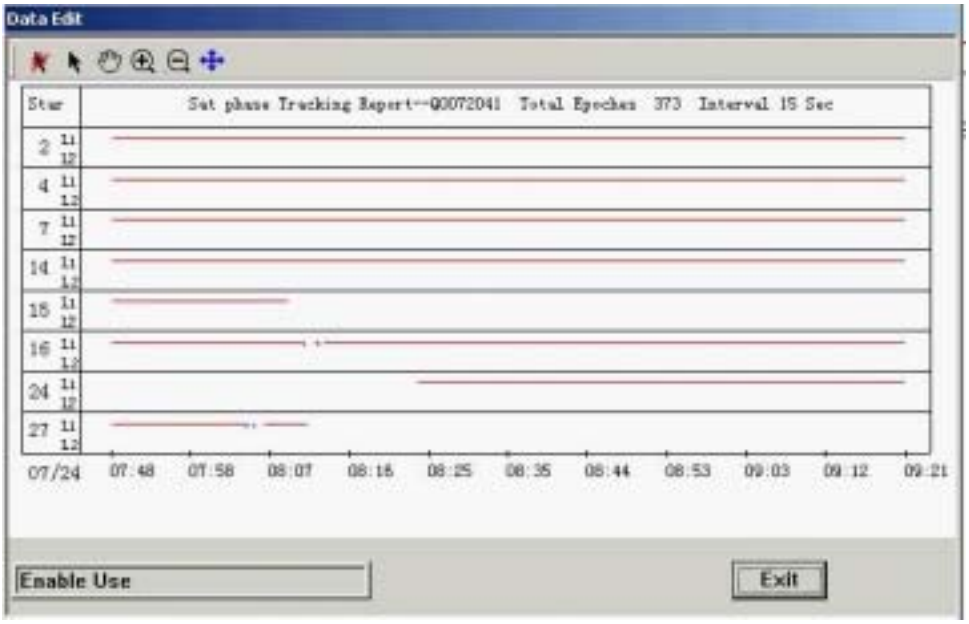


Fig 3-10 Data editing

3.1.4 Checking repeat vectors and closure loop

After calculating baselines, click “closure loop” to calculate closure error. Firstly, the software will check synchronous loop. Then it will calculate the asynchronous loop error. It will search all the synchronous and asynchronous loops automatically. The following fig shows the closure loop error.

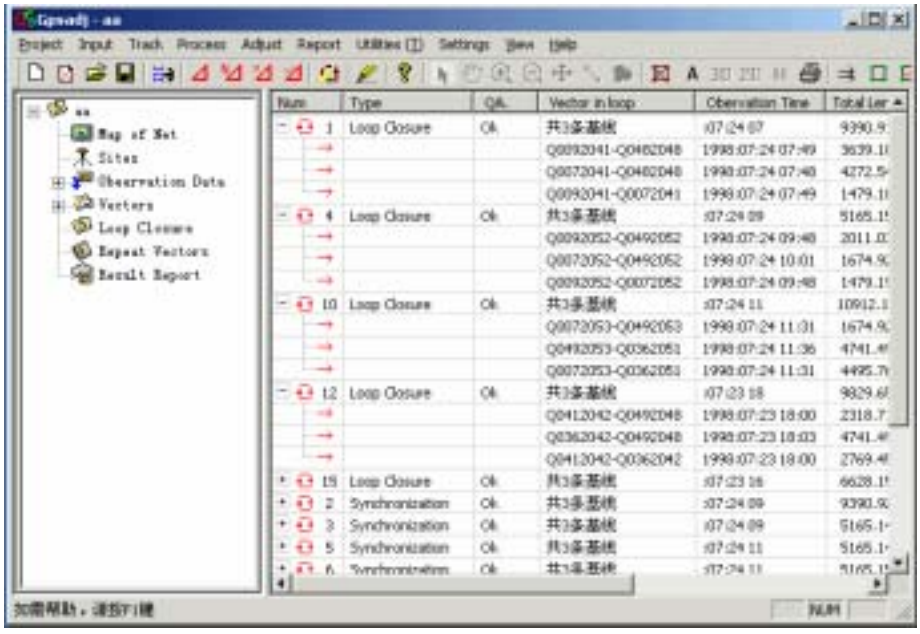


Fig 3-11 Closure loop

From this fig, you can see the range of closure error. If some exceeds the limit, please calculate it again.

3.1.5 Network adjustment and altitude calculation

Ⅰ. Data loading: Input coordinates of known points and prescribe the restrictions.

In this network, we suppose that Q007 and Q049 are two known points. Click “coordinates input” in the menu “data input”, it will show a dialog box as fig 3-12. Select “Q007”, and click blank box of “North X” corresponding to “Q007”, then you can input X coordinates. You can input other coordinates in the same way.

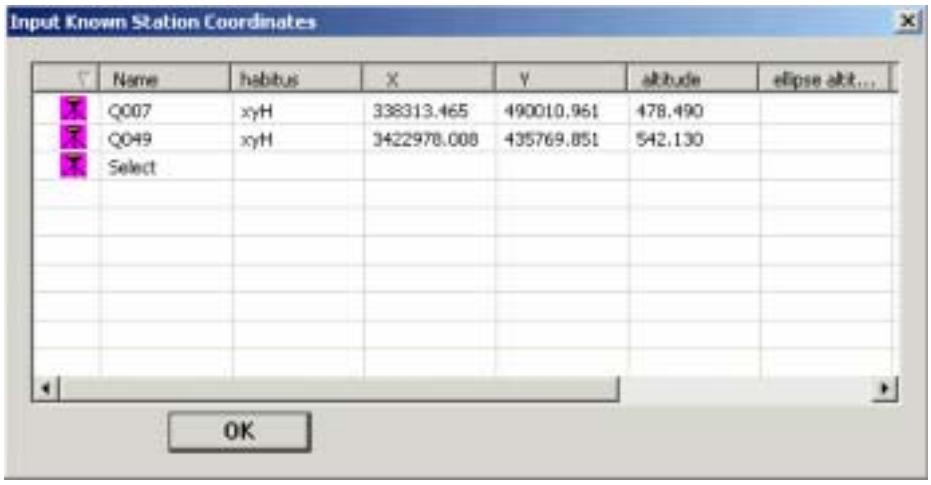


Fig 3-12 Input known points

II. Adjustment: it will adjust the whole net with known points. Please refer to the following steps:

1. Auto Select: Click it after baseline is calculated, the software will select eligible baselines to form network and calculate the closure loop error.
2. Three-dimension Adjustment: it will adjust free net in the WGS-84 system.
3. Two-dimension adjustment: it will adjust and restrict the two-dimension net with known points.
4. Altitude closure: it will calculate the altitude of observed point according to the method of altitude closure in the menu “adjustment parameter setting”.

As to adjustment report exporting and printing, please refer to section 2.6 in this manual.

3.2 An example of baseline calculation

We often come across ineligible baselines when calculating field data. During adjustment, we must delete some baselines of big error and select some known points to restrict adjustment so as to get the best result.

We take a construction controlling net as example to show the basic rules and operations of baseline processing, see fig 3-14.

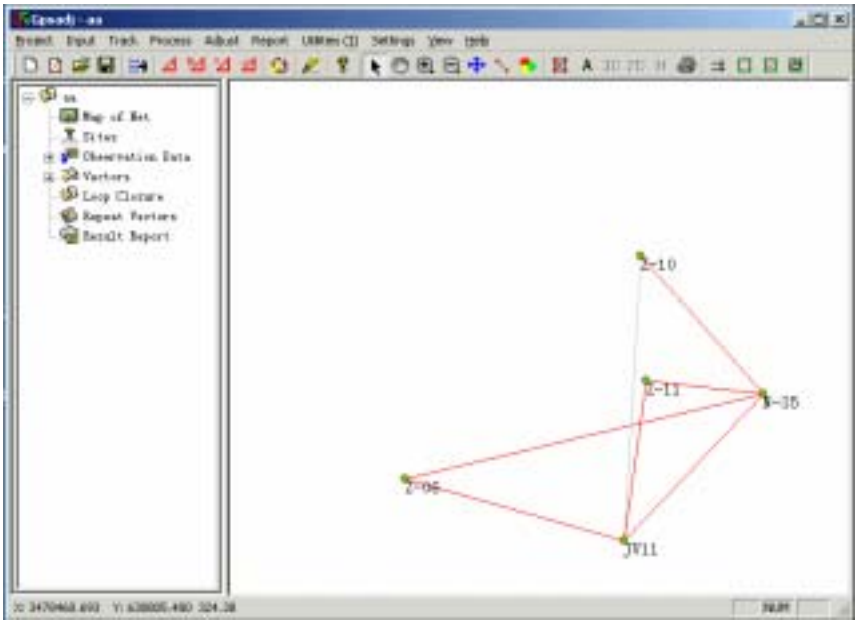


Fig 3-14 Construction net

In the above graph, the baseline Z-103281—JV113281 is not eligible because the variance after calculation is too low, as in fig 3-15.

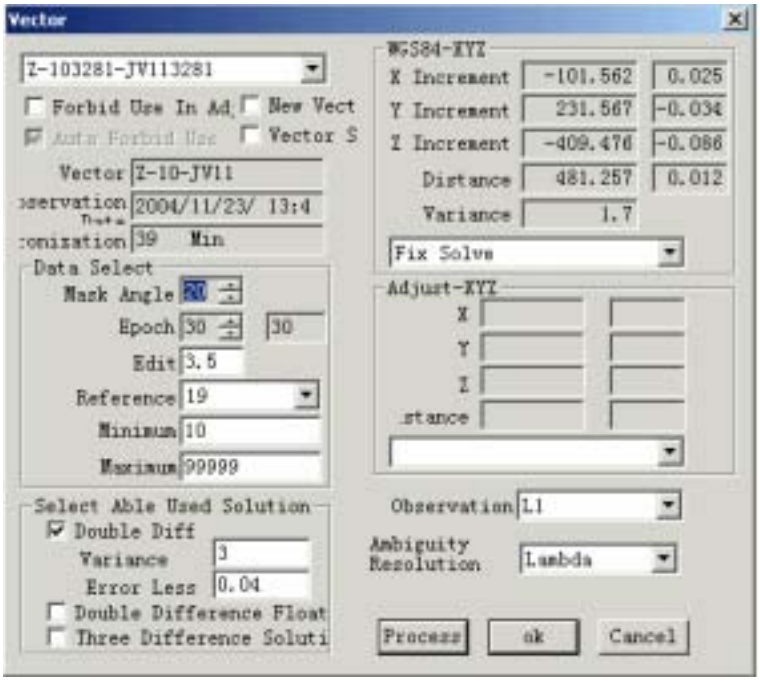


Fig 3-15 Baseline information

For the low-quality data, we can recalculate them. Usually we adopt the following three methods:

I. Select the appropriate epoch interval

You can change epoch interval to satisfy the demand of variance. When your observation time is short, please reduce the epoch interval; otherwise, you may increase it. When there is more cycle slip, you must increase the epoch interval.

II. Select the appropriate altitude closure angle

If changing epoch interval can’t make variance increase, please redress altitude closure angle. We usually increase altitude closure angle properly when there is enough satellites, in this case please

make the best of the altitude satellites data for calculation. When the satellites are few, please decrease altitude closure angle.

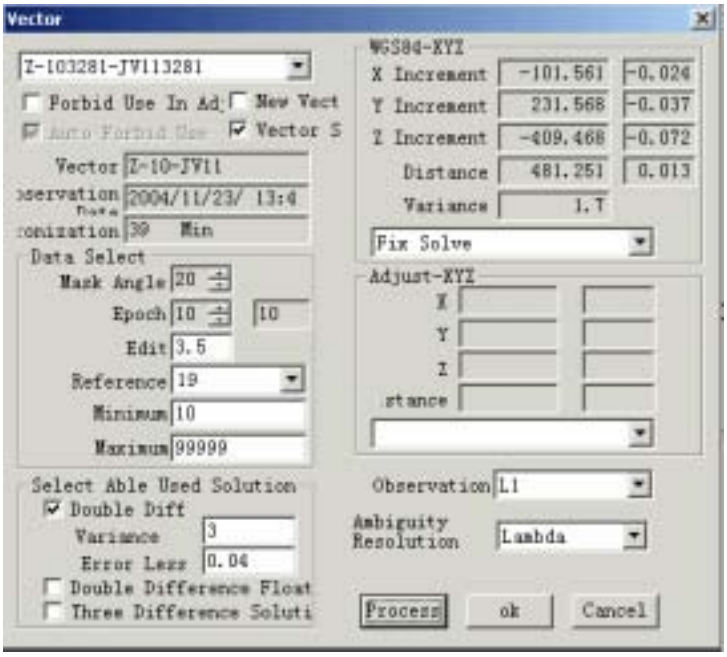


Fig 3-16 Changing epoch

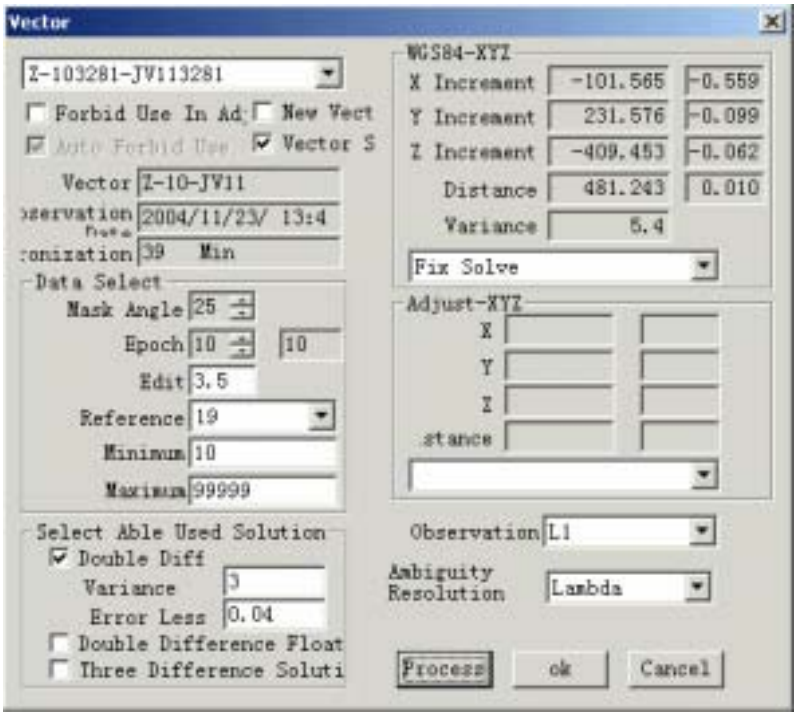


Fig 3-17 Changing altitude closure angle

III. How to delete invalid epoch

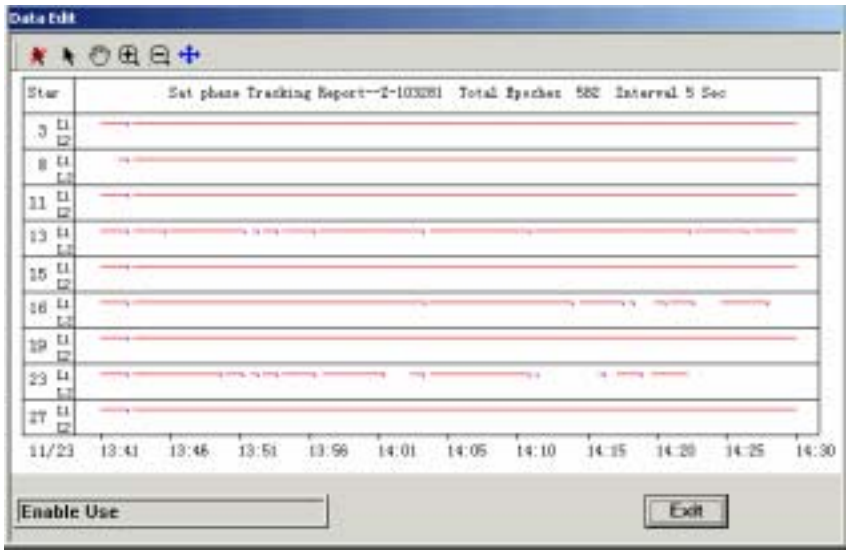


Fig 3-18 Satellite data graph of single baseline

There are many breaks in epoch in fig 3-18. Please click the status bar—observed data, then double click Z-103281, it will show a dialog box as fig 3-18. Red lines express carrier wave signals. Every red line corresponds with a satellite. The serial number of satellite is on the left of fig 3-18. The break of red line expresses signal interruption which is invalid epoch. The tool for deleting invalid epoch is  , click  , you can resume the deleted epoch. After you complete the above steps, please exit the data editing box and recalculate baselines.

All methods mentioned above are general principles, you can use them according to specific demand.

Chapter Ⅳ Data Transmission

4.1 Brief introduction and interface of data transmission software

The software interface is as follows:

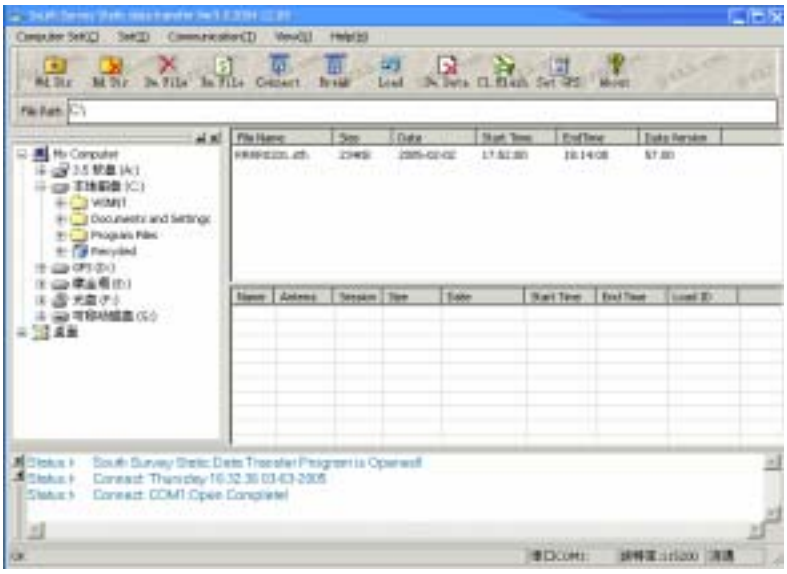


Fig 4-1 main interface of data transmission software

Program interface includes menu item, toolbar, status bar (left window), program window (right window).

4.1.1 Menu item

Menu item includes computer set, set, communication, view and help.

1. Computer set menu.

Computer set menu is to operate for file folders, see fig 4-2.

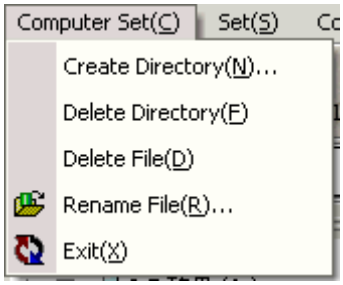


Fig 4-2 computer set menu

(1) Create a new file: Input file folder name, create a new file folder in current directory. Then you will see a dialog box as fig 4-3, input the name and click “OK” button to finish.

(2) Delete file folder: delete the selected file folder.

(3) Delete file: delete the selected file.

(4) Set the file name.

(5) Quit program: quit data transmission program.

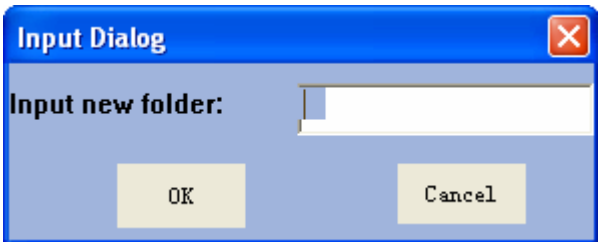


Fig 4-3 new folder dialog box

2. Set menu

This menu is to operate for GPS receiver, see fig 4-4.

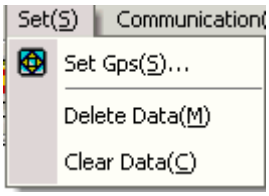


Fig 4-4 setting menu

(1) GPS set: This is to set altitude angle and collect interval, after you select the menu, you will see the GPS set dialog box as fig 4-5. Input relevant sampling frequency and altitude angle, then click “OK”.

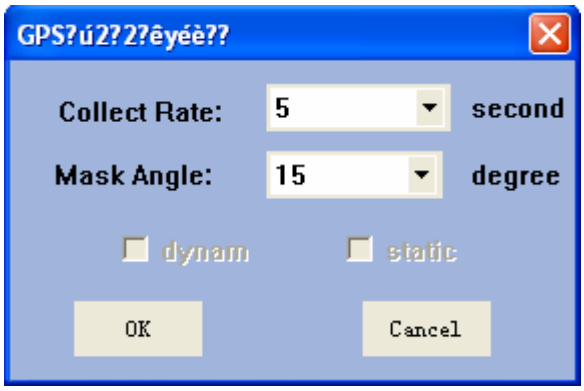


Fig 4-5 GPS setting dialog box

(2) Delete data: delete the selected data in memory.

(3) Clear data: clear all the data in memory.

3. Communication menu

Communication menu is to set the communication between computer and GPS receiver, see fig 4-6.

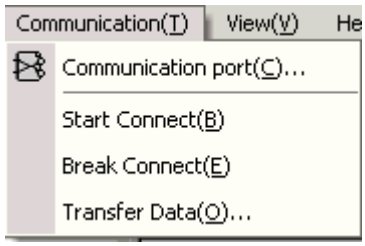


Fig 4-6 communication menu

(1) Communication interface: This is to set communication interface and baud rate, after you select the item, you will see the communication parameters set dialog box, see fig 4-7. Select the interface connected to computer and GPS receiver, click “OK” to finish.

Fig 4-7 dialog box of communication parameters set

(2) Start connecting: connect Polaris 9600.

(3) Disconnection: disconnect Polaris 9600.

(4) Transmit data: select file to be transmitted and use this function, you will see the dialog box as fig 4-8.

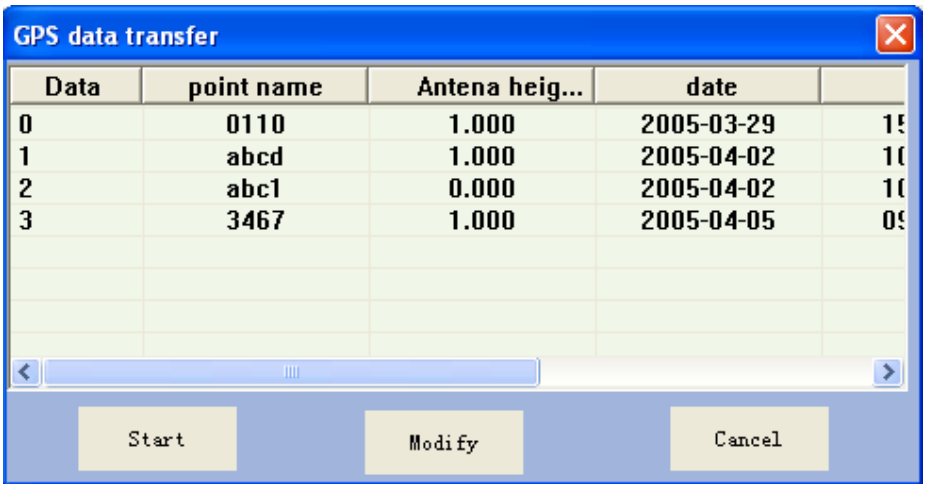


Fig 4-8 data transmission dialog box

After you select the corresponding file, click “START”, data in Polaris 9600 will be transmitted to the corresponding directory. Use this function in work state, you can change the point name, antenna height and observing session number. Point name is made up of four letters or numbers.

4. View menu

View menu is to operate the transmission software itself., see fig 4-9.

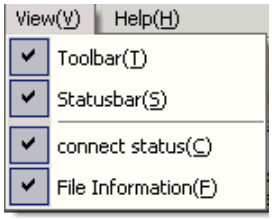


Fig 4-9 view menu

(1) Tool bar: control the visibility of toolbar.

(2) Status bar: show connection status and transmitting progress.

(3) Connecting status: track the status of program during transmission

(4) File information: show computer file directory information .

5. Help menu

Help menu is the online help and receiver registration for transmitting software, see fig 4-10.

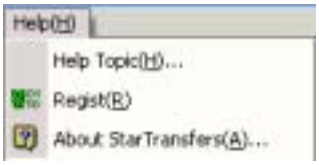


Fig 4-10 help menu

(1) Help subject: The online help about transmission software.

(2) Software registration: register GPS receiver, you will see the dialog box as fig 4-11 after selecting this menu. Input corresponding registration number and click “OK”.

Fig 4-11 receiver registration dialog box

(3) About StarTransfers: our software copyright information and company website. You will see the dialog box as fig 4-12 after selecting this menu, then click “ok” to finish.

Fig 4-12 about StarTransfers dialog box

4.1.2 Toolbar

All items in toolbar are shortcuts. You can see data transmission toolbar in fig 4-13.

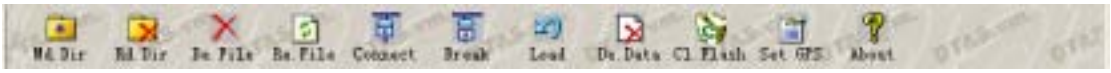
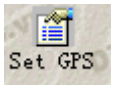


Fig 4-13 data transmission toolbar

1.  Input folder name, create a new file folder in current directory.
2.  Delete the selected folder.
3.  Delete the selected file.
4.  Set file name.
5.  Connect Polaris 9600 to computer.
6.  Disconnect with serial-port, disconnect Polaris 9600 to computer.
7.  Select the file to be transmitted and transmit it back to computer.

8.  Delete selected data in 9600.

9.  Clear all data in 9600 receiver (you can only use it after make sure all data have been transmitted to computer safely, , otherwise all the data will be lost).

10. 

Set altitude angle and collect interval.

11. 

Software edition information.

4.1.3 Status bar

Status bar is on the left window of program, which shows detailed process of each operation.

4.1.4 Program window

Program window is on the right window of program, the upper half shows the file content in computer, the lower half shows the data in 9600 receiver.

4.2 How to transmit data

In this section, we will introduce how to transmit outside observation data to computer, steps are as follows:

Ⅰ.Preparation before connection

1. Turn on switch and make sure the power is enough.
2. Connect cable to computer serial-port 1(COM1) or serial-port 2(COM2).
3. Wait about 10 seconds till the receiver enters main interface, then you can connect and transmit data (you cannot transmit data in initial interface).
4. Set file folder to save outdoor observation data, you can set it in data communication software.

Ⅱ. Set communication parameters

1. Select “communication port” in “communication” menu, you will see a dialog box as fig 4-14.
2. Select communication port COM1 or COM2 in set dialog box, click “OK” to finish.

Fig 4-14 communication parameter set dialog box

Ⅲ. Connect computer and GPS receiver

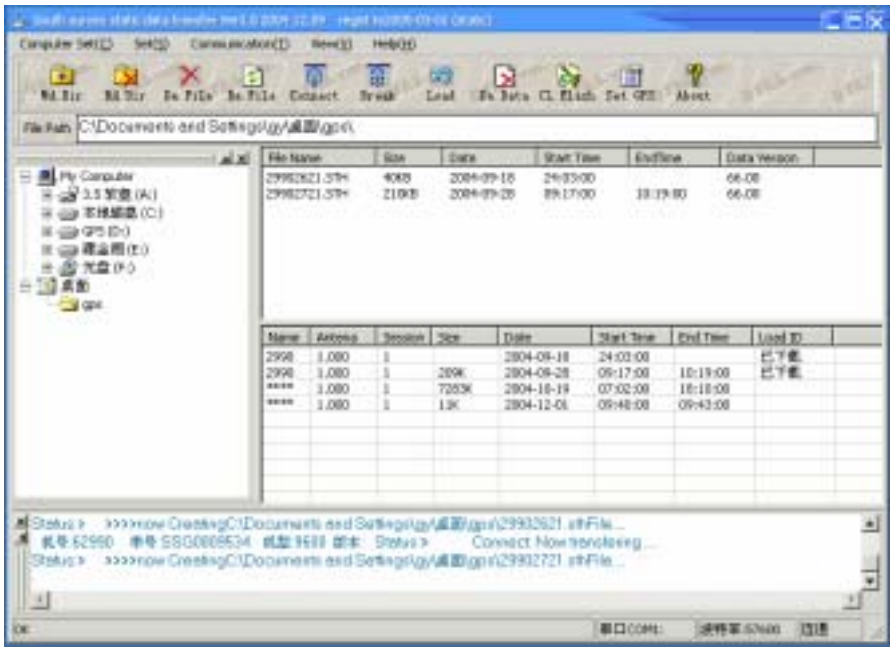


Fig 4-15 program menu after connecting computer to GPS receiver

Select “start to connect” in “communication” menu or click “ 

” directly in toolbar. If you correctly set communication parameter in second step, the connection will be performed. You will see outdoor observation data in lower half of program window, see fig 4-15. If you set communication parameter incorrectly, please repeat the second step.

Ⅳ. Data transmission

1. Select “transmit data” in “communication” menu, you will see the dialog box as fig 4-16.
2. Select outdoor observation data in GPS data transmission dialog box, then click “Start”.

Ⅴ. Break connection

Select “break connect” in “communication” menu or select “ 

” directly in toolbar to disconnect to computer and GPS receiver.

For example, if you want to save data to file folder JT in root directory E, please refer to the below operation:

1. Open file folder JT in root directory E.
2. Select data you want to transmit (for example point data 2113), see fig 4-16.
3. You can change point name, antenna height, time period number in fig 4-16.
4. Click “start”, the data “2113” will be transmit to appointed directory E:\JT .
5. Break connection.

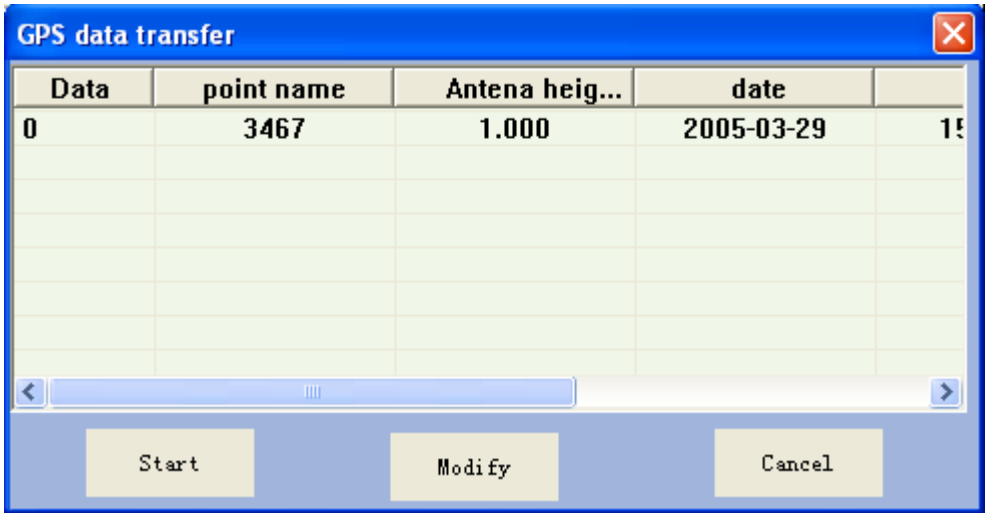


Fig 4-16 GPS data transmission dialog box

4.3 Expanded function of data transmission software

4.3.1 How to input registration account

Registration account is a user identification code to make sure users apply our company's GPS production correctly and legally. Please preserve it properly, the steps is as follows:

I. Select "software registration" in "help" menu, you will see a dialog as fig 4-17.

Ⅱ.Input registration account applied from our company in dialog box, then click "OK".

Note: Registration account has 21 digits, if digit is not enough, program will not identify it.

If the registration account is correct, you will see a dialog box as fig 4-18 to prompt registration finished.

If registration account is incorrect, you will failed registration dialog box, see fig 4-19.

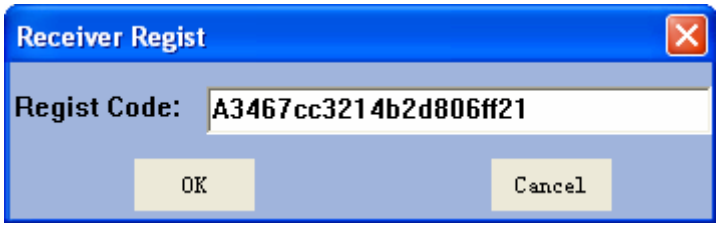


Fig 4-17 registration dialog box

Fig 4-18 successful registration dialog box

Fig 4-19 failed registration dialog box

4.3.2 Test registration account

Connect GPS receiver to computer, start up data transmission software, the topic bar will show registration account date. If the date is earlier than current date, it indicates that registration account is expired, please contact our company to ask for correct registration account.

4.3.3 Set function

You can set collect interval and altitude angle of GPS receiver in data transmission software. Select “set GPS” in “set” menu, you will see the parameter set dialog box as fig 4-20.

Sampling frequency: For example, set sampling interval as 5 seconds, then receiver will collect a epoch data every 5 seconds and collect 12 epoch data in every minute.

Satellite altitude angle is altitude closure angle, if you set 10 degrees, receiver will lock satellites with horizon elevation angle more than 10 degrees and screen other satellites.

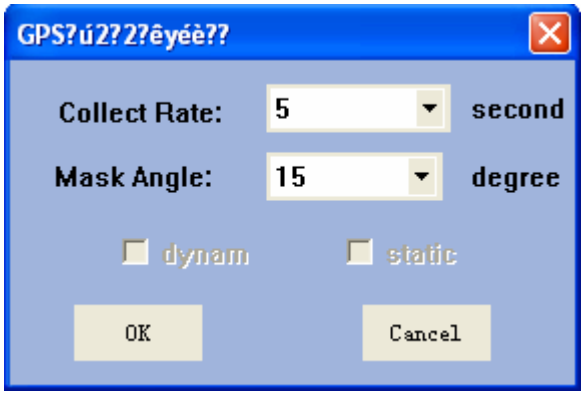


Fig 4-20 parameter setting dialog box

Notice: The parameter set of every GPS receiver should keep accordant. If you change one GPS receiver’s parameter, others’ must be changed accordingly.