SNAP: Survey Network Adjustment Package
User's Guide

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1 Using This Manual

This manual describes the use of the Survey Network Adjustment Package (SNAP) software. This chapter describes the organization of this manual and the notations used in it.

Organization

We recommend that you read through the Introduction to become familiar with SNAP's capabilities.

The Installation chapter describes the hardware and software configuration SNAP requires, lists files in the SNAP distribution package, and provides instruction for installing SNAP onto your computer.

SNAP BASICS tells you how to navigate the SNAP graphical user interface using the mouse.

The **GETTING STARTED** chapter is an overview of the procedural flow for typical network adjustment scenarios. It briefly explains SNAP's main function modules and provides a procedure for running a typical adjustment.

The **TUTORIAL** chapter details the step-by-step procedures for running SNAP using supplied sample data as input. You are walked through each screen encountered during an adjustment.

The remainder of this manual comprises:

- Reference chapters describing in detail the MAIN MENU screen and each main function module: IMPORT, EDIT, EXPORT, PROJECT MANAGER, ADJUST, DEFINE, REPORT, ANALYZE, and SETUP.
- Reference appendices describing understanding your results, error messages, and file definitions.

Notations

This section describes the notational conventions used in this manual.

- Bulleted lists set off items of equal importance.
- Numbered description items indicate a sequence of actions the program takes.
- Numbered instruction steps indicate a sequence of steps you are to perform.
- Typed commands are given in BOLD letters, e.g.: SNAP<Enter>
- Displayed data entry fields and labels are bold.
- Keys on your computer keyboard are enclosed in "<" and ">"; you are to press the corresponding key.

Examples:

<F10> means press the function key labeled "F10".

<Esc> means press the key labeled "Esc" (escape).

<Enter> means press the enter key; it may be labeled CR, Return or ø.

<6> means press the number "6" key.

.

2

Introduction

Ashtech's SNAP (Survey Network Adjustment Package) provides a rigorous and powerful adjustment package with Ashtech's highly sophisticated, easy-to-use graphical interface. SNAP's advanced graphical interface seamlessly guides you through the steps required for performing the adjustment, making an often complicated process easy and understandable. With SNAP you can:

- Perform pre-adjustment analysis via a graphical loop closure or the verify network function.
- Perform adjustments for GPS vectors and/or terrestrial observations.
- Perform adjustments on various ellipsoids/datums.
- Automatically compute geoidal separations during data import, or after adjusting the network.
- Graphically analyze the quality of the adjustment, easily identifying and dealing with problems.
- Create customized reports of the adjustment, enabling you to include only the information of interest.

SNAP is available as an integrated component of the WinPrism software suite or as a standalone package.

3

Installation

This chapter describes the minimum and recommended system configuration required to run SNAP, the SNAP software distribution package, and installation of the SNAP software.

System Configuration

The SNAP software is designed to run on an IBM Personal Computer/AT™ or compatible, using the industry-standard operating system, Microsoft MS- DOS™. Like all computer programs, SNAP achieves results faster when a more powerful computer is used. It can run on the minimum setup shown in the following table; however to significantly reduce your processing time, use the recommended system. It has been our experience that purchasing a recommended system is a cost-effective investment and will better utilize your time.

When buying equipment, Table 3.1. can guide your purchase:

Table 3.1. Equipment Minimum Recommended

Item	Minimum Requirement
CPU	486 or equivalent running at 33 MHz or faster
RAM	16 MB
Hard disk	40 MB of free disk space for program installation. Data will require more space.
Operating system	Windows 95 or NT
Printer	Laser, 300 dpi
Monitor	Color\, VGA, resolution 640 x 480 or higher
CD ROM	2x speed

Connect a mouse to your computer and install its driver according to the instructions provided.

SNAP Software Files

The SNAP software distribution disks contain the installation program and compressed SNAP program files, geoid model files, and two sets of sample data files.

SNAP Installation Procedure

The following installation instructions apply only if SNAP is installed as a standalone product. **If you purchased SNAP as part of WinPrism, SNAP is installed automatically with the WinPrism software, and you may proceed directly to Chapter 4, "SNAP Interface Basics".**

Install the SNAP software as follows:

1. Insert the disk labelled "SNAP Disk #1" into one of your floppy disk drives.
2. To install the SNAP software from the A: drive, at the DOS prompt type A:INSTALL (no parameters) and press <Enter>.
3. If installing from the B: drive, at the DOS prompt type B:INSTALL.
4. Observe the following message:

```
This program will install Ashtech's SNAP Version 1.0 on
your computer system and verify the integrity of the
distribution files.

   You can press the [Esc] key at any time to abort the
installation.

 Press [Esc] to quit, any other key to continue ...
```

5. If you press a key to continue, SNAP displays:

```
Detected Computer Configuration

DOS Version:  5.0

CPU type is an 80386

Math coprocessor detected

Total extended memory 3145728. (8Mb recommended

VGA Video Adapter Card

Press [Esc] to quit, any other key to continue ...
```

   The exact content of the above messages will vary depending upon your system. If you have a DOS version prior to 3.30, a CPU less than an 80386, no coprocessor, less than 4 megabytes total extended memory, or less than

EGA video, INSTALL will notify you (as in this example for memory) of our recommendation, but still allow you to install the software.

The default directories are C:\SNAP\EXE is for the SNAP program files, C:\SNAP\GEOID for the geoid model files, and C:\SNAP\SAMPLES for the tutorial sample data files.

6. If you press a key to continue, SNAP displays the following message:

```
Now you need to select the parts of SNAP you wish to
install.

SNAP PROGRAM FILES  YES

GEOID MODEL FILES   YES
```

To install everything requires about 9 megabytes of disk space. If you don't have enough disk space for the geoid model files, then SNAP will not be able to compute geoidal heights.

Use the up and down arrow keys and the PgUp/PgDn keys to move the bar to the group(s) you wish to install and then press the [Space] key to toggle the option from "No" to "Yes". Press [Enter] when you have selected the option(s) you want to install.

7. If you press a key to continue, SNAP presents the following message:

```
On which disk drive do you wish to install SNAP:

Drive C:
```

Use the up and down arrow keys and the PgUp and Pg Dn keys to move the bar to the disk drive you wish to install to, and then press the [Enter] key.

8. When you have pressed <Enter>, SNAP asks:

```
Now you need to specify the destination subdirectory where
the SNAP system will be installed.

Which subdirectory?

\SNAP
```

9. When you have pressed <Enter>, INSTALL reports its progress in reading, verifying, decompressing and writing the SNAP files to the specified hard drive directory.

10. For each of SNAP Disks 2 through 6, you will see the prompt:

```
PRESS ANY KEY

Please place the Master Distribution Disk labeled

"Disk #X" version: 1.0 in drive A:

Press the [Esc] key to abort, any other key to continue...
```

where "Disk #X" is Disk 2 through 6.

Insert the requested SNAP disk, and press a key to continue; INSTALL reports its progress in reading, verifying, decompressing and writing the SNAP files to the specified hard drive directory.

11. Next INSTALL asks permission to modify your AUTOEXEC.BAT and CONFIG.SYS files; INSTALL asks:

```
VERIFY
May I create/modify your AUTOEXEC.BAT file if needed (Y/N)?
```

If you choose Yes, INSTALL will add the node C:\SNAP\EXE to the PATH statement in your AUTOEXEC.BAT file (or the appropriate node if the installation directory is other than C:\SNAP).

If you choose No, and changes are needed, INSTALL displays:

```
The following changes need to be incorporated into:
AUTOEXEC.BAT
The node "C:\SNAP\EXE" should be added to the existing
PATH command
Press [Esc] to quit, any other key to continue...
```

where C:\SNAP is the default installation directory.

Press a key, and observe:

```
May I create/modify your CONFIG.SYS file if needed (Y/N)?
```

If you choose Yes, INSTALL will create or modify the statements BUFFERS=35 and FILES=40 in your CONFIG.SYS file.

IIf you choose No, and changes are needed, INSTALL displays:

```
The following changes need to be incorporated into:
CONFIG.SYS

The BUFFERS= size should be increased from xx to 35

The FILES= size should be increased from xx to 40

Press [Esc] to quit, any other key to continue...
```

INSTALL cannot modify AUTOEXEC.BAT and CONFIG.SYS files that have the read-only attribute set.

INSTALL then prompts:

PRESS ANY KEY

```
Please remove the disk in drive A:
and replace it with the disk labeled:

Disk #1
Press the [Esc] key to abort
Any other key to continue...
```

Insert the requested disk and press a key; INSTALL displays:

```
The SNAP installation has concluded successfully. To fully
utilize the system, you should make sure that your
software sentinel has been attached to the parallel port
of your computer.  Type "SNAP" and press the [Enter]  key
to start the program.

Be aware that to adjust a network of up to 500 stations,
up to 20 MB of hard disk space will be required. To adjust
a network of up to 2000 stations, up to 50 MB of hard disk
space may be needed.

Press any key to continue ...
```

Remove the distribution disk from the floppy drive and reboot your computer. This allows the changes in the AUTOEXEC.BAT and CONFIG.SYS files to take effect before you run the SNAP software.

Connect the SNAP sentinel device to your computer's printer port, and then connect your printer cable to the sentinel.

If the node \SNAP\EXE (or another desired SNAP program directory) is in your PATH statement, the command SNAP will now execute from any drive or directory on your computer.

4

SNAP Interface Basics

This chapter describes using the mouse, the graphical user interface, and directory selection.

Using the Mouse

Once you start SNAP, you will use the mouse extensively to navigate through its screens and select options.

Moving the Pointer

The white arrow on your screen is the pointer; it moves when you move the mouse. To move the mouse without moving the pointer, pick it up first.

Clicking

To click means to press and immediately release the mouse button. You click to make selections on the screen. Unless otherwise specified, SNAP recognizes all buttons on the mouse as "the mouse button".

Dragging

To drag means to press and hold the mouse button, move the mouse, and then release the mouse button.

Selecting

To select an item on the screen, therefore, move the pointer to it and click.

Graphical User Interface

Figure 4.1 shows the SNAP main screen.

Figure 4.1. SNAP Main Screen

Although all of SNAP's screens and subscreens are unique, most of the screens in SNAP are functionally organized around the following three areas:

The OPTIONS SELECTION area is generally the largest of the areas and is located in the center of the screen. It is in this area that the main function of the screen is carried out. This area may contain Icons, Data Entry Fields, Toggle Fields, or Data Display fields.

The PANEL area is located along the right side of the screen. This panel usually contains a list of available projects, but in some screens it will contain, files, points or vectors.

The CONTROL BUTTON MENU AREA is located at the bottom of the screen. This area usually contains various function Buttons and may contain Data Entry Fields, Toggle Fields, and/or Data Display Fields. SNAP also displays prompt messages and progress reports in this area.

As an example, the top-level MAIN MENU screen of SNAP contains many of these user interface elements and elements common to other screens. There are several areas to this screen:

The Options Selection area in this screen is the Options Grid with the main function module icons: IMPORT, EDIT, EXPORT, PROJECT MANAGER, ADJUST, DEFINE, REPORT, ANALYZE, and SETUP.

The PROJECTS Panel lists any available adjustment project files.

The Control Button Menu located at the bottom of the screen contains the EXIT button and the OPERATOR and DATE data entry fields.

Icons, Buttons, Data Fields, And Panels

The SNAP options available for selection appear as icons, buttons, or toggle fields.Static text (data that you cannot change) in the current screen appears in data display fields. Editable text (data that you can change) appears in data entry fields. The message area for informational prompts and in-process messages overlays the Control Button Menu area. A list of available items appears in a panel.

Typically, whenever the mouse pointer tracks over an option (icon, button, or toggle field) that is available for selection, that display element is highlighted. Conversely, if the option is not highlighted, it is usually not available.

To select an option or a data entry field, move the mouse pointer to the desired display element, and click the mouse button.

Items such as project files and point or vector names reflect a check mark (4) next to them once they have been selected.

To select a series of items, hold the mouse button down and drag the pointer so it tracks over several items.

To select a series of items from a panel, hold the mouse button down and move the pointer to the double down-arrow or double up-arrow to select a "page" at a time. (When you click on these panel arrows and do not hold the button down, you simply scroll through the items; see Panels below.)

Icons

An icon takes you to a lower-level SNAP screen with additional choices. For example, selecting the PROJECT MANAGER icon, Figure 4.2, from the top-level

MAIN MENU screen accesses the lower-level Project Manager screen shown in Figure 4.2.

Figure 4.2. Typical Icon

Figure 4.3. Project Manager Screen

Buttons

Buttons are used to initiate a function within the current screen or to leave the current screen and return to the previous screen (e.g., the MAIN MENU screen). For example, in the PROJECT MANAGER screen, the control button menu, Figure 4.4,

Figure 4.4. Typical Control Button Menu

contains the buttons CREATE, UPDATE, DELETE, CLONE, COMBINE, and QUIT. When you select QUIT, SNAP returns to the MAIN MENU screen. Selecting any other button in the menu initiates a function within the PROJECT MANAGER screen.

For example, when you select CREATE, SNAP activates a Project Identification Box, as shown in Figure 4.5,

Figure 4.5. Typical Box

where you can create adjustment project files. This Project Identification Box contains data entry fields, a data display field, and the buttons ACCEPT and CANCEL.

Message Area

When SNAP displays an informational prompt, Figure 4.6, in the Control Button Menu,

click the mouse button to continue.

Figure 4.6. Typical Prompt

Data Entry Fields

Data entry fields, Figure 4.7, allow you to type information from the keyboard.

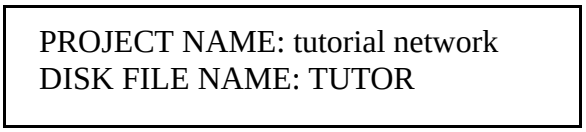

Figure 4.7. Typical Data Entry Fields

A blue rectangle next to a label signifies a data entry field. A data entry field is selected when it contains an L-shaped cursor. To select another data entry field, move the pointer to the field and click to move the cursor to that field. You can then modify the data in the field or enter new data. The cursor prompts for data entry in the insert mode. As you type each character from the keyboard, any character to its right is shifted right one position.

The <Insert> key toggles the entry mode from insert to typeover; other key functions are as detailed in Table 4.1.

Table 4.1. Key Functions

Key	Function Performed
Insert	Toggles insert mode (ON/OFF).
Delete	Delete character on which cursor rests.
Backspace	Delete character in front of cursor.
Home	Move to the beginning of the field.
End	Move to the end of the field.
Enter	Move one field down.
Arrow	Up and down arrow keys move to next prompt field up and down, respectively. Right and Left arrow keys move within active prompt until boundary of prompt is reached; they do not move the cursor to a different prompt field.

Data Toggle Fields

Toggle fields are blue rectangles that display the current option. When you select the field (move the pointer to the box and click on it), the message inside the field toggles

among the available options. For example, in the screen accessed from the SNAP MAIN MENU via EDIT module:

- The STATUS field toggles between INCLUDED and EXCLUDED.
- The LATITUDE field toggles among FREE, FIXED, and WEIGHTED.

Data Display Fields

Data display fields, Figure 4.8, only display information; you cannot edit these fields.

Figure 4.8. Typical Data Display Field

In the PROJECT MANAGER screen, the POINTS and VECTORS data display fields show the number of points and vectors, respectively, in the selected adjustment project.

Panels

Panels list items available to the current SNAP screen function. Beside the panel is a vertical bar containing up- and down- arrows. Select the single arrows to scroll through the list line-by-line, or the double arrows to scroll through the list a "page" at a time. A beep indicates that you have reached the end of a list. You cannot page or scroll further.

For example, if we use the CREATE button in the PROJECT MANAGER screen to create multiple adjustment project files, the PROJECTS panel in the MAIN MENU will show a panel similar to Figure 4.9.

Figure 4.9. Typical Panel

If the list contains more items than the panel can accommodate, you can scroll through it using the arrow buttons.

Directory Selection

SNAP requires a source directory for input files and a location directory for adjustment project files and other adjustment output files. By default, SNAP initially uses the current directory for both input and output files. You can change this default via the SETUP module accessed from the MAIN MENU.

The SETUP screen contains data entry fields for the DATA FILES DIRECTORY and the PROJECTS DIRECTORY. The DATA FILES DIRECTORY is the directory for input files (usually O-files). The PROJECTS DIRECTORY is the directory for project files and output files. The DATA FILES DIRECTORY and the PROJECTS DIRECTORY do not have to be the same directory.

To change the default:

1. Use the mouse to click on the data entry field for the directory you wish to change. SNAP then displays a check mark (4) in the box to the left of that field. Figure 4.10 shows the default directory selection panel.

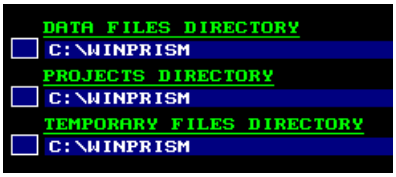

Figure 4.10. Directory Default Selection Panel

2. To change the drive, move the pointer to the DRIVE arrow buttons.
3. To reach a drive volume earlier in the alphabet, select the left arrow repeatedly until the desired letter appears; for a drive later in the alphabet, select the right arrow.
4. The DRIVE arrow buttons display only valid logical drives.

5. The panel below the DRIVE buttons, Figure 4.11, lists the files and subdirectories in the current directory.

Figure 4.11. Current File and Subdirectory Panel

6. Beside the panel is a vertical bar containing up- and down-arrow buttons. If the list contains more subdirectories than the panel can accommodate, you can use these buttons to scroll through the list.
7. To look further down into a directory tree, select one of its subdirectories; the panel will display the files and subdirectories within the selected subdirectory.
8. To move up a tree, select the \.. designator. This selects the parent directory and displays the files and subdirectories at that level.
9. After selecting the desired directories, click on either QUIT or SAVE in the Control Button Menu. QUIT will save the changes for the current session of SNAP only. SAVE will save the changes as the new defaults.

5

Getting Started

This chapter provides a brief overview of SNAP by describing the main function modules of the program and guiding you through the basic flow of performing a simple least-squares adjustment.

Before Running Snap

1. Follow the instructions in the Installation chapter to install the SNAP program and resource files into the desired directory.
2. Ensure that your CONFIG.SYS file has the required number of Files and Buffers, and that your AUTOEXEC.BAT file contains the SNAP program directory in the Path. Note that this is performed automatically if installing as part of WinPrism.
3. Attach the program sentinel (software key) to LPT1 or LPT2.
4. Create the directory where you wish to store the output adjustment project files.

   NOTE The output directory does not need to be the directory containing the input vector files.

Running Snap

1. Start WinPrism as described in the document "Looking Into WinPrism".
2. Select the ADJUST icon and click YES when asked whether to run SNAP.
3. You will then see the Ashtech logo, followed by the SNAP Main Menu, as shown in Figure 5.1.

Figure 5.1: SNAP Main Screen

This screen contains the following areas:

1. The Options Selection area with icons that provide access to SNAP's main function module: IMPORT, EDIT, EXPORT, PROJECT MANAGER, ADJUST, DEFINE, REPORT, ANALYZE, and SETUP.
2. The PROJECTS Panel listing any existing adjustment project files in the Project Directory.
3. The MAIN MENU Control Button Menu where you can optionally:
   a. Type your OPERATOR name and the DATE or
   b. EXIT the SNAP program to the DOS prompt.

The following sections introduce the main function modules. For details, see the Tutorial chapter and the appropriate Reference chapter later in this manual.

Import Module

This module lets you input POINT, VECTOR, and/or various conventional (Terrestrial) observation files to be adjusted.

Edit Module

This module lets you modify the POINT and VECTOR information prior to performing an adjustment.

Export Module

This module lets you export input data or adjustment results into disk files with specified formats.

Project Manager Module

This module lets you create and manipulate project files.

Adjust Module

This module lets you verify a survey network and perform an adjustment.

Define Module

This module lets you choose and define parameters for various adjustment options.

Report Module

This module lets you prepare reports from adjustment output.

Analyze Module

This module lets you perform network analysis and data quality assessment graphically.

Setup Module

This module lets you assign directories for input files, adjustment output files and temporary files produced during SNAP operation. It also allows you to specify your printer and set printer parameters.

Adjustment Processing Options

This section describes the SNAP processing options: rapid, standard, enhanced, and terrestrial.

Rapid

This option is fast and yet powerful in providing preliminary results for a GPS network adjustment project.

The major features of a RAPID adjustment are:

- Generation of adjusted coordinates for a GPS network if needed.
- Free (or minimally constrained) GPS network adjustments in the WGS-84 coordinate system only.
- Deweighting of observations for indication of possible blunders.
- Flagging observations failing the TAU criteria.
- Computation of a residual histogram.
- Computation of error propagation for GPS vectors.

The applications of this option include:

- Quality control of GPS observations.
- Standard or enhanced adjustments using the adjusted coordinates as input.
- Datum transformations and map projections using adjusted coordinates.
- Deformation monitoring projects where relative accuracy among positions of interest is important.

The RAPID option may produce the coordinates with the highest accuracy if observations were collected using sophisticated relative positioning techniques. However, the main purpose of RAPID processing is quality control of GPS observations.

Standard

This option performs complete GPS network adjustments. Besides adjustments in WGS-84/NAD83, STANDARD also allows constrained adjustments in any local datum. Additional parameters may be used in the adjustment to compensate for the network deformation caused by the local datum.

The major features of a STANDARD adjustment are:

- Constrained GPS network adjustments in WGS-84/NAD83.
- Constrained GPS network adjustments in a local datum.
- Computation of bias parameters if adjusted in local datum.
- Computation of adjusted vectors and standard deviations.
- Computation of a residual histogram.
- Computation of error ellipses in north/east and in height/east.
- Computation of error ellipses for vectors.
- Computation of 3-D error ellipsoids for stations and vectors.
- Computation of error propagation for GPS vectors.
- Computation of redundancy and internal reliability.

This option may produce the coordinates with the highest accuracy if observations were collected using sophisticated relative positioning techniques. A possible approach in using STANDARD processing is to perform a final one-iteration

adjustment of a GPS network which has been pre-processed using the RAPID option and guaranteed blunder-free.

Enhanced

This option is featured with the adjustments for the combined GPS and Terrestrial observations. This option becomes very useful when both GPS measurements and terrestrial observations are present in a network.

The major features of an ENHANCED adjustment are:

- Combined GPS network adjustments in any datum.
- Computation of bias parameters if adjusted in local datum.
- Computation of adjusted vectors and standard deviations.
- Computation of a residual histogram.
- Computation of error ellipses in north/east and in height/east.
- Computation of error ellipses for vectors.
- Computation of for stations and vectors.
- Computation of error propagation for GPS vectors and for terrestrial observations.
- Computation of redundancy and internal reliability.

ENHANCED adjustments are required when:

- GPS measurements are used to enhance a conventional network.
- Terrestrial observations and/or a part or an entire terrestrial traverse or network are attached to a GPS network.
- Conventional observations (e.g., angles) are used to enhance the geometry of a GPS network.

ENHANCED performs adjustments in WGS-84 and in any local datum. ENHANCED network adjustment may not necessarily produce the best results due to possible uneven observation qualities among the various data groups.

Terrestrial

This option deals with traditional three-dimensional network adjustments. TERRESTRIAL adjustment uses various observation types from conventional surveying, i.e., distances, angles, vertical angles, and height differences.

The major features of a TERRESTRIAL adjustment are:

- Adjustments of triangulation networks.
- Adjustments of trilateration networks.
- Adjustments of distance and angle combined networks.
- Adjustments of leveling networks.
- Computation of adjusted observations and their standard deviations.
- Computation of a residual histogram.
- Computation of error ellipses in north/east and in height/east.
- Computation of 3-D error ellipsoids for stations.
- Computation of error propagation for terrestrial observations.
- Computation of redundancy and internal reliability.

TERRESTRIAL adjustment may also be used to adjust and/or analyze the conventional portion of a combined network before performing an ENHANCED adjustment.

Performing A Simple Adjustment

The following procedure summarizes the steps in performing a simple adjustment.

1. Select PROJECT MANAGER from the SNAP Main Menu.
2. Select CREATE and specify the PROJECT FILE name and the DISK FILE NAME.
3. Select ACCEPT to add the adjustment project to the PROJECT SELECTION Panel.
4. Select QUIT to return to the SNAP Main Menu. Note that the adjustment project is selected in the PROJECTS Panel.
5. Select IMPORT.
6. Select the desired data file.
7. Select LOAD FILE.
8. Select QUIT to return to the Main Menu.
9. Select EDIT.
10. Select POINTS.
11. Select a point to hold fixed.
12. In CONSTRAINTS, select LATITUDE, LONGITUDE and ALTITUDE FIXED.
13. Select MODIFY.
14. Select QUIT to return to the MAIN MENU.
15. Select ADJUST.
16. Select VERIFY NETWORK.

17. Select PROCESS.

When the adjustment is complete, you may either select view OUTPUT, or select QUIT to return to the MAIN MENU, and select ANALYZE to graphically view the network adjustment.

6

Tutorial

Overview

This chapter takes you through the steps necessary to perform a simple, free adjustment of GPS vectors. In this tutorial, you will:

- Verify that SNAP is properly installed and then run SNAP.
- Use the SETUP module to verify that the data files directory and the projects directory are set up appropriately.
- Use the PROJECT MANAGER module to create an adjustment project.
- Use the IMPORT module to load the vectors to be adjusted into the project.
- Use the EDIT module to modify the control position coordinates, and set the constraints to fixed for the point.
- Use the ADJUST module to:
  - VERIFY NETWORK - Verify the integrity of the network prior to the adjustment.
  - PROCESS - Perform a default rapid adjustment of the vectors.
  - VIEW OUTPUT - Analyze the results in ASCII text form.
- Use the ANALYZE module to evaluate the results graphically.
- Use the REPORT module to create a customized report of the adjustment.

For more detailed information, please refer to the appropriate reference chapter.

Step 1: Before Running Snap

1. Follow the instructions in the Installation chapter to install the SNAP program and support files into the desired directory.
2. Attach the program sentinel (software key) to LPT1 or LPT2.
3. Start Windows 95 or Windows NT, and start WinPrism in the usual manner. SNAP starts when you select the ADJUST icon.

Step 2: Start Snap

1. Start SNAP by clicking on the ADJUST icon.
2. The Ashtech logo appears, followed by the version screen, and then the SNAP main menu, Figure 6.1.

Figure 6.1: SNAP Main Menu

3. There are several areas to this screen:
   c. The Options Selection area contains icons labeled IMPORT, EDIT, EXPORT, PROJECT MANAGER, ADJUST, DEFINE, REPORT, ANALYZE, and SETUP. These icons provide access to the SNAP functions.
   d. The PROJECTS Panel on the right lists the tutorial adjustment project files after you create them.
   e. The MAIN MENU cntrol button menu located at the bottom of the screen contains the EXIT button and the OPERATOR and DATE data entry fields where you can optionally type your name and the DATE, or EXIT the SNAP program to the Windows main screen.

Step 3: Setup Module - Set Up The Data Files And Projects Directories

Proceed as follows:

1. From the SNAP MAIN MENU Options Grid, click on the SETUP icon. The Setup screen appears, as shown in Figure 6.2.

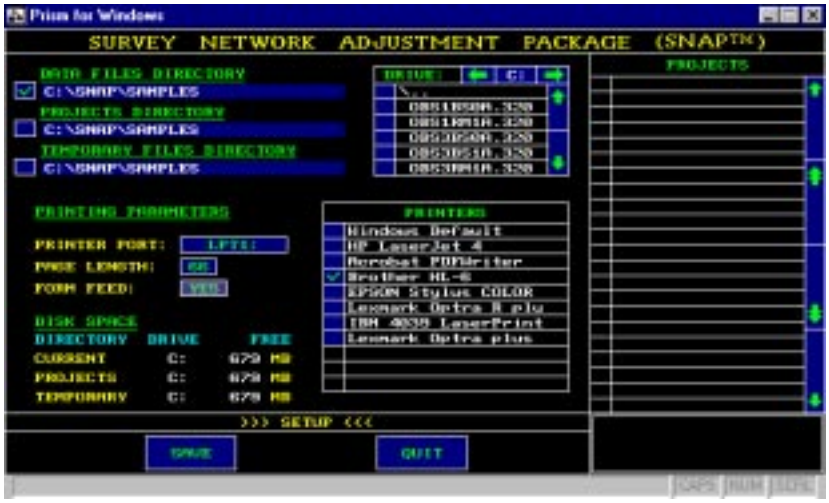

Figure 6.2: Setup Screen

2. Verify that the data files directory and projects file directory show the SNAP\SAMPLES directory, Figure 6.3.

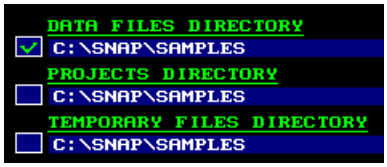

Figure 6.3: SAMPLES Directory

The DATA FILES DIRECTORY is where SNAP looks for input files. The PROJECT DIRECTORY is where SNAP saves output files.

Your sample data may be in a different location, depending upon your product configuration. A WinPrism installation will default to installing the tutorial files at c:\winprism\tutor\network.

3. If these directories do not show the SNAP\SAMPLES directory, select each directory field, and use the Drive Panel to select the SNAP\SAMPLES directory.
4. Once you are satisfied with the setup, click SAVE and then QUIT in the SETUP control button menu at the bottom of the screen to return to the SNAP MAIN MENU.

Step 4: Project Manager Module - Create A Project File

After ensuring that your data files and projects directory are set up properly, you are ready to create a project file. The project file will store all of your network observations. Proceed as follows:

1. From the SNAP MAIN MENU Options Grid, select the PROJECT MANAGER icon, and observe the PROJECT MANAGER screen, Figure 6.4.

Figure 6.4: PROJECT MANAGER Screen

Initially the current directory is empty of adjustment project files, and the PROJECT SELECTION Panel is empty.

2. Select the CREATE button from the PROJECT MANAGER Control Button Menu at the bottom of the screen to activate the Project Information Box. Fill in the Project Information data entry fields as follows (pressing <Enter> to change fields):

   PROJECT NAME: tutorial network

   DISK FILE NAME: TUTOR

   CREATED BY: Your Name

COMMENTS: snap tutorial network

SNAP automatically supplies the current computer date unless you type something else.

The Project Information Box should resemble Figure 6.5.

Figure 6.5: Project Information Box

3. Once you have filled in the information correctly, select the ACCEPT button in the project information box to create the adjustment project and add it to the Project Selection Panel, Figure 6.6.

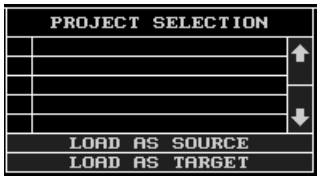

Figure 6.6: Project Selection Panel

4. Click the QUIT button in the control button menu at the bottom of the screen to return to the SNAP MAIN MENU.

Step 5: Import Module - Load The Vectors Into The Project

Once you have created the project, you are ready to import the data. In this tutorial, the type of data you will be importing is Prism/GPPS O-files, the default data type to import. Proceed as follows:

1. Ensure that the adjustment project is selected in the SNAP main menu projects panel, Figure 6.7.

Figure 6.7: Projects Panel

2. In the SNAP main menu, select the IMPORT icon. You will get the IMPORT screen, Figure 6.8.

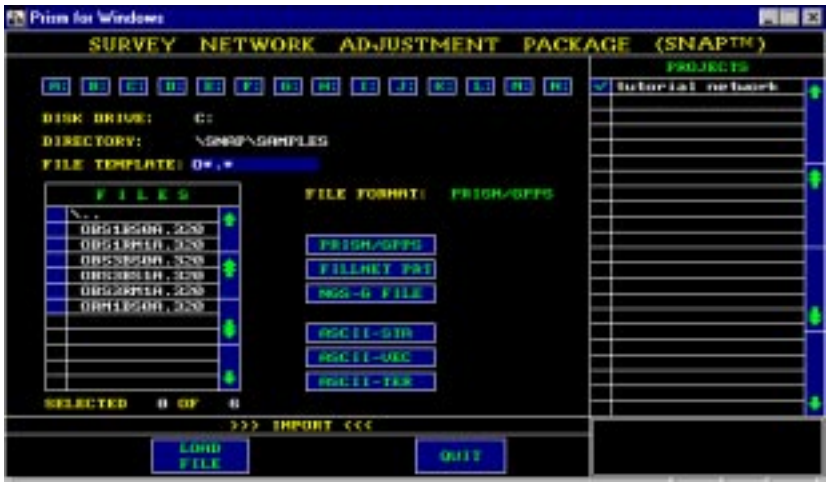

Figure 6.8: Import Screen

Note the following:

DISK DRIVE and DIRECTORY display the projects directory previously set via the SETUP module

FILE FORMAT displays the desired data format, PRISM/GPPS. (This is the default.)

FILE TEMPLATE displays the desired O-file template, O*.*.

The FILES Panel displays all the tutorial O-files in the current directory.

The PROJECTS Panel displays the selected tutorial network project.

3. Select all of the O-files in the FILES Panel. Do this by moving the pointer to the first O-file listed and drag the pointer to the last O-file; SNAP displays a check mark by each file and indicates that all the files are selected (Figure 6.9).

Figure 6.9: Files Panel

4. From the IMPORT control button menu at the bottom of the screen, select LOAD FILE to load the selected files into the tutorial network project file.

   SNAP replaces the IMPORT screen with a report of its progress:

   ```
   Loading data file
   ```

After the files are loaded and SNAP restores the IMPORT screen, select QUIT from the IMPORT control button menu at the bottom of the screen.

If the tutorial geoid files were installed, SNAP automatically computes the geoidal separations, reporting:

```
Computing Local Geoid Undulations

     and

Generating UTM Coordinates.
```

SNAP then returns to the SNAP main menu.

Step 6: Edit Module - Edit And Fix Your Control Site Coordinates

Before performing the adjustment, you should enter the position of your control site and fix its coordinates. In this tutorial, you will hold the station NBS0 as your fixed station. SNAP will hold these coordinates as fixed when it performs the adjustment.

5. From the MAIN MENU Options Grid, click EDIT; SNAP presents the EDIT screen, Figure 6.10.

Figure 6.10: EDIT Screen - Vector Mode

1. If you have selected EDIT for the first time, this screen will be in the edit vectors mode, as indicated by a check mark next to VECTORS in the lower left corner of the display. To switch to the edit/points mode, select the POINTS button from the EDIT control button menu at the bottom of the screen.

   In the EDIT/POINTS screen, Figure 6.11, select the NBS0 station from the POINTS Panel as the control point; SNAP then displays a check mark beside

NBS0 and displays the point information for the NBS0 station in the Options Selection Area, as shown in Figure 6.11.

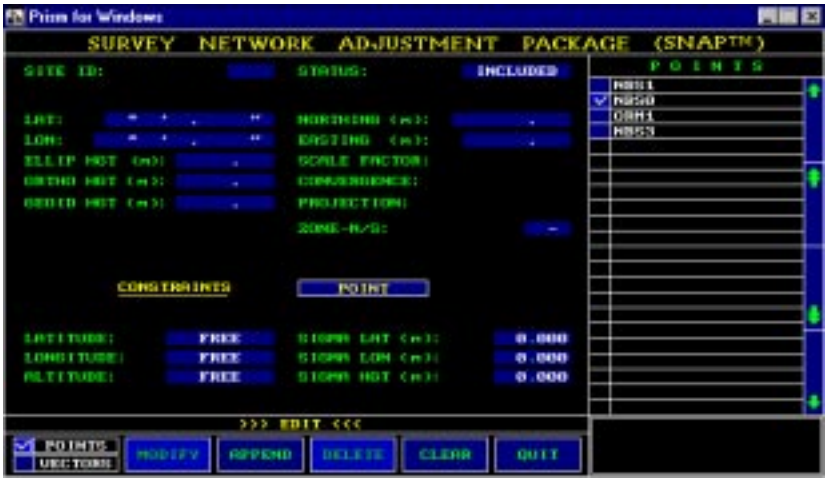

Figure 6.11: EDIT/POINTS Screen

In the upper left area of the screen is the LATitude, LONgitude, and height (HGT) coordinate data in the O-file for the NBS0 station.

2. Select each of the following data entry fields in turn, and type the published coordinates for the control point:

LAT:	39° 7'48.36842"N
LON:	77°12'54.11582"W
ELLIP HGT (m)	105.888

Note that if you press <Enter> after changing the ELLIP HGT, SNAP changes the ORTHO HGT display to 137.629.

Below the coordinate data is the constraints data display field, Figure 6.12; note that it shows POINT (the default setting).

Figure 6.12: Constraints Display

3. In the lower left area of the screen are the constraint toggle fields, LATITUDE, LONGITUDE, and ALTITUDE, each displaying FREE (the

default setting) (Figure 6.13). Click on each of these FREE fields to toggle them from FREE to FIXED.

Figure 6.13: Latitude, Longitude, Altitude Fields

4. Once you have modified the coordinates, and changed the constraints from free to fixed, in the EDIT control button menu at the bottom of the screen, select MODIFY to save the changes to the tutorial adjustment project.

   Note that once you modify the point, you will see [FFF] next to the NBS0 station in the Points panel, indicating that this point is fixed in latitude, longitude, and height.

Figure 6.14: Fixed Constraint Indication

From the EDIT control button menu, select QUIT to return to the SNAP MAIN MENU.

Step 7: Adjust Module - Verify Network And Perform Adjustment

Before performing the adjustment for the first time, you should verify the integrity of the network (i.e., check for isolated points, single-ended vectors, etc.) via the VERIFY NETWORK function in the ADJUST screen. After verifying the network, you are ready to perform the adjustment. Proceed as follows:

1. From the MAIN MENU Options Grid, click on the ADJUST icon to call the ADJUST screen, Figure 6.15.

Figure 6.15: ADJUST Screen

The ADJUSTMENT PARAMETERS panel shows you the selected parameters, in this case the default parameters for a rapid adjustment.

2. Select the VERIFY NETWORK button from the ADJUST control button menu at the bottom of the screen. .

   SNAP checks the data and displays the results in the NETWORK SUMMARY popup screen on the right side of the ADJUST screen, as shown in Figure 6.16.

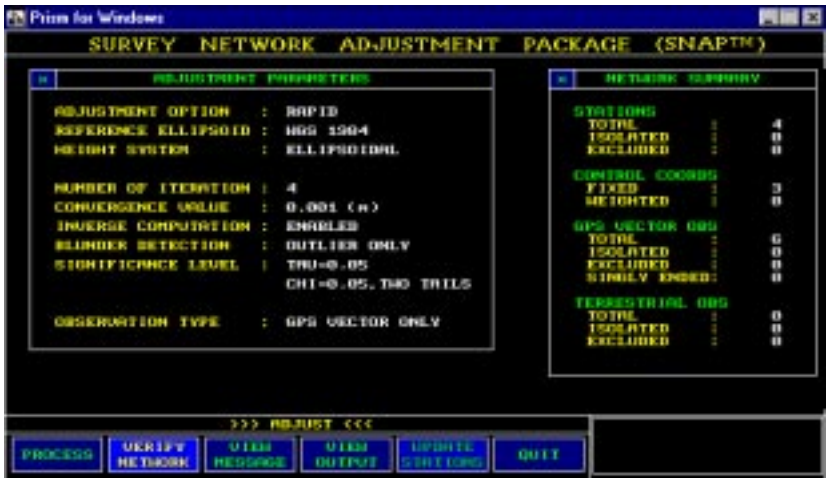

Figure 6.16: Network Summary Pop-up Screen

According to the NETWORK SUMMARY popup screen, there are no problems with isolated points or vectors in the tutorial project, nor any singly ended vectors. This project has four stations with 12 GPS vectors, and that six coordinates are being held fixed. Additionally, no points or vectors are to be excluded from the adjustment. If there were a problem, you could use the ANALYZE module to try to identify it graphically.

3. After verifying the network, in the ADJUST control button menu, click PROCESS to process the adjustment. SNAP then reports, in the control button menu area:

   ```
   Adjustment in Progress, WAIT ....
   ```

4. When processing is complete, in the Control Button Menu area, SNAP prompts:

   ```
   CREATE ADJUSTMENT ANALYSIS DATA?
   ```

5. Click the YES button. (If you do not answer within about 30 seconds, SNAP automatically creates the adjustment analysis data.) SNAP then reports:

```
Generating Analysis Data, WAIT ....
```

6. After completing the adjustment, SNAP summarizes the results in an ADJUSTMENT TESTS popup screen on the right side of the ADJUST screen and provides an ADJUSTMENT OUTPUT popup screen that lets you select the types of adjustment output you wish to view (Figure 6.17).

Figure 6.17: Adjustment Tests Screen

In the ADJUSTMENT TESTS screen, note that no outlier suspects are detected.

To fully analyze the quality of the adjustment, several factors need to be taken into account. This tutorial briefly mentions only a subset of these factors. For details, see the appendix Understanding Your Results.

You will next view some of the adjustment output in more detail for further analysis.

7. In the ADJUSTMENT OUTPUT popup screen, select the ADJUSTED POSITIONS, ADJUSTED OBSERVATIONS, and NETWORK

ACCURACY fields; SNAP displays a check mark next to each selected item, as shown in Figure 6.18.

Figure 6.18: Selected Output Adjustments

8. In the ADJUST control button menu at the bottom of the screen, select VIEW OUTPUT to view the selected items; SNAP then reports:

   ```
   Searching Output Objects...
   ```

   and displays the View Output screen, Figure 6.19.

Figure 6.19: View Output Screen - Page 1, Adjusted Positions

This screen lets you view the selected output objects: ADJUSTED POSITIONS, ADJUSTED OBSERVATIONS, and NETWORK ACCURACY.

9. Use the DN, PGDN, UP, and PGUP buttons from the control button menu at the lower left corner of the screen to scroll through the selected adjustment output objects a screen page at a time or one line at a time. You can also use the SEARCH button to jump to a specific ASCII text string. (For details on

navigating this screen, see the Adjust Module reference chapter, section entitled View Output Screen.)

The initial display contains PAGE 1, the first part of the ADJUSTED POSITIONS information with longitude displayed in positive east. Note that the sigmas [σ(N), σ(E) and σ(U)] associated with positions are all 2 millimeters or less.

10. PAGE 2 (ADJUSTED POSITIONS - WEST LONGITUDES) shows the second part of the ADJUSTED POSITIONS information with longitude displayed in positive west, as shown in Figure 6.20.

Figure 6.20: Page 2 - Adjusted Positions

3. PAGE 3 (TEN VECTORS WITH LARGEST RESIDUALS) shows the first part of the ADJUSTED OBSERVATION information (Figure 6.21).

Figure 6.21: Page 3 - Ten Vectors with Largest Residuals

Note that the vector residuals [V(R), V(N), V(E), and V(U)] are all 5 mm or less, and that no vectors were flagged by the TAU test.

11. PAGE 4 (TEN VECTORS WITH SMALLEST RESIDUALS) shows the second part of the ADJUSTED OBSERVATION information (Figure 6.22).

Figure 6.22: Page 4 - Ten Vectors with Smallest Residuals

12. PAGE 5 (ADJUSTED VECTOR OBSERVATIONS) shows the third part of the ADJUSTED OBSERVATION information, the beginning of which is shown in Figure 6.23).

Figure 6.23: Page 5 - Adjusted Vector Observations (Partial)

13. PAGE 6 [FGCS STANDARDS (VECTOR)] shows the fourth part of the ADJUSTED OBSERVATION information (Figure 6.24).

Figure 6.24: Page 6 - FGCC Standards

Note that this free adjustment meets the FGCS order AA standards.

14. PAGE 7 [NETWORK ACCURACY (VECTOR)] shows the network accuracy information:

Figure 6.25: Page 7- Network Accuracy

Once you are finished viewing the adjustment output, in the Control Button Menu at the bottom of the screen, select the QUIT button to return to the ADJUST screen.

15. In the ADJUST control button menu at the bottom of the display, click the QUIT button. SNAP then prompts, in the control button menu area:

    `Select the NO button.`

    SNAP returns you to the SNAP Main Menu.

Step 8: Analyze Module - Graphically Analyze Your Network

The ANALYZE module provides a graphical display of your network. It allows you to graphically identify any flagged vectors, select and view more information on the point or vector of interest, and a perform a variety of other tasks. In this tutorial, you will view the network and view residual information for a selected vector. Proceed as follows:

1. From the MAIN MENU Options Grid, select the ANALYZE icon, and observe the ANALYZE screen, Figure 6.26.

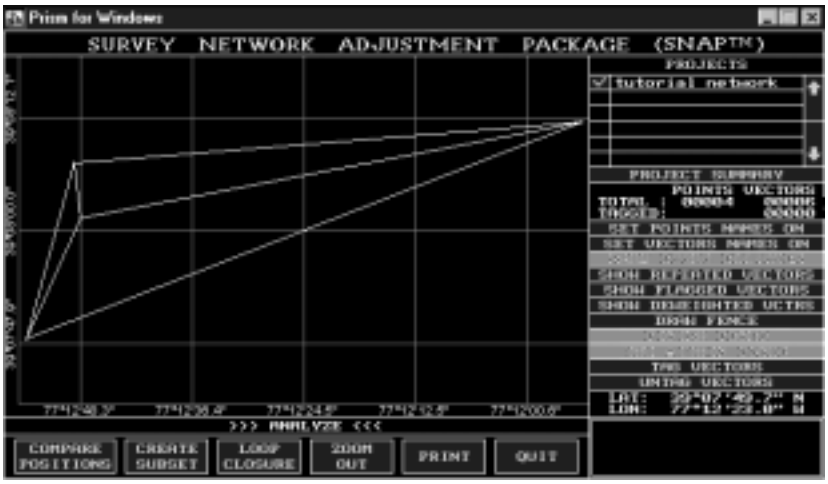

Figure 6.26: Analyze Screen

This is the adjusted tutorial network.

2. So that you can easily identify the points and vectors of interest, in the Graphics Tools Panel on the right of the screen, select the SET POINTS

NAMES ON button and the SET VECTORS NAMES ON button, and observe points and vectors as shown in Figure 6.27.

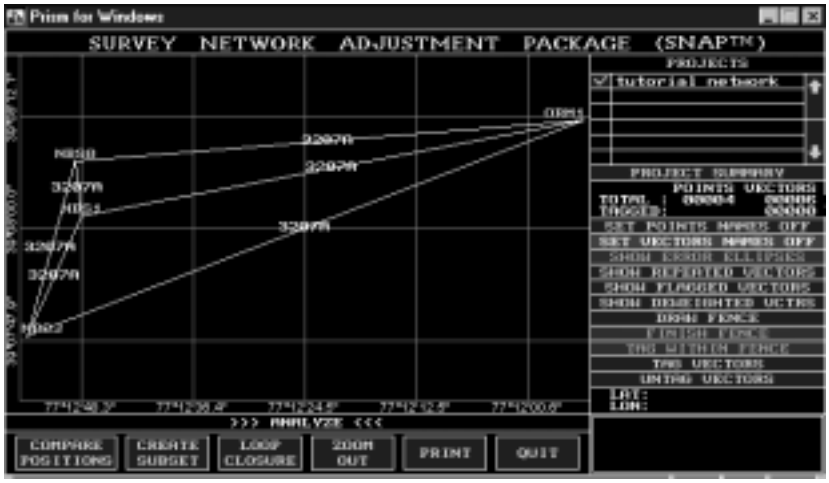

Figure 6.27: Point and Vector Names

Note that the button labels are now SET POINTS NAMES OFF and the SET VECTORS NAMES OFF.

3. Select the vector from NBS0 to ORM1, i.e., move the pointer to the vector in the Options Selection Area, and click on it (Figure 6.28).

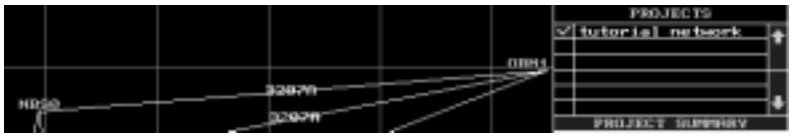

Figure 6.28: Selecting Vector

SNAP highlights the vector in green making it easily identifiable, and replaces the PROJECTS Panel at the top right of the screen with a VECTOR

Information Panel containing some basic information about the vector (Figure 6.29).

Figure 6.29: Vector Information

4. Select the RESIDUAL button from the VECTOR Information Panel; SNAP then replaces the Vector Information Panel with a Vector - Residual Panel containing the residuals associated with the vector ORM1-NBS0, as shown in Figure 6.30.

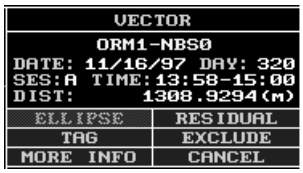

Figure 6.30: Vector-Residual Panel

Note that, in the Vector Information panel, you can also view more information regarding the vector, exclude the vector from an adjustment, and, had you performed a standard or enhanced adjustment, view the error ellipse information. You can perform similar operations on points. For details, see the Analyze Module reference chapter.

5. Once you are finished analyzing the network, from the ANALYZE control button menu at the bottom of the screen, select the QUIT button to return to the SNAP MAIN MENU.

Step 9: Report Module - Create A Customized Report

Once you are satisfied with the adjustment, you are ready to create a final report. The REPORT module lets you customize this report so that you only include the items of interest. Proceed as follows:

1. From the MAIN MENU Options Grid, select the REPORT icon, and observe the REPORT screen, Figure 6.31.

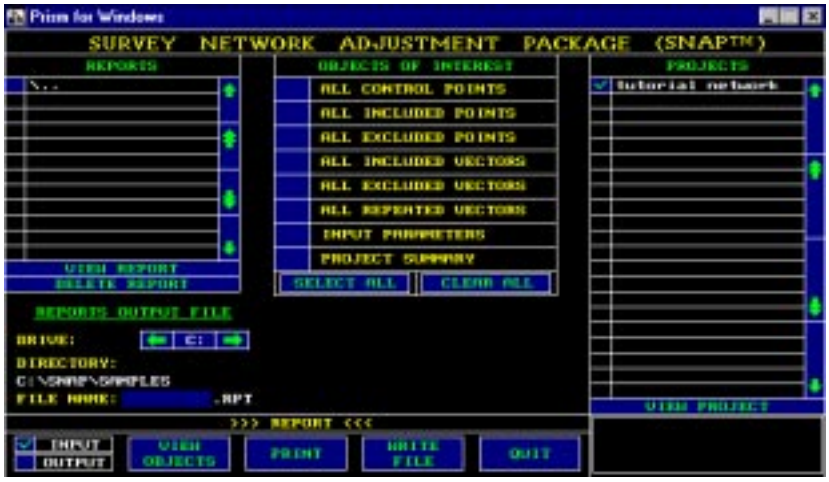

Figure 6.31: REPORT Screen

Note that, in the REPORT control button menu at the bottom of the screen, the INPUT button is checked (the default selection), meaning that the OBJECTS OF INTEREST Panel at the top of the screen contains INPUT OBJECTS OF INTEREST for the report.

2. Select the FILE NAME data entry field at the bottom left of the screen, type TUTOR (the output file name for your report) at the flashing cursor, and then press <Enter>.
3. SNAP then displays the new output file name (TUTOR.RPT), selected by a check mark, in the REPORTS panel at the top left of the screen.

   The next step is to select the OBJECTS OF INTEREST that you wish to include in the report. The objects of interest are of two types: input and output. First you will write the INPUT OBJECTS OF INTEREST to the

TUTOR.RPT report file, and then add the OUTPUT OBJECTS OF INTEREST.

4. Select the following items from the INPUT OBJECTS OF INTEREST Panel: ALL CONTROL POINTS, INPUT PARAMETERS, and PROJECT SUMMARY; SNAP displays a check mark by each selected item, as shown in Figure 6.32.

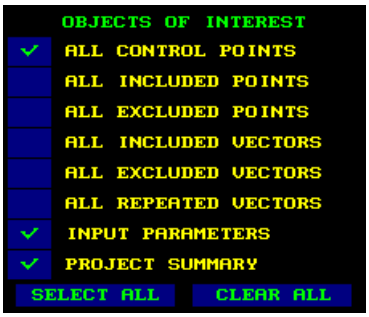

Figure 6.32: Input Objects of Interest

5. After you have made the selection, from the REPORT Control Button Menu at the bottom of the screen, select the WRITE FILE button to write the information to the TUTOR.RPT report file.
6. Select the OUTPUT button from the control button menu; SNAP then replaces the INPUT OBJECTS OF INTEREST Panel with the OUTPUT OBJECTS OF INTEREST Panel, Figure 6.33.

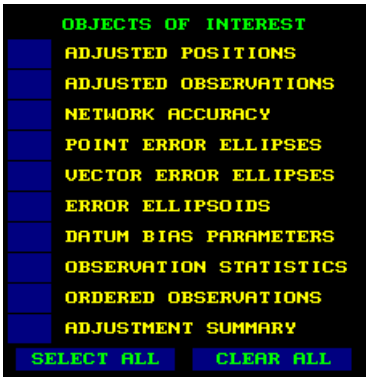

Figure 6.33: Output Objects of Interest

7. Select the following items from the OUTPUT OBJECTS OF INTEREST Panel: ADJUSTED POSITIONS, ADJUSTED OBSERVATIONS, NETWORK ACCURACY, and ADJUSTMENT SUMMARY; SNAP displays a check mark by each selected item. After you have made the selection, click the WRITE FILE button in the REPORT control button menu at the bottom of the display.
8. SNAP displays a message in the Control Button Menu area:

```
FILE ALREADY EXISTS  OVERWRITE/APPEND/CANCEL
```

9. Click the APPEND button to append the OUTPUT OBJECTS OF INTEREST to the existing INPUT OBJECTS OF INTEREST (producing a single final TUTOR.RPT report file). This report is an ASCII text file that can be printed directly or imported into any word processor. The file is located in the project directory that you specified in Step 3-Setup, page 32.
10. When SNAP finishes writing the file, in the REPORT Control Button Menu at the bottom of the display, click QUIT to return to the SNAP MAIN MENU.

Step 10: Exit Snap

From the MAIN MENU Control Button Menu, click EXIT to exit to Windows.

7

Reference

The remainder of this manual comprises:

- The reference chapters describing in detail the MAIN MENU screen and each main function module: IMPORT, EDIT, EXPORT, PROJECT MANAGER, ADJUST, DEFINE, REPORT, ANALYZE, and SETUP.
- Reference appendices describing understanding your results, error messages, and file definitions.

Snap Main Menu Screen

General

This chapter describes the SNAP Main Menu screen: the main function module icons in the Options Selection Area, the PROJECT Panel, and the MAIN MENU Control Button Menu.

When you execute SNAP, the first screen that appears is the Main Menu, as shown in Figure 8.1.

Figure 8.1: SNAP Main Menu

This screen contains the following areas:

- The Options Selection Area with the main function module icons: IMPORT, EDIT, EXPORT, PROJECT MANAGER, ADJUST, DEFINE, REPORT, ANALYZE, and SETUP.
- The PROJECTS Panel listing the project names associated with any existing *.PRO files in the PROJECTS DIRECTORY (as specified via the SETUP module)
- The MAIN MENU Control Button Menu where you can optionally type your OPERATOR name and the DATE or EXIT the SNAP program.

Options Selection Area

This area contains the SNAP function module icons; select them to perform the following tasks:

- IMPORT to import POINT, VECTOR, and/or various conventional (Terrestrial) observation files to be adjusted.
- EDIT to modify the POINT and VECTOR information prior to performing an adjustment.
- EXPORT to export input data or adjustment results into disk files with specified formats.
- PROJECT MANAGER to create and manipulate project files.
- ADJUST to verify a survey network and perform an adjustment.
- DEFINE to choose and define parameters for various adjustment options.
- REPORT to prepare reports from adjustment output.
- ANALYZE to perform network analysis and data quality assessment graphically.
- SETUP to:
    - Assign directories for all input files, adjustment output files and temporary files produced during SNAP operation.
    - Specify your printer and set printer parameters.

See the appropriate reference chapter for complete descriptions of each module in the Options Grid.

Projects Panel

This panel lists the adjustment projects SNAP finds in the projects directory. (The PROJECT DIRECTORY is specified via the SETUP module.) The first time you run SNAP, you will not have previously created any project files, and this panel will be empty. (Project files [*.PRO- files] are created via the PROJECT MANAGER module.)

If you wish to work with an existing project, select it from the PROJECTS Panel; SNAP then displays a check mark in front of it, as shown in :

Figure 8.2: Projects Panel

Main Menu Control Button Menu

This menu contains the OPERATOR/DATE data entry fields and the EXIT button, as shown in Figure 8.3.

Figure 8.3: Main Menu Control Button Menu

OPERATOR/DATE Data Entry Fields

These fields let you:

- Type your OPERATOR name, up to 20 alphanumeric characters or spaces (no punctuation); SNAP will display the resulting entry in the CREATED BY data entry field of the PROJECT MANAGER module.
- Type the current date; by default SNAP displays the current date from your computer.

EXIT Button

This button terminates SNAP and returns to WinPrism.

9

Import Module

GENERAL

This module lets you import vector data from a variety of sources including Ashtech PRISM/GPPS O-files, FILLNET PRT files, NGS G-files, and Ashtech SNAP data files into the currently selected adjustment project.

Import Screen

From the MAIN MENU select the IMPORT icon; observe the IMPORT screen,

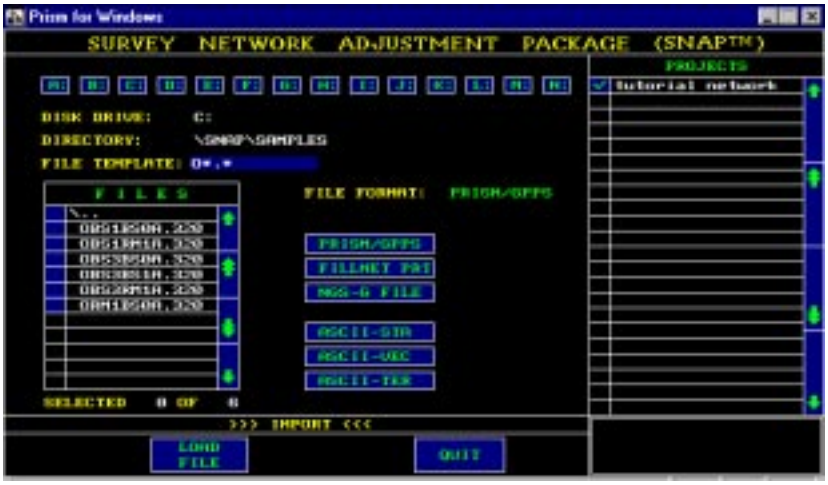

Figure 9.1: Import Screen

This screen contains the following areas:

- The PROJECTS Panel on the right.
- The Options Selection Area with DISK DRIVE buttons and data display field, DIRECTORY data display field, FILE FORMAT buttons and data display field,

FILE TEMPLATE data entry box, FILES Panel, and SELECTED data display field.
- The IMPORT Control Button Menu at the bottom with the LOAD FILE and QUIT buttons.

Input

SNAP can use the following file types as input:

- GPPS/PRISM O-files from GPS baseline processing. O-files contain both vector information and approximate point information.
- NGS G-files and ASCII-VEC data files (Vector observation or V-files). These files contain only vector information.
- ASCII-STA data files (Station information or S- files) contain only point information.
- ASCII-TER data files (Terrestrial observation or T- files). These files contain only terrestrial observations.
- FILLNET input files (*.PRT-files).

You can import any combination of file types into a single project file. To import FILLNET files, the project files must be empty of any input files before the import occurs.

General Procedure

1. Select the desired project from the MAIN MENU.
2. Select the IMPORT icon from the MAIN MENU.
3. Select the desired DISK DRIVE and DIRECTORY.
4. Select one or more files.
5. Select LOAD FILE from the Control Button Menu.
6. When finished, select QUIT from the Control Button Menu.

Projects Panel

This panel lists the adjustment projects SNAP finds in the projects directory. You must select an adjustment project from the list before importing any data; SNAP displays a 4 in front of it, as shown in Figure 9.2.

Figure 9.2: Projects Panel

Options Selection Area

This area contains the DISK DRIVE buttons and data display field, DIRECTORY data display field, FILE FORMAT buttons and data display field, FILE TEMPLATE data entry box, FILES Panel, and SELECTED data display field.

DISK DRIVE Buttons and Path Display Field

The DISK DRIVE and DIRECTORY data display fields show the disk drive volume where IMPORT expects to find data files to import. SNAP initially sets these fields to the DATA FILES DIRECTORY specified via the SETUP module. If the desired input files are not in this directory, you can override this setting as follows:

1. Use one of these DISK DRIVE buttons to select the disk volume containing the files you want to import. Depending on your computer configuration, you can select any drive volume in the range A to M.
2. Select the desired directory via the FILES Panel.
3. When you are finished, the desired drive and directory should be displayed in the DISK DRIVE and DIRECTORY data display fields.

FILE FORMAT Buttons and Data Display Field

The FILE FORMAT buttons let you select the type of file you want to import (PRISM/GPPS, FILLNET PRT, NGS-G FILE, ASCII-STA, ASCII-VEC, or ASCII-TER). SNAP displays the selected format name in the FILE FORMAT data display field. SNAP displays the corresponding default prefix/wildcard specification in the FILE TEMPLATE data display field. The default is PRISM/GPPS (O-files).

FILE TEMPLATE Data Entry Field

This field determines the file names displayed in the FILES Panel, defaulting to the file-type prefix/wildcard specification corresponding to the selected FILE FORMAT

button selected: O*.* for PRISM/GPPS, *.PRT for FILLNET PRT, N*.* for NGS-G FILE, S*.* for ASCII-STA, V*.* for ASCII-VEC, and T*.* for ASCII-TER. If the files you want to import have a different naming convention, select the box and type the appropriate template.

Files Panel

This panel lists the files in the selected directory that correspond to the specified file template, as shown in Figure 9.3.

Figure 9.3: FILES Panel

When you select an existing file name from the FILES panel, SNAP displays a check mark in front of it.

Selecting Files for Import

If the DISK DRIVE, DIRECTORY, FILE FORMAT, and FILE TEMPLATE are all correct, the desired files should now be displayed in the FILES Panel. This section describes how to select O-files and how to select files with other formats.

Selecting O-Files

SNAP allows you to select one or more O-files into the project with a single LOAD FILE selection.

Click on individual files, or drag the mouse to select multiple files; SNAP displays a 4 in front of each selected file, as shown in Figure 9.4

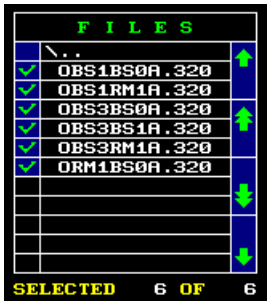

Figure 9.4: Selected Files

Below the FILES Panel, the SELECTED X OF Y data display field indicates the number of selected files of the total number available.

Selecting Files with Other Formats

Files in other than O-file format contain a group of vectors (NGS-G, FILLNET.PRT, ASCII-VEC), stations (ASCII-STA), or terrestrial observations (ASCII-TER). Therefore, SNAP allows you to select only one such file at a time for loading, e.g., for FILLNET PRT files, as shown in Figure 9.5.

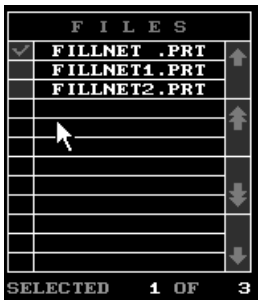

Figure 9.5: Select One File

After you LOAD FILE into the project, you can then select and load additional files into the project individually.

Import Control Button Menu

This menu contains a LOAD FILE button and a QUIT button:

LOAD FILE Button

After the desired files are selected from the FILES Panel, this button loads the data from the selected files into the selected project.

Loading O-Files

For multiple O-files, as each file is read, SNAP displays the current file name, the total files read and total bad format files and continues until all the files selected are loaded. Figure 9.6 shows a typical selection of O-files.

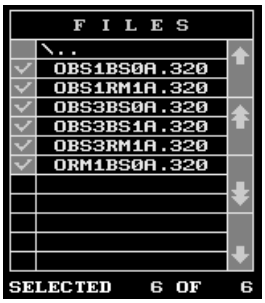

Figure 9.6: Selected O-Files Indicated by Check Mark

If SNAP cannot read an O-file, it increments the BAD field. At the end of the reading process, the "bad" files will still have the check mark next to them in the FILES Panel. Once the files are read, SNAP reports:

```
Updating Project File, WAIT...
```

and then restores the IMPORT screen.

Loading Files with Other Formats

SNAP loads files in other than O-file format, one file at a time; Figure 9.7 shows a typical ASCII-STA-file list.

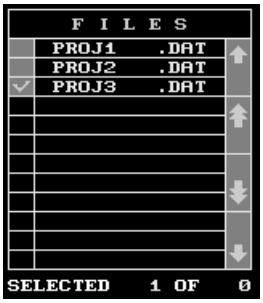

Figure 9.7: Typical ASCII-STA File

SNAP then updates the project file and restores the IMPORT screen.

NOTE: Terrestrial observations are treated as a special case in this release. They are stored into another file in addition to the standard project file (named PROJFILE.TER, where PROJFILE is the name of the associated project file) which is editable by an ASCII editor before an adjustment.

QUIT Button

This button returns you to the SNAP MAIN MENU.

If you have selected LOAD FILE in the current session, when you select QUIT, SNAP attempts to first compute the geoid height for each point, and update the project file.

NOTE: The default geoid undulation model for the computation is GEOID93. You may change the current model to OSU91A or NONE via the DEFINE module.

10

Edit Module

This module lets you modify points and vectors in an adjustment project, specifically:

- Edit the name and values of a point already imported.
- Edit the name of a vector.
- Add (append) a new point or vector.
- Delete a point or vector.
- Include or exclude a point or vector.
- Weight, fix , or free individual points or all points.
- Re-weight a vector.

Edit Screen

Select a project from the MAIN MENU PROJECTS panel, and then select the EDIT icon; SNAP then displays either an EDIT/VECTOR screen, Figure 10.1, or an EDIT/POINTS screen, Figure 10.2.

Figure 10.1: Edit Vector Screen

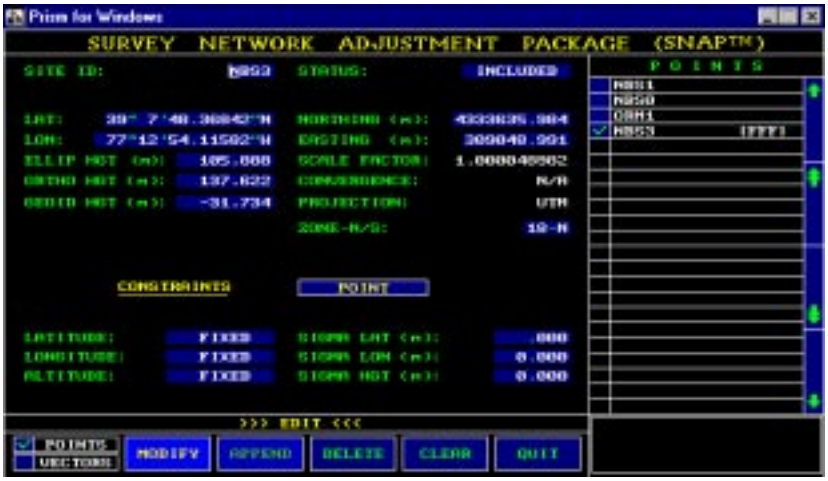

Figure 10.2: Edit Points Screen

The first time you select EDIT in the current SNAP session, the initial default EDIT screen is EDIT/POINTS format. Thereafter, each time you select EDIT in the current SNAP session, the EDIT screen displays the format in effect when you last quit the EDIT screen, EDIT/POINTS or EDIT/VECTORS.

The EDIT screen shown is selected by the POINTS or VECTORS button in the Edit Control Button Menu at the bottom of the screen (Figure 10.3).

Figure 10.3: Edit Control Button Menu

INPUT

A selected project file.

OUTPUT

Modified point and/or vector information in the selected project file.

General Procedure

1. Select the desired project from the MAIN MENU.
2. Select the EDIT icon from the MAIN MENU.

3. Select POINTS or VECTORS from the Control Button Menu.
4. To edit an existing point or vector in the project, select one, make the desired changes, and select MODIFY.
5. To create a new point or vector, select CLEAR, type the required information, and select APPEND.
6. To delete a point or vector from the project, select one, and select DELETE.
7. When finished, select QUIT from the Control Button Menu..

Edit/points Screen

When you select the POINTS button from the EDIT Control Button Menu, observe the EDIT/POINTS screen, Figure 10.4.

Figure 10.4: EDIT/POINTS Screen

This screen contains the following areas:

- The POINTS panel on the right.
- The OPTIONS selection area with SITE ID, STATUS, LAT, LON, ELLIP HGT, ORTHO HGT, GEOID HGT, NORTHING, EASTING, SCALE FACTOR, CONVERGENCE, PROJECTION, ZONE, CONSTRAINTS,

LATITUDE, LONGITUDE, ALTITUDE, SIGMA LAT, SIGMA LON, and SIGMA HGT data entry boxes and data entry fields.

- The EDIT control button menu at the bottom with the buttons POINTS, VECTORS, MODIFY, APPEND, DELETE, CLEAR, and QUIT.

Initially no point in the POINTS panel is selected, most of the data entry/data display fields in the options selection area are blank, and the MODIFY and DELETE buttons in the EDIT Control Button Menu are dim and disabled while the APPEND button is bright and enabled.

Points Panel

This panel lists, by site identifier, the points contained in the selected project file. This is where the point of interest is selected.

This display does not apply to ASCII-TER data files (Terrestrial observation or T-files).

When you select a point from the POINTS Panel, SNAP displays a check mark in front of it, as shown in Figure 10.5,

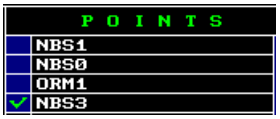

Figure 10.5: Selected Point(s)

and displays the information for the selected point in the Options Selection Area.

Points Options Selection Area

This area lets you view, edit, or add points information, as shown in Figure 10.6.

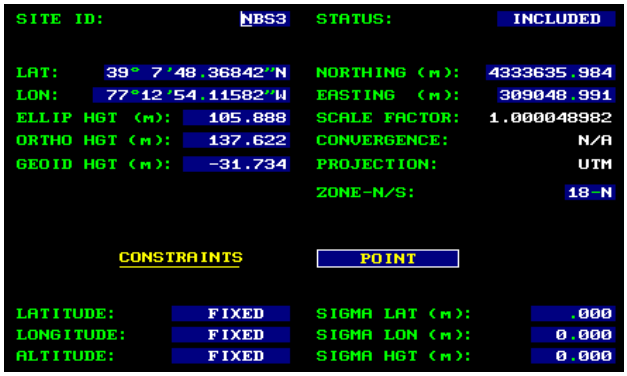

Figure 10.6: Point Edit Area

Once you have made the changes to the selected point, select MODIFY from the EDIT Control Button Menu to save the changes and store them to the project file.

SITE ID Data Entry Field

This field is the four-character station identifier for the selected point.

STATUS Toggle Field

This field toggles between INCLUDED (default) and EXCLUDED. To exclude the selected point from the adjustment, select EXCLUDED; to include the point in the adjustment, select INCLUDED. You can also include/exclude the point in the adjustment after selecting the point via the ANALYZE module.

LAT-Latitude Data Entry Field

This field displays the latitude coordinate value. If you change the latitude and then press <Enter>, SNAP recomputes the UTM values. If you change the latitude and then select MODIFY from the Control Button Menu, SNAP recomputes the geoidal height.

LON-Longitude Data Entry Field

This field displays the longitude coordinate value. If you change the longitude and then press <Enter> or change fields, SNAP recomputes the UTM values. If you change the longitude and then select MODIFY from the Control Button Menu, SNAP recomputes the geoidal height.

ELLIP HGT-Ellipsoidal Height Data Entry Field

This field displays the ellipsoidal height value in meters for the selected point. ELLIP HGT is initially displayed using the value from the imported PRISM/GPPS O-file or ASCII-STA data file. If you change the ellipsoidal height and press <Enter>, SNAP recomputes the ORTHO HGT (orthometric height) value.

ORTHO HGT-Orthometric Height Data Entry Field

This field displays the orthometric height in meters for the selected point. ORTHO HGT is initially computed from the ELLIP HGT and the GEOID HGT. If you change the orthometric height and press <Enter>, SNAP recomputes the ellipsoidal height value.

GEOID HGT-Geoidal Height Data Entry Field

This field displays the geoidal separation in meters as interpolated from a geoid model. If the model is not available or not used, this value is zero.

NORTHING Data Entry Field

This field displays the UTM Northing coordinate in meters. If you change the northing value and press <Enter>, SNAP recomputes the geodetic coordinates.

EASTING Data Entry Field

This field displays the UTM Easting coordinate in meters. If you change the easting value and press <Enter>, SNAP recomputes the geodetic coordinates.

SCALE FACTOR Data Display Field

This field displays the UTM scale factor.

CONVERGENCE Data Display Field

This field is not implemented in this release.

PROJECTION Data Display

This field displays the type of projection used to compute the northing and easting values.

ZONE-N/S Data Entry Field

This field displays the UTM zone associated with the northing and easting coordinates and the indicator for the northern hemisphere (N) or the southern hemisphere (S). If you change the zone and then press <Enter> or change fields, SNAP recomputes the latitude and longitude.

CONSTRAINTS Toggle Field

This field determines whether the selected constraints are to be applied to the selected points or to all points. This field toggles between POINT (default) and ALL. If CONSTRAINTS is POINT, the constraints in latitude, longitude, altitude and sigmas apply to the selected point only. If CONSTRAINTS is ALL, the constraints apply to all points in the project (except EXCLUDED points). This field is rarely used, except for troubleshooting purposes.

Constraints Definition

FREE (unconstrained) means that the selected point coordinate is to be adjusted relative to some other constrained reference point.

FIXED means the selected coordinate is a fixed reference coordinate.

WEIGHTED means that a constraint is applied to the coordinate. This constraint is set in the SIGMA field for the coordinate.

You can adjust a network to the WGS-1984 reference ellipsoid with only one point fixed in one coordinate. You need to fix and/or weight at least seven coordinates to adjust a network to a local reference ellipsoid when DATUM BIAS PARAMETERS is ENABLED (via the DEFINE module).

LATITUDE Toggle Field

This field sets the latitude coordinate as FREE (default), FIXED, or WEIGHTED.

LONGITUDE Toggle Field

This field sets the longitude coordinate as FREE (default), FIXED, or WEIGHTED.

ALTITUDE Toggle Field

This field sets the altitude coordinate as FREE (default), FIXED, or WEIGHTED.

SIGMA LAT Data Entry Field

This field sets the constraint that is applied to the latitude coordinate when the LATITUDE toggle field is set to WEIGHTED.

SIGMA LON Data Entry Field

This field sets the constraint that is applied to the longitude coordinate when the LONGITUDE toggle field is set to WEIGHTED.

SIGMA HGT Data Entry Field

This field sets the constraint that is applied to the altitude coordinate when the ALTITUDE toggle field is set to WEIGHTED.

Constraints Example

When you select MODIFY from the EDIT Control Button Menu to save your changes to the constraints, SNAP displays the settings (F for fixed, W for weighted) next to the site identifier in the POINTS Panel, as shown in Figure 10.7.

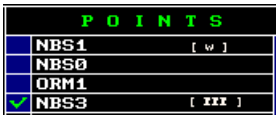

Figure 10.7: Points Panel

Edit/vectors Screen

When you select the VECTORS button in the EDIT Control Button Menu, observe the Edit/vectors screen, Figure 10.8.

Figure 10.8: Edit/vectors Screen

This screen contains the following areas:

- Vectors Panel on the right.
- Options Selection Area with:
  - FROM STATION, TO STATION, RATIO, and SOLUTION FILE NAME data entry fields and STATUS data entry box at the top, followed by:
  - FIXED SOLUTION and FLOAT SOLUTION mutually exclusive buttons, followed by:
  - RMS, BASELINE, DELTA X, ST DEV X, DELTA Y, ST DEV Y, DELTA Z, ST DEV Z, CORR XY, CORR XZ, and CORR YZ data display fields and data entry fields in columns below the FIXED SOLUTION and FLOAT SOLUTION buttons, respectively.
  - At the bottom of the options selection area are the data display fields END DATE, DAY, SESS, and TIME.
- EDIT Control Button Menu at the bottom with the buttons POINTS, VECTORS, MODIFY, APPEND, DELETE, CLEAR, and QUIT.

Vectors Panel

This panel lists the vectors contained in the selected project file. This is where the vector of interest is selected.

This display does not apply to ASCII-TER data files (Terrestrial observation or T-files).

When you select a vector from the VECTORS Panel, SNAP displays a check mark in front of it, and displays the information for the selected point in the Options Selection Area.

Vectors Options Selection Area

This area lets you view, edit, or add vector information, as shown in Figure 10.9.

Figure 10.9: Vectors Selection Area

Once you have made the changes to the selected vector, select MODIFY from the EDIT Control Button Menu to save the changes save the changes and store them in the project file.

For existing vectors, only the following data fields can be modified: FROM STATION, TO STATION, STATUS, ST DEV X, ST DEV Y, and ST DEV Z.

FROM STATION Data Entry Field

This field displays the "from" site identifier for the selected vector.

TO STATION Data Entry Field

This field displays the "to" site identifier for the selected vector.

RATIO Data Display Field

This field displays the integer search ratio value from the fixed solution for PRISM/ GPPS O-files. This value is only meaningful for data from GPPS/PRISM O-files. This value is not used for adjustment purposes.

SOLUTION FILE NAME Data Display Field

This field shows the name of the imported output file (O-file) containing the selected vector.

STATUS Toggle Field

This field toggles between INCLUDED (default) and EXCLUDED. To exclude the selected vector from the adjustment, select EXCLUDED; to include the vector in the adjustment, select INCLUDED. You can also include/exclude the vector in the adjustment after selecting the vector via the ANALYZE module.

FIXED SOLUTION and FLOAT SOLUTION Buttons

These buttons determine which solution (FLOAT or FIXED) will be used in the adjustment. For O-files resulting from PRISM or from GPPS version 4.4 and up, SNAP automatically selects FIXED SOLUTION as the best solution. You can select either the fixed solution or the float solution for use in the adjustment. In this release, only the fixed solution is enabled for NGS G-files and ASCII-VEC data files.

RMS Data Display Field

This field displays the root-mean- squared error of the baseline length in meters as found in the solution file. This value is not used for adjustment purposes. Be aware that LC2 O-files do not display a true RMS value, but the chi^2/NDF value.

BASELINE Data Display Field

This field displays the baseline vector length in meters computed from the DELTA X, DELTA Y, and DELTA Z components.

DELTA X Data Display Field

This field displays the vector delta X component length in meters in WGS-84 XYZ coordinates.

ST DEV X Data Entry Field

This field displays the standard deviation in meters of the delta X component.

DELTA Y Data Display Field

This field displays the vector delta Y component length in meters in WGS-84 XYZ coordinates.

ST DEV Y Data Entry Field

This field displays the standard deviation in meters of the delta Y component.

DELTA Z Data Display Field

This field displays the vector delta Z component length in meters in WGS-84 XYZ coordinates.

ST DEV Z Data Entry Field

This field displays the standard deviation in meters of the delta Z component.

CORR XY Data Display Field

This field displays the vector correlation matrix XY term.

CORR XZ Data Display Field

This field displays the vector correlation matrix XZ term.

CORR YZ Data Display Field

This field displays the vector correlation matrix YZ term.

END DATE Data Display Field

This field displays the calendar date when the data was collected. It is not applicable to ASCII-VEC files.

DAY Data Display Field

This field displays the day of the year when the data was collected. It is not applicable to ASCII-VEC files.

SESS Data Display Field

This field displays the session identifier during which the data was collected. It is not applicable to ASCII-VEC files.

TIME Data Display Field

This field displays the common UTC time interval of the vector. It is not applicable to ASCII-VEC files.

Edit Control Button Menu

This menu, contains the following buttons: POINTS/ VECTORS, MODIFY, APPEND, DELETE, CLEAR, and QUIT.

Figure 10.10: Edit Control Button Menu

POINTS/VECTORS Button

This button selects the EDIT/POINTS or EDIT/ VECTORS

screen. When you select POINTS, SNAP reports, in the Control Button Menu area:

```
Load point data ...
```

and then the EDIT/POINTS screen. When you select VECTORS after viewing the EDIT/POINTS screen, SNAP reports:

```
Load vector data ...
```

and then the EDIT/VECTORS screen.

MODIFY Button

This button saves any changes made to the selected point or vector. You must select MODIFY to save changes after completing modifications to each point; otherwise the changes are lost.

APPEND Button

This button allows manual entry of new points or vectors. To create a new point or vector, select CLEAR to clear the existing point or vector information, type the new information, and then select APPEND. For points, the minimum information is SITE ID, LAT, and LON. For vectors, the minimum information is FROM STATION, TO STATION, and the FIXED SOLUTION or FLOAT SOLUTION.

DELETE Button

This button deletes the selected point or vector from the project file.

CAUTION

If you select a vector and select DELETE, SNAP deletes the vector without further prompting.

If you select a point and select DELETE, SNAP prompts, in the Control Button Menu area (Figure 10.11).

Figure 10.11: Delete Warning

If you select DELETE, SNAP deletes any vectors containing the selected point.

If you select CANCEL, SNAP aborts the deletion.

CLEAR Button

This button deselects any point or vector you may have chosen from the POINTS or VECTORS Panel and clears the fields in the Options Selection Area.

QUIT Button

This button returns you to the SNAP MAIN MENU.

11

Export Module

This module lets you export points and/or vectors from the current adjustment project file to NGS G-files, Ashtech point files, a standard SNAP output file, or (not implemented in this release) Template Files.

Export Screen

From the MAIN MENU, select a project from the MAIN MENU PROJECTS Panel, and then select the EXPORT icon; observe the EXPORT screen, Figure 11.1.

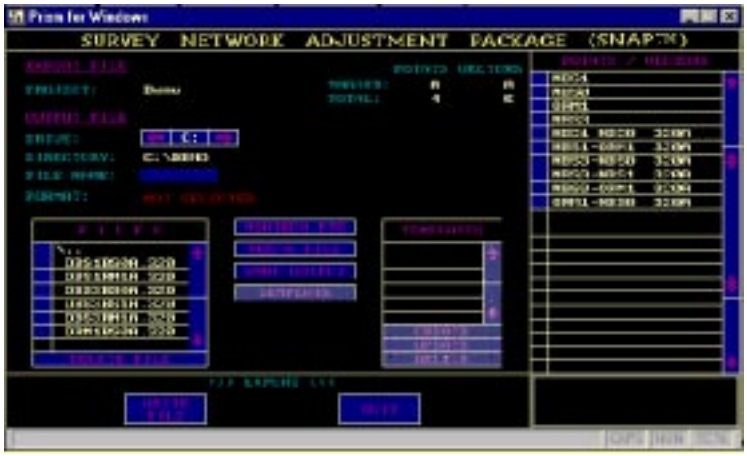

Figure 11.1: EXPORT Screen

This screen contains the following areas:

- The POINTS / VECTORS Panel on the right.
- The Options Selection Area containing:
  - The EXPORT FILE Area for the file to be exported from (adjustment PROJECT name and a display of TAGGED POINTS/ VECTORS.
  - The OUTPUT FILE Area for the file to be exported to (DRIVE buttons and data display field, DIRECTORY data display field, FILE NAME of

the exported file, exported file FORMAT buttons and data display field, FILES Panel, and TEMPLATE Panel).

- The EXPORT Control Button Menu at the bottom with the WRITE FILE and QUIT buttons.

INPUT

A selected project file that contains point and vector information.

OUTPUT

SNAP can output any of the following file types:

- Ashtech points files (*.PTS) containing point data.
- NGS G-files (*.NGS) containing vector data.
- SNAP output files (*.OUT) containing point and vector data.
- Template files (user-defined) containing point and vector data (not implemented in this release).

General Procedure

1. Select an adjustment project from the MAIN MENU.
2. Select the EXPORT icon from the MAIN MENU.
3. Select a file format for the output file to be exported.
4. Select the destination path for the output file.
5. Specify the name of the output file.
6. Select points and/or vectors to be exported.
7. Write the output file.
8. When finished, select QUIT from the Control Button Menu.

Points / Vectors Panel

This panel lists all the points and vectors in the current adjustment project. After you select one of the OUTPUT FILE FORMAT buttons this panel will list only the points for ASHTECH PTS format and only the vectors for NGS G-file format.

When you select one or more items from this panel, SNAP displays a check mark in front of it, as shown in Figure 11.2.

Figure 11.2: Points/Vectors Panel

To deselect an item and remove the check mark, click on it again.

Export File Area

This area contains the PROJECT data display field and the TAGGED POINTS/ VECTORS data display field.

PROJECT Data Display Field

This field displays the name of the selected adjustment project, as shown in Figure 11.3.

Figure 11.3: Project Data Display Field

TAGGED POINTS/VECTORS Data Display Field

This field displays the TOTAL number of points and/or vectors in the current project and those points and/or vectors that you selected (TAGGED) in the current project, as shown in Figure 11.4.

Figure 11.4: Total and Tagged Points/Vectors

Output File Area

This area contains the DRIVE toggle field, the DIRECTORY data display field, the FILE NAME data entry field, the FORMAT buttons and data display field, the FILES Panel, and the DELETE FILE button.

DRIVE Toggle Field

This field toggles between the drives available for data output. Select the arrow buttons to choose the disk volume where you want the exported file to be stored.

Figure 11.5: Drive Toggle Field

DIRECTORY Data Display Field

This field displays the current subdirectory path selected via the FILES Panel. Initially this is the directory where you executed SNAP.

FILE NAME Data Entry Field

This field displays the name of the file where the exported data is to be written. After you select a FORMAT button, type the desired file name. SNAP automatically appends the appropriate extension. (A format selection is mandatory.)

FORMAT Buttons and Data Display Field

These buttons (ASHTECH PTS, NGS-G FILE, SNAP OUTPUT or TEMPLATE) select the type of file you want to export.

- ASHTECH PTS selects Ashtech points (*.PTS) files containing point data.
- NGS G- FILE selects NGS G-files (*.NGS) containing vector data.
- SNAP OUTPUT selects SNAP output files (*.OUT) containing point and vector data.
- Template (not implemented in this release) selects template files (user defined) containing point and vector data.

(See the File Definitions appendix for more information about these files.)

The initial default is NOT SELECTED. When you select one of these formats, SNAP displays the selected format name in the FORMAT display field and the corresponding file name extension after the FILE NAME data entry field. (A format selection is mandatory.)

FILES Panel

This panel lists the files in the selected directory that have the same extension as the FILE NAME field (i.e. that correspond to the selected FORMAT) and contains a DELETE FILE button (Figure 11.6).

Figure 11.6: Files Panel

When you select an existing file name from the FILES Panel, SNAP displays a check mark in front of it.

DELETE FILE Button

This button deletes a selected file. Select the file you wish to delete from the FILES Panel, and then select DELETE FILE.

Templates Panel

This panel is not implemented in this release.

EXPORT CONTROL BUTTON MENU

This menu, Figure 11.7, contains the WRITE FILE and QUIT buttons.

Figure 11.7: Export Control Button Menu

WRITE FILE Button

This button initiates the export process. Select WRITE FILE to write data from the current project to the specified file in the specified format.

QUIT Button

This button returns you to the SNAP MAIN MENU.

12

Project Manager Module

This module lets you:

- Create an adjustment project.
- Delete an adjustment project.
- Rename an adjustment project.
- Clone (duplicate) an adjustment project.
- Combine two adjustment projects.
- Copy vectors along with related points from one project to another.
- Move vectors along with related points from one project to another.

To inspect the ASCII adjustment project file (*.PRO file) resulting from PROJECT MANAGER, use the VIEW PROJECT button via the REPORT module (see the Report Module chapter for details), or use an ASCII editor from the DOS command line.

Project Manager Screen

Select the PROJECT MANAGER icon from the MAIN MENU, and observe the PROJECT MANAGER screen, Figure 12.1.

Figure 12.1: Project Manager Screen

This screen contains the following areas:

- The PROJECT MANAGER Control Button Menu at the bottom with the buttons CREATE, UPDATE, DELETE, CLONE, COMBINE, and QUIT.
- The PROJECT SELECTION Panel at top center with its LOAD AS SOURCE and MOVE TAGGED buttons.
- The SOURCE PROJECT Panel on the left with its COPY TAGGED and MOVE TAGGED buttons.
- The TARGET PROJECT Panel on the right.
- Project Data Display Fields SOURCE, TARGET and TAGGED at center screen.
- The Project Identification Box with its buttons and data entry/display fields: PROJECT NAME, DISK FILE NAME, CREATED BY, CREATION DATE, COMMENTS, POINTS, VECTORS, ACCEPT, and CANCEL.

INPUT

None required, but you can modify an existing adjustment project (*.PRO file).

OUTPUT

An ASCII adjustment project file (*.PRO file).

General Procedures

This section summarizes procedures to create a project, update a project, delete a project, clone a project, combine two projects, and copy and/or move tagged vectors.

Create A Project

1. Select CREATE.
2. Fill out the Project Identification Box.
3. Select ACCEPT.

Update A Project

1. Select a project.
2. Select UPDATE.
3. Change the Project Identification Box.
4. Select ACCEPT.

Delete a Project

1. Select a project.

2. Select DELETE.

Clone a Project

1. Select a project.
2. Select CLONE.
3. Change the Project Identification Box.
4. Select ACCEPT.

Combine Two Projects

1. Select the source project, and then select LOAD AS SOURCE.
2. Select the target project, and then select LOAD AS TARGET.
3. Select COMBINE. The source information is appended to the target project.

Copy/Move Tagged Vectors

1. Select the source project, and then select LOAD AS SOURCE.
2. Select the target project, and then select LOAD AS TARGET.
3. Select the desired source vectors.
4. To copy the selected vectors to the Target Project, select COPY TAGGED.
5. To move the selected vectors to the Target Project and delete them from the Source Project, select MOVE TAGGED.

Project Manager Control Button Menu

This menu, contains the following buttons: CREATE, UPDATE, DELETE, CLONE, COMBINE, and QUIT.

Figure 12.2: Project Manager Control Button Menu

CREATE Button

This button lets you create a new project (*.PRO-file) in the projects directory (specified via the SETUP module).

When you select CREATE, SNAP activates the Project Identification Box. You must fill out the fields PROJECT NAME and DISK FILE NAME with unique entries; the other fields in the label are optional. When you are satisfied with your specifications, select ACCEPT in the box to create the new project or CANCEL to cancel the

creation. If you select ACCEPT, SNAP creates the new *.PRO file and displays the new project name in the PROJECT SELECTION Panel.

UPDATE Button

This button lets you modify the name and description of the selected project.

Select a project from the PROJECT SELECTION Panel, select UPDATE, make the desired changes in the Project Identification Box, and select ACCEPT in the box to save the changes.

DELETE Button

This button deletes an existing project.

Select a project from the PROJECT SELECTION Panel, and select DELETE; SNAP prompts, in the Control Button Menu area, as shown in Figure 12.3.

DELETE THIS FILE ?

YES NO

Figure 12.3: Delete Message

Select YES or NO.

CLONE Button

This button lets you copy all the points and vectors from the selected project into a new project.

Select a project from the PROJECT SELECTION Panel, select CLONE, and make the desired changes in the Project Identification Box. (You must change both the PROJECT NAME and DISK FILE NAME fields.) When you are satisfied with your changes, select ACCEPT in the box to copy the project or CANCEL to cancel the copy.

COMBINE Button

This button lets you append the vectors and associated points of a designated SOURCE PROJECT to the existing vectors and points of a designated TARGET PROJECT. The adjustment parameters of the resulting TARGET PROJECT will be those of the original TARGET PROJECT.

Select the source project from the PROJECT SELECTION Panel, and select LOAD AS SOURCE; SNAP then displays the vectors in the selected project in the SOURCE PROJECT Panel and displays the project name in the SOURCE data display field of the Project Display area.

Select the target project from the PROJECT SELECTION Panel, and select LOAD AS TARGET; SNAP then displays the vectors in the selected project in the TARGET PROJECT Panel and displays the project name in the TARGET data display field of the Project Display area.

Select COMBINE; SNAP then appends the vectors and associated points from the Source Project to the Target Project.

QUIT Button

This button returns you to the SNAP MAIN MENU.

Project Identification Box

This box, Figure 12.4, contains the project name and attributes for the selected project. SNAP activates it for data entry during CREATE, UPDATE, and CLONE.

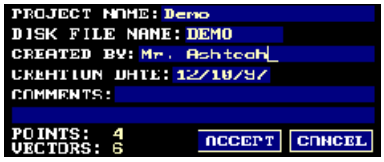

Figure 12.4: Project Identification Box

PROJECT NAME Data Entry Field

This field contains the name of the selected project.

DISK FILE NAME Data Entry Field

This field contains the unique MS-DOS-format disk file name of the selected project. SNAP automatically appends the extension .PRO to this file name.

CREATED BY Data Entry Field

This optional field contains the name of the program operator.

CREATION DATE Data Entry Field

This optional field contains the date the selected project was created.

COMMENTS Data Entry Field

This optional field contains any desired comments about the project.

POINTS and VECTORS Data Display Fields

These fields display the number of points and vectors in the selected project.

ACCEPT Button

This button accepts any entries you may have made to the Project Identification Box, and:

- Creates a new *.PRO file for the specified project if you activated the box via the CREATE button.
- Updates the *.PRO file corresponding to the selected project if you modified the box via the UPDATE button.
- Copies the selected project into a new *.PRO file if you modified the box via the CLONE button.

CANCEL Button

This button cancels any changes to the box and deactivates the box.

Project Selection Panel

This panel lists the projects that reside in the projects directory, as shown in Figure 12.5.

Figure 12.5: Project Selection Panel

If you select a project from this panel, SNAP displays a check mark in front of the project and displays the project information in the Project Information Box.

LOAD AS SOURCE Button

This button loads the selected project into the SOURCE PROJECT Panel on the left side of the screen where SNAP displays the vectors in the project.

LOAD AS TARGET Button

This button loads the selected project into the TARGET PROJECT Panel on the right side of the screen where SNAP displays the vectors in the project.

Source Project Panel

This panel, Figure 12.6, displays the vectors for the project loaded as source.

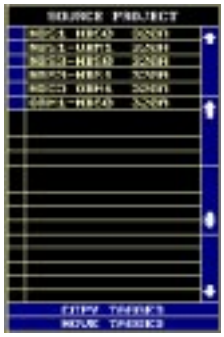

Figure 12.6: Source Project Panel

You can copy or move selected vectors and associated points from the SOURCE PROJECT to the TARGET PROJECT.

You cannot copy or move vectors from source projects containing only vector data or only point data; both the vectors and related points must be present in the source project.

COPY TAGGED Button

This button lets you copy the selected vectors from the source project to the target project. To copy them, select the vectors from the SOURCE PROJECT Panel, and then select COPY TAGGED.

MOVE TAGGED Button

This button lets you move the selected vectors to the target project and delete them from the source project. To move them, select the vectors from the TARGET PROJECT Panel, and then select MOVE TAGGED.

Target Project Panel

This panel displays the vectors for the project loaded as target.

PROJECT DATA DISPLAY FIELDS

These fields (SOURCE, TARGET, and TAGGED) display, respectively, the source project name, the target project name, and the number of vectors tagged in the SOURCE PROJECT Panel.

13

Adjust Module

This module lets you:

- Perform an adjustment and view the results.
- Verify and display summaries of network information and adjustment parameter settings.
- Update point coordinates, geoid heights, and vector weights in the selected adjustment project.
- Review the runtime messages.

Adjust Screen

From the MAIN MENU, select a project from the PROJECTS Panel, and then select the ADJUST icon; observe the ADJUST screen, Figure 13.1.

Figure 13.1: Adjust Screen

This screen initially contains the following areas:

- The ADJUST Control Button Menu with the buttons PROCESS, VERIFY NETWORK, VIEW MESSAGE, VIEW OUTPUT, UPDATE STATIONS, and QUIT.
- In the Options Selection area, the ADJUSTMENT PARAMETERS popup screen. As you proceed with the adjustment, the following popup screen will also appear: NETWORK SUMMARY, ADJUSTMENT TESTS, and ADJUSTMENT OUTPUT.

INPUT

Adjustment project file.

OUTPUT

- Adjustment results for input to the ADJUST, REPORT, and/or ANALYZE modules.
- An optional updated project file.

General Procedure

1. Select the desired project from the SNAP MAIN MENU.
2. Select ADJUST.
3. Ensure that the ADJUSTMENT PARAMETERS are correct.
4. Select VERIFY NETWORK.
5. Ensure, in the NETWORK SUMMARY popup screen, that the network and control configuration is correct.
6. Select PROCESS.
7. When SNAP finishes processing, inspect the ADJUSTMENT TESTS; if desired, create the adjustment analysis data.
8. To view the adjustment output file, select the objects of interest from the ADJUSTMENT OUTPUT, and then select VIEW OUTPUT.
9. To revise the station positions (including geoid height) in the project with the adjusted data, select UPDATE STATIONS.

Adjust Control Button Menu

The buttons in this menu control all functions of the ADJUST module:

PROCESS Button

This button lets you perform an adjustment on the selected project after you have defined the parameter settings via the EDIT and/ or DEFINE modules.

When you select PROCESS, SNAP checks whether you verified the network. If you have, SNAP proceeds with the adjustment. If you have not, SNAP prompts, in the Control Button Menu area:

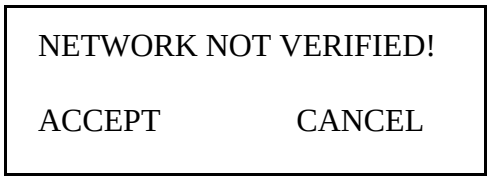

Figure 13.2: Network Verification Message

Select ACCEPT to continue the adjustment or CANCEL to cancel it.

In general, you should verify the network before performing the adjustment if this is the first attempt to adjust the project or if significant changes have been made to the project.

If you have already verified the network in the current ADJUST session, as processing proceeds, SNAP reports:

```
Adjustment in Progress, WAIT ...
```

If you have elected not to verify the network, SNAP first reports:

```
Preparing Points.....

Preparing Vectors...
```

(If terrestrial data is used in the adjustment, SNAP first reports:

```
Preparing Observations ...)
```

followed by:

```
Adjustment in Progress, WAIT ...
```

When SNAP finishes processing, it displays the ADJUSTMENT OUTPUT popup screen, and the ADJUSTMENT TEST popup screen,

Figure 13.3: Adjustment Test Popup Screen

In the Control Button Menu area, SNAP prompts:

CREATE ADJUSTMENT ANALYSIS DATA?
YES NO

If you select YES, SNAP creates a number of additional post-adjustment statistics such as error ellipses. (For details, see the Understanding Your Results appendix.) For large networks this can be a time-consuming process; select this step when you are close to a final adjustment. If you make no selection, SNAP automatically generates the adjustment analysis data after about 30 seconds.

From the ADJUSTMENT OUTPUT and ADJUSTMENT TESTS popups, you can inspect the results of the ADJUSTMENT TESTS or select among the ADJUSTMENT OUTPUT options for further review. (For details about these screens see the appropriate section later in this chapter.)

VERIFY NETWORK Button

This button lets you check the network connectivity and control configuration, and review the summary. During verification, SNAP reports, e.g.:

```
Checking Points....

Checking Vectors...
```

(If terrestrial data is used in the adjustment, SNAP reports:

```
Checking observations ...)
```

When SNAP finishes verification, it displays the NETWORK SUMMARY popup screen on the right side of the ADJUST screen, Figure 13.4.

Figure 13.4: Network Summary Popup

For details, see the Network Summary Popup Screen section later in this chapter.

VIEW MESSAGE Button

This button lets you review the runtime messages SNAP produces during the adjustment process. The messages may help you troubleshoot unsatisfactory or failed adjustments.

The message is a temporary file and is therefore viewable only during the current ADJUST module session; SNAP deletes the file when you return to the MAIN MENU.

When you select VIEW MESSAGE after a processing session, you will see the View Message screen, as shown in Figure 13.5.

Figure 13.5: View Message Screen

The message text appears on the standard SNAP View Output screen; for details on navigating this screen, see the View Output Screen section later in this chapter.

To return to the ADJUST screen, select QUIT.

VIEW OUTPUT Button

This button lets you view the output items selected from the ADJUSTMENT OUTPUT popup screen after the adjustment. The ADJUSTMENT OUTPUT screen contains information used to evaluate the adjustment.

Certain output objects are not available under certain adjustment conditions. For details, see the Adjustment Output Popup Screen section later in this chapter, the Reports Module reference chapter, and the Understanding Your Results appendix.

The adjustment can also be graphically analyzed via the ANALYZE module. (For details, see the appendix Understanding Your Results.) Before selecting VIEW OUTPUT, select the items of interest from the ADJUSTMENT OUTPUT screen.

Then when you select VIEW OUTPUT, you will see the View Output screen with the information selected, as shown in Figure 13.6.

Figure 13.6: View Output Screen

The message text appears on the standard SNAP View Output screen; for details on navigating this screen, see the View Output Screen section later in this chapter.

To return to the ADJUST screen, select QUIT.

UPDATE STATIONS Button

This button lets you replace the initial position coordinates in the project with the adjusted ones. SNAP recomputes the geoid heights of the points based on the new positions. SNAP enables UPDATE STATIONS only if you have processed the adjustment during the current ADJUST module session. If you do not select UPDATE STATIONS before you select QUIT, SNAP gives you another chance to update after you select QUIT. To update stations during a subsequent ADJUST module session, you must first reprocess the selected project.

When you select UPDATE STATIONS, SNAP attempts to compute the geoid height for each point and update the project file.

QUIT Button

This button returns you to the SNAP MAIN MENU.

Adjustment Parameters Popup Screen

This screen lists the parameter values set and saved via the DEFINE module, as shown in Figure 13.7.

Figure 13.7: Adjustment Parameters Popup Screen

For details about these parameters, see the Define Module reference chapter. Before you select PROCESS to begin the adjustment, verify that these settings are satisfactory. If not, select the DEFINE module to redefine the parameters.

Network Summary Popup Screen

This popup screen summarizes the network verification results after you select VERIFY NETWORK. It lets you judge the general configuration of the network before processing the adjustment. When SNAP finishes verification, it displays the NETWORK SUMMARY popup on the right side of the screen, as shown in Figure 13.8

Figure 13.8: Network Summary Screen

Inspect the popup screen to determine whether to proceed with the adjustment. If you are not satisfied with the network configuration, use the ANALYZE or EDIT module

to determine the problem. Once you are satisfied with the network configuration, you are ready to process the adjustment.

STATIONS Data Display Fields

TOTAL This field displays the total number of points in the project.

ISOLATED This field displays the number of included points that are not connected to the network.

EXCLUDED This field displays the number of points excluded from the adjustment (coded X in the POINTS Panel of the EDIT module).

CONTROL COORDS Data Display Fields

FIXED This field displays the number of FIXED-constraint coordinates to be used in the adjustment (coded [F] in the POINTS Panel of the EDIT module.)

WEIGHTED This field displays the number of WEIGHTED-constraint coordinates to be used in the adjustment (coded [W] in the POINTS Panel of the EDIT module).

GPS VECTOR OBS Data Display Fields

TOTAL This field displays the total number of vectors in the project.

ISOLATED This field displays the number of included vectors that are not connected to the network.

EXCLUDED This field displays the number of points excluded from the adjustment (coded X in the VECTORS Panel of the EDIT module).

SINGLY ENDED

This field displays the number of included vectors in the project that are only connected at one end to any other vectors in the project.

TERRESTRIAL OBS Data Display Fields

TOTAL This field displays the total number of terrestrial observations in the project.

ISOLATED This field displays the number of terrestrial observations that are not connected to the network.

EXCLUDED This field displays the number of terrestrial observations that are excluded from the adjustment (so marked in the *.TER file).

Adjustment Tests Popup Screen

After you select PROCESS, and SNAP finishes the adjustment, this popup screen summarizes the adjustment test statistics. When SNAP finishes processing, it displays the ADJUSTMENT TESTS popup on the right side of the screen, as shown in Figure 13.9.

Figure 13.9: Adjustment Tests Popup Screen

(For details on these parameters, see the appendix entitled Understanding Your Results.)

CHI-SQUARE TEST Data Display Fields

These fields display the results of the chi^2 test for the normal distribution of the residuals. The chi^2 test passes if the CHI-SQUARE data field is between the LOWER LIMIT and the UPPER LIMIT. The CHI-SQUARE TEST parameters are:

CONFIDENCE

This field displays the confidence level (1-CHI)100%, where CHI is the TEST SIGNIFICANCE CHI value set via the DEFINE module.

LOWER LIMIT

This field displays the theoretical allowable lower limit of the chi^2 value (dimensionless) computed based on the CONFIDENCE parameter above and degrees of freedom (see VARIANCE below).

UPPER LIMIT

This field displays the theoretical allowable upper limit of the chi2 value (dimensionless) computed based on the CONFIDENCE parameter above and degrees of freedom (see VARIANCE below).

CHI-SQUARE

This field displays the computed chi^2 value at the given confidence level.

VARIANCEThis field displays the a posteriori estimate of the variance of unit weight.

GOODNESS OF FIT Data Display Fields

These fields display how well the distribution of observation residuals matches the theoretical chi-square distribution at the given confidence level. The GOODNESS OF FIT field (PASSED or FAILED) is meaningful only when the number of observations is sufficiently large. Therefore, if the CHI- SQUARE TEST passed, the GOODNESS OF FIT test result may not be critical. The goodness-of-fit parameters are:

CONFIDENCE - This field displays the confidence level (1-CHI)100%, where CHI is the TEST SIGNIFICANCE CHI value set via the DEFINE module.

CRITERIA - This field displays the theoretical value at the given confidence level and the degrees of freedom.

CALCULATED - This field displays the computed test value.

OUTLIER SUSPECTS Data Display Fields

The OUTLIER SUSPECTS field tells how many observations may contain blunders which will be flagged using symbol "*" in the adjustment output. The outlier suspects parameters are:

CONFIDENCE - This field displays the confidence level (1-TAU)100%, where TAU is the TEST SIGNIFICANCE TAU value set via the DEFINE module.

CRITERIA - This field displays the TAU-test criteria based on Pope's Theory of outlier detection.

AUTO DETECTED OBS Data Display Fields

The AUTO DETECTED OBS field tells how many observations that failed to meet the following criteria were detected and automatically deweighted during the adjustment. The auto-detected observations criteria parameters are:

CRITERIA 1 - This field displays blunder criteria for the first iteration of the adjustment (left BLUNDER CRITERIA value set via the DEFINE module).

CRITERIA 2 - This field displays blunder criteria for later iterations of the adjustment (middle BLUNDER CRITERIA value set via the DEFINE module).

CRITERIA 3 - This field displays criteria for misclosure of the residuals between iterations (right BLUNDER CRITERIA value set via the DEFINE module).

SCALE VECTOR SIGMAS Button

This button, when enabled, lets you scale the vector sigma values using the a posteriori variance (under the chi2 test). When you readjust the data using the scaled vector observations, the resultant variance should be around 1.0, and the chi^2 test will probably pass. You should do this if the variance factor is below one.

This option is only available when the selected ADJUSTMEN T OPTION is RAPID.

When you select this option, the vector sigmas in the project file are automatically overwritten.

USE POSTERIORI VARIANCE Button

This button performs the same function as SCALE VECTOR SIGMAS except that the scaled values are not stored. The resultant variance (under the chi^2 test) should be close to 1.0. To use these scaled sigmas in the adjustment, you must reprocess the adjustment immediately after selecting this button.

This option is only when the selected ADJUSTMEN T OPTION is STANDARD, ENHANCED, or TERRESTRIAL.

UPDATE DETECTED VECTORS Button

This button replaces the corresponding input vector sigmas in the project with the deweighted vector sigmas. If the data display field next to AUTO DETECTED OBS shows anything but zero, SNAP detected and deweighted troublesome observations in the output and enabled the UPDATE DETECTED VECTORS button.

Adjustment Output Popup Screen

The Adjustment Output screen, Figure 13.10, appears when SNAP finishes processing the adjustment, and lets you select the output item(s) you wish to view. (These are identical to the OUTPUT OBJECTS OF INTEREST accessed via the REPORT module, but the output items in this ADJUSTMENT OUTPUT screen cannot be written to a report file.) After you have selected the items of interest from this screen, select the VIEW OUTPUT button from the ADJUST Control Button

Menu to view the output. At the bottom of both the INPUT and the OUTPUT OBJECTS OF INTEREST Panels are the SELECT ALL and CLEAR ALL buttons. These buttons and each of the output items are briefly described below. For details, see the Understanding Your Results and File Definitions appendices, and the Reports Module reference chapter.

Figure 13.10: Adjustment Output Screen

ADJUSTED POSITIONS

This item contains the adjusted positions in both East and West longitude, as well as the associated sigmas. This information is always available.

ADJUSTED OBSERVATIONS

This item contains the vectors with the ten largest and smallest residuals, followed by adjusted vector observations. This information is always available.

NETWORK ACCURACY

This item displays how your network conforms to the FGCS accuracy standards, followed by the relative accuracy. This information is always available.

POINT ERROR ELLIPSES

This item contains the magnitudes of the axes and orientation of the point error ellipses. This data is created when you answer YES to CREATE ADJUSTMENT ANALYSIS DATA. This information is not available when the selected ADJUSTMENT OPTION is RAPID.

VECTOR ERROR ELLIPSES

This item contains the magnitudes of the axes and orientation of the vector error ellipses. This data is created when you answer YES to CREATE ADJUSTMENT

ANALYSIS DATA. This information is not available when the selected ADJUSTMENT OPTION is RAPID.

ERROR ELLIPSOIDS

This item contains the magnitudes of the axes and orientation of the error ellipsoids. This data is created when you answer YES to CREATE ADJUSTMENT ANALYSIS DATA. This information is not available when the selected ADJUSTMENT OPTION is RAPID.

DATUM BIAS PARAMETERS

This item contains the computed datum bias parameters. This data is created when you enable the option via the DEFINE module, and have sufficient constraints to compute it.

OBSERVATION STATISTICS

This item contains the blunder detection and residual statistics. This data is created when you answer YES to CREATE ADJUSTMENT ANALYSIS DATA. This information is only partially available when the selected ADJUSTMENT OPTION is RAPID.

ORDERED OBSERVATIONS

This item contains the observations grouped by point name. This data is created when you answer YES to CREATE ADJUSTMENT ANALYSIS DATA. Only part of this information is available when the selected ADJUSTMENT OPTION is RAPID.

ADJUSTMENT SUMMARY

This item contains a summary of the parameters and observations, adjustment tests, and the adjustment histogram. This information is always available.

SELECT ALL Button

This button selects for inclusion in the report all of the objects displayed in the ADJUSTMENT OUTPUT screen.

CLEAR ALL Button

This button deselects all selected objects displayed in the ADJUSTMENT OUTPUT screen.

View Output Screen

SNAP uses this standard screen format to display text when you select the VIEW MESSAGE and VIEW OUTPUT buttons. It is an 80-character-by-23-line display of the selected output, as shown in Figure 13.11.

Figure 13.11: View Output Screen

The control and display elements are:

FILE Data Display Field

This field displays the file name of the temporary file containing the selected objects of interest from the current project.

LINES Data Display Field

This field displays the number of lines in the file.

PAGE START Data Entry Field

This field lets you type is the line number (default is line 1) in the file where the screen begins displaying information.

LINE NR Toggle Field

This field toggles the line numbering on the screen. It is OFF by default.

COLUMN NUMBER Data Display Field

This field displays the file column number for reference.

UP Button

This button scrolls the screen up one line.

DN Button

This button scrolls the screen down one line.

PGUP Button

This button scrolls the screen up 23 lines.

PGDN Button

This button scrolls the screen down 23 lines.

LT Button

This button scrolls the screen one column to the left.

RT Button

This button scrolls the screen one column to the right.

PGLT Button

This button scrolls the screen 80 columns to the left.

PGRT Button

This button scrolls the 80 columns to the right.

PRINT Button

This button prints the displayed file.

SEARCH Button

This button searches for a specified alphanumeric ASCII character string. Select it and observe, in the Control Button Menu area, Figure 13.12:

Figure 13.12: Control Button Menu

FORWARD Button

This button selects the forward (default) search direction.

BACKWARD Button

This button selects the backward search direction.

STRING Data Entry Field

This field lets you type the desired character string, up to 19 characters.

RESULT Data Display Field

This field display FOUND! if the search succeeds or NOT FOUND! if the search fails.

SEARCH Button

This button begins the string search.

NEXT Button

This button searches for the next occurrence of the string.

EXIT Button

This button returns you to the View Output screen.

QUIT Button

This button returns you to the ADJUST screen.

14

Define Module

This module lets you specify the adjustment parameters to be used for the adjustment.

Define Screen

From the MAIN MENU, select a project from the MAIN MENU PROJECTS Panel, and then select the DEFINE icon; observe the DEFINE screen, Figure 14.1.

Figure 14.1: Define Screen

This screen initially displays the default settings for the RAPID ADJUSTMENT OPTION. It contains the following areas:

- The DEFINE Control Button Menu at the bottom with the buttons CURRENT, DEFAULT, SAVE, FULL MENU, SHORT MENU, and QUIT. (Initially, the Short Menu is displayed in the Options Selection area, and the SHORT MENU button is disabled.)
- The ADJUSTMENT DEFINITION buttons (RAPID, STANDARD, ENHANCED, and TERRESTRIAL) at the lower right.
- The Options Selection Area with the adjustment parameter toggle fields: ADJUSTMENT OPTION, REFERENCE ELLIPSOID, HEIGHT SYSTEM, GEOID UNDULATION MODEL, and DATUM BIAS PARAMETERS. The

parameters displayed depend on which menu is selected (full or short) and which adjustment definition is selected.

- PREV, FIRST, and LAST reference ellipsoid selection buttons at the center right.
- At the upper right, the ELLIPSOID INFORMATION Panel describing the default WGS 1984 ellipsoid.

INPUT

A project file.

OUTPUT

A set of parameters to be used in the adjustment.

GENERAL PROCEDURE

1. Select the desired project from the SNAP MAIN MENU.
2. Select DEFINE.
3. Select the desired ADJUSTMENT DEFINITION: RAPID, STANDARD, ENHANCED, or TERRESTRIAL.
4. To edit an individual parameter, select it, and toggle through the available settings.
5. To store the changes, select SAVE.

DEFINE CONTROL BUTTON MENU

This menu, Figure 14.2, contains the following buttons: CURRENT/ DEFAULT, SAVE, FULL MENU, SHORT MENU, and QUIT.

Figure 14.2: Define Control Button Menu

CURRENT/DEFAULT Button

This button lets you select between the default settings for the adjustment options and the currently saved settings. A check mark indicates which of these settings is in effect.

SAVE Button

This button saves the displayed parameter settings for the selected project.

FULL MENU Button

This button selects the full menu display of parameter-setting toggle fields.

SHORT MENU Button

This button selects the short menu display of parameter-setting toggle fields.

QUIT Button

This button returns you to the SNAP MAIN MENU.

Adjustment Definition Buttons

These buttons, Figure 14.3, let you select the adjustment option without toggling through the ADJUSTMENT OPTION toggle field and let you access definitions for each adjustment type via the buttons.

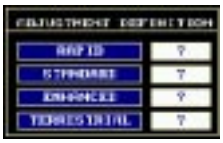

Figure 14.3: Adjustment Definition Buttons

When you select a button next to an option button, the option definition popup screen appears, as shown in Figure 14.4.

```
            STANDARD ADJUSTMENT
3-D GPS NETWORK ADJUSTMENTS IN ANY DATUM
CONSTRAINED ADJUSTMENTS USING GPS VECTORS
MSL HEIGHTS ALLOWED FOR REGIONAL NETWORKS
ESTIMATES FOR DATUM BIAS PARAMETERS
EXTENSIVE POST-PROCESSING STATISTICS
```

Figure 14.4: Option Definition Popup

Each of the adjustment options is briefly described below. For details, see the Getting Started chapter, Adjustment Options section.

RAPID

A rapid adjustment is a 3-D free or minimally constrained GPS network adjustment in WGS-84 coordinates. It permits the fastest computation of all the options and is recommended for blunder detection of vector observations. It does not perform constrained adjustments, nor adjustments on a different ellipsoid. The following parameters are disabled if this option is used: reference ellipsoid, height system, and datum bias parameters. Additionally, error ellipses, ellipsoids, and some other statistics are not computed during a rapid adjustment.

STANDARD

A standard adjustment is a complete 3-D free or constrained GPS network adjustment in any of the datums available. It is the recommended adjustment option for complete adjustment analysis and for the final constrained adjustment.

ENHANCED

An enhanced adjustment is used when you wish to combine GPS and terrestrial observations in the adjustment. In addition to the standard adjustment parameters, you can also set the observation variance factor.

TERRESTRIAL

A terrestrial adjustment is a 3-D adjustment in any datum. You can also perform a leveling network adjustment with this option. In addition to the standard adjustment parameter, you can also control which terrestrial observations will be used in the adjustment.

OPTIONS SELECTION AREA PARAMETERS: ALWAYS DISPLAYED

The following adjustment parameter toggle fields are always displayed: ADJUSTMENT OPTION, REFERENCE ELLIPSOID, HEIGHT SYSTEM, GEOID UNDULATION MODEL, and DATUM BIAS PARAMETERS, as shown in Figure 14.5.

Figure 14.5: Options Always Displayed

ADJUSTMENT OPTION Toggle Field

This field displays the type of adjustment to be performed and toggles among RAPID, STANDARD, ENHANCED, or TERRESTRIAL. The adjustment options are defined in the Adjustment Definition Buttons section above.

REFERENCE ELLIPSOID Toggle Field

This field displays the reference ellipsoid to be used in the adjustment. It toggles among the following ellipsoids: WGS 1984 (default), AIRY, AUSTRALIAN NATIONAL, BESSEL 1841, CLARKE 1866, CLARKE 1880, EVEREST, GRS 1980, INTERNATIONAL, KRASSOVSKY, MODIFIED AI RY, MODIFIED EVEREST, SOUTH AMERICAN 1969, or WGS 1972. The corresponding ellipsoid parameters are displayed in the ELLIPSOID INFORMATION area. When the selected ADJUSTMENT OPTION is RAPID, this parameter is WGS 1984 only, and this field is not editable.

HEIGHT SYSTEM Toggle Field

This field displays the height system to be used in the adjustment. It toggles among ELLIPSOIDAL (default), ORTHOMETRIC, and DERIVED HAE (Height Above Ellipsoid). When the selected ADJUSTMENT OPTION is RAPID, this field is disabled, and ellipsoidal height is always used. These three height systems affect both the input and output height of the adjustment:

ELLIPSOIDAL

When this is selected, the ellipsoidal height is used as the control input, and the adjusted positions are reported as ellipsoid height.

ORTHOMETRIC

When this is selected, the orthometric height is used as the control input, and the adjusted positions are reported as orthometric height. The geoidal separation is not taken into account in the adjustment.

DERIVED HAE

When this is selected, this ellipse height is used as the control input, but the adjusted positions are reported as orthometric height.

GEOID UNDULATION MODEL Toggle Field

This field displays the geoid model to be used to derive the geoidal height. It toggles among GEOID93 (default), OSU91A, and NONE. SNAP computes geoidal heights during the IMPORT process and while updating project positions. The GEOID93

model is used for the contiguous United States. The OSU91A model is a world-wide model, but is not as accurate as the GEOID93 model.

DATUM BIAS PARAMETERS Toggle Field

This field displays whether to compute datum bias parameters (rotation and scale) during the adjustment. It toggles between DISABLED (the default) and ENABLED. When the selected REFERENCE ELLIPSOID is WGS 1984, this parameter is DISABLED only, and this field is not available.

If DATUM BIAS PARAMETERS is ENABLED, you need to select FIXED and/or WEIGHTED constraints for at least seven coordinates among three points (via the EDIT module).

OPTIONS SELECTION AREA PARAMETERS: FULL MENU DISPLAY ONLY

In addition to the adjustment parameter toggle fields that are always displayed (ADJUSTMENT OPTION, REFERENCE ELLIPSOID, HEIGHT SYSTEM, GEOID UNDULATION MODEL, and DATUM BIAS PARAMETERS), the following parameters are also displayed when the FULL MENU is selected: INVERSE COMPUTATION, AUTO BLUNDER DETECTION, BLUNDER CRITERIA, TEST SIGNIFICANCE, ITERATION/CONVERGENCE, CONFIDENCE REGION, as shown in Figure 14.6.

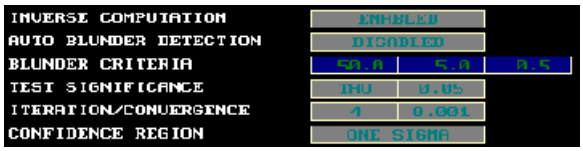

Figure 14.6: Additional Parameters

INVERSE COMPUTATION Toggle Field

This field specifies whether SNAP will perform an inverse computation. It toggles from ENABLED (default) to DISABLED. Select ENABLED to perform a complete adjustment analysis. Select DISABLED to obtain only the adjusted positions and/or the adjusted observations or to speed up the adjustment.

AUTO BLUNDER DETECTION Toggle Field

This field enables the auto-blunder detection option. It toggles from DISABLED (default) to ENABLED. The auto-blunder detection option automatically detects problem observations (based on the BLUNDER CRITERIA fields on the next line)

and deweights them accordingly. The deweighted vectors will have a ratio greater than 1.0 in the observation statistics.

BLUNDER CRITERIA Toggle Fields

These fields set the blunder criteria to be used in the auto-blunder detection option, and are active when AUTO BLUNDER DETECTION is ENABLED. If the adjustment fails to meet these criteria, the vectors will be deweighted. The three criteria are:

Criteria 1 (Left Field)

This field sets the upper limit for the standardized residual for the first iteration of the adjustment. When enabled, it toggles from 50.0 (default) to the available values: 10.0, 20.0,...,100.0.

Criteria 2 (Center Field)

This field sets the upper limit for the standardized residual for subsequent iterations of the adjustment. When enabled, it toggles from 5.0 (default) to the available values: 1.0, 2.0,...,10.0.

Criteria 3 (Right field)

This field sets the upper limit of the blunder misclosure between iterations of the adjustment. When enabled, it toggles from 0.5 (default) to the available values: 0.1, 0.2,...,1.0.

TEST SIGNIFICANCE (TAU/ CHI) Toggle Fields

These fields set the significance level to be used for the tau test and the ch^i2 test. To set the significance level for the tau test, toggle the left field to TAU, and toggle the significance level in the right field to the desired value. To set the significance level for the chi^2 test, toggle the left field to CHI, and toggle the right field to the desired value. The significance level can be set 0.05 or 0.10.

ITERATION/CONVERGENCE Toggle Fields

This field sets the maximum iterations for the adjustment and for the convergence criteria. SNAP will terminate the adjustment when one of these two parameters is met.

ITERATION: Left Field

This field toggles from 4 (default) to the available values: 1, 2,...,10.

CONVERGENCE: Right Field

This field toggles from 0.001 (default) to the available values: 0.002, 0.003,...,0.010.

CONFIDENCE REGION Toggle Field

This field sets the confidence level on which the statistics reported in the adjustment are to be based. It toggles among ONE SIGMA (default), 90% LEVEL, 95% LEVEL, and 99% LEVEL.

OPTIONS SELECTION AREA PARAMETERS: ENHANCED ONLY

In addition to the adjustment parameter toggle fields that are always displayed (ADJUSTMENT OPTION, REFERENCE ELLIPSOID, HEIGHT SYSTEM, GEOID UNDULATION MODEL, and DATUM BIAS PARAMETERS), and the fields when the FULL MENU is selected (INVERSE COMPUTATION, AUTO BLUNDER DETECTION, BLUNDER CRITERIA, TEST SIGNIFICANCE, ITERATION/ CONVERGENCE, CONFIDENCE REGION), the OBS VARIANCE FACTOR parameters are also displayed when the selected ADJUSTMENT OPTION is ENHANCED, as shown in Figure 14.7.

Figure 14.7: Obs Variance Factor Parameters

GPS OBS VARIANCE FACTOR Toggle Fields

These fields set a separate variance factor for the GPS observations and the TERRESTRIAL observations. To change the integer value, select the corresponding numerical display toggle field and toggle among the available values: 1.0, 2.0,...,10.0. To change the selected integer value, select the left or right arrow above the toggle field to increment or decrement the value in 0.1 steps.

OPTIONS SELECTION AREA PARAMETERS: TERRESTRIAL ONLY

In addition to the adjustment parameter toggle fields that are always displayed (ADJUSTMENT OPTION, REFERENCE ELLIPSOID, HEIGHT SYSTEM, GEOID UNDULATION MODEL, and DATUM BIAS PARAMETERS), and the fields when the FULL MENU is selected (INVERSE COMPUTATION, AUTO BLUNDER DETECTION, BLUNDER CRITERIA, TEST SIGNIFICANCE, ITERATION/ CONVERGENCE, CONFIDENCE REGION), the OBSERVATION TYPE

parameters are also displayed when the selected ADJUSTMENT OPTION is TERRESTRIAL, as shown in Figure 14.8.

Figure 14.8: Observation Type Parameters

DISTANCE | ANGLE (Horizontal / Vertical) | LEVELING Toggle Fields

These fields specify which of these types of data are to be used in the adjustment. They toggle between YES (default) and NO.

REFRACTION FACTOR Toggle Field

This field specifies whether to use the refraction factor. It toggles between 2.6 (default) to NO. If set to 2.6, the factor will be used with a standard value of 2.6. If set to NO, it is disabled.

Ellipsoid Information Area

This area displays the geometric description of the REFERENCE ELLIPSOID selected in the Options Selection area or by the PREV/FIRST/LAST buttons below the panel. SEMIMAJOR and SEMIMINOR AXIS dimensions are in meters, and INVERSE FLATTENING is dimensionless. Following is the default WGS 1984 ellipsoid, as shown in Figure 14.9:

Figure 14.9: Default Ellipsoid

PREV, FIRST [AND] LAST BUTTONS

These buttons let you select among the available reference ellipsoids. When you select an ellipsoid, SNAP displays its geometric description in the ELLIPSOID

INFORMATION area above the buttons. WGS-84 is the only ellipsoid available when the ADJUSTMENT OPTION is RAPID.

PREV Button

This button selects the reference ellipsoid ahead of the current one in the selection list.

FIRST Button

This button selects the WGS 1984 reference ellipsoid, the first ellipsoid in the selection list.

LAST Button

This button selects the WGS 1972 reference ellipsoid, the last ellipsoid in the selection list.

15

Report Module

This module lets you:

- Select various input and output components (objects of interest) of an adjustment project for inclusion into a report.
- View or print selected objects of interest.
- Manage existing report files.
- View a selected adjustment project file.

Report Screen

Select the REPORT icon from the MAIN MENU, and observe the REPORT screen, Figure 15.1.

Figure 15.1: Report Screen

This screen contains the following areas:

- The REPORT Control Button Menu at the bottom with the buttons INPUT, OUTPUT, VIEW OBJECTS, PRINT, WRITE FILE, and QUIT.
- The PROJECTS Panel on the right with the VIEW PROJECT button.
- The OBJECTS OF INTEREST area in the center containing:
  - Either the input objects or the output objects.
  - The SELECT ALL and CLEAR ALL buttons.
- The REPORTS OUTPUT FILE area with:
  - The DRIVE buttons, DIRECTORY data display field, and FILE NAME data entry field at lower left; and
  - The REPORTS Panel at upper left with the VIEW REPORT and DELETE REPORT buttons.

INPUT

- The adjustment project file and the adjustment output.
- xisting report files (.RPT files).

OUTPUT

Report files (.RPT files) containing the selected objects of interest.

General Procedure

1. Select REPORT from the SNAP MAIN MENU.
2. Select the desired project.
3. Select the type of objects of interest, INPUT or OUTPUT.
4. Select the desired objects of interest.
5. If desired, VIEW or PRINT the selected objects.
6. Select the desired DRIVE.
7. Select the desired report files directory.
8. Enter the desired FILE NAME.
9. Select WRITE FILE.

Report Control Button Menu

This menu, Figure 15.2, contains the following buttons: INPUT/ OUTPUT, VIEW OBJECTS, PRINT, WRITE FILE, and QUIT.

Figure 15.2: Report Control Button Menu

INPUT/OUTPUT Button

This button selects the INPUT OBJECTS OF INTEREST Panel or the OUTPUT OBJECTS OF INTEREST Panel for display.

The input objects of interest are:

- ALL CONTROL POINTS
- ALL INCLUDED POINTS
- ALL EXCLUDED POINTS
- ALL INCLUDED VECTORS
- ALL EXCLUDED VECTORS
- ALL REPEATED VECTORS
- INPUT PARAMETERS
- PROJECT SUMMARY

The output objects of interest are:

- ADJUSTED POSITIONS
- ADJUSTED OBSERVATIONS
- NETWORK ACCURACY
- POINT ERROR ELLIPSES
- VECTOR ERROR ELLIPSES
- ERROR ELLIPSOIDS
- DATUM BIAS PARAMETERS
- OBSERVATION STATISTICS
- ORDERED OBSERVATIONS
- ADJUSTMENT SUMMARY)

VIEW OBJECTS Button

This button displays the objects selected from the OBJECTS OF INTEREST Panel. Select a project from the PROJECTS Panel and one or more objects from the OBJECTS OF INTEREST Panel, and then select VIEW OBJECTS. The text appears on the standard SNAP View Output screen; for details on navigating this screen, see the Adjust Module chapter, View Output Screen section.

PRINT Button

This button prints the objects selected from the OBJECTS OF INTEREST Panel. Each object will begin on a new page.

WRITE FILE Button

This button writes the selected objects of interest to a file. When you are satisfied with your input and/or output selections, select WRITE FILE to store the data to the .RPT file entered in the FILE NAME data entry field or selected from the REPORTS

Panel. If you select an existing *.RPT file, SNAP prompts, in the Control Button Menu area:

SNAP reports its progress as it writes each selected Object of Interest into the report file:

FILE ALREADY EXISTS !
OVERWRITE APPEND CANCEL

QUIT Button

This button returns you to the SNAP MAIN MENU.

PROJECTS PANEL

This panel, Figure 15.3, lists the projects that reside in the projects director.

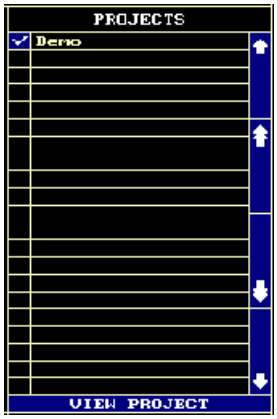

Figure 15.3: Projects Panel

At the bottom of the panel is the VIEW PROJECT button. If you select a project from this panel, SNAP displays a check mark in front of it.

VIEW PROJECT Button

This button displays the selected project file. The text appears on the standard SNAP View Output screen; for details on navigating this screen, see the Adjust Module chapter, View Output Screen section.

Reports Output File Area

This area contains the DRIVE toggle field, the DIRECTORY data display field, and the FILE NAME data entry field, as shown in Figure 15.4.

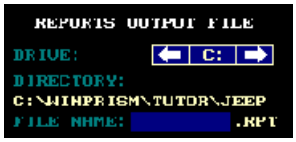

Figure 15.4: Reports Output File Panel

DRIVE Toggle Field

This field toggles between the available drives for data output. Select the arrow buttons to choose the disk volume where you want the report file to be stored.

DIRECTORY Data Display Field

This field displays the current subdirectory path selected via the REPORTS Panel. Initially this is the directory where you executed SNAP.

FILE NAME Data Entry Field

This field displays the name of the file where the report data is to be written, as shown in Figure 15.5.

Figure 15.5: Reports Panel

Reports Panel

This panel lists the files in the selected directory that have the extension .RPT.

When you select an existing file name from the REPORTS Panel, SNAP displays a check mark in front of it.

VIEW REPORT Button

This button lets you view the selected report file. The text appears on the standard SNAP View Output screen; for details on navigating this screen, see the Adjust Module chapter, View Output Screen section.

DELETE REPORT Button

This button deletes the selected file. Select the file you wish to delete from the REPORTS Panel, and then select DELETE REPORT.

Objects Of Interest Panels

These panels display the input and output items (the objects of interest) available for inclusion in a report, as shown in Figure 15.6 and Figure 15.7.

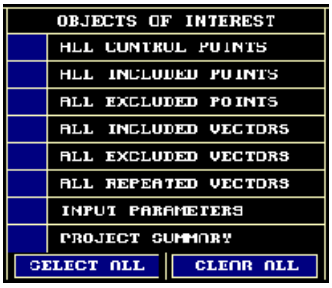

Figure 15.6: Input Objects of Interest

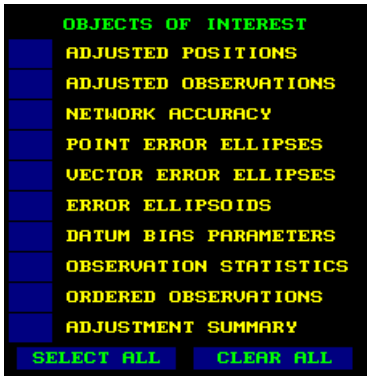

Figure 15.7: Output Objects of Interest

The display (input or output) is controlled by the INPUT/ OUTPUT button in the REPORT Control Button Menu. When you select an item from either of these panels, SNAP displays a check mark in front of it. SNAP formats the objects you select from this list in an ASCII report style. Each Object of Interest selected starts on a separate page of the report preceded by a header listing the SNAP software version, project name, project file name, creator name, creation date, ellipsoid used, and page number.

At the bottom of both the INPUT and the OUTPUT OBJECTS OF INTEREST Panels are the SELECT ALL and CLEAR ALL buttons described below. The input and output objects of interest themselves are described in subsequent sections.

SELECT ALL Button

This button selects all of the objects displayed in the OBJECTS OF INTEREST list (typically for review purposes, not necessarily for inclusion in the report).

CLEAR ALL Button

This button deselects all selected objects displayed in the OBJECTS OF INTEREST list.

Input Objects Of Interest

This section briefly describes the input objects of interest.

All Control Points

This item contains a list of all of the control points, i.e., points for which one or more coordinates are set to FIXED or WEIGHTED, as shown below. :

```
============================================================
       ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network      FILE : TUTOR.PRO
  CREATOR   : Your Name             DATE : 05/19/1994
  ELLIPSOID : WGS 1984              PAGE : 3     OF INPUT
============================================================
                              ALL CONTROL POINTS
NAME  LATITUDE/LONGITUDE   SIGMA   HAE/HAMSL   SIGMANORTHING/EASTING
---- ------------------ ------- ----------- ----- -- ---------------
NBS1    39° 8' 1.30471"N   1.000     105.965             4333945.954
        77°12'48.21999"W             138.071              308689.726
ORM1    39° 8'11.59797"N             121.455             4334232.121
        77°11'54.80637"W   1.000     153.556              309979.961
NBS3    39° 7'51.00898"N             105.108   1.000     4333619.487
        77°12'32.76732"W             137.211              309053.042
NBS5    39° 7'48.36842"N   FIXED     105.888   FIXED     4333550.573
        77°12'54.11582"W   FIXED     137.994              308538.422
```

All Included Points

This item lists all points for which the STATUS is set to INCLUDED, e.g.:

```
============================================================
       ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                    FILE : TUTOR.PRO
  CREATOR   : Your Name                           DATE : 05/19/1994
  ELLIPSOID : WGS 1984                            PAGE : 4     OF INPUT
============================================================
                         ALL INCLUDED POINTS
NAME  LATITUDE/LONGITUDE   SIGMA   HAE/HAMSL   SIGMA NORTHING/EASTING
```

NBS1	39° 8' 1.30471"N	1.000	105.965		4333945.954	
	77°12'48.21999"W		138.071		308689.726	
NBS0	39° 8' 7.23833"N		107.629		4334129.357	
	77°12'49.01495"W		139.737		308675.101	
ORM1	39° 8'11.59797"N		121.455		4334232.121	
	77°11'54.80637"W	1.000	153.556		309979.961	
NBS3	39° 7'51.00898"N		105.108	1.000	4333619.487	
	77°12'32.76732"W		137.211		309053.042	
NBS5	39° 7'48.36842"N	FIXED	105.888	FIXED	4333550.573	
	77°12'54.11582"W	FIXED	137.994		308538.422	

All Excluded Points

This item lists all points for which the STATUS is set to EXCLUDED, e.g.:

ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE version 1.0

PROJECT : Andorra1 FILE : STEVE05.PRO

CREATOR : DATE : 04/05/1994

ELLIPSOID : WGS 1984 PAGE : 5 OF INPUT

ALL EXCLUDED POINTS

NAME	LATITUDE/LONGITUDE	SIGMA	HAE/HAMSL	SIGMA	NORTHING/EASTING
_BUS	37°22'27.87896"N		2.315		4136839.714
	122° 2'27.38829"W				584914.106
_TCV	37°22'39.81405"N		-3.769		4137214.034
	122° 2' 1.45745"W				585548.104

All Included Vectors

This item lists all vectors for which the STATUS is set to INCLUDED, e.g.:

```
============================================================

       ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0

  PROJECT   : tutorial network                        FILE : TUTOR.PRO

  CREATOR   : Your Name                               DATE : 05/19/1994

  ELLIPSOID : WGS 1984                                PAGE : 5     OF INPUT

============================================================

                      ALL INCLUDED VECTORS

FROM   TO   OBSERVATION  SIGMA      CORRELATION MATRIX SOLUTION SESSION

---- ---- ------------ ------ ------------------ ---- -------- -------


NBS1 NBS0      -43.8880 0.0016  1.0000 -0.1073  0.1051    FIXED       A

               107.1380 0.0043          1.0000 - 0.7758     100.       86

              142.9910 0.0030                  1.0000   0.0035   18:29

NBS1 ORM1     1209.3110 0.0024  1.0000 -0.5093  0.4146    FIXED       A

               467.7390 0.0045          1.0000 - 0.7182     100.       86

              256.0030 0.0042                  1.0000   0.0075   18:29

...

...

...

NBS5 NBS1       82.4410 0.0017  1.0000 -0.5030  0.4148    FIXED       A

               276.3740 0.0033          1.0000 - 0.7254     100.       86

              309.9800 0.0031                  1.0000   0.0054   18:29

NBS5 NBS3      488.5920 0.0012  1.0000 -0.5039  0.4203    FIXED       A

               163.7660 0.0023          1.0000 - 0.7272     100.       86

               63.1500 0.0021                  1.0000   0.0037   18:29

NBS5 ORM1     1291.7530 0.0020  1.0000 -0.5013  0.4157    FIXED       A
```

```
              744.1130 0.0037          1.0000 - 0.7285     100.      86
             565.9820 0.0035                1.0000   0.0060   18:29
ORM1 NBS0   -1253.2000 0.0026  1.0000 -0.3938  0.3843    FIXED      A
             -360.6060 0.0058          1.0000 - 0.7079     100.      86
             -113.0120 0.0049                1.0000   0.0083   18:29
```

All Excluded Vectors

This item lists all vectors for which the STATUS is set to EXCLUDED, e.g.:

```
============================================================
           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : Andorra1                                FILE : STEVE05.PRO
  CREATOR   :                                         DATE : 04/05/1994
  ELLIPSOID : WGS 1984                                PAGE : 7     OF INPUT
============================================================

                        ALL EXCLUDED VECTORS
FROM   TO   OBSERVATION  SIGMA      CORRELATION MATRIX SOLUTION SESSION
---- ---- ------------ ------ ------------------ ---- -------- -------
_BUS _MAN    -335.5130 0.0043  1.0000  0.6700 - 0.5200    FIXED      A
              594.9510 0.0061          1.0000 - 0.5100     33.4     198
             424.1750 0.0055                1.0000   0.0066   16:18
_BUS _TCV     661.8290 0.0039  1.0000  0.6300 - 0.5200    FIXED      A
             -145.0190 0.0053          1.0000 - 0.3900      3.0     198
             288.7150 0.0063                1.0000   0.0068   16:29
_BUS _TEN     512.9910 0.0046  1.0000  0.6300 - 0.5000    FIXED      A
             1019.3210 0.0066          1.0000 - 0.4700      2.3     198
            1462.4900 0.0064                1.0000   0.0083   16:30

_TCV _TEN    -148.8390 0.0050  1.0000  0.6100 - 0.5300    FIXED      A
             1164.3390 0.0071          1.0000 - 0.3900      7.8     198
```

```
             1173.7770 0.0084                  1.0000   0.0088   16:29
_BUS _MAN     -335.5130 0.0043  1.0000  0.6700 - 0.5200    FIXED      A
               594.9510 0.0061          1.0000 - 0.5100     33.4     198
              424.1750 0.0055                  1.0000   0.0066   16:18
```

ALL REPEATED VECTORS

This item contains a list of all repeat vectors, e.g.:

```
============================================================

           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : Andorra1                                FILE : STEVE05.PRO
  CREATOR   :                                         DATE : 04/05/1994
  ELLIPSOID : WGS 1984                                PAGE : 9     OF INPUT
============================================================

                              ALL REPEATED VECTORS
FROM   TO   OBSERVATION  SIGMA      CORRELATION MATRIX SOLUTION SESSION
---- ---- ------------ ------ ------------------ ---- -------- -------
_AST _BUS     -790.8630 0.0035  1.0000  0.6400 - 0.5200    FIXED      A
               -631.8350 0.0048          1.0000 - 0.4100      3.5     198
              -1227.7660 0.0053                  1.0000   0.0061   16:28
_AST _BUS     -790.8630 0.0035  1.0000  0.6400 - 0.5200    FIXED      A
               -631.8350 0.0048          1.0000 - 0.4100      3.5     198
              -1227.7660 0.0053                  1.0000   0.0061   16:28
_AST _MAN    -1126.3740 0.0041  1.0000  0.6700 - 0.5400    FIXED      A
                 -36.8830 0.0058          1.0000 - 0.4600      3.0     198
               -803.5920 0.0060                  1.0000   0.0063   16:18
_AST _MAN    -1126.3740 0.0041  1.0000  0.6700 - 0.5400    FIXED      A
                 -36.8830 0.0058          1.0000 - 0.4600      3.0     198
               -803.5920 0.0060                  1.0000   0.0063   16:18
_AST _MAN    -1126.3740 0.0041  1.0000  0.6700 - 0.5400    FIXED      A
```

```
              -36.8830 0.0058          1.0000 - 0.4600      3.0     198
             -803.5920 0.0060                1.0000   0.0063   16:18
```

Input Parameters

This item lists the input parameter settings selected via the DEFINE module, e.g.:

```
============================================================
           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                      FILE : TUTOR.PRO
  CREATOR   : Your Name                             DATE : 05/19/1994
  ELLIPSOID : WGS 1984                              PAGE : 2     OF INPUT
============================================================
```

INPUT PARAMETERS	
ITEM	DESCRIPTION
ADJUSTMENT OPTION	STANDARD
HEIGHT SYSTEM	ELLIPSOIDAL
NUMBER OF ITERATIONS	4
CONVERGENCY CRITERIA	0.001
REFERENCE ELLIPSOID	WGS 1984
SEMIMAJOR AXIS	6378137.000
INVERSE FLATTENING	298.2572235630
DATUM BIAS PARAMETERS	DISABLED
CRITERIA FOR TAU TEST	0.05
CRITERIA FOR CHI-SQUARE TEST	0.05
AUTO BLUNDER DETECTION	DISABLED

```
|        INVERSE COMPUTATION          |        ENABLED                      |
|                                     |                                     |
------------------------------------------ ----------------------------
```

Project Summary

This item displays the project summary generated via the PROJECT MANAGER module, e.g.:

```
============================================================

           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0

  PROJECT   : tutorial network                       FILE : TUTOR.PRO

  CREATOR   : Your Name                              DATE : 05/19/1994

  ELLIPSOID : WGS 1984                               PAGE : 1     OF INPUT

============================================================

------------------------------------------ ----------------------------

|                              PROJECT SUMMARY                         |

|------------------------------------------ ----------------------------|

| ITEM               | DESCRIPTION                                    |

|------------------------------------------ ----------------------------|

| PROJECT NAME       | tutorial network                               |

| PROJECT FILE NAME  | TUTOR.PRO                                      |

| CREATED BY         | Your Name                                      |

| CREATION DATE      | 05/19/94                                       |

| COMMENTS           | snap tutorial network                          |

| POINTS CONTAINED   | 5                                              |

| VECTORS CONTAINED  | 10                                             |

------------------------------------------ ----------------------------
```

Output Objects Of Interest

This section briefly describes the output objects of interest.

These objects are only available after an adjustment has been performed, and certain output objects are not available under certain adjustment conditions. For details, see: the Adjust Module reference chapter, Adjustment Output Popup Screen section; the Define Module reference chapter, and the Understanding Your Results appendix.

Adjusted Positions

This item contains a list of the adjusted point positions in both East and West longitude, as well as the associated sigmas, e.g.:

```
============================================================

           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0

  PROJECT   : tutorial network                        FILE : TUTOR.PRO

  CREATOR   : Your Name                               DATE : 05/19/1994

  ELLIPSOID : WGS 1984                                PAGE : 3     OF OUTPUT

=================================================================================

                                ADJUSTED POSITIONS

 NAME         LATITUDE     s(N)        LONGITUDE     s(E)  ELL HEIGHT    s(U)

 ---- --------------  ------- ---------------  - ------ -----------  ------

 NBS1   39° 8' 1.30767"    0.00  282°47'11.77797"    0.00     106.604    0.00

 NBS0   39° 8' 7.24125"    0.00  282°47'10.98320"    0.00     108.277    0.00

 ORM1   39° 8'11.60100"    0.00  282°48' 5.19184"    0.00     122.102    0.00

 NBS3   39° 7'51.01196"    0.00  282°47'27.23064"    0.00     105.748    0.00

 NBS5   39° 7'48.36842"          282°47' 5.88418"             105.888

=================================================================================

           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0

  PROJECT   : tutorial network                        FILE : TUTOR.PRO

  CREATOR   : Your Name                               DATE : 05/19/1994

  ELLIPSOID : WGS 1984                                PAGE : 4     OF OUTPUT

=================================================================================

                    ADJUSTED POSITIONS  -  WEST LONGITUDES

 NAME         LATITUDE     s(N)        LONGITUDE     s(E)  ELL HEIGHT    s(U)
```

```
---- --------------  ------- ---------------  - ------ ----------  ------
NBS1  39° 8' 1.30767"   0.00  77°12'48.22203"   0.00    106.604   0.00
NBS0  39° 8' 7.24125"   0.00  77°12'49.01680"   0.00    108.277   0.00
ORM1  39° 8'11.60100"   0.00  77°11'54.80816"   0.00    122.102   0.00
NBS3  39° 7'51.01196"   0.00  77°12'32.76936"   0.00    105.748   0.00
NBS5   39° 7'48.36842"           77°12'54.11582"             105.888
```

Adjusted Observations

This item contains a list of the vectors with the 10 worst and best residuals, followed by the adjusted vector observations, e.g.:

```
=========================================================================
           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
 PROJECT   : tutorial network                        FILE : TUTOR.PRO
 CREATOR   : Your Name                               DATE : 05/19/1994
 ELLIPSOID : WGS 1984                                PAGE : 5     OF OUTPUT
=========================================================================

                    TEN VECTORS WITH LARGEST RESIDUALS

NAME NAME SESS     DISTANCE      V(R)     V(N)     V(E)     V(U)  TAU    RPPM
---- ---- ----  ---------  --------  -------  - ------  -------  ---  ------
NBS1 NBS0  86A     183.987     0.002   -0.001   - 0.001    0.002        13.31
ORM1 NBS0  86A    1308.938     0.002    0.001    0.001   -0.002         1.87
NBS1 ORM1  86A    1321.647     0.001    0.000    0.001    0.000         0.76
NBS5 NBS0  86A     594.766     0.001    0.001    0.000    0.001         2.38
NBS3 NBS0  86A     634.650     0.001    0.001    0.000    0.000         1.58
NBS5 NBS1  86A     423.399     0.001   -0.001    0.000   -0.001         3.34
NBS5 ORM1  86A    1594.574     0.000    0.000    0.000    0.000         0.00
NBS5 NBS3  86A     519.162     0.000    0.000    0.000    0.000         0.00
NBS3 ORM1  86A    1111.175     0.000    0.000    0.000    0.000         0.00
NBS3 NBS1  86A     488.430     0.000    0.000    0.000    0.000         0.00
=========================================================================
```

ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE version 1.0

PROJECT : tutorial network FILE : TUTOR.PRO

CREATOR : Your Name DATE : 05/19/1994

ELLIPSOID : WGS 1984 PAGE : 6 OF OUTPUT

TEN VECTORS WITH SMALLEST RESIDUALS

NAME	NAME	SESS	DISTANCE	V(R)	V(N)	V(E)	V(U)	TAU	RPPM
NBS3	NBS1	86A	488.430	0.000	0.000	0.000	0.000		0.00
NBS3	ORM1	86A	1111.175	0.000	0.000	0.000	0.000		0.00
NBS5	NBS3	86A	519.162	0.000	0.000	0.000	0.000		0.00
NBS5	ORM1	86A	1594.574	0.000	0.000	0.000	0.000		0.00
NBS5	NBS1	86A	423.399	0.001	-0.001	0.000	-0.001		3.34
NBS3	NBS0	86A	634.650	0.001	0.001	0.000	0.000		1.58
NBS5	NBS0	86A	594.766	0.001	0.001	0.000	0.001		2.38
NBS1	ORM1	86A	1321.647	0.001	0.000	0.001	0.000		0.76
ORM1	NBS0	86A	1308.938	0.002	0.001	0.001	-0.002		1.87
NBS1	NBS0	86A	183.987	0.002	-0.001	- 0.001	0.002		13.31

ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE version 1.0

PROJECT : tutorial network FILE : TUTOR.PRO

CREATOR : Your Name DATE : 05/19/1994

ELLIPSOID : WGS 1984 PAGE : 7 OF OUTPUT

ADJUSTED VECTOR OBSERVATIONS

NAME	NAME	SESS	OBSERVATION	s(XYZ)	ADJUSTED	V(XYZ)	V(NEU)	V'	TAU	RPPM
NBS1	NBS0	86A	-43.888	0.002	-43.888	0.000	-0.001	-0.2		5.44
			107.138	0.004	107.136	- 0.002	-0.001	-0.2		5.44

```
                  142.991  0.003    142.991   0.000   0.002   0.4     10.87
NBS1 ORM1  86A   1209.311  0.002   1209.312   0.001   0.000   0.0      0.00
                  467.739  0.004    467.739   0.000   0.001   0.2      0.76
                  256.003  0.004    256.003   0.000   0.000   0.0      0.00
NBS3 NBS0  86A   -450.039  0.002   -450.039   0.000   0.001   0.2      1.58
                  219.743  0.004    219.744   0.001   0.000   0.0      0.00
                  389.819  0.004    389.820   0.001   0.000   0.0      0.00
NBS3 NBS1  86A   -406.151  0.002   -406.151   0.000   0.000   0.0      0.00
                  112.608  0.003    112.608   0.000   0.000   0.0      0.00
                  246.829  0.003    246.829   0.000   0.000   0.0      0.00
NBS3 ORM1  86A    803.161  0.002    803.161   0.000   0.000   0.0      0.00
                  580.347  0.003    580.347   0.000   0.000   0.0      0.00
                  502.832  0.003    502.832   0.000   0.000   0.0      0.00
NBS5 NBS0  86A     38.553  0.002     38.553   0.000   0.001   0.2      1.68
                  383.510  0.005    383.510   0.000   0.000   0.0      0.00
                  452.969  0.004    452.970   0.001   0.001   0.2      1.68
NBS5 NBS1  86A     82.441  0.002     82.441   0.000  -0.001  -0.2      2.36
                  276.374  0.003    276.374   0.000   0.000   0.0      0.00
                  309.980  0.003    309.979  - 0.001  -0.001  -0.2      2.36
NBS5 NBS3  86A    488.592  0.001    488.592   0.000   0.000   0.0      0.00
                  163.766  0.002    163.766   0.000   0.000   0.0      0.00
                   63.150  0.002     63.150   0.000   0.000   0.0      0.00
NBS5 ORM1  86A   1291.753  0.002   1291.753   0.000   0.000   0.0      0.00
                  744.113  0.004    744.113   0.000   0.000   0.0      0.00
                  565.982  0.004    565.982   0.000   0.000   0.0      0.00
ORM1 NBS0  86A  -1253.200  0.003  -1253.200   0.000   0.001   0.1      0.76
                 -360.606  0.006   -360.604   0.002   0.001   0.1      0.76
                 -113.012  0.005   -113.012   0.000  -0.002  -0.2      1.53
```

Network Accuracy

This item displays how well your network conforms to the FGCC accuracy standards, followed by the relative network accuracy, e.g.:

```
============================================================

            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                         FILE : TUTOR.PRO
  CREATOR   : Your Name                                DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                 PAGE : 8     OF OUTPUT
============================================================================

                           FGCC STANDARDS (VECTOR)
                            Confidence Level: 95%
NAME NAME SESS   DISTANCE  1.96s     AA       A       B      C1    C2-I   C2-II
.... .... .... ........ ....... .......  .......  - ......  .......  .......  .......
NBS1 NBS0  86A   183.985   0.000   0.003    0.005   0.008   0.010   0.020  0.031
NBS1 ORM1  86A  1321.648   0.000  0.003    0.005   0.008   0.017   0.033  0.073
NBS3 NBS0  86A   634.651   0.000  0.003    0.005   0.008   0.012   0.024   0.044
NBS3 NBS1  86A    488.430  0.000  0.003   0.005   0.008   0.011   0.022   0.039
NBS3 ORM1  86A   1111.175  0.000  0.003   0.005   0.008   0.015   0.030   0.063
NBS5 NBS0  86A    594.767  0.000  0.003   0.005   0.008   0.012   0.023   0.042
NBS5 NBS1  86A    423.398  0.000  0.003   0.005   0.008   0.011   0.022   0.037
NBS5 NBS3  86A    519.162  0.000  0.003   0.005   0.008   0.011   0.023   0.040
NBS5 ORM1  86A   1594.574  0.000  0.003   0.005   0.008   0.019   0.038   0.085
ORM1 NBS0  86A   1308.937  0.000  0.003   0.005   0.008   0.016   0.033   0.072
============================================================================

            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                         FILE : TUTOR.PRO
  CREATOR   : Your Name                                DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                 PAGE : 9     OF OUTPUT
============================================================================

                         NETWORK ACCURACY (VECTOR)
                          Confidence Level: 1 sigma
```

NAME	NAME	SESS	DISTANCE	SIGMA	1.00s	PPM	RELATIVE	FGCC STD
NBS1	NBS0	86A	183.985	0.000	0.000	0.00	****	N/A
NBS1	ORM1	86A	1321.648	0.000	0.000	0.00	****	N/A
NBS3	NBS0	86A	634.651	0.000	0.000	0.00	****	N/A
NBS3	NBS1	86A	488.430	0.000	0.000	0.00	****	N/A
NBS3	ORM1	86A	1111.175	0.000	0.000	0.00	****	N/A
NBS5	NBS0	86A	594.767	0.000	0.000	0.00	****	N/A
NBS5	NBS1	86A	423.398	0.000	0.000	0.00	****	N/A
NBS5	NBS3	86A	519.162	0.000	0.000	0.00	****	N/A
NBS5	ORM1	86A	1594.574	0.000	0.000	0.00	****	N/A
ORM1	NBS0	86A	1308.937	0.000	0.000	0.00	****	N/A

Point Error Ellipses

This item contains the magnitudes of the axes and orientation of the point error ellipses (not available if the ADJUSTMENT OPTION is RAPID or if the analysis data was not chosen to be generated in the ADJUST module), e.g.:

```
================================================================

            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0

  PROJECT   : tutorial network                        FILE : TUTOR.PRO
  CREATOR   : Your Name                               DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                PAGE : 10    OF OUTPUT

=====================================================================

               POINT HORIZONTAL ERROR ELLIPSES  (NORTH - EAST)

                           (Factor 1.000 Applied)

              NAME         MAJOR          MINOR        ZENITH (deg)

              ....        ......         ......       .......

              NBS1         0.000          0.000         171.7

              NBS0         0.000          0.000          11.5

              ORM1         0.000          0.000         170.3

              NBS3         0.000          0.000         170.8

=====================================================================

            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
```

```
  PROJECT   : tutorial network                          FILE : TUTOR.PRO
  CREATOR   : Your Name                                 DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                  PAGE : 11    OF OUTPUT
=========================================================================

               POINT VERTICAL ERROR ELLIPSES  (HEIGHT - EAST)

                           (Factor 1.000 Applied)

              NAME         MAJOR          MINOR        ZENITH (deg)
              ....        ......         ......       .......
              NBS1         0.001          0.000           2.4
              NBS0         0.001          0.000         178.9
              ORM1         0.001          0.000           3.4
              NBS3         0.001          0.000           3.3
```

Vector Error Ellipses

This item contains the magnitudes of the axes and orientation of the vector error ellipses (not available if the ADJUSTMENT OPTION is RAPID or if the analysis data was not chosen to be generated in the ADJUST module), e.g.:

```
============================================================

           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                          FILE : TUTOR.PRO
  CREATOR   : Your Name                                 DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                  PAGE : 12    OF OUTPUT
=========================================================================

               VECTOR HORIZONTAL ERROR ELLIPSES  (NORTH - EAST)

                           (Factor 1.000 Applied)

          NAME NAME         MAJOR          MINOR        ZENITH (deg)
          .... ....        ......         ......       .......
          NBS1 NBS0         0.000          0.000          14.5
          NBS1 ORM1         0.000          0.000         170.7
          NBS3 NBS0         0.000          0.000          12.0
          NBS3 NBS1         0.000          0.000         171.5
          NBS3 ORM1         0.000          0.000         170.6
          NBS5 NBS0         0.000          0.000          11.5
```

```
          NBS5 NBS1         0.000          0.000         171.7
          NBS5 NBS3         0.000          0.000         170.8
          NBS5 ORM1         0.000          0.000         170.3
          ORM1 NBS0         0.000          0.000           6.9
=============================================================================
    PROJECT   : tutorial network                          FILE : TUTOR.PRO
  CREATOR   : Your Name                                 DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                  PAGE : 13    OF OUTPUT
=============================================================================
               VECTOR VERTICAL ERROR ELLIPSES  (HEIGHT - EAST)
                           (Factor 1.000 Applied)
          NAME NAME         MAJOR          MINOR        ZENITH (deg)
          .... ....        ......         ......       .......
          NBS1 NBS0         0.001          0.000         176.6
          NBS1 ORM1         0.001          0.000           2.7
          NBS3 NBS0         0.001          0.000         178.8
          NBS3 NBS1         0.001          0.000           2.4
          NBS3 ORM1         0.001          0.000           3.3
          NBS5 NBS0         0.001          0.000         178.9
          NBS5 NBS1         0.001          0.000           2.4
          NBS5 NBS3         0.001          0.000           3.3
          NBS5 ORM1         0.001          0.000           3.4
          ORM1 NBS0         0.001          0.000         179.9
```

Error Ellipsoids

This item contains the magnitudes of the axes and orientation of the error ellipsoids (not available if the ADJUSTMENT OPTION is RAPID or if the analysis data was not chosen to be generated in the ADJUST module), e.g.:

```
============================================================
            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                          FILE : TUTOR.PRO
  CREATOR   : Your Name                                 DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                  PAGE : 14    OF OUTPUT
```

```
=========================================================================

                          POINT ERROR ELLIPSOIDS

                          (Factor 1.000 Applied)

    NAME     MAJOR      MEDIUM      MINOR      AZIMUTH(deg)  ALTITUDE(deg)

    ....    ......     .......     ......      .. .....       ........

    NBS1     0.001       0.000      0.000         64.8           87.4

    NBS0     0.001       0.000      0.000        211.4           87.9

    ORM1     0.001       0.000      0.000         64.9           86.3

    NBS3     0.001       0.000      0.000         70.9           86.6

=========================================================================

           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0

  PROJECT   : tutorial network                        FILE : TUTOR.PRO

  CREATOR   : Your Name                               DATE : 05/19/1994

  ELLIPSOID : WGS 1984                                PAGE : 15    OF OUTPUT

=========================================================================

                         VECTOR  ERROR ELLIPSOIDS

                          (Factor 1.000 Applied)

 NAME NAME     MAJOR      MEDIUM      MINOR      AZIMUTH(deg)  ALTITUDE(deg)

 .... ....    ......     .......     ......      . ......       ........

 NBS1 NBS0     0.001       0.000      0.000         224.1           85.1

 NBS1 ORM1     0.001       0.000      0.000          66.3           87.0

 NBS3 NBS0     0.001       0.000      0.000         213.0           87.8

 NBS3 NBS1     0.001       0.000      0.000          60.9           87.3

 NBS3 ORM1     0.001       0.000      0.000          64.0           86.3

 ORM1 NBS0     0.001       0.001      0.000         183.5           88.9
```

Datum Bias Parameters

This item contains the computed datum bias parameters, e.g.:

```
=============================================================

            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0

  PROJECT   : Albania1                                FILE : STEVE02.PRO

  CREATOR   :                                         DATE : 04/05/1994
```

```
 ELLIPSOID : AIRY                                    PAGE : 1     OF OUTPUT
=========================================================================

------------------------------------------ --------------------------
|                          DATUM BIAS PARAMETERS                       |
|------------------------------------------ --------------------------|
|                    BIAS PARAMETERS IN CARTESIAN SYSTEM               |
|------------------------------------------ --------------------------|
|   ROTATION ANGLE (SECONDS)   |           AXIS       |         SIGMA       |
|      X                       |         340.00       |         17.00       |
|      Y                       |         180.00       |          8.80       |
|      Z                       |         220.00       |         11.00       |
|                              |                      |                     |
|   SCALE                      |            PPM       |         SIGMA       |
|                              |          79.00       |          0.88       |
|------------------------------------------ --------------------------|
|                    BIAS PARAMETERS IN MAPPING PLANE                  |
|------------------------------------------ --------------------------|
|  ROTATION ANGLE (SECONDS)    |           AXIS       |         SIGMA       |
|      NORTHING                |          -3.20       |          0.17       |
|      EASTING                 |        -430.00       |         22.00       |
|      HEIGHT                  |          93.00       |          4.70       |
|                              |                      |                     |
|   SCALE                      |            PPM       |         SIGMA       |
|                              |          79.00       |          0.88       |
------------------------------------- ------------------------------
```

Observation Statistics

This item contains the blunder detection and residual statistics, e.g.:

```
============================================================

           ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                        FILE : TUTOR.PRO
  CREATOR   : Your Name                               DATE : 05/19/1994
```

```
 ELLIPSOID : WGS 1984                                    PAGE : 16    OF OUTPUT
=========================================================================

                          OBSERVATION STATISTICS

                       BLUNDER DETECTION AND RESIDUAL

 NAME NAME NAME SESS   LENGTH  RATIO   SIGMA     V(R)  V'(R)  TAU    PPM  TYPE
 ... .... .... .... ........ ....... ........ .... ....  .....  ... .......  ....

  NBS1 NBS0       86A      183    1.0     N/A    0.002    0.5       10.93  VECT
  NBS1 ORM1       86A     1321    1.0     N/A    0.001    0.1        0.76  VECT
  NBS3 NBS0       86A      634    1.0     N/A    0.001    0.2        1.58  VECT
  NBS3 NBS1       86A      488    1.0     N/A    0.000    0.0        0.00  VECT
  NBS3 ORM1       86A     1111    1.0     N/A    0.000    0.0        0.00  VECT
  NBS5 NBS0       86A      594    1.0     N/A    0.001    0.2        1.68  VECT
  NBS5 NBS1       86A      423    1.0     N/A    0.001    0.3        2.36  VECT
  NBS5 NBS3       86A      519    1.0     N/A    0.000    0.0        0.00  VECT
  NBS5 ORM1       86A     1594    1.0     N/A    0.000    0.0        0.00  VECT
  ORM1 NBS0       86A     1308    1.0     N/A    0.002    0.3        1.53  VECT
=========================================================================

            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                         FILE : TUTOR.PRO
  CREATOR   : Your Name                                DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                 PAGE : 17    OF OUTPUT
=========================================================================

                          OBSERVATION STATISTICS

                       RELIABILITY AND BLUNDER IMPACT

  NAME NAME NAME SESS  REDUNDANCY  BLUNDER  INTERNAL  ABSORBED  FACTOR  TYPE
.... .... .... ....  ...........  .......  ...... ..  ........  ......  ....

  NBS1 NBS0       86A       1.565     0.00      0.03      0.00     0.7  VECT
  NBS1 ORM1       86A       2.085     0.00      0.03      0.00     0.3  VECT
  NBS3 NBS0       86A       1.987     0.00      0.03      0.00     0.3  VECT
  NBS3 NBS1       86A       1.745     0.00      0.03      0.00     0.0  VECT
  NBS3 ORM1       86A       1.659     0.00      0.03      0.00     0.0  VECT
  NBS5 NBS0       86A       2.056     0.00      0.03      0.00     0.0  VECT
```

```
  NBS5 NBS1       86A       1.742     0.00      0.03      0.00     0.4  VECT
  NBS5 NBS3       86A       1.107     0.00      0.02      0.00     0.0  VECT
  NBS5 ORM1       86A       1.835     0.00      0.03      0.00     0.0  VECT
  ORM1 NBS0       86A       2.219     0.00      0.04      0.00     0.4  VECT
```

Ordered Observations

This item contains the observations grouped by point name, e.g.:

```
================================================================

            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0

  PROJECT   : tutorial network                        FILE : TUTOR.PRO
  CREATOR   : Your Name                               DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                PAGE : 18    OF OUTPUT

=====================================================================

                              ORDERED OBSERVATIONS

 NAME NAME NAME  LENGTH RATIO  SIGMA   V(N)   V(E)   V(U) TAU REDUNDANCE TYPE

 .... .... .... ........ .....  ..... ....... ....... ....... ... .......... ....

 NBS1 NBS0          183   1.0    N/A  0.001  0.001 -0.002          1.565 VECT

 NBS1 ORM1         1321   1.0    N/A  0.000 -0.001  0.000          2.085 VECT

 NBS1 NBS3          488   1.0    N/A  0.000  0.000  0.000          1.745 VECT

 NBS1 NBS5          423   1.0    N/A -0.001  0.000 -0.001          1.742 VECT

 NBS0 NBS1          183   1.0    N/A -0.001 -0.001  0.002          1.565 VECT

 NBS0 NBS3          634   1.0    N/A  0.001  0.000  0.000          1.987 VECT

 NBS0 NBS5          594   1.0    N/A  0.001  0.000  0.001          2.056 VECT

 NBS0 ORM1         1308   1.0    N/A  0.001  0.001 -0.002          2.219 VECT

 ORM1 NBS1         1321   1.0    N/A  0.000  0.001  0.000          2.085 VECT

 ORM1 NBS3         1111   1.0    N/A  0.000  0.000  0.000          1.659 VECT

 ORM1 NBS5         1594   1.0    N/A  0.000  0.000  0.000          1.835 VECT

 ORM1 NBS0         1308   1.0    N/A -0.001 -0.001  0.002          2.219 VECT

 NBS3 NBS0          634   1.0    N/A -0.001  0.000  0.000          1.987 VECT

 NBS3 NBS1          488   1.0    N/A  0.000  0.000  0.000          1.745 VECT

 NBS3 ORM1         1111   1.0    N/A  0.000  0.000  0.000          1.659 VECT

 NBS3 NBS5          519   1.0    N/A  0.000  0.000  0.000          1.107 VECT
```

```
NBS5 NBS0          594   1.0    N/A -0.001  0.000 -0.001          2.056 VECT
NBS5 NBS1          423   1.0    N/A  0.001  0.000  0.001          1.742 VECT
NBS5 NBS3          519   1.0    N/A  0.000  0.000  0.000          1.107 VECT
NBS5 ORM1         1594   1.0    N/A  0.000  0.000  0.000          1.835 VECT
```

Adjustment Summary

This item contains a summary of the parameters and observations, adjustment tests, and the adjustment histogram, e.g.:

```
============================================================

            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
  PROJECT   : tutorial network                          FILE : TUTOR.PRO
  CREATOR   : Your Name                                 DATE : 05/19/1994
  ELLIPSOID : WGS 1984                                  PAGE : 1     OF OUTPUT
=========================================================================

.......................................... ..........................
|                            ADJUSTMENT SUMMARY                        |
|........................................ ..........................|
|        ITEM                          |        DESCRIPTION           |
|........................................ ..........................|
|        SLANT DISTANCES (EDM)         |        0                     |
|        AZIMUTHS                      |        0                     |
|        VERTICAL ANGLES               |        0                     |
|        HORIZONTAL ANGLES             |        0                     |
|        HEIGHT DIFFERENCES            |        0                     |
|        VECTOR OBSERVATIONS           |        10                    |
|                                      |                              |
|        NUMBER OF OBSERVATIONS        |        30                    |
|        NUMBER OF PARAMETERS          |        12                    |
|        WEIGHTED PARAMETERS           |        0                     |
|        NUMBER OF SINGULARITIES       |        0                     |
|        DEGREE OF FREEDOM             |        18                    |
|                                      |                              |
```

	CHI-SQUARE TEST	FAILED
	VARIANCE OF UNIT WEIGHT	0.10
	CHI-SQUARE	1.86
	CONFIDENCE LEVEL	95.00%
	CONFIDENCE LIMIT	8.23, 31.53
	GOODNESS OF FIT TEST	FAILED
	CALCULATED	14.90
	LIMIT AT 95% CONFIDENCE	12.59

ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE version 1.0

PROJECT : tutorial network FILE : TUTOR.PRO

CREATOR : Your Name DATE : 05/19/1994

ELLIPSOID : WGS 1984 PAGE : 2 OF OUTPUT

ADJUSTMENT SUMMARY

ITEM	DESCRIPTION
POPES TEST	
POPES BLUNDER CRITERIA	2.8410
CONFIDENCE LEVEL	95.00%
HISTOGRAM	STANDARDIZED RESIDUALS
X AXIS	RESIDUAL INTERVAL
Y AXIS	FREQUENCY OF OCCURRENCE

X Y .00 2.40 4.80 7.20 9.60 12.00

```
                I---------I---------I------ ---I---------I---------I
-3.25           0 +
-2.75           0 +
-2.25           1 .---+
-1.75           0 +
-1.25           1 .---+
-0.75           0 +
-0.25          11 .----.----.----.----.----.- ---.----.----.----.+
 0.25          12 .----.----.----.----.----.- ---.----.----.----.----+
 0.75           3 .----.----.--+
 1.25           1 .---+
 1.75           1 .---+
 2.25           0 +
 2.75           0 +
 3.25           0 +
```

16

Analyze Module

This module lets you graphically perform pre-adjustment or post-adjustment analysis of the network of points and/ or vectors. Specifically, you can:

- View and analyze network geometry for an adjustment project.
- Zoom in on any area of the network.
- Extract a subset of the network graphically.
- Display POINT/VECTOR names and access detailed POINT/VECTOR information.
- Perform a loop closure graphically.
- Plot scaled error ellipses (horizontal, vertical, and relative).
- Plot point displacements between two adjustments.
- Perform a control tie analysis.
- Highlight repeated, flagged, and deweighted vectors.
- If the network contains terrestrial observation, display that portion of the network as dashed lines.

Analyze Screen

Select the ANALYZE icon from the MAIN MENU. SNAP presents the Analyze screen, Figure 16.1.

Figure 16.1: Analyze Screen

This screen contains the following areas:

- The PROJECTS Panel at upper right with the PROJECT SUMMARY button.
- The Network Display Area comprising the majority of the screen. The points and/or vectors in the selected project appear in this area overlaying a labelled latitude/longitude grid.
- ANALYZE Control Button Menu at the bottom of the screen with the buttons COMPARE POSITIONS, CREATE SUBSET, LOOP CLOSURE, ZOOM OUT, PRINT, and QUIT.
- Graphics Tools Panel at lower middle right of the screen.
- LAT-LON data display field at lower right of the screen.

INPUT

- Adjustment project files and adjustment output list files.

OUTPUT

- Hard copies of graphics plots.
- LOG file for loop closures.
- New adjustment project file extracted from an existing network.

Projects Panel

This panel lists the projects that reside in the projects directory, as shown in Figure 16.2.

Figure 16.2: Projects Panel

If you select a project from this panel, SNAP displays a check mark in front of it and displays the contained points and/or vectors in the Network Display Area.

Project Summary Button

This button displays the project summary information generated in the PROJECT MANAGER module. This information is displayed in a popup screen over the Network Display Area.

Network Display Area

This area graphically displays the network, as shown in Figure 16.3.

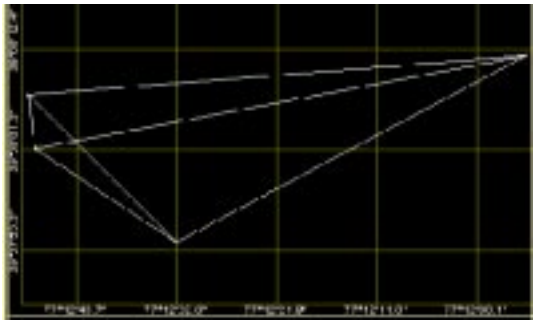

Figure 16.3: Network Display Area

In this area you can use the mouse to:

- Indicate the coordinates of any location in the network.
- Zoom in to a specific subsection of the network.
- Select a specific point or vector to obtain more information.

The network components are displayed as follows:

- The vertical axis shows the north latitude extent of the project in degrees, minutes, and seconds to one decimal.
- The horizontal axis shows the west longitude extent of the project in degrees, minutes, and seconds to one decimal.
- Included points are white.
- Included vectors are dark blue.
- Excluded points and vectors are grey.
- Flagged, deweighted, and repeated vectors are light blue.
- Highlighted (selected) points and vectors are green.
- Tagged vectors are red.
- Terrestrial data (if any) is dark blue dashed lines.

Pointer Tracking

This function tracks the mouse pointer when the pointer is in the Network Display Area. The coordinate represented by the pointer is displayed in the LAT-LON data display field, Figure 16.4.

Figure 16.4: Lat/Lon Data Display Field

Zoom In

To zoom in to a specific portion of the network display, move the mouse pointer to one corner of the desired region, press and hold the left mouse button, drag the pointer to the opposite corner of the region, and release the button, as shown by the dashed rectangle in Figure 16.5.

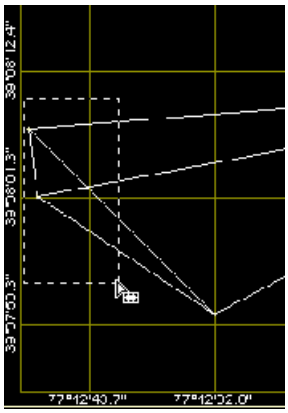

Figure 16.5: Zoom In

SNAP then expands the "windowed" region to fill the Network Display Area and changes the labelled latitude/ longitude grid accordingly.

The magnified region displays all contained points but discards any vectors that extend outside its limits.

You may repeat this procedure as often as desired to further magnify a specific region of interest.

To restore the full extent of the displayed project, select the ZOOM OUT button in the ANALYZE Control Button Menu.

Select Points

To obtain more information about a point, in the Network Display Area, select the desired point with the mouse pointer. SNAP then highlights the point in green and replaces the PROJECTS Panel with the POINT Information Panel described later in this chapter. To exit the POINT Information Panel, either select CANCEL from the POINT Information Panel or click anywhere in the Network Display Area.

Select Vectors

To obtain more information about a vector, in the Network Display Area, select the desired vector with the mouse pointer. SNAP then highlights the point in green and replaces the PROJECTS Panel with the VECTOR Information Panel described later in this chapter. To exit the VECTOR Information Panel, either select CANCEL from the VECTOR Information Panel or click anywhere in the Network Display Area.

Point Information Panel

This panel displays more information about a selected point. When you select a point in the Network Display Area, SNAP highlights the point in green and replaces the PROJECTS Panel with a POINT Information Panel and a set of control buttons, as shown in Figure 16.6.

Figure 16.6: Point Information Panel

Description Area

The area contains the point name, point status, and point coordinates (latitude, longitude, and height). The point status is located at the top of the POINT Information Panel to the right of the word "POINT". The indicator X means excluded.

ELLIPSE Button

This button displays the error ellipse information in the Network Display Area. Press a mouse button to remove the listing and restore the network display.

This button is disabled if the ellipse information is not computed. For details, see the Adjust Module reference chapter.

CONNECTION Button

This button displays a list of the vectors connected to the selected point. SNAP highlights the point connections in magenta in the Network Display Area and replaces the POINT Information Panel with the POINT CONNECTIONS Panel, Figure 16.7. This panel lists all the vectors starting or ending at the selected point.

Figure 16.7: Point Connections Panel

To obtain more information about any of these vectors, select the desired vector in the POINT CONNECTIONS Panel.

CANCEL Button

This button removes the POINT CONNECTIONS Panel and restores the POINT Information Panel.

EXCLUDE/INCLUDE Button

This button selects whether to exclude or include the selected point in the adjustment. It toggles between EXCLUDE (default) and INCLUDE. When you select EXCLUDE, SNAP prompts, in the Control Button Menu area:

ALL ASSOCIATED VECTORS WILL BE EXCLUDED
CONTINUE CANCEL

If you select CONTINUE, SNAP toggles the EXCLUDE label to INCLUDE, highlights the point's network connections in grey in the Network Display Area, and

displays an "X" beside the POINT label in the Point Information Panel, Figure 16.8.

Figure 16.8: Include Marker

If you have excluded a network connection by excluding a point, reincluding the point will not reinclude the connection.

MORE INFO Button

This button replaces the Network Display Area with a read-only version of the data entered for the selected point in the POINTS Options Selection area of the EDIT module; press a mouse button to restore the network display.

CANCEL Button

This button exits the POINT Information Panel.

Vector Information Panel

This panel displays more information about a selected vector. When you select a vector in the Network Display Area, SNAP highlights the vector in green and replaces the Projects Panel with a Vector Information panel and a set of control buttons, Figure 16.9.

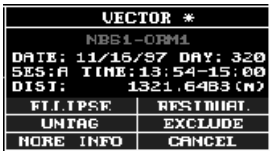

Figure 16.9: Vector Information Panel

If the vector is a repeat vector, SNAP highlights the vector display and replaces the Projects Panel with a Vector Selection panel, Figure 16.10.:

Figure 16.10: Vector Selection Panel

If you select one of the vectors from the panel, SNAP replaces the VECTOR SELECTION Panel with the VECTOR Information Panel.

The vector status information is located at the top of the vector information panel to the right of the word VECTOR. This area may have any of the following indicators: * (tagged), X (excluded), F (flagged), or D (deweighted).

Description Area

This area displays the vector name, vector status, and vector attributes (calendar date of measurement, day of year, session identifier, collection time interval, and distance (vector length in meters). The vector status is located at the top of the VECTOR Information Panel to the right of the word "VECTOR". This area may have one or more of the following indicators: * (tagged), F (flagged), X (excluded), or D (deweighted).

ELLIPSE Button

This button displays the error ellipse information in the Network Display Area, Figure 16.11. :

Figure 16.11: Error Ellipse Display

Press a mouse button to remove the listing and restore the network display.

This button is disabled if the ellipse information is not computed. For details, see the Adjust Module reference chapter.

REIDUAL Button

This button displays the adjusted vector residuals. When you select RESIDUAL, SNAP replaces the Projects Panel with the Vector - Residual Panel, Figure 16.12.

Figure 16.12: Vector-Residual Panel

The RESIDUAL button is disabled if an adjustment was not performed. For details, see the Adjust Module chapter.

DISTANCE: This field displays the length of the vector in meters.

V(N,E,U): These fields display the residuals in north, east, and up components (in meters).

Redundancy

This field display an indicator of geometric strength in the neighborhood of the vector. This value ranges between 0 and 3.

CANCEL: This button restores the VECTOR Information Panel.

TAG/UNTAG Button

This button lets you tag or untag the selected vector. It toggles between TAG (default) and UNTAG. When you select TAG, SNAP toggles the label to UNTAG and displays an "*" beside the VECTOR label in the VECTOR Information Panel (Figure 16.13).

Figure 16.13: Tag/Untag Button

EXCLUDE/INCLUDE Button

This button lets you exclude or include the selected vector in the adjustment. It toggles between EXCLUDE (default) and INCLUDE. When you select EXCLUDE, SNAP toggles the label to INCLUDE and displays an "X" beside the VECTOR label in the VECTOR Information Panel, Figure 16.14.

Figure 16.14: Vector Information Panel

In this example the vector is also tagged.

MORE INFO Button

This button replaces the Network Display Area with a read-only version of the data entered for the selected vector in the VECTORS Options Selection area of the EDIT module; press a mouse button to restore the network display.

CANCEL Button

This button exits the VECTOR Information Panel and restores the PROJECTS Panel.

Graphics Tools Panel

This panel lets you show additional information in the Network Display Area. It is located to the right of the Network Display Area between the PROJECTS Panel and the LAT-LON field.

TAGGED POINTS/VECTORS Data Display Field

This field displays the total number of points and/or vectors in the current project and those vectors that you tagged in the current project, as shown in Figure 16.15.

	POINTS	VECTORS
TOTAL:	00005	00027
TAGGED:		00000

Figure 16.15: Total Points in Current Project

SET POINTS NAMES ON Toggle Button

This button toggles between SET POINTS NAMES ON (default) and SET POINTS NAMES OFF. Select SET POINTS NAMES ON to display the site identifiers for all of the points in the Network Display Area, Figure 16.16.

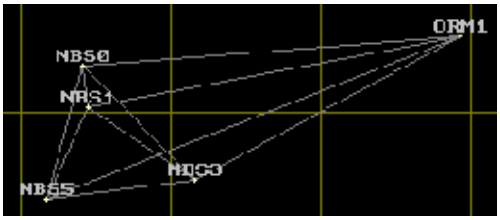

Figure 16.16: Network Display Area - Set Point Names On

Select SET POINTS NAMES OFF to remove the names.

SET VECTORS NAMES ON Toggle Button

This button toggles between SET VECTORS NAMES ON (default) and SET VECTORS NAMES OFF. Select SET VECTORS NAMES ON to display the vector names of all the vectors in the Network Display Area, similar to Figure 16.16 except vectors are displayed instead of points. The vector name has the form dddys, where:

ddd	is the GPS day of the year.
y	is the last digit of the year.
s	is the session identifier.

If any vector is repeated the number of repeats is displayed rather than the name.

Select SET VECTORS NAMES OFF to remove the names/numbers.

SHOW ERROR ELLIPSES Toggle Button

This button displays, for all of the points and/or vectors in the Network Display Area, the error ellipses in horizontal and vertical components or the error ellipsoids. It toggles between SHOW ERROR ELLIPSES (default) and ERROR ELLIPSES OFF.

This button is disabled if the ellipse information is not computed. For details, see the Adjust Module reference chapter.

When SHOW ERROR ELLIPSES is enabled, select it and observe the display shown in Figure 16.17.

Figure 16.17: Show Error Ellipses

All of the Graphics Tools buttons are disabled except SET POINTS NAMES ON/OFF and SET VECTORS NAMES ON/OFF, and ERROR ELLIPSES OFF.

COMPARE POSITIONS, CREATE SUBSET, and LOOP CLOSURE in the ANALYZE Control Button Menu are disabled.

New buttons appear below the Network Display Area: PTS HOR, PTS VER, VEC HOR, and VEC VER. These buttons display the desired ellipse(s) in the Network Display Area. When one or more is selected, a scale appears to the right of these buttons, indicating the scale of the ellipses.

PTS HOR Button

This button displays (in light blue) the horizontal component (in the Northing-Easting coordinate plane) of the point error ellipsoid for each of the points, as shown in Figure 16.18.

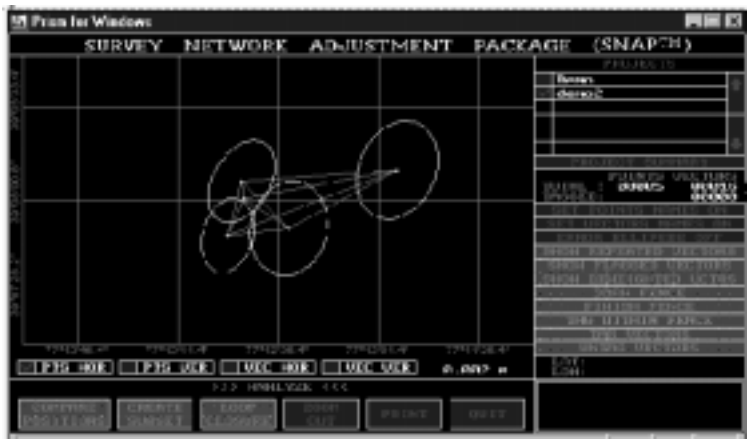

Figure 16.18: Horizontal Component of Point Error

PTS VER Button

This button displays (in magenta) the vertical component of the point error ellipsoid for each of the points, as shown in Figure 16.19.

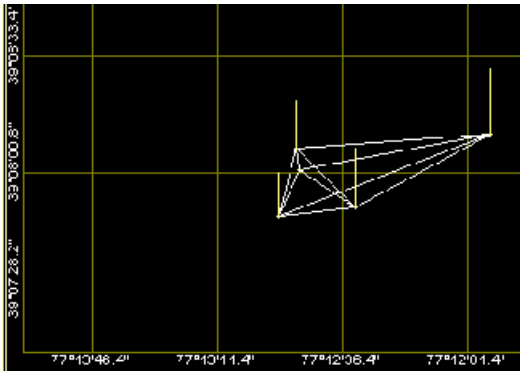

Figure 16.19: Vertical Component of Vector Error Ellipsoid

VEC HOR Button

This button displays (in pink) the horizontal component (in the Northing- Easting coordinate plane) of the vector error ellipsoid for each of the points, e.g.:

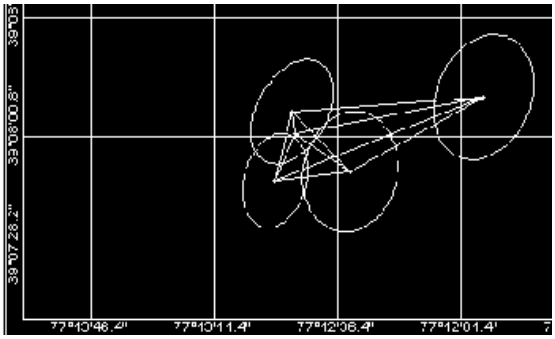

Figure 16.20: Horizontal Component of Vector Error Ellipsoid

VEC VER Button

This displays (in green) the vertical component of the vector error ellipsoid for each of the points, as shown in Figure 16.21.

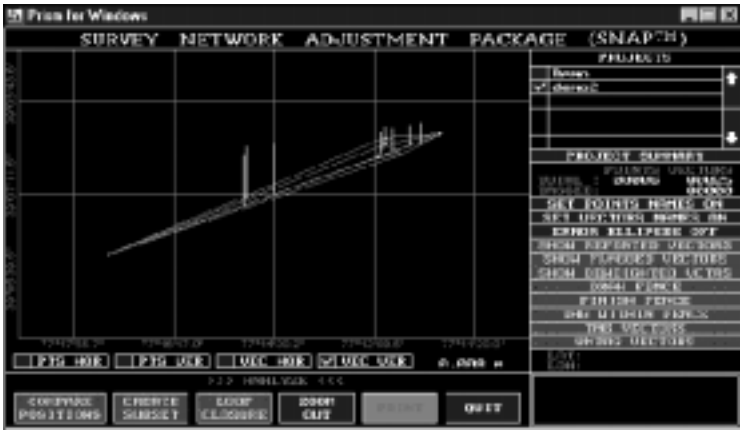

Figure 16.21: Vertical Component of Vector Error Ellipsoid

SHOW REPEATED VECTORS Toggle Button

This button toggles between SHOW REPEATED VECTORS (default) and REPEATED VECTORS OFF. SHOW REPEATED VECTORS highlights in light blue all repeat vectors in the Network Display Area. REPEATED VECTORS OFF restores all vectors to dark blue.

SHOW FLAGGED VECTORS Toggle Button

This button toggles between SHOW FLAGGED VECTORS (default) and FLAGGED VECTORS OFF. SHOW FLAGGED VECTORS highlights all of the vectors in the network that SNAP flagged as outlier suspects during the adjustment by blunder detection using Pope's TAU criteria.

SHOW FLAGGED VECTORS is disabled if an adjustment was not performed or analysis data was not generated.

SHOW DEWEIGHTED VCTRS Toggle Button

This button toggles between SHOW DEWEIGHTED VECTORS (default) and DEWEIGHTED VECTORS OFF. SHOW DEWEIGHTED VECTORS highlights, in the Network Display Area, all of the vectors that SNAP deweighted during the

adjustment when Automatic Blunder Detection found possible blunders. DEWEIGHTED VECTORS OFF removes the highlight.

DRAW FENCE Button

This button lets you enclose a portion of the network for creation of a new project via the CREATE subset button. When you select DRAW FENCE, SNAP replaces DRAW FENCE with the display shown in Figure 16.22.

Figure 16.22: Draw Fence

In the Network Display Area, move the pointer to the start of the fence, and click. Move the pointer to another location; SNAP follows the pointer with a "rubber band". When you click, SNAP draws that portion of the fence in magenta. When the desired region is approximately fenced, select FINISH FENCE. SNAP then automatically connects to the starting point.

At this point, select TAG WITHIN FENCE to tag the fenced vectors. Select CREATE SUBSET to create a new project file these tagged vectors.

To abort while drawing the fence, select CANCEL.

To redraw the completed fence, reselect DRAW FENCE.

FINISH FENCE Button

This button is used with DRAW FENCE to enclose a subset of the displayed network.

TAG WITHIN FENCE Button

This button tags all vectors (and associated end points) that are completely enclosed within the current fence. After you select TAG WITHIN FENCE, SNAP displays the number of tagged vectors in the Control Button Menu area.

TAG VECTORS Button

This button tags all vectors and points in the Network Display Area. To tag a specific vector, see the Vector Information Panel section earlier in this chapter.

UNTAG VECTORS Button

This button untags all of the vectors in the Network Display Area. To untag a specific vector, see the Vector Information Panel section earlier in this chapter.

Analyze Control Button Menu

This menu, Figure 16.23, contains the following buttons: COMPARE POSITIONS, CREATE SUBSET, LOOP CLOSURE, ZOOM OUT, PRINT, and QUIT.

Figure 16.23: Analyze Control Button Menu

COMPARE POSITIONS Button

This button lets you compare the adjusted point positions between two adjustments representing the same network. For example, you would compare position shifts for adjustments from different control configurations (such as between a free adjustment and a constrained adjustment). Before you can compare positions, ensure that the project directory contains at least two adjusted projects for that network.

Adjustment Selection Panel

When you select COMPARE POSITIONS, SNAP prompts, in the Control Button Menu area:

```
SELECT TWO ADJUSTMENTS FOR COMPARISON
```

and replaces the PROJECTS Panel with an ADJUSTMENT SELECTION Panel, Figure 16.24.

Figure 16.24: Adjustment Selection Panel

This panel displays the available projects by the DISK FILE NAME assigned via the PROJECT MANAGER module.

To cancel the comparison and restore the Network Display Area in the ANALYZE screen, select CANCEL from this panel. To continue the comparison, select the two desired project files from the ADJUSTMENT SELECTION Panel. (SNAP displays a check mark in front of each selected project.)

Compare Positions Screen

After an acceptable selection has been made, SNAP displays the Compare Positions screen, Figure 16.25.

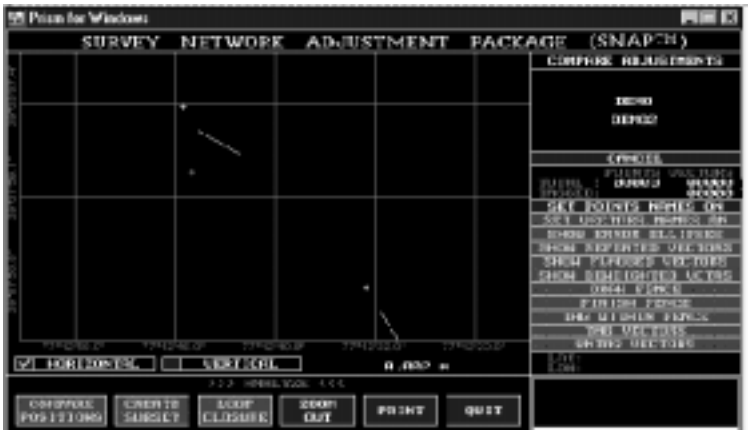

Figure 16.25: Compare Positions Screen

This screen initially contains:

- The points in the network, with control points marked by a magenta cross.
- A graphical display of horizontal shift in position between the adjustments for each point (displayed in light blue).
- HORIZONTAL and VERTICAL shift display buttons, and the shift scale.
- The COMPARE ADJUSTMENTS Panel showing the adjustments selected, and the CANCEL button.

HORIZONTAL Button

This button graphically displays (in light blue) the horizontal shift in position between the adjustments for each point (the default).

VERTICAL Button

This button graphically displays (in red) the vertical shift in position between the adjustments for each point.

Point Shift Display Panel

To obtain more information about the shifts for any one point, select the point. SNAP then highlights the selected point in green and replaces the COMPARE ADJUSTMENT Panel with the POINT Shift Display Panel, Figure 16.26.

Figure 16.26: Point Shift Display Panel

This panel contains the point name, azimuth (direction), components of the shift (horizontal, latitude, longitude, and vertical), and the CONTROL TIE and CANCEL buttons.

If the point is a control point in at least one of the two adjustments, the CONTROL TIE button is enabled and the panel also shows a list of the components fixed in each adjustment, as shown in Figure 16.27.

Figure 16.27: Fixed Components

CONTROL TIE Button

This button displays the control tie information in the Network Display Area. This information includes: the two control points, components of the shift (horizontal, latitude, and longitude), the ppm and relative accuracy.

CANCEL Button

This button removes the POINT Shift Display Panel and restores the COMPARE ADJUSTMENTS Panel (and the Compare Positions screen).

CANCEL Button

This button removes the Compare Positions screen and restores Network Display in the ANALYZE screen. When finished with the comparison, select CANCEL from the COMPARE ADJUSTMENTS Panel.

CREATE SUBSET Button

This button creates a new adjustment project containing any tagged vectors from the current project.

Tag the desired vectors in the Network Display Area via the VECTOR Information Panel described earlier in this chapter or via the DRAW FENCE and TAG WITHIN FENCE buttons in the Graphics Tools Panel described later in this chapter.

Select CREATE SUBSET; SNAP then disables the ANALYZE Control Button Menu and the Graphics Tools Panel, and displays a version of the Project Identification Box from the PROJECT MANAGER module, as shown in Figure 16.28.

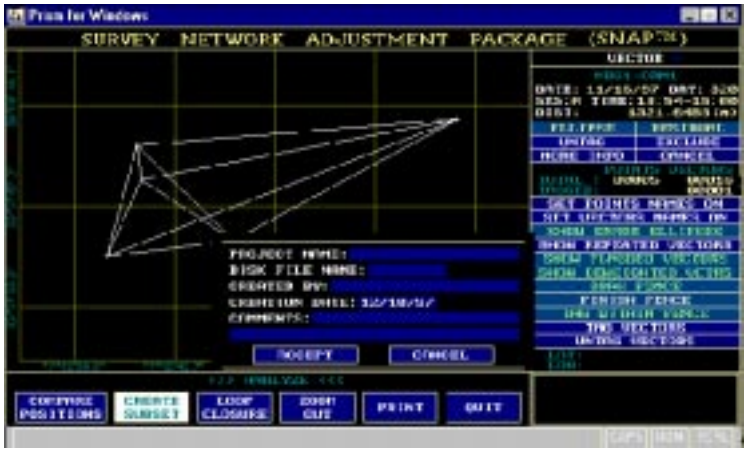

Figure 16.28: Project Identification

Fill in this box as described in the Project Manager Module chapter, Project Identification Box section, and select ACCEPT.

SNAP then creates the specified project file in the project directory, removes the popup, enables the control buttons, and displays the new project name in the PROJECTS Panel.

LOOP CLOSURE Button

This button lets you determine loop misclosures graphically. Up to 15 vectors may be included in a single loop. When you select LOOP CLOSURE, SNAP replaces the PROJECTS Panel with an empty LOOP CLOSURE Panel.

LOOP CLOSURE Panel

In the Network Display Area, select the first vector in the desired loop to access the initial LOOP CLOSURE Panel, Figure 16.29.

Figure 16.29: Loop Closure Panel

As the first vector is selected, SNAP displays it in the Loop Closure Panel as shown in Figure 16.30,

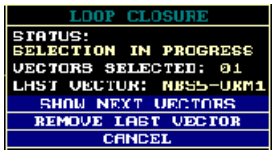

Figure 16.30: Selected Vector

and tags it (in red) in the Network Display Area.

Either select the next vector from the Network Display Area, or select SHOW NEXT VECTORS.

If you select SHOW NEXT VECTORS, SNAP highlights all the next vectors (vectors issuing from the end points of the first tagged vector in the Network Display Area), and replaces the LOOP CLOSURE Panel with a VECTOR SELECTION Panel described below.

If desired, select REMOVE LAST VECTOR to delete the last selected vector from the LOOP CLOSURE Panel and untag it in the Network Display Area.

When a loop of vectors is complete, SNAP replaces the LOOP CLOSURE Panel with the LOOP CLOSURE RESULTS Panel, described later in this section.

Vector Selection Panel

This panel lists all the repeat observations for the selected vector or all the next vectors (vectors issuing from the end points of the selected vector), as shown in Figure 16.31.

Figure 16.31: Repeat Observations of Selected Vector

Select the desired next vector or one of the repeat observations.

Loop Closure Results Panel

This panel contains the components of the misclosure in meters and ppm, the linear misclosure, the loop length, and the FULL PAGE REPORT, LOG, and CANCEL buttons, as shown in Figure 16.32.

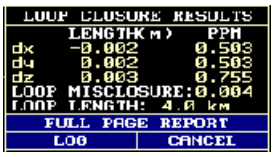

Figure 16.32: Loop Closures Results Panel

FULL PAGE REPORT Button

This button accesses a screen displaying the complete loop closure results report in the Network Display Area, as shown in Figure 16.33.

Figure 16.33: Report Screen

Press a mouse button to remove the full page report from the Network Display Area.

LOG Button

This button saves the full report results to an ASCII text file named PROJECT.LOG (where PROJECT is the DISK FILE NAME assigned via the PROJECT MANAGER module). Multiple loop closures can be appended to the same file.

CANCEL Button

This button exits the loop closure mode.

ZOOM OUT Button

This button restores the initial full-extent display of the selected project, after you have zoomed in at least one time on a region of the displayed project; if you have not zoomed in, ZOOM OUT has no effect.

PRINT Button

This button prints the network graphics according to the printer parameters set via the SETUP module.

QUIT Button

This button returns you to the MAIN MENU.

17

Setup Module

This module lets you assign directories for input files, adjustment output files and temporary files produced during SNAP operation. It also allows you to specify your printer and set printer parameters. All SNAP modules use these settings. The first time you run SNAP, the parameters affected by the SETUP module assume factory default values. Each time you change any value, SNAP overwrites any existing SYSTEM.INI file in the SNAP/EXE directory. The parameter settings in this file override the factory defaults. Each time you run SNAP, it uses the values in SYSTEM.INI until you change them again. (To restore all factory default values, delete the SYSTEM.INI file.)

Setup Screen

Select the SETUP icon from the MAIN MENU, and observe the SETUP screen, Figure 17.1.

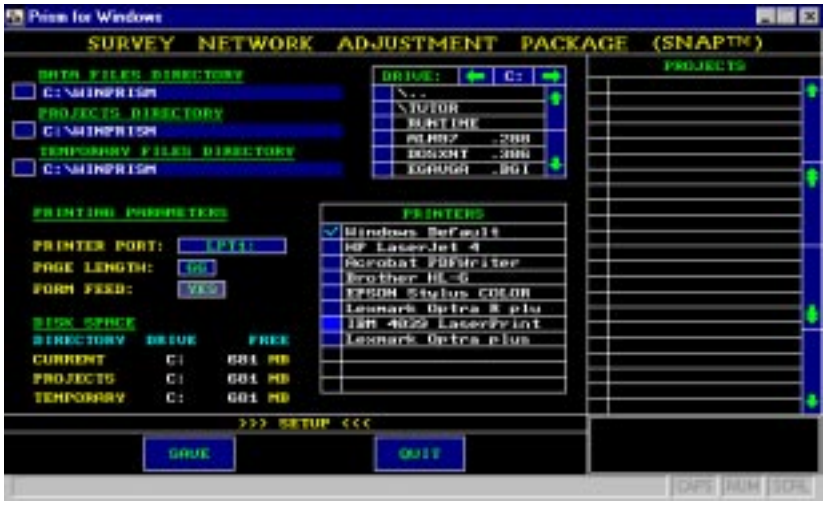

Figure 17.1: SETUP Screen

This screen contains the following areas:

- The PROJECTS PANEL on the right.
- The DATA FILES DIRECTORY, PROJECTS DIRECTORY, and TEMPORARY FILES DIRECTORY data entry fields.
- The DRIVE toggle field and Directory Panel.
- The PRINTING PARAMETERS area comprising:
- The PRINTERS Panel.
- The PRINTER PORT toggle field.
- The PAGE LENGTH toggle field.
- The FORM FEED toggle field.
- The DISK SPACE area.
- The SETUP Control Button Menu at the bottom with the SAVE and QUIT buttons.

General Procedure

This section summarizes the procedures to specify the data files directory, projects directory, temporary files directory and printer parameters.

1. Assign the DATA FILES DIRECTORY, PROJECTS DIRECTORY, and TEMPORARY FILES DIRECTORY:
   a. Select the corresponding data entry field.
   b. Select the desired DRIVE.
   c. Select the desired directory.
2. Select a printer, the PRINTER PORT, and the PAGE LENGTH.

Projects Panel

This panel lists the adjustment projects SNAP finds in the projects directory, Figure 17.2.

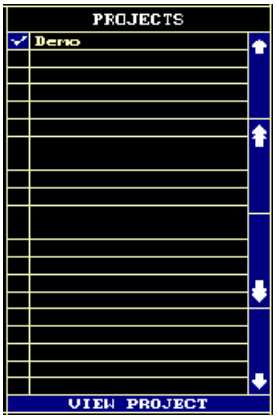

Figure 17.2: Projects Directory

The PROJECTS DIRECTORY is specified via the SETUP module. The first time you run SNAP, you will not have previously created any project files, and this panel will be empty. (Project files [*.PRO-files] are created via the PROJECT MANAGER module.) When you select an adjustment project from the list, SNAP displays a 4 in front of it.

DATA FILES DIRECTORY, PROJECTS DIRECTORY, [AND] TEMPORARY FILES DIRECTORY DATA ENTRY FIELDS

These fields let you specify the data files directory, projects directory, and temporary files directory. By default, SETUP: imports files from the DATA FILES DIRECTORY; creates, looks for, and writes adjustment output files to the PROJECTS DIRECTORY; and uses the TEMPORARY FILES DIRECTORY internally as a workspace for temporary files that it creates. The initial default value for these directories is the directory from which you executed SNAP. If you select SAVE (from the SETUP Control Button Menu), SNAP uses the current value for these directories during the current session and each time you run SNAP until you change the directory again in SETUP. If you change a directory but do not save it, SNAP uses it during the current session, and then uses any previously saved value in subsequent sessions. When you select one of these directory fields, SNAP displays a 4 in front of the selected field and displays, in the Directory Panel to the right, the files and subdirectories in the selected directory.

Drive Toggle Field And Directory Panel

The DRIVE field, Figure 17.3 toggles between the available drives. Select the arrow buttons to choose the disk volume.

Figure 17.3: Dive Field,

The panel below the DRIVE field lists all the files and subdirectories in the current directory or in the selected DATA FILES DIRECTORY, PROJECTS DIRECTORY, or TEMPORARY FILES DIRECTORY data entry field.

Printing Parameters Area

This area, Figure 17.4, lets you identify to SNAP the type of printer you have attached to your system, the printer port, and the appropriate page length parameter.

Figure 17.4: Printers Panel

Printers Panel

This panel lists the supported printers. When you select a printer, SNAP displays a check mark in front of it.

PRINTER PORT Toggle Field

This field displays the computer port to which your printer is connected. It toggles between LPT1 (line printer port 1, the default) or LPT2 (line printer port 2).

PAGE LENGTH Toggle Field

This field displays the number of lines per printed page. It toggles between 66 (the default) and 72.

FORM FEED Toggle Field

This field displays whether to insert a form-feed character at the end of each physical page and at the end of printing to clear the print buffer. It toggles between YES (the default) and NO (not implemented in this release).

Disk Space Area

For the CURRENT FILES DIRECTORY, and the selected PROJECTS DIRECTORY and TEMPORARY FILES DIRECTORY, the DRIVE column displays the specified disk volume, and the FREE column lists the available space in kilobytes.

Setup Control Button Menu

This menu, Figure 17.5, contains the SAVE and QUIT buttons.

Figure 17.5: Setup Control Button Menu

SAVE Button

This button saves the current parameter settings in this screen for subsequent use each time you run SNAP.

QUIT Button

This button applies the current parameter settings in this screen to the current SNAP session, and returns you to the MAIN MENU screen. If you select QUIT without first selecting SAVE, the current settings are used only in the current session.

A

Understanding Your Results

0This appendix guides you in understanding the output of an adjustment. It explains how to analyze, interpret and troubleshoot your adjustment results. The first two sections cover the results from the ADJUSTMENT TESTS screen and ADJUSTMENT OUTPUT screens accessed via the ADJUST module. (These results can also be accessed via the REPORT or ANALYZE modules). The third section provides suggestions on troubleshooting your network adjustment.

ADJUSTMENT TESTS SCREEN RESULTS

This section discusses the results displayed in the ADJUSTMENT TEST popup screen, Figure 1. For information on generating this screen, see the Adjust Module chapter.

Figure A.1: Adjustment Tests Popup Screen

The statistics presented on this screen provide a general indication of the overall quality of the adjustment. Use this as a preview into the adjustment analysis. For example, if the results are poor, it may be premature to generate the additional adjustment analysis data. Following is a description of the tests and results shown in this screen.

In order to keep the adjustment task manageable and to identify any blunders in a timely fashion, we recommend that you perform daily adjustments during your project.

CHI-SQUARE TEST:

The Chi-square test concerning variance is the most commonly used statistical test in least squares network adjustments. This is a test for the normal distribution of the residuals. The residuals are expected to result from random errors, which obey a normal distribution, i.e., a bell-shaped curve. The Chi-square and variance will both reflect the accuracy of the

error model (vector weights or vector sigmas) used in the adjustment as well as help you determine whether the adjustment may be distorted due to systematic errors or blunders. Systematic errors may come from unmodeled effects of ionosphere and troposphere, multipath, incorrectly fixed integer ambiguities, or human mistakes.

When the Chi-square passes and the variance is near one, the residuals and computed distribution are considered valid. A variance greater than one may indicate either that blunder(s) exist in the network or that the vector sigmas are too small (vector weighting is too optimistic). A variance less than one may indicate that the vector sigmas are too large (vector weighting is too pessimistic).

GOODNESS OF FIT:

The purpose of the Goodness-of-Fit test is to check whether each sub-divided set of the standardized residuals comes from a population with a Chi-square distribution. A passed Goodness-of-Fit test may indicate that nearly perfect observations have been collected. Note, however, the Goodness-of-Fit test may fail more often than the Chi-square test concerning variance. The causes for failures include blunders in observations or more often, not enough observations to meet the requirements of the model. A failure of the Goodness-of-Fit does not necessarily mean that the adjustment is poor.

OUTLIER SUSPECTS:

Outlier suspects are the observations in the adjustment that have been flagged as possible outliers via the Tau test, and are an indication of suspect or bad vector(s). Each flagged observation will be marked with an asterisk in the Adjusted Observations section of the Adjustment Output. Flagged observations can also be graphically identified via the ANALYZE module. The Tau test checks if a standardized residual meets the Tau criteria. If it is more than the criteria, the observation is flagged as a possible outlier.

Keep in mind that a single bad vector can create a ripple effect within the adjustment, causing good vectors nearby to also be flagged as possible outliers. See the troubleshooting section later in this chapter for details on how to cope with this situation.

AUTO DETECTED OBS:

Autodetected observations are the observations that have automatically been deweighted via the autodetection algorithm. A deweighted vector may indicate a suspect vector.

This is only applicable if you have enabled the auto-blunder detection in the DEFINE module. The observations are automatically deweighted if the adjustment fails the

defined criteria. (See the Define Module reference chapter for more information regarding these criteria.) Each deweighted observation will have a ratio greater than 1.0 in the Observations Statistics section of the Adjustment Output. Deweighted observations can also be graphically identified via the ANALYZE module.

ADJUSTMENT OUTPUT SCREEN RESULTS

This section discussed the output items available for selection in the ADJUSTMENT OUTPUT popup screen, Figure 2. For information on generating this screen, see the Adjust Module discussion.

Figure A.2: Adjustment Output Screen

The output items from this screen provide detailed information concerning the quality of the network. Following are descriptions of the significance of key items for adjustment analysis in each section of the Adjustment Output. (See the Reports Module reference chapter for an example of each section of the Adjustment Output.)

ADJUSTED POSITIONS

This section of the Adjustment Output provides the adjusted positions in latitude, longitude, and height as well as the estimated accuracies for each component. If one station's sigmas are much larger than the rest, this may indicate a problem station.

ADJUSTED OBSERVATIONS

This section of the Adjustment Output provides the raw observation and associated sigmas, the adjusted observations, the associated residuals (V) in the XYZ and NEU components, the standardized residual, the Tau test result, and the radial parts per million (RPPM, i.e., the residual against distance), for each observation. Additionally, it provides a list of the ten vectors with the highest and lowest residuals. If an

observation has failed the Tau test, it will be marked with an asterisk (*) in the Tau column. If the standardized residual is greater than 3, it is flagged with an exclamation mark (!) in the standardized residual column (V′) next to the standardized residual value.

Any observation that is flagged with an asterisk or marked with an exclamation point may indicate the presence of a suspect observation. Note that a single bad vector can create a ripple effect within the adjustment, causing good vectors nearby to also be flagged as possible outliers. The vector with the highest residual may be the problem vector. You can isolate a problem vector by running loop closures in the area with and without the suspect vector. (Use the LOOP CLOSURE function in the ANALYZE module.)

Be aware that problem vectors may not be flagged via the tests mentioned above. Use the residuals V(XYZ) and V(NEU) and the relative parts per million (RPPM) to further assess the quality of the observations. Look for any vectors whose residuals are significantly higher than the rest of the residuals in the network, or whose RPPM exceed the desired accuracy. However, keep in mind the following:

?Residuals will normally be proportional to baseline length.

?The radial error (RPPM) will tend to be high on short baselines (less than one kilometer).

NETWORK ACCURACY

This section of the Adjustment Output contains two main parts: the compliance to FGCS standards, and the network accuracy. Use this information to quickly view the accuracy of each vector in your network.

FGCC STANDARDS TABLE

This table shows how each vector conforms with the FGCC standards at the 95% confidence level. The 1.96s column next to the distance is the upper limit of the error interval of the vector computed at the 95% confidence level. The next several columns state the maximum allowable relative residual meet the requirements of a survey of the standard noted at the top of the column. This value is based on the length of the vector. The error interval of the vector must be equal to or less than the maximum allowable relative residual to meet the standard. An asterisk next to the value indicates that the vector does not meet the standards.

Network Accuracy Table

This table summarizes the network accuracy for each vector. The sigma value next to the distance is the computed accuracy of the vector at the one sigma confidence level. The next column displays the upper limit of the error interval computed at the user-

defined confidence level. The next two columns display the relative accuracy of the network in parts per million and as a ratio. The final column displays the highest FGCS standard that the vector meets. Use the columns to identify any vectors that do not conform to the desired accuracy for your network. Note that relative accuracies tend to be large on short baselines (less than one kilometer).

POINT ERROR ELLIPSES and VECTOR ERROR ELLIPSES

These two sections of the Adjustment Output display the horizontal error ellipses (major axis, minor axis, and zenith) for all points/vectors in the network at the user-defined confidence level. Use this to further identify anomalous vectors, i.e., relatively large axis values, values that stand out from the rest, or ellipses whose orientation does not conform to the norm.

ERROR ELLIPSOIDS

This section of the Adjustment Output displays the 3-D error ellipses (major, medium and minor axes, azimuth and altitude) for all points/vectors in the network to the user-defined confidence level. Use this to further identify anomalous vectors, i.e., relatively large axis values, values that stand out from the rest, or ellipses whose orientation does not conform to the norm.

DATUM BIAS PARAMETERS

This section of the Adjustment Output shows the computed rotation angles and scale required to transform the network between the WGS-84 system and the user-defined system. It is primarily used for fitting the GPS network into a local datum. The sigmas indicate the consistency of the transformation required for each vector in the network or the quality of the control points used to constrain the adjustment. If the sigma is large, the computed transformation cannot be trusted.

OBSERVATION STATISTICS

This section of the Adjustment Output contains two main parts: the blunder detection and residual table, and the reliability and blunder impact table.

Blunder Detection and Residual Table

This table summarizes the standard deviation, radial residual, standardized residual, Tau test results and the parts per million for each vector or terrestrial observation. An notable item in this table is the ratio, which is the ratio of the previous residual to the current residual in the adjustment. If this value is greater than one, the observation has been automatically deweighted. A deweighted observation will provide less contribution to the adjustment and indicates a suspect vector.

Reliability and Blunder Impact Table

This table provides advanced statistical tools for further analysis. Following is a brief description of these items:

Redundancy

This is an indicator of the geometric strength of the vector in the neighborhood, and ranges from 0 to 3. The larger this value is, the stronger the geometry is in the area.

Blunder

This is an indicator of the possible magnitude of the blunder in the vector, and is given in meters.

Internal (Internal Reliability)

This is an indicator of the capability of the network to detect marginal errors for that vector. If the number is large, it indicates a weak geometry in that area.

This is an indicator of the possible magnitude of the blunder that has been absorbed by the adjustment and is given in meters.

Factor

This is the variance-covariance factor computed using an alternative formula. This is for experimental purposes only.

ORDERED OBSERVATIONS

This table provides a list of vectors sorted by site name and contains information that is found on other screens, specifically: ratio; sigma; vector residual in north, east, and up; the Tau test results; and the redundancy.

ADJUSTMENT SUMMARY

The adjustment summary contains a summary of the adjustment observation input, adjustment test summary statistics, and a histogram of the standardized residuals.

The observation input summary tells you the number of measurements used in the adjustment, the number of unknowns (i.e., point/station positions) that the adjustment is solving for, and the degrees of freedom.

The adjustment test summary statistics provides a subset of the information in the adjustment test screen discussed earlier in this chapter.

The histogram displays the distribution and frequency of the standardized residuals for every observation. Ideally, this should be a bell-shaped curve.

TROUBLESHOOTING YOUR NETWORK

This section discusses how to assess the general quality of the adjustment, identify problem areas, and resolve problem points or vectors.

General Assessment of the Adjustment

This section shows you how to interpret the sometimes contradictory statistics created in the adjustment and displayed in the ADJUSTMENT TESTS screen. The primary statistics used to evaluate an adjustment are variance, the Chi-square test, and the Goodness-of-Fit test.

In the ideal case, the variance will be near one, and both the Chi-square and Goodness-of-Fit tests will pass. Even when this occurs, you should still review the adjusted observations for any anomalies.

A variance less than one usually indicates that the error estimates of the observations (vector sigmas) are too large (overly pessimistic). In other words, the network may be better than the sigmas indicate. You may wish to scale the vectors using the Scale Vectors button on the Adjustment Test screen (rapid adjustment only). This will automatically scale all of the vector sigmas by the same amount, maintaining the relative integrity of the sigmas and making the error estimates better reflect the quality of the network. This scaling normally results in a unity variance (variance equal to one) in subsequent adjustments.

A variance greater than one usually indicates a problem in the adjustment. Typical problems are one or more bad vectors, an erroneous antenna height, a bad station occupation, misnaming a station, etc. In this case, use the information presented in the Adjustment Output (described earlier in this chapter) to locate problem areas, and the information described below to help isolate the problem. A variance greater than one may also indicate that the error estimates of the observations are too small (overly optimistic).

If the Chi-square test fails because it is significantly below the lower limit, the error estimates may be too large, and often, the variance will also be below one. Scaling the sigmas as described above may help to make the error estimates better reflect the quality of the network.

If the Chi-square test fails because it is significantly larger that the upper limit, there may be a problem in the adjustment. Check for the flagged outliers and high residuals to determine the problem area.

The Goodness-of-Fit test is only meaningful if the network has a sufficiently large number of observations. A failed Goodness-of-Fit test does not necessarily indicate a problem, particularly if the variance and Chi-square test are acceptable, the adjusted

observations do not show any anomalies, and the calculated value is reasonably close to the cut-off criteria.

Identifying Problem Vectors and Points

Once a problem area has been located in the free adjustment, it can be difficult from visual inspection alone to determine exactly which vectors are causing the problem. Bad vectors often create "ripple effects" which will distort the network in the area surrounding the vector causing flagged vectors and high residuals.

A good way to identify a bad vector is through a loop closure analysis. Loop closure analysis can be graphically performed via the ANALYZE module. Several loop misclosures should be computed in the questionable area using a different set of vectors for each run. Generally (but not always) the vectors with the highest residuals tend to be the problem vectors, and you should begin by focusing on these vectors. There will be a significantly larger misclosure for the loops containing the problem vector(s).

If you notice that most or all of the vectors connected to a particular site have high residuals during a free adjustment, the station itself may be suspect. Possible problems with a station can include significant obstructions, radio interference, severe multipath, erroneous antenna height, etc.

In a constrained adjustment, problems can be caused by the control. This assumes that all internal problems have been resolved in the free adjustment. The accuracy of the constrained adjustment is limited by the accuracy of the control points. A good way to determine if the problem is with the control is to perform a control tie analysis. A control tie analysis compares the calculated value of a control point with the published value of the control point. This can be done via the ANALYZE module.

Dealing with Problem Vectors and Points

Once you have identified the problem vector, you have the following three choices available:

1. Reprocess the vector to get a better solution.
2. Remove the vector from the adjustment.
3. Reobserve the vector.

If a vector can be improved by reprocessing it, this should be your first choice. This improves the quality of the adjustment while maintaining the geometric strength of the network. A vector should be removed from the adjustment if and only if reprocessing does not improve the vector and if the vector is not needed to maintain the geometric strength of the network. Redundant vectors are the most suitable candidates for this criteria. Comparing the redundancy values with and without this

vector should give an indication of the impact the vector has on the network's geometric strength. If a vector cannot be reprocessed and the vector is vital to the network, you have no choice but to reobserve the vector.

B

Error Messages

This appendix lists the SNAP error messages in alphabetical order.

CANNOT COMBINE PROJECT

This prompt appears in the PROJECT MANAGER Control Button Menu area if you do not select both a SOURCE PROJECT and a TARGET PROJECT before selecting COMBINE.

FILE FILENAME.PRO ALREADY EXISTS

This prompt appears in the PROJECT MANAGER Control Button Menu area if you try to CREATE or CLONE a DISK FILE NAME (in the Project Identification Box) that already exists in the current directory.

FILE MUST HAVE A NAME

This prompt appears in the PROJECT MANAGER Control Button Menu area if you select ACCEPT from a new Project Identification Box with no disk file name.

NO MESSAGE FILE

This prompt appears in the ADJUST Control Button Menu area if you select VIEW MESSAGE before selecting PROCESS in the current session.

NO OUTPUT FILE

This prompt appears in the ADJUST Control Button Menu area if the projects directory does not contain a *.LST file for the project selected in the MAIN MENU PROJECTS Panel when you select VIEW OUTPUT.

ONLY WGS84 ALLOWED FOR 'RAPID' OPTION

This prompt appears in the DEFINE Control Button Menu area if you select the PREV, FIRST, or LAST buttons when the selected ADJUSTMENT OPTION is RAPID.

PROJECT ALREADY EXISTS

This prompt appears in the PROJECT MANAGER Control Button Menu area if you try to CREATE or CLONE a PROJECT NAME (in the Project Identification Box) that already exists in the current directory.

PROJECT LIST IS EMPTY

This prompt appears in the MAIN MENU Control Button Menu area if you select IMPORT, EDIT, EXPORT, ADJUST, or DEFINE without at least one corresponding *.PRO file in the projects directory.

PROJECT MUST HAVE A NAME

This prompt appears in the PROJECT MANAGER Control Button Menu area if you select ACCEPT from a new Project Identification Box with no project name.

SELECT FILE FIRST

This prompt appears:

- In the EXPORT Control Button Menu area if you select WRITE FILE without selecting either an EXPORT FILE or an OUTPUT FILE.
- In the REPORT Control Button Menu area if you select WRITE FILE without selecting a report file name.

SELECT FORMAT FIRST

This prompt appears, in the EXPORT Control Button Menu area if you leave the FORMAT NOT SELECTED (the default) and then select the FILE NAME data entry field or the WRITE FILE button.

SELECT PROJECT FIRST

This prompt appears:

- In the MAIN MENU Control Button Menu area if you attempt to select EDIT, EXPORT, ADJUST, or DEFINE without selecting a project name from the PROJECTS Panel.
- In the PROJECT MANAGER Control Button Menu area if you do not select a project from the PROJECT SELECTION panel before selecting UPDATE, DELETE or CLONE.

C

File Definitions

ASCII-STA File (Station.dat File)

This ASCII file contains, in the format required for import to a SNAP project file, an East-West Longitude label, and, for each station:

- Position adjustment flag.
- Individual coordinate adjustment and weighting flags.
- Station name (site identifier).
- Approximate station coordinates (latitude, longitude and height) in "packed" format (degrees, minutes, and decimal seconds).
- Standard deviations of weighted coordinates (topocentric northing, easting, and height) in meters.

Reserve all lines prior to the triple colon (:::) in columns 1, 2 and 3 for comments; the line after the ::: is the first significant data line in the file. Each significant line is 91 columns long. In the following example, not included in the listing are the column locators comprising the first two lines and the last two lines, and the bracketed annotations after the first significant line. The data set begins on the first significant line (after the :::), e.g.:

```
         1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901
:::
EAST
```

[The first significant line shows the longitude hemisphere, EAST or WEST of Greenwich.]

```
*111001*2*  10*   372450.85612*     0.010*  2374624.43630*     0.010*   71.0110*     1.000*
*111000*2*  19*   372455.26810*     0.010*  2374701.20150*     0.010*   66.4810*     1.000*
*111000*2*  42*   372500.65540*     0.010*  2374746.15340*     0.010*   60.9690*     0.003*
*000000*2*  41*   372501.62420*     0.010*  2374755.67460*     0.010*   64.2594*     0.005*
*111000*2*  20*   372503.49440*     0.010*  2374808.23190*     0.010*   78.1930*     0.003*
*111000*2*  39*   372449.25960*     0.010*  2374755.67610*     0.010*   46.5860*     0.003*
*110000*2*  33*   372518.39060*     0.010*  2374801.23310*     0.010*   47.4810*     0.004*
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901
         1         2         3         4         5         6         7         8         9
```

For the second and subsequent significant lines, the data fields are arranged as follows:

Second Line

Columns														
1	2-4	5-7	8	9	10	11-14	15	16-17	18	19-20	21-22	23-30	31	32-41
use?	adjust?	weight?	*	2	*	site	*	blank	N/S	lat°	lat’	lat"	*	lat σ

Subsequent Lines

Columns										
42	43-44	44-47	50-57	58	59-68	69	70-79	80	81-90	91
*	blank	lon°	lon’	lon"	*	lon σ	height	*	height σ	*

The columns are defined as follows:

Column 1 This column shows whether to use the position in the adjustment:

* means use.

- means do not use.

In columns 2, 3, and 4, individual coordinates can be held fixed (0) in order to define minimal constraints or hold stations fixed as required. For "plane" adjustments,

column 4 should be 0. For adjustment of a leveling network, columns 2 and 3 should both be 0.

Column 2	This column shows whether the latitude coordinate is adjustable (1) or fixed (0).
Column 3	This column shows whether the longitude coordinate is adjustable (1) or fixed (0).
Column 4	This column shows whether the height coordinate is adjustable (1) or fixed (0).
Column 5	This column shows whether the latitude coordinate is weighted (1) or not weighted (0).
Column 6	This column shows whether the longitude coordinate is weighted (1) or not weighted (0).
Column 7	This column shows whether the height coordinate is weighted (1) or not weighted (0).
Column 8	This asterisk is a field separator.
Column 9	This column shows the format of the approximate station position coordinates. SNAP requires a "packed" format (2).
Column 10	This asterisk is a field separator.
Col 11-14	These columns show the site ID, up to four alphanumeric characters.
Column 15	This asterisk is a field separator.
Col 16-17	These columns are always blank.
Column 18	This column shows the latitude hemisphere: - means SOUTH of the equator. Blank means NORTH of the equator.
Col 19-20	These columns show the degrees of latitude.
Col 21-22	These columns show the minutes of latitude.
Col 23-30	These columns show the seconds of latitude, up to five decimals.
Column 31	This asterisk is a field separator.
Col 32-41	These columns show the northing standard deviation (sigma) for the latitude (if weighted) in meters, up to three decimals.
Column 42	This asterisk is a field separator.
Col 43-44	These columns are always blank.
Col 44-47	These columns show the degrees of longitude.
Col 48-49	These columns show the minutes of longitude.
Col 50-57	These columns show the seconds of longitude, up to five decimals.

Column 58	This asterisk is a field separator.
Col 59-68	These columns show the easting standard deviation (sigma) for the longitude (if weighted) in meters, up to three decimals.
Column 69	In this column: * means the height is positive. - means the height is negative.
Col 70-79	These columns show the height in meters, up to four decimals.
Column 80	This asterisk is a field separator.
Col 81-90	These columns show the standard deviation (sigma) for the height (if weighted) in meters, up to three decimals.
Column 91	This asterisk terminates the line.

ASCII-TER File (terr.dat File)

This ASCII file contains, in the format required for import to a SNAP project file, for each terrestrial observation:

- Observation adjustment flag.
- Names for the backsight target, the standpoint, and the foresight target.
- Codes for the type and format of the observation.
- Signs and magnitudes of the heights of the backsight target, the standpoint, and the foresight target.
- Sign and magnitude of the observation.
- Standard deviation (sigma) for the observation.

The sequence of the observation listing is arbitrary.

Linear measurements are in meters or feet. Heights above the station backsight target, and foresight target markers are always in meters, even if the observation and standard deviation are in feet. Heights of instrument and targets must be listed, even if zero.

Angular measurements are in decimal degrees or in packed format (degrees, minutes, and decimal seconds). Angles are measured at the standpoint (IS) from the backsight target (IT1) to the foresight target (IT2) in a clockwise sense.

Two point observations (distances and azimuths) are measured from IS to IT1. (The observation is given from the IS to IT1, or, equivalently, in the sense IT1-IS.)

It is not necessary to reduce the observations to the station marker.

Reserve all lines prior to the triple colon (:::) in columns 1, 2 and 3 for comments; the line after the ::: is the first significant data line in the file. Each significant line is 69 characters long.

In the following example, not included in the listing are the column locators comprising the first two lines and the last two lines. The data set begins on the first significant line (after the :::), e.g.:

```
         1         2         3         4         5         6
1234567890123456789012345678901234567890123456789 0123456789012345678
*  36*  99*  20*4*41*   0.000*   0.000*   0.000*      36.585*  1.000*
*  99*  36*    *1*11*   0.172*   0.200*   0.000*     227.255*  0.004*
*  38*  39*    *1*11*   0.348*   0.200*   0.000*     378.664*  0.004*
*  39*  38*    *1*11*   0.172*   0.381*   0.000*     378.667*  0.004*
*  39*  40*    *1*11*   0.172*   0.200*   0.000*     399.959*  0.004*
*  40*  39*    *1*11*   0.172*   0.200*   0.000*     399.956*  0.004*
*  39*  41*    *1*11*   0.172*   0.200*   0.000*     381.549*  0.004*
*  41*  39*    *1*11*   0.172*   0.200*   0.000*     381.546*  0.004*
*  39*  42*    *1*11*   0.172*   0.381*   0.000*     422.471*  0.004*
```

```
*  42*  39*    *1*11*   0.348*   0.200*   0.000*     422.470*  0.004*
*  40*  41*    *1*11*   0.172*   0.200*   0.000*     159.236*  0.004*
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
          1          2          3          4          5          6
```

For the significant lines, the data fields are arranged as follows:

Data Field Column Arrangement

Columns									
1	2-5	6	7-10	11	12-15	16	17	18	19-20
use?	BT name	*	SP name	*	FT name	*	observation code	*	form code
Data fields									

Data Field Column Arrangement

Columns										
21	22-29	30	31-38	39	40-47	48	49-60	61	62-68	69
±	BT height	±	SP height	*	FT height	*	observation	*	sigma	*
Data fields										

The columns are defined as follows:

Column 1	This column shows whether to use the observation in the adjustment: * means use, - means do not use.
Col 2-5	These columns show the backsight target (BT) name, up to four alphanumeric characters.
Column 6	This asterisk is a field separator.
Col 7-10	These columns show the standpoint (SP) name, up to four alphanumeric characters.
Column 11	This asterisk is a field separator.
Col 12-15	These columns show the foresight target (FT) name, up to four alphanumeric characters.
Column 16	This asterisk is a field separator.
Column 17	This column shows the observation code: 1 means slant distance, 2 means azimuth, 3 means: Altitude (vertical angle) if the form code is 31 or 32. Zenith angle if the form code is 31 or 32. 4 means horizontal angle. 5 and 6 are not used. 7 means ellipsoidal height difference.
Column 18	This asterisk is a field separator.
Col 19-20	These columns show the form code for the preceding observation code: 11 means meters units for observation codes 1 (slant distance) and 7 (ellipsoidal height difference). 12 means feet units for observation codes 1 (slant distance) and 7 (ellipsoidal height difference). 21 means decimal degrees for observation code 2 (azimuth). 22 means "packed" format (degrees, minutes, and decimal seconds) for observation code 2 (azimuth). 31 means decimal degrees and defines observation code 3 as altitude. 32 means "packed" format (degrees, minutes, and decimal seconds) and defines observation code 3 as altitude. 33 means decimal degrees and defines observation code 3

as zenith angle.

34 means "packed" format (degrees, minutes, and decimal seconds) and defines observation code 3 as zenith angle.

41 means decimal degrees for observation code 4 (horizontal angle).

42 means "packed" format (degrees, minutes, and decimal seconds) for observation code 4 (horizontal angle).

Column 21 — In this column, for the subsequent height of the backsight target measurement center:

* means the height is positive, - means the height is negative.

Col 22-29 — These columns show the height of the backsight target measurement center (HBT) in meters, up to four decimals.

Column 30 — In this column, for the subsequent height of the standpoint measurement center:

* means the height is positive, - means the height is negative.

Col 31-38 — These columns show the height of the standpoint measurement center (HS) in meters, up to four decimals.

Column 39 — In this column, for the subsequent height of the foresight target measurement center:

* means the height is positive, - means the height is negative.

Col 40-47 — These columns show the height of the foresight target measurement center (HFT) in meters, up to four decimals.

Column 48 — This asterisk is a field separator.

Col 49-60 — These columns show the sign and magnitude of the observation.

Column 61 — This asterisk is a field separator.

Col 62-68 — These columns show the standard deviation (sigma) for the observation, up to three decimals. The units of the observation determines the units of sigma as follows:

Observation Units

Observation	Sigma
meters	meters
decimal degrees	seconds
"packed" degrees, minutes, seconds	seconds

Column 69 — This asterisk terminates the line.

ASCII-VEC File (vector.dat File)

This ASCII file contains the following information, in the format required for import to a SNAP project file, for each GPS vector observation:

- Vector adjustment flag.
- Names for the target and the standpoint.
- Heights of the target and the standpoint (must be zero).
- Signs and magnitude of the observation deltas.
- The upper portion of the variance-covariance matrix.

The vector lengths and covariance elements are in meters. Reserve all lines prior to the triple colon (:::) in columns 1, 2 and 3 for comments; the line after the ::: begins the first significant data item in the file. Each significant data item consists of one line 68 characters long followed by another line 66 characters long.

In the following example, not included in the listing are the column locators comprising the first two lines and the last two lines. The data set begins on the first item (after the :::), e.g.:

```
         1         2         3         4         5         6
1234567890123456789012345678901234567890123456789012345678901234567890123456789
:::
*  20*  41*   0.000*   0.000*     274.023*    - 144.360*      54.370*
  0.965D-05  0.654D-05  0.105D-04 -0.743D-05 - 0.765D-05  0.129D-04
*  20*  39*   0.000*   0.000*     389.891*      39.747*     367.828*
  0.769D-05  0.595D-05  0.136D-04 -0.599D-05 - 0.819D-05  0.117D-04
*  39*   1*   0.000*   0.000*    2784.456*   - 1654.785*      61.654*
  0.169D-04  0.120D-04  0.273D-04 -0.118D-04 - 0.151D-04  0.228D-04
*   1*  33*   0.000*   0.000*   -3190.493*    1266.428*    -775.484*
  0.216D-04  0.177D-04  0.335D-04 -0.153D-04 - 0.209D-04  0.269D-04
*  35*  20*   0.000*   0.000*     455.156*     - 54.892*     238.038*
  0.951D-04  0.106D-04  0.192D-04 -0.453D-05 - 0.116D-04  0.147D-04
*  41*  42*   0.000*   0.000*     206.470*    - 111.514*      25.569*
  0.671D-05  0.345D-05  0.812D-05 -0.464D-05 - 0.551D-05  0.617D-05
*  42*  19*   0.000*   0.000*     991.375*    - 500.170*     128.563*
  0.662D-05  0.347D-05  0.843D-05 -0.437D-05 - 0.561D-05  0.595D-05
1234567890123456789012345678901234567890123456789012345678901234567890123456789
         1         2         3         4         5         6
```

For the significant data items, the data fields are arranged as follows:

For the first line the columns are defined as follows:

ASCII Data Format - First Line

1Columns														
1	2-5	6	7-10	11	12-19	20	21-28	29	30-41	42	43-54	55	56-67	68
use ?	T name	*	SP name	*	T height	*	SP height	*	δX length	*	δY	*	δZ	*
First Line Data Fields														

Column 1 This column shows whether to use the observation in the adjustment:

* means use, - means do not use.

Col 2-5 These columns show the target (T) name, up to four alphanumeric characters.

Column 6 This asterisk is a field separator.

Col 7-10 These columns show the standpoint (SP) name, up to four alphanumeric characters.

Column 11 This asterisk is a field separator.

Col 12-19 These columns show the target (T) height, always 0.000 meters.

Column 20 This asterisk is a field separator.

Col 21-28 These columns show the standpoint (SP) height, always 0.000 meters.

Column 29 This asterisk is a field separator.

Col 30-41 These columns show the vector observation δX length (in meters) cartesian coordinates in the mathematical sense of (T - SP).

Column 42 This asterisk is a field separator.

Col 43-54 These columns show the vector observation δY length (in meters) in cartesian coordinates in the mathematical sense of (T - SP).

Column 55 This asterisk is a field separator.

Col 56-67 These columns show the vector observation δZ length (in meters) in cartesian coordinates in the mathematical sense of (T - SP).

Column 68 This asterisk terminates the first line.

For the second line the columns are defined as follows:

ASCII Data Format - Second Line

Columns					
1-11	12-22	23-33	34-44	44-45	56-66
S_{x^2} length	S_{xy} length	S_{y^2} length	S_{xz} length	S_{yz} length	S_{y^2} length
Second Line Data Fields					

Col 1-11 These columns show the covariance element s_{x^2} length in meters.

Col 12-22 These columns show the covariance element s_{xy} length in meters.

Col 23-33 These columns show the covariance element s_{y^2} length in meters.

Col 34-44 These columns show the covariance element s_{xz} length in meters.

Col 44-55 These columns show the covariance element s_{yz} length in meters.

Col 56-66 These columns show the covariance element s_{y^2} length in meters.

Ashtech Points File (.pts-File)

This is the Ashtech projection points file from the Prism/ TOOLS/TRANSFORM function for input to the GPS/ CADD software. You can also create .PTS-files via the SNAP EXPORT module.

The Ashtech points file has two sections: a header, followed by a list of the points and their coordinates. The header has a fixed string for its first line, which is used to identify the file as an Ashtech points file. The header is followed by a series of lines that describe the coordinate system that represents the point positions. Each descriptor is preceded by a key word which starts on the first column, followed by an ID string and/or a description/data. Most of the descriptors are optional, making the file format more flexible. The header format is shown below. The SYSTEM, DATUM, HEIGHT, and UNITS are optional with defaults. The SYSTEM default is GEOG, or geographic coordinates. The DATUM default is WGS-84. The HEIGHT default is ellipsoidal heights, and the UNITS default is meters. The ZONE depends on the SYSTEM; if the SYSTEM is GEOG or GEN, the ZONE is not applicable, otherwise it is required. All of the other descriptors labeled ".opt" are completely optional. The ID starts at column 20, the description at column 40, the exception being the ZONE, which also has the zone number which starts at column 30.

```
         1         2         3         4         5         6         7
1234567890123456789012345678901234567890123456789012345678901234567890
ASHTECH POINTS FILE
```

```
PROGRAM:          PRISM v2.0.00       Sep 30 1993
opt.      CREATED FROM:Database Filesdbmtran.out
GEOG      SYSTEM:           SPC83                  State Plane Coordinate 1983
WGS84     DATUM:            GRS80                  North American 1983
opt.      TRANSLATION:                             (0.000,   0.000,   0.000}
opt.      ROTATION:                                {  0.00,   0.00,   0.00}
opt.      SCALE:                                   0.0000
          ELLIPSOID:        GRS80                  Geodetic Ref. Sys. 1980
opt.      SEMI-MAJOR AXIS:                         6378137.0
opt.      INVERSE FLATTENING:                      298.25722
opt.      PROJECTION:       LC83                   Lambert Conformal
dep.      ZONE:             CA__      0403         California (Zone3)
ELLIP     HEIGHT:           GEOD                   Geoidal
METER     UNITS:            USFT                   U.S. SURVEY FEET
```

Comments may be placed between the header and the body. The only restriction on comments is that they cannot start in the first column.

The body is preceded by a one-line header and a blank line. The header should start at the first column. The header depends on the SYSTEM to be used, and it also has optional fields. The header identifies the fields in the position data; minimum has POINT start at the first column to specify the point number in the file, three fields to specify the position, and the SITE field to specify the point name. The position fields which would be latitude, longitude, and height for geographic systems, or northing, easting, and height for projections. For a 2-D point, the height is reported as -9.99E+29. The optional fields could be position sigmas and/or attitude information. The sigmas must be in the same system and units as the position information. The attribute field is a free-form string of up to 80 characters that can include white space characters. All of the data fields are separated by three spaces. The examples below are zero-filled to show the format, you do not need to zero-fill the data when generating an actual file.

```
POINT    LATITUDE                  LONGITUDE     HEIGHTSITEATTRIBUTE
00001    37 22 56.39742 N122 02 02.38628 W00011.937ASH1This is a sample point.
or
POINT    NORTHING                  EASTING       HEIGHTSITEN_SIG E_SIGHT_SIG
00001    0187927.915               12345678.012  00011.937ASH100.000 00.00000.000
00002    0187927.915               12345678.012  -9.99E+29ASH200.000 00.00000.000
```

FILLNET File (.prt-File)

This is a single file containing all vector solutions and preliminary positions suitable for input to the FILLNET program or to SNAP.

NGS G-File

This is the ASCII National Geodetic Survey GPS data transfer format file imported to or exported from a selected SNAP project file. The NGS G-file comprises:

- One Project Record (A) at the beginning of the file.
- For each data collection session:
  - One Group Header Record (B).
  - N minus 1 (where N is the number of receivers) Member Records (C).
  - Sufficient correlation records (D) to express all cross correlation coefficients.

This section describes, in the context of the data fields required by the NGS G format, the optional data fields entered via the Project Information Box of the EXPORT module and other Ashtech-specific data entries. For details on the NGS G format, see Annex N to the CR8BB User's Guide described in the Selected Bibliography appendix to this manual.

Each file is 80 characters wide. The following two examples are for a single session using two receivers. Not included in the listing are the column locators comprising the first two lines.

Example without optional entries via the EXPORT module:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789 01234567890123456789012345678901
A
B19940327162319940327182901               BCAST0400020101015
CNBS1NBSO    -438880   16    1071380   43    1429910   30 A 864ANBS1A 864ANBSO
D  1  2 -1073000  1  3  1051000  2  3 -7758000
```

Example with optional entries via the EXPORT module:

```
         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789 01234567890123456789012345678901
AYN1994032619940401
B19940327162319940327182901LINECOMP 5.1.0 BCAST0400020101015ASHTEC19940609
CNBS1NBSO    -438880   16    1071380   43    1429910   30 A 864ANBS1A 864ANBSO
D  1  2 -1073000  1  3  1051000  2  3 -7758000
```

In the Project Record, the data fields are arranged as follows:

Data Fields in Project Record

Columns			
1	2-3	4-11	12-19
A	Project Code	Starting Date	Ending Date
Data Fields			

Column 1 This column is A, the automatic Project Record code.

Col 2-3 These columns show the optional PROJECT CODE (job code) from EXPORT.

Col 4-11 These columns show the optional STARTING DATE (start-of-project) from EXPORT.

Col 12-19 These columns show the optional ENDING DATE (end-of-project) from EXPORT.

In the Group Header Record, the data fields are arranged as follows:

Data Fields in Group Header Record

Columns							
1	2-13	14-25	26-27	28-42	43-47	48-51	52-53
B	date first actual measurement	date last actual measurement	# vector measurements	PROGRAM & VERSION	SOURCE ORBIT	ORBIT ACCURACY	02
Data Fields							

Data Fields in Group Header Record - Continued

Columns					
54-55	56-57	58-59	60	61-66	67-74
meteorological use code	ionosphere use code	time parameter use code	nominal accuracy code	AGENCY ID	PROCESSING DATE
Data Fields					

where the columns are defined as follows:

Column 1 This column is B, the automatic Group Header Record code.

Col 28-42 These columns show the optional postprocessing software ID and version, PROCESSING PROGRAM and PROGRAM VERSION from EXPORT.

Col 43-47 These columns show the optional SOURCE OF ORBIT source from EXPORT.

Col 48-51 These columns show the optional ORBIT ACCURACY from EXPORT.

Col 52-53 These columns show the solution coordinate system code. SNAP supports only 02 (WGS-84).

Col 61-66 These columns show the optional processing AGENCY ID from EXPORT.

Col 67-74 These columns show the optional PROCESSING DATE from EXPORT.

In the Member Record, the data fields are arranged as follows:

Data Fields in Member Record

Columns					
1	2-5	10-20	21-25	26-36	37-41
C	origin & differen-tial station serial number and suffix	vector delta X	vector sigma X	vector delta Y	vector sigma Y
Data Fields					

Data Fields in Member Record

Columns			
42-52	53-57	58	59-78
vector delta Z	vector sigma Z	rejection code	origin & differential station data file name
Data Fields			

where the columns are defined as follows:

Column 1 This column is C, the automatic Member Record code.

Col 59-68	These columns show the origin station data media identifier (data file name) where the prefix A means Ashtech.
Col 69-78	These columns show the differential station data media identifier (data file name) where the prefix A means Ashtech.

PRISM/GPPS File (O-File)

This is the binary Vector Output file generated by the LINECOMP program (in Prism or GPPS) as a result of processing static or pseudo-kinematic survey data or by the Precise Differential Navigation and Surveying (PNAV) software from kinematic survey data (i.e. in the Survey Mode). An O-file contains, in abbreviated binary form, vector information and solution statistics, for each pair of known and unknown stations selected for processing from PROJFILE.STA, PROJFILE.PSD, or PROJFILE.KIN. It can be read by adjustment packages such as FILLNET, Geolab™ or SNAP. It can be inspected via the VECTOR OUTPUT function in the Prism/ PROCESS/RESULTS screen.

NOTES

In the PNAV O-file, the FLOAT SOLUTION data listed is always identical to the FIXED SOLUTION data. The PNAV solution is a fixed solution if the Lowest RATIO is greater than 95 and the Sigmas in the ambiguities are all zeroes; otherwise the PNAV solution is a float solution.

The O-file contains multiple solutions for multiple baseline vectors.

The solution information for each calculated vector is preceded by a line of asterisks in the PROCESS/RESULTS/ VECTOR OUTPUT display.

LINECOMP Example

```
LINECOMP: 5.0.02    STATIC    - L1 ONLY      Processed: 08/05/92 15:44
PROJECT: GPS Survey           Year: 1991   Day: 280  Session: A
Start: 13:58 Span:  64 min                           Interval: 20.00 s
------------------------------------------------ --------------------
KNOWN Station:   NBS5                   STATION NBS5
LAT : N 39 07 48.28921   LONG : W 77 12 55.18082   ELLIP. HT: 137.568
Antenna Height:          | Met. Information:      | Operator:   DWK
  Slant:         1.481 m |  Temp:       20.0(C)   | Receiver #: 225
  Radius:        0.132 m |  Humidity:   50.0(%)   | Antenna #:  159
  Vert Offset:   0.000 m |  Pressure: 1010.0(mb)  |
Antenna Offset:          |                        | Comment:    _______
  North:         0.000 m |                        |
  East:          0.000 m |                        | Receiver Log ID: 00

------------------------------------------------ --------------------
```

```
UNKNOWN Station: ORM1                       STATION ORM1
Antenna Height:          | Met. Information:     | Operator:   MWE
  Slant:        1.488 m |  Temp:       20.0(C)  | Receiver #: 429
  Radius:       0.132 m |  Humidity:   50.0(%)  | Antenna #:  293
  Vert Offset:  0.000 m |  Pressure: 1010.0(mb) |
Antenna Offset:          |                       | Comment: ROOM_ONE_OBS_
  North:        0.000 m |                       |
  East:         0.000 m |                       | Receiver Log ID: 00
------------------------------------------------ ------------------
           FLOAT SOLUTION           |           FIXED SOLUTION
                                    |
RMS:  0.0076 m                      | RMS:  0.0081 m  Lowest RATIO: 100.00
Conv: 0.0000 m 898 of 899 Meas Used | Conv: 0.0000 m 898 of 899 Meas Used
                                    |
LATITUDE:    N   39 08 11.52186     | LATITUDE:    N   39 08 11.52181
LONGITUDE:   W  077 11 55.87315     | LONGITUDE:   W  077 11 55.87356
ELLIP. HT:              153.876     | ELLIP. HT:              153.859
                                    |
delta X:          1291.779 +/-0.028 | delta X:      1291.767 +/-0.003
delta Y:           744.041 +/-0.025 | delta Y:      744.050+/-0.010
delta Z:           566.046 +/-0.016 | delta Z:      566.034 +/-0.007
                                    |
BASELINE LENGTH:       1594.584     | BASELINE LENGTH:   594.575
                                    |
Reference SV: 13                    | Reference SV: 13
SV    Amb.   Sigma   Fit(m)  # Meas | SV    Amb.   Sigma  Fit(m) # Meas
02   1.015   0.162   0.024    193   | 02   1.015   0.000   0.031    193
06   4.950   0.118   0.045    150   | 06   4.950   0.000   0.044    150
12   9.948   0.079   0.035    193   | 12   9.948   0.000   0.036    193
14   0.032   0.172   0.035    193   | 14   0.032   0.000   0.034    193
24   0.936   0.092   0.057    169   | 24   0.936   0.000   0.063    169
------------------------------------------------ ----------------------
```

PNAV Example

```
PNAV: 2.1.00P     KINEMATIC - L1-L2              Processed: 03/02/94 12:17
PROJECT: PNAV Survey/PNAV Search    Year: 1992   Day: 231  Session: A
Start: 22:35 Span:   5 min    Start: 22:35 Span:   5 min   Interval: 10.00 s
------------------------------------------------ -------------------------
KNOWN Station:   _TG3                       STATION _TG3
  LAT : N 37 22 23.55522   LONG : W 121 59 51.23491    ELLIP. HT:    2.094
Antenna Height:          | Met. Information:     | Operator:   PHG
  Slant:        0.000 m |  Temp:       20.0(C)  | Receiver #: 113
  Radius:       0.000 m |  Humidity:   50.0(%)  | Antenna #:  ___
```

```
  Vert Offset:  0.000 m |  Pressure: 1010.0(mb) |
Antenna Offset:         |                       | Comment:    6L_TESTING___
  North:        0.000 m |                       |
  East:         0.000 m |                       | Receiver Log ID: 00
--------------------------------------------- -------------------------
UNKNOWN Station: SSSP                     STATION SSSP
Antenna Height:         | Met. Information:     | Operator:   PHG
  Slant:        1.632 m |  Temp:       20.0(C)  | Receiver #: 108
  Radius:       0.132 m |  Humidity:   50.0(%)  | Antenna #:  109
  Vert Offset:  0.000 m |  Pressure: 1010.0(mb) |
Antenna Offset:         |                       | Comment:    6L_TESTING___
  North:        0.000 m |                       |
  East:         0.000 m |                       | Receiver Log ID: 01
--------------------------------------------- -------------------------
            FLOAT SOLUTION                |           FIXED SOLUTION
                                          |
RMS:  0.0070 m                            | RMS:  0.0070 m  Lowest RATIO: 100.00
Conv: 0.0000 m   29 of   29 Meas Used     | Conv: 0.0000 m   29 of   29 Meas Used
                                          |
LATITUDE:    N   37 25 23.71124           | LATITUDE:    N   37 25 23.71124
LONGITUDE:   W  122 04 48.40531           | LONGITUDE:   W  122 04 48.40531
ELLIP. HT:              -22.268           | ELLIP. HT:              -22.268
                                          |
delta X:         -4396.007 +/-0.707       | delta X:         -4396.007 +/-0.707
delta Y:          6753.246 +/-0.372       | delta Y:          6753.246 +/-0.372
delta Z:          4397.576 +/-0.262       | delta Z:          4397.576 +/-0.262
                                          |
BASELINE LENGTH:       9179.863           | BASELINE LENGTH:       9179.863
                                          |
Reference SV:  3                          | Reference SV:  3
SV    Amb.   Sigma   Fit(m)  # Meas       | SV    Amb.   Sigma   Fit(m)  # Meas
20   6.642   3.310   0.000     28         | 20   6.642   3.310   0.000     28
26   8.701   1.766   0.000     28         | 26   8.701   1.766   0.000     28
16   0.790   2.652   0.000     28         | 16   0.790   2.652   0.000     28
17  -7.491   2.092   0.000     28         | 17  -7.491   2.092   0.000     28
23  -7.295   3.512   0.000     28         | 23  -7.295   3.512   0.000     28
---------------------------------------------- -------------------------
```

SNAP Output File

This is the ASCII *.OUT file created via the SNAP OUTPUT FORMAT selection in the EXPORT module. It comprises the following items:

- ALL INCLUDED POINTS
- ADJUSTED POSITIONS (East longitudes)
- ADJUSTED POSITIONS - WEST LONGITUDES)
- ADJUSTED VECTOR OBSERVATIONS
- ADJUSTED TERRESTRIAL OBSERVATIONS (for enhanced or terrestrial adjustments only)

Following are excerpts from a typical SNAP OUTPUT file:

```
============================================================
            ASHTECH SURVEY NETWORK ADJUSTMENT PACKAGE  version 1.0
PROJECT: Terrestrial Tutor                    FILE :    TUTOR3.PRO
CREATOR:                                       DATE : 06/01/1994
ELLIPSOID: WGS 1984
============================================================
                              ALL INCLUDED POINTS
NAME  LATITUDE/LONGITUDE   SIGMA   HAE/HAMSL   SIGMA NORTHING/EASTING
.... ..................... ....... ........... ..... .. ..............
   1    37°24'46.00522"N              76.137   0.004      4140937.509
       122°14'15.99120"W             107.920               567451.908
  10    37°24'50.85612"N              71.011   0.004      4141095.095
       122°13'35.56370"W             102.802               568444.467
  19    37°24'55.26810"N              66.481   0.004      4141238.523
       122°12'58.79850"W              98.283               569347.081
  42    37°25' 0.65540"N              60.969   0.003      4141413.804
       122°12'13.84660"W              92.781               570450.646
  41    37°25' 1.62420"N   FIXED      64.259   FIXED      4141445.640
       122°12' 4.32540"W   FIXED      96.073               570684.430
...
...
...
  39    37°24'49.25960"N              46.586   0.003      4141064.591
       122°12' 4.32390"W              78.397               570687.695
  33    37°25'18.39060"N              47.481   0.004      4141963.502
       122°11'58.76690"W              79.299               570816.675
8888    37°25' 1.25170"N   0.010      64.960   0.003      4141432.789
       122°12'10.91570"W   0.010      96.772               570522.534
```

NBS1	39° 8' 1.30471"N	105.965	4333945.954
	77°12'48.21999"W	138.071	308689.726
NBS0	39° 8' 7.23833"N	107.629	4334129.357
	77°12'49.01495"W	139.737	308675.101
ORM1	39° 8'11.59797"N	121.455	4334232.121
	77°11'54.80637"W	153.556	309979.961
NBS3	39° 7'51.00898"N	105.108	4333619.487
	77°12'32.76732"W	137.211	309053.042
NBS5	39° 7'48.36845"N	105.241	4333550.574
	77°12'54.11609"W	137.347	308538.415

ADJUSTED POSITIONS

NAME	LATITUDE	s(N)	LONGITUDE	s(E)	ELL HEIGHT	s(U)
1	37°24'46.00531"	0.01	237°45'44.00556"	0.01	76.231	0.02
10	37°24'50.85611"	0.01	237°46'24.43379"	0.01	71.123	0.02
19	37°24'55.27041"	0.01	237°47' 1.19970"	0.01	66.742	0.01
42	37°25' 0.65687"	0.00	237°47'46.15271"	0.00	61.081	0.02
41	37°25' 1.62420"		237°47'55.67460"		64.259	
20	37°25' 3.49440"		237°48' 8.23190"		78.202	0.01
39	37°24'49.26130"	0.00	237°47'55.67618"	0.01	46.549	0.01
...						
...						
...						
34	37°25'16.54443"	0.01	237°48'18.37721"	0.01	49.665	0.03
36	37°25' 1.08351"	0.01	237°48'22.45851"	0.00	72.339	0.02
38	37°24'53.16369"	0.01	237°48'10.27354"	0.00	53.597	0.01
99	37°25' 6.45911"	0.01	237°48'28.77935"	0.00	77.094	0.03
40	37°25' 1.15563"	0.00	237°47'49.22551"	0.00	64.925	0.01
8888	37°25' 1.25170"	0.09	237°47'49.08430"	0.09	64.960	0.03
NBS1	39° 8' 1.30471"	0.00	282°47'11.78001"	0.00	105.965	0.00
NBS0	39° 8' 7.23829"	0.01	282°47'10.98524"	0.01	107.638	0.03
ORM1	39° 8'11.59804"	0.01	282°48' 5.19389"	0.01	121.463	0.03
NBS3	39° 7'51.00900"	0.01	282°47'27.23268"	0.01	105.108	0.02
NBS5	39° 7'48.36546"	0.01	282°47' 5.88622"	0.01	105.249	0.03

ADJUSTED POSITIONS - WEST LONGITUDES

NAME	LATITUDE	s(N)	LONGITUDE	s(E)	ELL HEIGHT	s(U)
1	37°24'46.00531"	0.01	122°14'15.99444"	0.01	76.231	0.02
10	37°24'50.85611"	0.01	122°13'35.56621"	0.01	71.123	0.02
19	37°24'55.27041"	0.01	122°12'58.80030"	0.01	66.742	0.01
42	37°25' 0.65687"	0.00	122°12'13.84729"	0.00	61.081	0.02
41	37°25' 1.62420"		122°12' 4.32540"		64.259	
20	37°25' 3.49440"		122°11'51.76810"		78.202	0.01

```
   39   37°24'49.26130"    0.00  122°12' 4.32382"    0.01      46.549    0.01
...
...
...
   38   37°24'53.16369"    0.01  122°11'49.72646"    0.00      53.597    0.01
   99   37°25' 6.45911"    0.01  122°11'31.22065"    0.00      77.094    0.03
   40   37°25' 1.15563"    0.00  122°12'10.77449"    0.00      64.925    0.01
 8888   37°25' 1.25170"    0.09  122°12'10.91570"    0.09      64.960    0.03
 NBS1   39° 8' 1.30471"    0.00   77°12'48.21999"    0.00     105.965    0.00
 NBS0   39° 8' 7.23829"    0.01   77°12'49.01476"    0.01     107.638    0.03
 ORM1   39° 8'11.59804"    0.01   77°11'54.80611"    0.01     121.463    0.03
 NBS3   39° 7'51.00900"    0.01   77°12'32.76732"    0.01     105.108    0.02
 NBS5   39° 7'48.36546"    0.01   77°12'54.11378"    0.01     105.249    0.03
                          ADJUSTED VECTOR OBSERVATIONS
 NAME NAME SESS OBSERVATION s(XYZ)    ADJUSTED  V(XYZ)  V(NEU)    V' TAU   RPPM
 ---- ---- ---- ----------- ------ ----------- --- ---- ------- ----- --- ------
   41   20  N/A     274.023  0.003     274.059    0.04  -0.023  -4.0!     73.14
                   -144.360  0.003    -144.266    0.09  -0.019  -3.3!     60.42
                     54.370  0.004      54.266   - 0.10  -0.142 -24.8!    451.57
   41   20  N/A     274.023  0.003     274.059    0.04  -0.023  -4.0!     73.14
                   -144.360  0.003    -144.266    0.09  -0.019  -3.3!     60.42
                     54.370  0.004      54.266   - 0.10  -0.142 -24.8!    451.57

   39   20  N/A     389.891  0.003     389.937    0.05  -0.016  -2.8      29.77
                     39.747  0.004      39.809    0.06   0.006   1.0      11.16
                    367.828  0.003     367.749   - 0.08  -0.109 -18.9!    202.80
    1   39  N/A    2784.456  0.004    2784.426   - 0.03   0.009   1.1       2.78
                  -1654.785  0.005   -1654.815   - 0.03  -0.009  -1.1       2.78
                     61.654  0.005      61.696    0.04   0.059   7.2!     18.21
   33    1  N/A   -3190.493  0.005   -3190.471    0.02   0.000   0.0       0.00
                   1266.428  0.006    1266.490    0.06  -0.014  -1.5       3.98
                   -775.484  0.005    -775.533   - 0.05  -0.081  -9.0!     23.02
...
...
...
 NBS3 ORM1  86A     803.161  0.002     803.161    0.00   0.000   0.0       0.00
                    580.347  0.003     580.347    0.00   0.000   0.0       0.00
                    502.832  0.003     502.832    0.00   0.000   0.0       0.00
 NBS5 NBS0  86A      38.553  0.002      38.553    0.00   0.001   0.2       1.68
                    383.510  0.005     383.510    0.00   0.000   0.0       0.00
                    452.969  0.004     452.970    0.00   0.001   0.2       1.68
 NBS5 NBS1  86A      82.441  0.002      82.441    0.00  -0.001  -0.2       2.36
                    276.374  0.003     276.374    0.00   0.000   0.0       0.00
```

```
                    309.980  0.003     309.979    0.00  -0.001  -0.2       2.36
 NBS5 NBS3  86A     488.592  0.001     488.592    0.00   0.000   0.0       0.00
                    163.766  0.002     163.766    0.00   0.000   0.0       0.00
                     63.150  0.002      63.150    0.00   0.000   0.0       0.00
 NBS5 ORM1  86A    1291.753  0.002    1291.753    0.00   0.000   0.0       0.00
                    744.113  0.004     744.113    0.00   0.000   0.0       0.00
                    565.982  0.004     565.982    0.00   0.000   0.0       0.00
 ORM1 NBS0  86A   -1253.200  0.003   -1253.200    0.00   0.001   0.1       0.76
                   -360.606  0.006    -360.604    0.00  -0.001  -0.1       0.76
                   -113.012  0.005    -113.012    0.00  -0.002  -0.2       1.53
                        ADJUSTED TERRESTRIAL OBSERVATIONS
 NAME NAME NAME    OBSERVATION       RESIDUAL        ADJUSTED   |V'| TAU TYPE
 ---- ---- ---- ------------  ------------  --- ----------- ----- --- ----
   20   19        0-24  4.3361   0  0 -0.0414    0- 24  4.3774   3.8     VANG
   20   40       -1 36 37.2295   0  0  0.0048   -1 36 37.2247   0.4     VANG
   20   40       -1 36 37.2295   0  0  0.0048   -1 36 37.2247   0.0     VANG
   31   20            398.3542        -0.0139        398.3403   7.0     DIST
   20   31            398.3519        -0.0116        398.3403   5.8     DIST
   32   20            287.8233        -0.0013        287.8220   0.7     DIST
   20   32            287.8214         0.0006        287.8220   0.3     DIST
   33   20            491.4247         0.0011        491.4258   0.5     DIST
...
...
...
   33   34              2.1790         0.0245          2.2035   4.1     DHGT
   32   33            -21.6950        -0.0184        - 21.7134   4.6     DHGT
   20   32             -9.0180        -0.0097         -9.0277   1.9     DHGT
   38   20             24.5900         0.0159         24.6059   5.3     DHGT
   36   38            -18.7360        -0.0061        - 18.7421   1.2     DHGT
   36   38            -18.7360        -0.0061        - 18.7421   1.2     DHGT
   34   36             22.6800        -0.0063         22.6737   0.9     DHGT
   31   32             -7.1060        -0.0229         -7.1289   3.8     DHGT
   38   41             10.6560         0.0065         10.6625   1.6     DHGT
   42   31             15.3140        -0.0909         15.2231  18.2     DHGT
   40   42             -4.0020         0.1572         -3.8448  31.4     DHGT
   41   40              0.7110        -0.0447          0.6663  11.2     DHGT
   39   40             18.3850        -0.0086         18.3764   1.4     DHGT
   38   39             -7.0180        -0.0296         -7.0476   7.4     DHGT
   38   39             -7.0180        -0.0296         -7.0476   7.4     DHGT
```

D

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