Reliance Workabout

Field Operations Manual

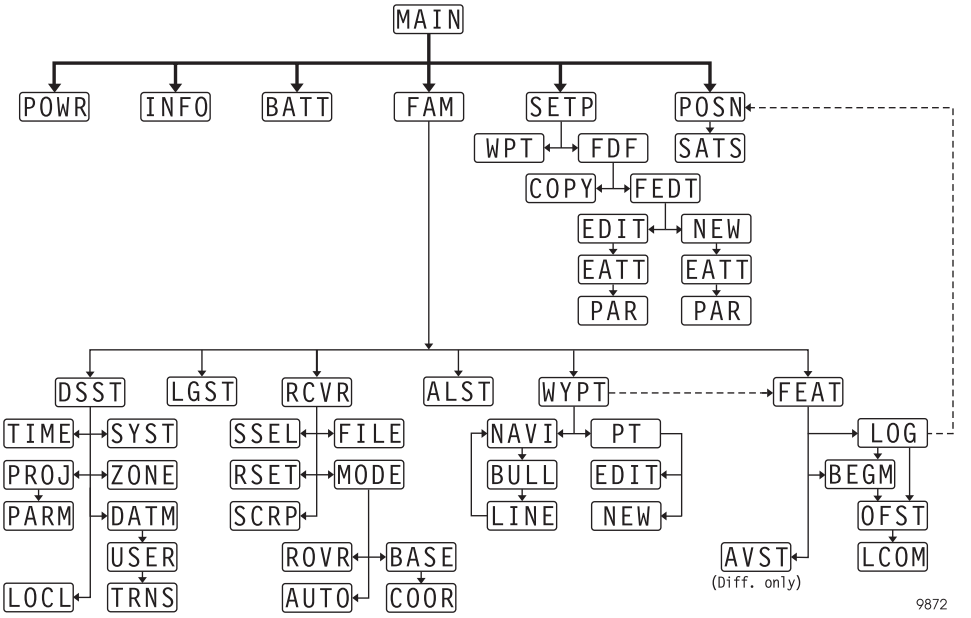
Ashtech
1170 Kifer Road
Sunnyvale, CA USA 94086

Phone and Fax Numbers

- Main
  - Voice: 408-524-1400
  - Fax: 408-524-1500
- Sales
  - US: 800-922-2401
  - International: 408-524-1670
  - Fax: 408-524-1500
- Europe
  - Voice: 44-1-993-883-533
  - Fax: 44-1-993-883-977
- Support
  - US: 800-229-2400
  - International: 408-524-1680
  - Fax: 408-524-1500
- BBS
  - Direct: 408-524-1527

Internet

- support@ashtech.com
- http://www.ashtech.com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User Notice

FCC (CFR 47, Part 15.105), BS EN 55022: 1995

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to FCC, CFR 47, Part 15 Rules, and Class A ITE (Information Technology Equipment), pursuant to the European Standard EN 55022: 1995. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Manufacturer provided or recommended shielded input/output cables must be used for this equipment to comply with the regulation limits tested.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications to the equipment or cables not specifically approved, in writing, by the manufacturer may void the user's authority to operate this equipment.

Declaration of Conformity

(according to ISO/IEC Guide 22 and EN45014)

Ashtech Inc.
1170 Kifer Road
Sunnyvale, California 94086

declares that the product:

Reliance SCA-12 GPS Receiver
Model #: 800087

(This declaration covers all options of the product)

to which this declaration relates, **meets the essential health and safety requirements** and is in conformity with the relevant EU Directives listed below:

EU EMC Directive 89/336/EEC 1993

using the relevant section of the following EU standards and other normative documents:

EMC:	**EN55022 1987 Class A**
	IEC 1000-4-2 (1995)
	ENV 50140 (1994)
	IEC 1000-4-4 (1995)
	ENV50141 (1994)

Supplementary information:
The product model listed above complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC

Gary Sapia
Quality Engineer
Ashtech Inc.
Sunnyvale, California
January 3, 1997

European Contact:
Your local Ashtech Sales Office or
Ashtech Europe Limited, Blenheim Office Park, Long Hanborough,
Oxfordshire OX8 8LN, England
Tel: 44 993 883 533, Fax: 44 993 883 977

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Introduction

Overview

The Ashtech Reliance system provides full-featured capability for rapid and precise GIS data acquisition. The receiver has the highest precision of any GPS-based GIS data acquisition product. The standard receiver processes C/A code data only, for sub-meter accuracy. The high-performance receiver processes C/A code and carrier phase data for decimeter accuracy. These accuracies are achieved by post-processing the data collected in the field. In addition, real-time sub-meter accuracies can be obtained using the RTCM differential option.

Reliance makes it possible for a minimally trained worker to rapidly collect precise data on the location and attributes of *point* features such as trees and fire hydrants, *line* features such as roads and power lines, and *area* features such as city blocks and lakes.

Reliance comprises two basic components:

Hardware - for data acquisition

Software - for controlling the hardware in the field and post-processing the data in the office

Hardware

The hardware includes the receiver shown in Figure 1.1.

Figure 1.1: SCA-12 Receiver

The receiver computes feature positions and stores the position data, along with feature descriptions logged by the user in the field. The 4.5 megabytes of memory can store more than 27 hours of data at a 5-second recording interval.

The receiver is controlled by a Workabout handheld controller shown in Figure 1.2.

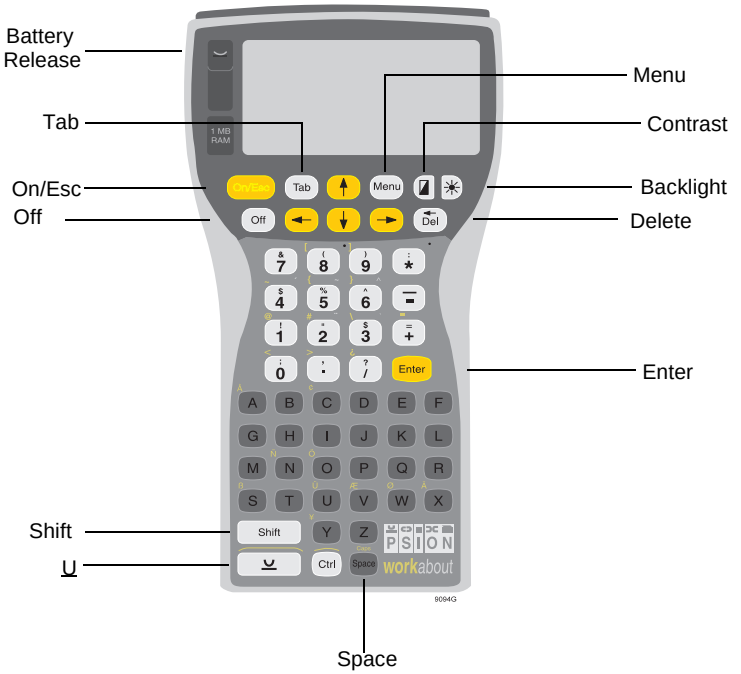

Figure 1.2: Workabout Handheld Controller

The receiver, along with two Panasonic camcorder batteries, mounts inside a backpack as shown in Figure 1.3.

Figure 1.3: Backpack

The GPS Survey antenna is shown in Figure 1.4.

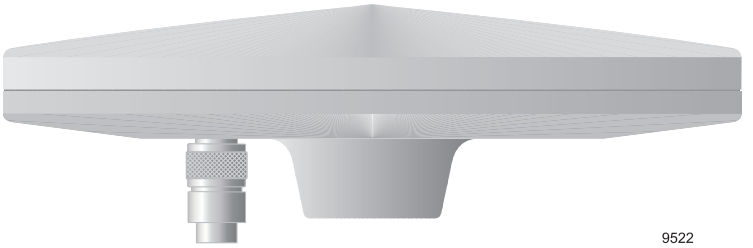

Figure 1.4: GPS Survey Antenna

Interconnections between the receiver, the Workabout, and the batteries within the backpack are made with the interface cable shown in Figure 1.5.

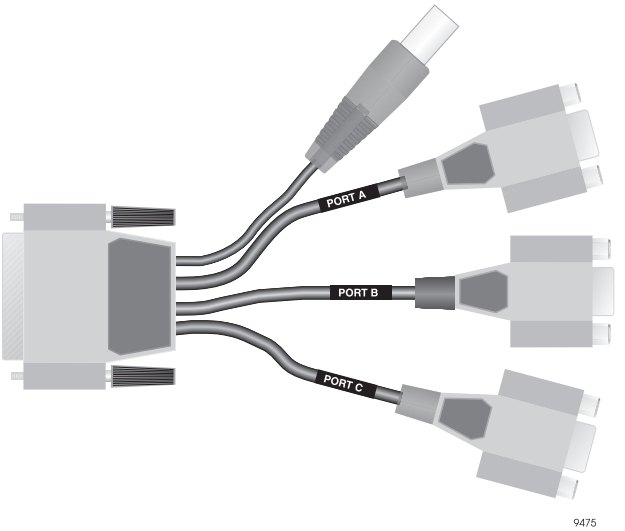

Figure 1.5: Interface Cable

For detailed specifications on the interface cable, refer to Appendix A, **Cable Information**.

Figure 1.6 shows the complete system configuration.

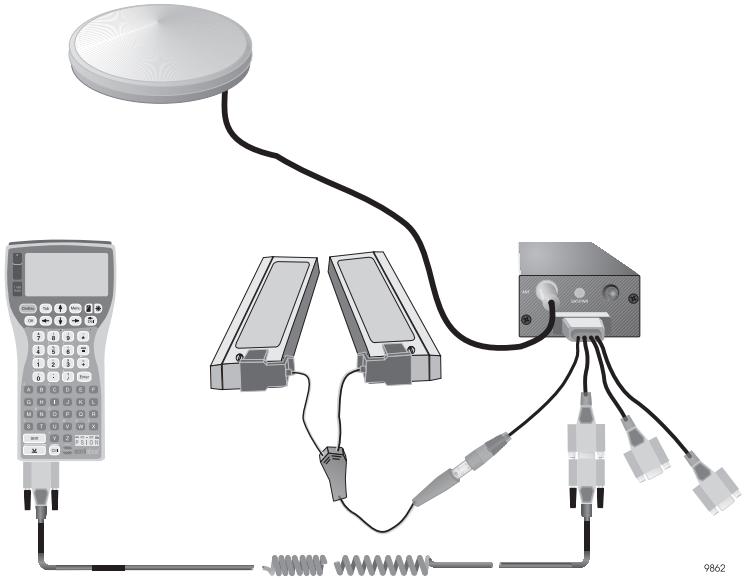

Figure 1.6: System Configuration

Interconnection between the Workabout and the PC is made with the Workabout-to-PC cable shown in Figure 1.7. This cable is used to transfer waypoint and feature files between the PC and the Workabout.This type of cable is also used to connect the Workabout to the GPS receiver.

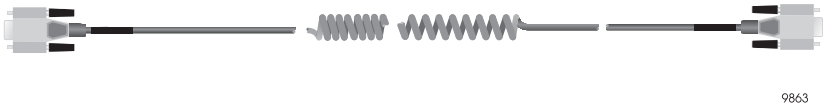

Figure 1.7: Workabout-to-PC Interface Cable

A battery charger, Figure 1.8, is used to recharge the camcorder batteries. Only one battery can be connected to the charger at a given time. A fully charged battery will operate the receiver for about 6 hours. If completely discharged, the battery will require about 6 hours to fully recharge.

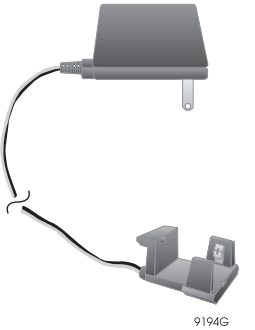

Figure 1.8: Battery Charger

Two batteries and two chargers are supplied with each Reliance system.

The Panasonic camcorder battery is shown in Figure 1.9.

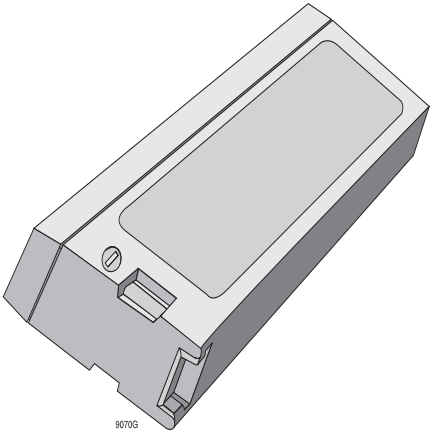

Figure 1.9: Camcorder Battery

Software

The software comprises the programs necessary to control the Workabout in the field, create files for describing features, process the collected data, and format the data for export to GIS packages.

The software has three functions:

Pre-mission preparation

Field operations

Post-mission processing

The **Pre-mission** software is used in the office to create asset descriptions called Feature Files. These files are lists of feature names, attributes, and attribute values. Libraries of such features may be created, stored and uploaded to the Workabout from the office PC.

The **Field** software runs on the Workabout and provides the capability to log features, attributes, attribute values, and positions in the field.

The **Post-mission** software runs on a PC, processes the collected data for high-accuracy positions, and allows viewing the collected data. The data can be translated into formats compatible with all the major GIS software packages.

Survey Planning

Survey planning is necessary to obtain reliable and accurate data. A well-planned survey saves valuable field time and costs, while getting the most accurate results. A poorly planned survey costs time and money and may produce results poor enough to require re-surveying parts of the target area. This chapter describes general planning considerations required to utilize the Reliance system, but does not cover the specifics for planning a particular type of survey.

When planning a GPS/GIS survey, you need to consider the following parameters:

- What does the survey accomplish?
- What accuracy is required?
- What is the scale of the final map product?
- What is the truth of the product; is the truth dictated by the map or the absolute truth?

These questions are important to consider when deciding on what level of accuracy is needed for the survey. The level of accuracy directly depends on the time and money spent completing the survey.

For example, if your goal is to update telephone pole locations on an existing map at a scale of 1:10,000 so that repair men can go out and easily locate poles, the Reliance Submeter system may provide an adequate solution in that the existing map dictates the positions (and not the “absolute GPS truth), a 0.5 mm wide line on a 1:10,000 scale map cuts the accuracy back to 2-5 m, and telephone poles are typically 1/3 meter in diameter located far enough apart that a given location ± 3 meters is close enough for a person to go out and easily locate the pole.

At the other end, you are planning on mapping property for legal or tax implementations, the level of accuracy must be considerably higher, requiring use of the Reliance

After determining the level of accuracy required, survey planning requires these additional steps:

- Reconnaissance work and observation network designing and scheduling
- Creating the project file
- Creating the feature and waypoint files
- Transferring the feature and waypoint files to the Workabout.

Types of Surveying

Reliance is a versatile, cost-effective system that allows for several levels of accuracy during a single surveying session. Table 2.1 lists the different levels of accuracy, published accuracies, and possible applications.

Table 2.1: Survey Types

	Submeter System	Decimeter System	Precision System
Requirements	• Continually broadcasting base station • Minimum 5 satellites continuously tracking for at least 15 minutes	• Continually broadcasting base station • Minimum 5 satellites continuously tracking for at least 15 minutes • P option installed on GPS receiver	• Continually broadcasting base station • Minimum 6 satellites continuously tracking for at least 30 minutes per survey point • V option installed on GPS receiver • Baselines less than 10 kilometers

Applications	• Utility mapping (power poles)
	• Road signs
	• Lamp poles
	• Fire hydrants, manhole covers, water mains
	• Parks and recreation assets (picnic tables, benches, grills)
	• Wetland and forest management
	• Crop scouting, weed management
	• Lease boundaries (not legally binding)
		• Projects with specifications requiring better than 50 cm control including:
		  • Utility mapping (power poles)
		  • Road signs
		  • Lamp poles
		  • Fire hydrants, manhole covers, water mains
		  • Parks and recreation assets (picnic tables, benches, grills)
		  • Wetland and forest management
		  • Crop scouting, weed management
		  • Lease boundaries (not legally binding)
		• Updating existing maps to higher level of accuracy or larger scale
		• Registration of map to know published control points
			• Single points with high accuracy.

Table 2.1: Survey Types

	Submeter System	Decimeter System	Precision System
Published Accuracies	• 35 cm, static or dynamic, 67% probability, post-processed • 75 cm, static or dynamic, 95% probability, post-processed • 45 cm, 2-sec RTCM latency, 67% probability, real-time correction	• 10 cm, tracking satellites for 20 min, static or dynamic, 67% probability, post-processed • 15 cm, tracking satellites for 20 min, static or dynamic, 95% probability, post-processed • 15 cm, tracking satellites for 10 min, static or dynamic, 67% probability, post-processed • 30 cm, tracking satellites for 10 min, static or dynamic, 95% probability, post-processed • 15 cm, tracking satellites for 10 min, static or dynamic, 67% probability, post-processed • 35 cm, instantaneous, static or dynamic, 67% probability, post-processed • 75 cm, instantaneous, static or dynamic, 95% probability, post-processed • 45 cm, 2-sec RTCM latency, 67% probability, real-time correction	• 1 cm, static only, tracking satellites for > 30 min, 67% probability • 1.5 cm, static only, tracking satellites for > 30 min, 95% probability • Same accuracy as Decimeter system for occupation times <30 minutes or when moving • 45 cm, 2-sec RTCM latency, 67% probability, real-time correction

Reliance Precision System

In order to solve to the centimeter level of accuracy, the base and rover stations must remain stationary and must track a minimum of six satellites for at least 30 minutes with a Position Dilution of Precision (PDOP) of less than 3.5 in order to fix ambiguities. If the CM processor is unable to fix integers for any reason, it reverts to a decimeter float solution.

Hence, to acquire centimeter accuracy, you must perform a **static** survey requiring a longer survey time. The static method utilizes long occupation times to solve the carrier phase ambiguities. During an extended survey period, observed satellites move across the sky, changing the satellite geometry. This enables the post-processing software to determine the carrier phase ambiguities and accurately determine the position of the unknown point. The required occupation time depends upon the length of the baseline between the two points being observed (the longer the baseline, the longer the occupation time) and the condition of the atmosphere (namely the ionosphere) during the data collection period. On average, occupation times will range from 20 to 30 minutes for baselines less than 10 kilometers.

The static method of surveying is the most accurate method due to the large amount of data collected. The significant disadvantage of the static method is the amount of time needed to determine an accurate position for the unknown point.

A static survey requires at least two stationary GPS systems that collect data from several common satellites over a specific time period. One system is commonly centered over a known point while the other system(s) occupy unknown stations. In order to compute accurate baselines and establish accurate positions on the unknown points, the data collected in the field is post-processed.

Once data for the initial baseline are collected, one of the GPS systems remains stationary while the remaining systems move to additional survey points. Data from at least six satellites must be collected for an additional 30 minutes per survey point.

Decimeter System

For applications where the accuracy requirements are 1-3 decimeters, Reliance offers the total feature asset management (FAM) solution. The Reliance Decimeter system uses the same carrier phase measurements as the centimeter system, yet important differences allow a static or moving rover to attain results as good as one decimeter in as little as 20 minutes.

In order to achieve results as good as one decimeter for baselines up to 100 km, only a few basic criteria must be met. At least five satellites common to base and remote receivers must be tracked continuously for a minimum of 20 minutes. The PDOP index should remain below 3.5 for the duration the session. Rover antenna setup, and reference coordinate errors add directly to resulting position errors, but with careful field procedures they can be virtually eliminated. If satellite obstruction becomes a problem at some point during feature collection, field operatives can simply continue work in the open for 20 minutes to ensure the continuity of decimeter results.

Without sacrificing accuracy for economy the Reliance Decimeter Processor provides the best of both worlds for precision GIS and FAM applications.

Submeter System

The Submeter system makes it easy to collect the largest amount of reliable data in the shortest time period. Point data need only be collected for 20 to 30 seconds, and the system accurately records data whether you are walking or moving in a vehicle.

A base station receiver is required to occupy a known point, collecting data from at least five satellites throughout the entire survey. Each roving GPS receiver must have continual lock on at least five satellites throughout the survey, however if the number of tracked satellites drops below five, you must remain stationary until the receiver regains lock on 5 satellites for at least fifteen minutes.

Planning the Survey

As in a conventional survey, completing the pre-survey reconnaissance work and designing the survey network and schedules are the most important steps in the survey other than data collection.

In addition, GPS survey planning also requires verifying satellite coverage and planning the survey to maximize satellite coverage to ensure accurate results. This is particularly important with the Precision System which requires 30 minutes of continual tracking of at least six satellites. If the number of satellites drops below six for even 30 seconds, the results can be compromised.

Mission Planning is the application used to verify satellite coverage. Refer to the Multiple-Site Mission Planning User's Guide for information on mission planning.

Answers to Frequently Asked Questions

Q: What is stored in the Workabout and what is stored in the receiver?

A: The software program, the feature files, and the waypoint files are stored in the Workabout. Issuing the DOS **`dir`** command displays all files located in the Workabout. GPS measurement data and descriptions of features logged in the field are stored in the GPS receiver.

Q: How long can the receiver store data?

A: For an average of six satellites, the standard 4.5 Mb storage of the receiver records continuous GPS measurements at a one-second interval for about 8 hours. At a five-second recording interval, the receiver records data continuously for about 40 hours.

Logging position-only data, (no post-processing) allows over 40 times the aforementioned durations.

Q: What recording interval should I use?

A: If you want to produce detailed lines and areas, then use the shortest interval, 1 second. However, using a 1-second interval quickly fills the receiver memory. Longer sessions can be recorded using a recording interval of 2 or 5 seconds, but lines and areas are not as detailed. The base station recording interval must be less than or equal to the rover recording interval for post-processing of all collected data.

Q: How many sessions can I record?

A: The receiver can record up to 100 sessions or until memory is full. The number of sessions in a project is limited only by the memory available on the PC.

Q: How far away from the base station can I be and still get accurate positions?

A: As the distance to the base station increases, the post-processed accuracy decreases by 1 ppm of the baseline length. Thus, for a 100 km distance between the rover and the base station, accuracy decreases by 10 cm. Distances beyond 100 km become increasingly less accurate because of differences in the ionospheric distortion of the satellite signals received by the base and rover.

The base and rover must simultaneously track at least five satellites (the same satellites) for submeter and decimeter accuracy, and six satellites for centimeter accuracy.

Q: What is a project?

A: A project is the collection of all the field and base data collected for the particular region being mapped, as well as any related Feature and Change information. A project also has a "state," or set of defined operating parameters, that may vary from one project to another. As an example, one user of the data you process may wish to receive their exported data in Latitude/Longitude (Geographic) Coordinates, using the WGS-84 ellipsoid, while another might request all project work be delivered in UTM Coordinates with the North American Datum of 1927 as their frame of reference. These values are set in menus within the Project Control dialog window.

Q: What is a session?

A: A session is a particular set of GPS measurements and features. A session can last as little as a few minutes or as long as several days. Each session must contain at least one feature. A session ends when a different feature file is selected, the recording interval is changed, the session name is changed, or the GPS receiver is turned off. Sessions are the building blocks of a project: a pipeline asset inventory project might

be called Pipeline.prj, while MondayAM.S01 and MondayPM.S03 would be valid sessions names for collected field data.

Q: Do I have to use the default directories?

A: No. The default directory names are just a suggestion. Some users prefer to group the base, rover, feature, waypoint, and change files together in one directory on a day-by-day or project-by-project basis. However, once you set default directories for a project, they must remain the same throughout the project. If you change directory names or file locations, the software will be unable to recognize the address of a requested data file. We suggest you find a comfortable working setup and stay with it to remove chances for confusion.

Q: What type of file can I select as a Rover file?

A: Files with the "S" extension followed by a two-digit number are selectable as a rover file. For example, wetland.s01 is a valid rover file name.

Q: What type of file can I select as a Base file?

A: Files that begin with "B" which are in the Ashtech B-file format are selectable as a base file. These files may be logged directly into the PC, downloaded from a receiver, or converted from the industry-standard RINEX format using Reliance Processor. For example, bbasea96.175 is a valid base file name.

Q: What is a change file?

A: A change file contains position and feature information for each point logged in the field. The rover and base files are condensed into a change file for faster session loading. Once a session has been loaded and processed, the change file contains all of the required corrected information for displaying, filtering, and exporting the data.

Q: What is a feature file?

A: A feature file contains a list of the features that are to be logged in the field. This file is created in the office with the Reliance Processor Feature Editor and then transferred to the Workabout field data logger. Most features will have a list of associated descriptive attributes, although some features may not have these additional information layers. Attributes can be numbers, text, or menu items. There is no limit to the number of attributes you can link to a feature. The feature file also describes the point symbols, line colors, line styles, fill colors, and fill styles used when displaying logged features in the Map View.

Q: How do I upload feature and waypoint files to the Workabout?

A: Files are transferred between the PC and Workabout using the Transfer dialog. Begin by opening the Transfer module from the Project Control menu, or use the Tools menu in the Reliance header bar. Once you've opened the Transfer module, turn on the Workabout and exit the Reliance FAMlog software (select the EXIT softkey, and type "Y" to confirm your exit) Now connect your Workabout to the PC using the supplied cable. Once you're connected to the PC, type HCOM at the DOS prompt,

and press the **Yes** key to launch the HCOM File Transfer Utility. Once you've accomplished these steps, select and press the "Transfer information between the PC and the Workabout device" button in the open Transfer Data dialog. You'll see a simplified Transfer dialog for viewing, transfer, and file deleting on the Workabout.

Q: How do I download files from the GPS receiver?

A: GPS measurement data and any integrated feature and attribute information are stored in the GPS receiver. These integrated files are transferred to the PC through the Download module in Reliance Processor. The first step in transferring files is to connect your receiver to a PC serial port using the standard female DB9 connector in your backpack system. If you're working with a base station, use the DB9 female connector supplied with the standard base receiver cable. Now turn on the GPS receiver. Next, press the "Download GPS data from the GPS receiver" button on the Transfer Data dialog. This will start the Download dialog. You should now be able to view, download, and delete files from any GPS receiver connected to the system. Make sure you select the correct path for your data files before transferring data. Remember to turn off the GPS receiver when you're done with the file transfer process.

Q: Why aren't all my PC COM ports shown?

A: The Reliance Processor automatically lists only the available COM ports. For example, if your PC has two COM ports and the mouse uses port 1, only port 2 will be listed.

Q: Why are there so many rover files?

A: New rover files are created each time the receiver is powered on, each time Reliance is exited and restarted, each time a session name is entered, each time a feature file is selected, and each time the recording interval is changed. The creation of these new files is required for Reliance to properly post-process and locate features in the data.

Q: Why do I need the base station coordinates?

A: Differential processing requires rover data be compared to a base station file in order to remove sources of error in the rover files. Base and rover data are always processed relative to each other. The accuracy of your corrected rover data is dependent on the underlying precision of 1; your GPS receiver system; and 2; the accuracy of your base station coordinates. Although the Reliance Processor can average a base station data file to generate these reference coordinates, this value will only be accurate to about 100 meters. So if you have an inaccurate base position, your field data will be corrected to the same accuracy as that known coordinate. If your base, or control, coordinate is known to within a centimeter, your corrected field data has the potential to be accurate to within the same tolerance. The better your control coordinates, the better your field data will be.

You can check this by visiting a known point or benchmark repeatedly. If all your results fall within the system accuracy capability, but are offset by 2 meters to the northwest, then you'll know your base coordinates need adjustment or resurveying.

Q: How do I get these base station coordinates?

A: The *Reliance Base Station Manual* explains in detail how to get the coordinates of your new base station using a previously surveyed point. If you need additional help in this area, call your local dealer, or call Ashtech technical support.

Q: What is the difference between submeter and decimeter processing?

A: Submeter processing uses smoothed C/A code data, and is available from all Reliance receivers. Decimeter processing requires either the purchase of a Decimeter system, or an upgrade to your Submeter equipment. Decimeter results are obtained by using the carrier phase of the L1 satellite signal.

Q: What sort of accuracy can I expect from a single GPS receiver?

A: The accuracy is about 100 meters, give or take a few tens of meters. The DoD has intentionally degraded the signals. No matter what type of receiver you have, a single GPS receiver produces about 100-meter accuracy, depending on the nature of the SA degradation for the period of time you're using the unit. 100 meters or so is the best accuracy you can ever hope to get with a single unit. (It may be a $200.00 recreational unit or a $20,000.00 top-of-the-line geodetic receiver.)

The official DoD policy on autonomous (single receiver) GPS accuracy is 95% of the time you'll be within 100 meters, and you'll be 99.99% certain to be somewhere within 300 meters.

You will not get good results by averaging uncorrected positions. You have to average hours (days) of measurements to get a number that converges on truth. SA does not produce steady-state disturbances. SA is a random degradation, and it varies constantly. But it does not vary with any consistency. It's consistently variable, or constantly inconsistent. For example, if you averaged ten minutes of measurements, your result may show a spherical error of probability (SEP) of 15 meters. So you'd naturally think, judging from your statistics, that you've gotten a valid average and you're inside a 15 meter sphere, when in fact you're probably well off the mark. Remember, SA is constantly affecting your results. The tight little group you averaged may well be 89 meters away from your actual point. Five hours (or five minutes) later, your readings are very likely to indicate an entirely different location.

The only sure method to get reliable, accurate position fixes better than 100 meters RMS is with differential GPS. Any claims of better accuracy are misrepresenting the reality of GPS and the SA environment, or show a mistaken understanding of GPS capabilities.

In most cases you'll probably find you're within 35-50 meters of your actual position if you compare the system reading with a known point. However, SA fluctuates so much you could be 35 meters one direction one minute, then 50 meters the another direction 10 minutes later.

Q: What is differential GPS, and how do I get it?

A: Differential GPS is a straightforward method to overcome the effects of SA. There are two basic ways to achieve differential results. The most common uses a computer to process data collected and stored while in the field, then downloaded later to a processor system. Another method is by receiving radio signals that provide corrections in real time. The first is known as Post-Processed Differential, the latter as Real-Time Differential. Each is useful, although post-processing is the most common, reliable, and proven method now available. Ashtech GPS receivers operate in either mode.

The fundamental theory behind differential correction is simple. At least two receivers must operate at the same time, with one unit located on a known point. Both receivers must be using the same set of satellites to derive positions. In post-processed differential, GPS data collected on the known point (by a receiver usually referred to as a reference station) is used, after the field survey is completed, to remove inaccuracies from the field data. The process actually finds its roots in the principles of quadratic equations.

Post-Processed differential corrects for SA after collection (post-processed), while Real-Time differential applies corrections while you're in the field.

Q: How far away from a control point can I be and still get accurate readings?

A: It depends upon the accuracy you're looking for. If you're concerned with a meter or two, the usual requirement for natural resource applications, there's no practical limit to the distance as long as the satellites you work with in the field are available from your reference dataset. Some people have tested equipment at 600+ kilometers and found answers within a meter or two. Most people work much closer than that, but you can work a good distance away from your home base and still achieve solid results. Keep the baseline accuracy of your system in mind when you go away from your reference station. For the Reliance Decimeter and Precision systems, this is 10 cm + 1 part per million of distances between reference and rover system.

In addition, you should conduct a careful mission plan to ensure the satellites you're working with at the field point are visible at the reference station. Watch for low-lying satellites visible at one end of the session, and obscured at the other. Set the mask angle in the base station to five degrees, and 10 degrees in the field unit. Atmospheric differences can affect your post-processing over long baselines too, although for meters-accurate results it's unlikely you'll notice any substantial effect.

Q: What is a sampling rate, and what does it mean?

A: The sampling rate of a GPS receiver describes how often the unit records satellite data and how often position fixes are calculated. Reliance can be set to sample from every 1 second up to 655 seconds. Reliance systems units are also "in synch" with the GPS second. This means they record pseudorange data exactly on the second (or the interval is selected). By synchronizing the receiver to the second, data files interface

smoothly and efficiently with other GPS receivers that follow this basic convention. Some systems on the market interpolate between measured satellite data, and may produce an unreliable set of measurements.

Every post-processed GPS coordinate file owes its success to accurate timing. Fixes and data taken in the field match up with fixes and data acquired at the reference station. If there's a timing difference between one end of the equation and the other, your accuracy will suffer. This is why Ashtech is very careful about locking its receivers exactly to GPS time, and working only with actual measured data in the Reliance Processor software package.

Q: Can I share data with a receiver from another manufacturer?

A: Yes. With a valid RINEX file, Reliance can process the data as if it came from Reliance. Your accuracy is the same using a RINEX file as it would working with Reliance data. A RINEX (Receiver INdependent EXchange) format was developed some years ago by an international group of GPS equipment manufacturers and operators. It provides a seamless transfer of data from one manufacturer's receiver/ software package to another.

RINEX files are made up of the basic components used to create a GPS fix, such as the pseudorange measurements. All signal components acquired by the receiver are formatted and provided in the RINEX file. Reliance supports all imported RINEX files. Reliance also creates RINEX files for use in another manufacturer's post processing package.

Unfortunately, there are misconceptions about RINEX data and its capabilities. Consider the following:

RINEX was conceived as a basic transfer format. It does not provide attribute transfers. However, since virtually every use of a RINEX file is as a control dataset from a reference station, the RINEX inability to transfer attribute information is a non-issue.

Q: What's an epoch?

A: When looking at GPS data, epoch refers to a particular unit of acquired data. An epoch of data is one set of measurements, commonly one second's worth, although many users in the GIS community work at five-second intervals. Whatever the interval between samples, an epoch is the same, the measurement at that time.

Field Operations

This chapter presents step-by-step instructions that guides you through the most common usage of the package and enables you to become productive quickly.

The following instructions show you how to set up, configure, and use the Reliance system in a typical FAM data collection session.

What Is Needed

Before beginning, you will need the following:

- SCA-12 receiver with power source
- Workabout handheld controller
- GPS Survey antenna
- Interface and antenna cables

Equipment Connections

Connect the receiver and other equipment as specified in the following steps:

1. Install the receiver and batteries into the backpack.
2. Identify the interface cable. The cable has a large 25-pin connector, with four cables branching from the connector. Three of the branches terminate in small 9-pin connectors which connect to the Workabout Interface Cable (marked Port A), an RTCM radio (optional) (marked Port B), and the serial port of a PC (marked Port C). The remaining branch ends in a power connection which should be attached to a short Y-cable with two P-clip connectors which snap onto the camcorder batteries. Refer to Appendix A for more details.
3. Connect the 9-pin PORT A connector of the interface cable to the mating connector on the Workabout interface cable.
4. Connect the Workabout interface cable to the bottom of the Workabout.
5. Connect the large25-pin connector to the SERIAL port of the receiver.
6. Connect the two p-clip connectors to the two camcorder batteries.

Connect one end of the antenna cable to the ANT connector on the receiver. Connect the other end of the antenna cable to the GPS Survey antenna. The antenna may be mounted on a pole attached to the side of the backpack, or to a handheld range pole. A magnetic

mount and extension post are also provided for applications which require vehicle mounting.

Using The Workabout Handheld Controller

The Workabout handheld controller is a rugged, dustproof, and splashproof, but to ensure trouble-free operation, Ashtech recommends the following:

- Learn the basics of the Reliance program before beginning work
- Carry a spare set of AA batteries for the Workabout
- Avoid subjecting your Workabout to unnecessary temperature extremes - bright sunlight in a vehicle, for example, extreme and prolonged humidity, or physical mistreatment

Turning Workabout On and Off

Press the **On/Esc** key to turn the Workabout on. Press the **Off** key to turn it off. To conserve power, the Workabout turns off automatically if you have not pressed any keys for several minutes - a period of time which can be set optionally, as described in the manufacturer's manual. If the Workabout turns off automatically, press the **On/ Esc** key to restart.

Screen Contrast

Press the contrast key E to adjust the screen for optimum readability.

Screen Backlight

Press the backlight key H to turn backlighting on or off. Backlight turns off automatically after a short time, to conserve power.

Data Entry

- To type numbers or letters, press the appropriate keys. To type a space, press the **Space** key.
- To delete characters you have just typed, press the **Shift** and **Del** keys.
- To delete a character under the cursor, press the **Del** key.

Moving the Cursor

Use the arrow keys to move the cursor a character or line at a time.

Starting Reliance

To start Reliance, perform the following steps:

1. Verify that all cables are connected as specified in *Equipment Connections*.
2. Press the **On/Esc** button on the Workabout. The Workabout display should come on, with the command processor prompt **M>** being visible in the upper left corner. If you do not see such a prompt, you must switch to the command processor mode; to do this, press **Menu,** choose **COMMAND PROCESSOR** from the list, and press **Enter**.
3. Next, ensure that the Reliance software is loaded into the Workabout. To do this, type **DIR** and press **Enter**. The software file names should appear on the Workabout screen as listed below (your actual numbers may be different, but the names should be identical). Only part of the list is visible at any one time; press the **Enter** key to step through the entire list.

```
Volume LOC::M:RAMDRIVE
Dir of LOC::M\
CONFIG.GIS          1342        01:41
DYLANIM.DYL         1072        07:57
DYLCTOP.DYL         3664        02:37
DYLGLIB.DYL         13664       04:36
DYLMICC.DYL         5728        10:47
DYLMIPP.DYL         25728       06:12
EXAMPLE2.FDF        4520        09:36
EXAMPLE.FDF         3612        04:50
GENERIC.FDF         3046        05:17
GEO.DAT             31594       03:58
GEO.DYL             40144       03:40
GRAPH.DYL           6896        04:28
HCOM.IMG            2784        01:26
R.IMG               76096       09:59
SYS$8087.LDD        8720        10:30
DSST.IMG            20640       04:49
EXAMPLE.WPT         240         12:06
FETR.IMG            26304       04:50
SCRIPT.SCR          41          05:28
```

LOGOGIS.PIC	6032	02:56
SCRIPT1.SCR	12	11:04
STRENG.LNG	9983	04:04
STRPOR.LNG	9983	04:04

23 files

Press Enter to continue...

If any files are missing, refer to the instructions in Appendix B to reinstall the software.

4. Press **Enter** to continue.
5. The command processor prompt **M>** should appear. With the **M>** prompt on the screen, call up the FAMlog program by pressing the **R** key and then the **Enter** key. The logo screen should appear, as shown in Figure 3.1.

Figure 3.1: Logo Screen

6. Check your receiver. The receiver turns on automatically when the power connection is made, and should be on at this time, as indicated by the **PWR/SAT** light flashing red. After a few moments, the **PWR/SAT** light should flash green several times, then red, then green several times. This cycle should repeat continuously. The red flash indicates that the receiver is powered on, and the green flashes indicate the number of satellites being tracked, e.g., four flashes indicate four satellites being tracked.
7. Press any key. The message "**Testing COM 1...**" should momentarily appear, followed by **"Setting Receiver.....".** After a few seconds the FAMlog (Field Asset Management) screen should appear, as shown in Figure 3.2 (your numbers will be different).

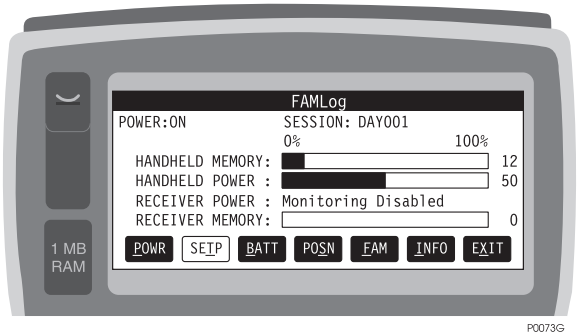

Figure 3.2: FAMlog Screen

Table 3.1 describes each item in the FAMlog screen.

Table 3.1: Description of FAMlog Screen

Item	Description
POWER	ON or OFF, indicates current power status of receiver
SESSION	Displays current session name (blank until you enter a name on the Session Setup screen)
HANDHELD MEMORY	Displays percentage of memory available in Workabout
HANDHELD POWER	Displays percentage of battery power available in Workabout.
RECEIVER POWER	Displays percentage of battery power available in camcorder battery. This is a calculated value based on numbers that you enter on the Battery Management screen.
RECEIVER MEMORY	Displays percentage of receiver memory available. The percentage dimishes (i.e., the memory fills) as you collect data.
POWR	Pressing U and P turns the receiver off or on.
SETP	Pressing U and T calls the Session Setup screen.
BATT	Pressing U and B calls the Battery Management screen.
POSN	Pressing U and S calls the Position screen.
FAM	Pressing U and F calls the FAM (Field Asset Management Main) screen.
INFO	Pressing U and I calls the Information screen.
EXIT	Pressing U and X exits the program.

Selecting Menu Items

Menu items are shown at the bottom of the screen as small black boxes. A menu item is selected by pressing the MENU key. The currently selected item is white rather than black. To select another item press the tab key until the desired selection is white. You can change the active button with the **Tab** key; each time **Tab** is pressed, the active button advances one position to the right. To move the active button to the left, press **Shift** and **Tab**.

POWR (power)
SETP (setup)
BATT (battery)
POSN (position)
FAM (field asset management)
INFO (information)
EXIT (exit)

As an alternate method to select a function, simultaneously press the U key (lower left corner of panel) and the **letter that is underlined** in the button symbol. For example, in the above illustration, note that the X is underlined in the EXIT symbol, so if you want to EXIT the program press U and X. Similarly, to turn off POWR, press U and P, and so on.

A second method of using the functions is to use the **numerical position** of the black button instead of the underlined letter. For example, in the illustration above, the FAM button is the fourth from the left, thus you can call FAM by pressing U and 4.

The On/Esc key is a shortcut for the CNCL, QUIT, and STOP buttons. To exit a screen without saving any changes, press the On/Esc key.

Setting Up A Session

A session can last from a few minutes to several days, but is usually one continuous work period where data is collected non-stop. Set up a session using the Session Setup screen, as follows.

1. On the FAMlog screen, press U and T to call the Session Setup screen, Figure 3.3.

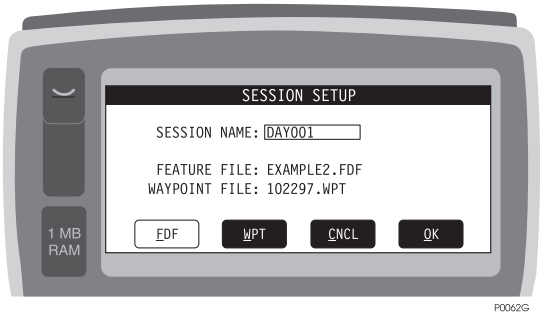

Figure 3.3: Session Setup Screen

2. The Session Setup screen contains a field where you must key in a session name. Session names follow the same conventions as DOS file names: no spaces, only 8 characters allowed. The EXAMPLE2. FDF contains a session named “DAY001” as shown in the illustration.

You may encounter some error messages when the receiver is first turned on, such as “Old coordinates. Not enough satellites.” Refer to Appendix C if the error messages continue after a minute or so.

3. Next, select the feature file to be used for this session. Press U and F to bring up the Feature File Selection screen, Figure 3.4.

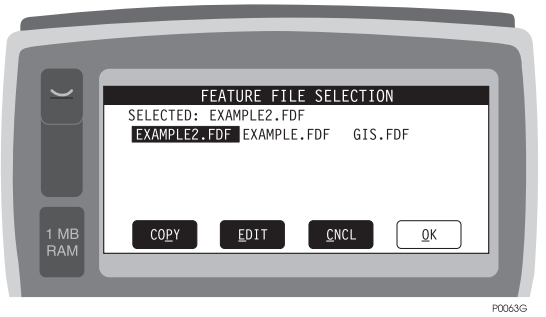

Figure 3.4: Feature File Selection Screen

"FDF" (Feature Definition File) is the file extension for feature files. Feature files are created in the office using the Reliance software, and then downloaded to the Workabout. Your Workabout comes pre-loaded with two feature files, EXAMPLE.FDF and EXAMPLE2.FDF, for demonstration purposes.

4. Highlight EXAMPLE2.FDF using the arrow keys, then press U and O to accept the selection and return to the Session Setup screen.
5. Now select a waypoint file. In the Session Select screen, press U and W to call the Waypoint File Selection screen, Figure 3.5.

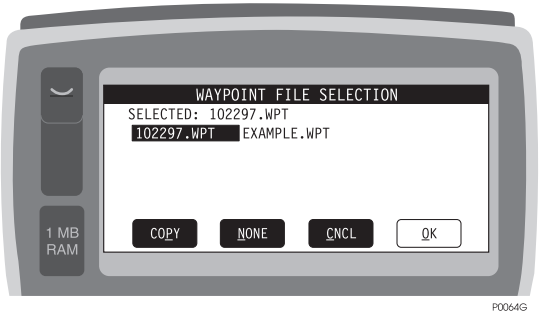

Figure 3.5: Waypoint File Selection Screen

The Workabout contains two built-in waypoint files, 102297.WPT and EXAMPLE.WPT, for demonstration purposes. Highlight 102297.WPT, then press U and O to accept the selection and return to the Session Select screen.

6. Press U and O once more to return to the FAMlog screen. The top right-hand corner now displays the session name you entered, i.e. “DAY.001”.

The Workabout has a power-saving feature that automatically turns off the Workabout if a key is not pressed for several minutes. If the Workabout turns off at any time, turn it back on using the ON\ESC key.

Clearing Receiver Memory

Before using the receiver for the first time, you should reset the receiver memory.

1. In the FAMlog screen, press U and F (FAM) to call the FAM Main Menu, shown in Figure 3.6.

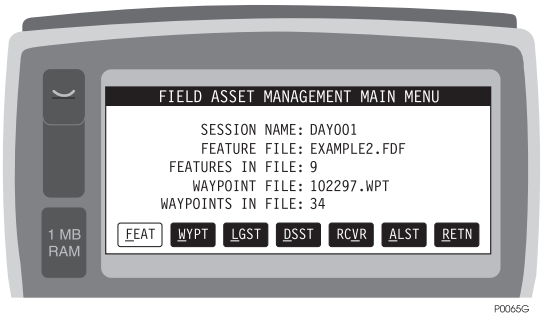

Figure 3.6: FAM Main Menu

2. With the FAM Main Menu displayed, press U and V (RCVR). The Receiver Setup screen appears, as shown in Figure 3.7.

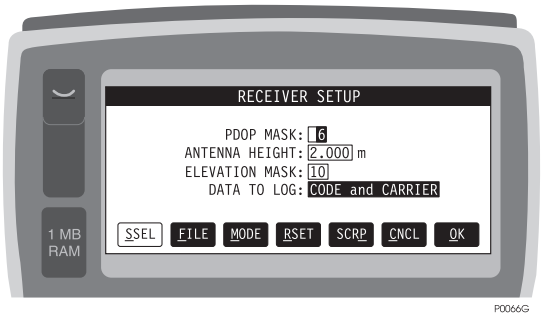

Figure 3.7: Receiver Setup Screen

This screen shows the default values for PDOP mask, antenna height, elevation mask, and type of data to log. You can change these values by keying in different data. The default values are used for this tutorial.

3. Press RSET. The Receiver Reset menu appears, as shown in Figure 3.8.

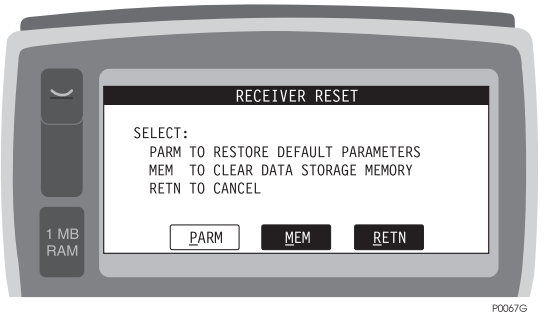

Figure 3.8: Receiver Reset Screen

The receiver data storage memory should be cleared before the very first session is begun with a new receiver. Press U and M (MEM) to clear the receiver data storage memory. Wait until the "**Clearing Memory**" message disappears, then press U and R (RETN) to return to the Receiver Setup screen, then U and C to return to the FAM Main menu.

Logging Features, Assigning Attributes, Pausing

You can log features and assign attributes while you are at a point or while you are on a trajectory for a line or area. For illustrative purposes, assume that a lake feature is to be annotated by following a trajectory around the perimeter of the lake. We will move around the lake in a clockwise direction. While traversing, we will log a tree and a stone fence, as shown in Figure 3.9.

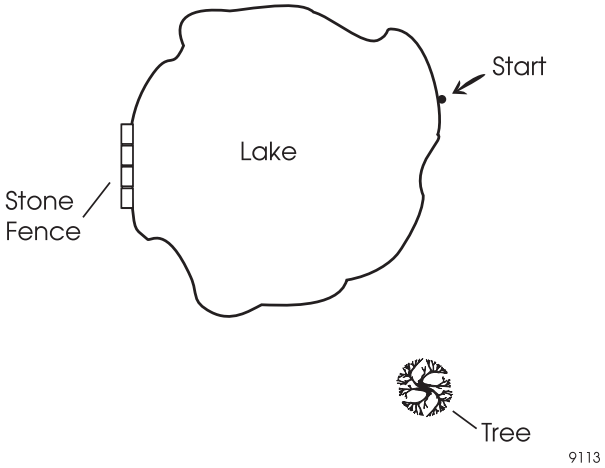

Figure 3.9: Example Feature Logging Environment

Perform the following steps:

1. In the FAM Main menu, call the Feature Logging menu by pressing U and F (FEAT). The Feature Selection screen appears, as shown in Figure 3.10.

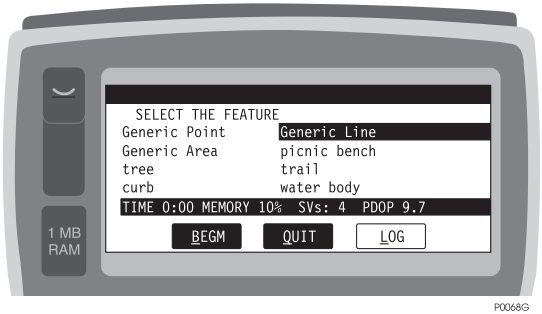

Figure 3.10: Feature Selection Screen

This screen lists the features that you can choose: generic point, generic line, generic area, etc. Note the black bar near the bottom of the screen, showing TIME, MEMORY, SVs and PDOP; this bar gives you a real-time display of current status.

If you are in differential mode, HRMS values will be shown instead of PDOP values.

2. Use the arrow keys to highlight a feature, e.g., **water body** (Figure 3.11).

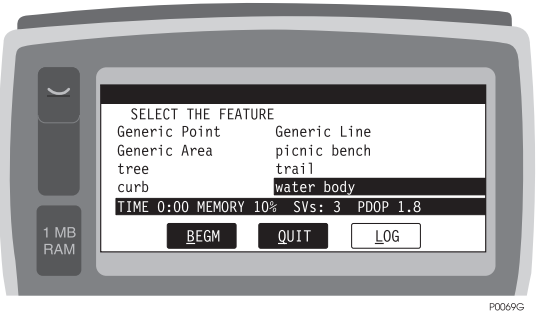

Figure 3.11: Selecting First Feature - Water Body

3. Press U and L (LOG) to log the feature. The screen changes to Area Logging, as shown in Figure 3.12.

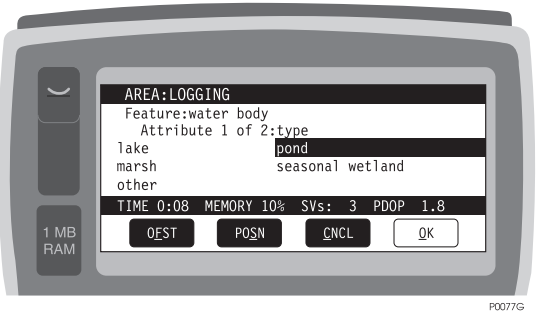

Figure 3.12: Area Logging Screen - Attribute 1 of 2 (Type)

In this case, the screen indicates that you can log two attributes. The first attribute is **type,** which can be **lake**, **marsh**, **pond**, etc.

Remember that feature logging begins as soon as the LOG key is pressed. Attribute entry can be performed simultaneously with data logging. Note that the NEST key is still available; a particular point on the fence could be logged, for example. Or, the PAUS key could be pressed and a point off of the lake and fence could be logged, for example.

4. Select **pond**, then **Enter** to accept the entry. The second attribute screen appears, as shown in Figure 3.13.

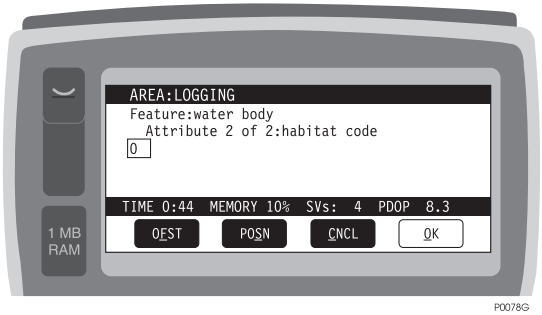

Figure 3.13: Area Logging Screen - Attribute 2 of 2 (Habitat Code)

This screen requires you to enter the second attribute, in this case **habitat code;** habitat code is a user-defined parameter embedded in the feature definition file. Enter a habitat code (use 10 for this example), then press U and O (OK)to record the entry. The Area Logging status screen appears, displaying the results of your actions, as shown in Figure 3.14.

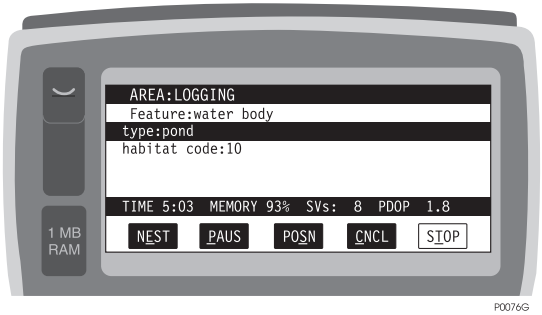

Figure 3.14: Area Logging Status Screen

5. Press U and S (POSN) to view the Position screen, Figure 3.15.

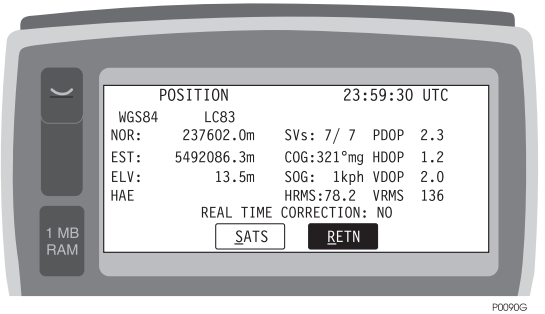

Figure 3.15: Position Screen

This screen shows your current position in WGS-84 coordinates; if you want to use a different coordinate system, you can change the coordinate system using the “Display Setup Screen.” on page 71.

For this example, we will assume that we now wish to log a tree (Figure 3.9), which is not on the perimeter of the lake. We need to **pause** logging of the lake, log the tree, then resume logging the lake.

6. Press U and R (RETN) to return to the Area Logging Status screen, Figure 3.14. Now press U and P (PAUS) to pause the logging activity. The Area Paused screen appears, as shown in Figure 3.16.

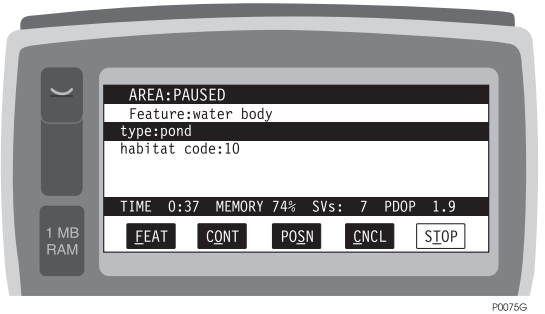

Figure 3.16: Area Paused Screen

7. You are going to log a new feature, the tree; to do this, press U and F (FEAT), calling the Area Paused, Select Feature screen, Figure 3.17.

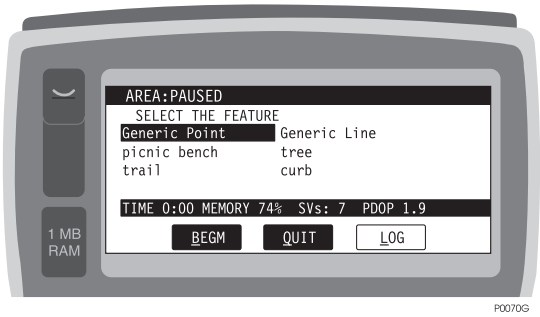

Figure 3.17: Area Paused, Select Feature

Note that only point and line features are listed; the software does not allow logging two features of the same type simultaneously.

8. In an actual survey you would walk to the tree. Then with your receiver at the tree, highlight **tree**, as shown in Figure 3.18, and press **Enter**.

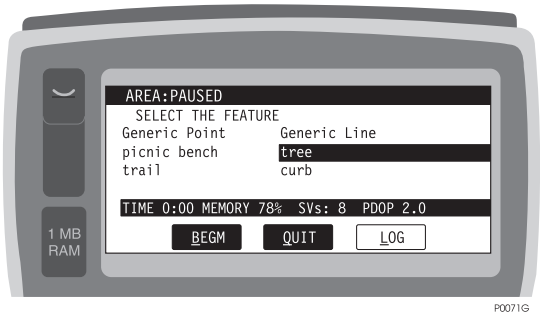

Figure 3.18: Select Point Feature (Tree)

9. The Area: Paused Point:Logging screen appears, as shown in Figure 3.19.

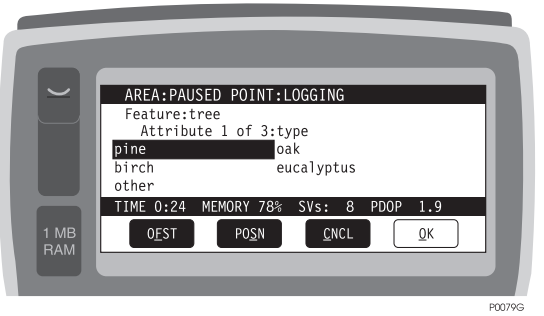

Figure 3.19: Area: Paused Point:Logging Screen (Attribute 1 - Type)

This menu lets you select the first of three attributes, which is the **type** of tree - pine, birch, etc. For this example, select **pine** and then press **Enter** to accept the selection.

10. The Attribute 2 screen appears, as shown in Figure 3.20.

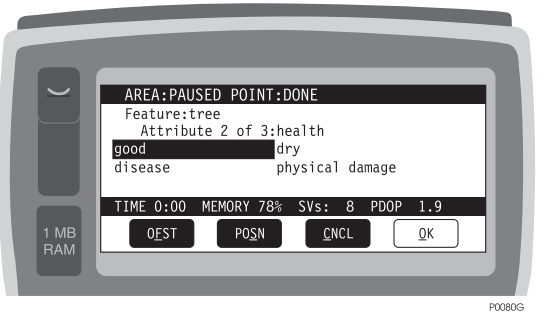

Figure 3.20: Point Attribute Screen (Attribute 2 - Health)

This menu lets you select the second attribute, **health,** such as **good**, **disease**, etc.

11. Select **good** and press **Enter**. The Attribute 3 screen appears, as shown in Figure 3.21.

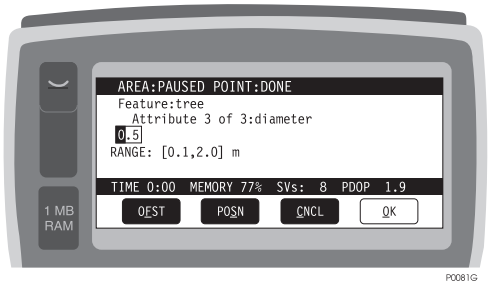

Figure 3.21: Point Attribute Screen (Attribute 3 - Diameter)

This screen provides a field for you to key in the third attribute, **diameter**. Key in a value for **diameter,** say 0.5 meter, and press **Enter**. Note that the acceptable range is 0.1 to 2.0 meters.

12. Press U and O (OK) to display the attribute entries for the tree. The Area Paused, Point Done screen appears, Figure 3.22, displaying the attributes that you selected and entered.

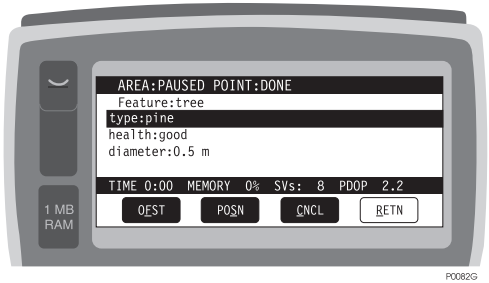

Figure 3.22: Area Paused, Point Done Screen

Press U and R (RETN) to return to the Area Paused screen. Press U and Q (QUIT) to quit point logging, and then U and O (CONT) to continue. In the field, you would now move back to the last logged point on the lake perimeter and continue the survey.

CAUTION
Be careful not to inadvertently press the On/Esc key during feature logging; the active feature will be cancelled.

CAUTION
Note that selecting "OK" ENDS the feature. Press the Enter key if you wish to accept attribute values.

Feature Nesting

The next operation is **feature nesting**. Assume that the stone fence (Figure 3.9) is now to be logged along the lake. Since the lake (an area feature) and the fence (a line feature) are different types of features, they can be logged simultaneously using nesting.

1. While logging the area feature, press U and E (NEST) to call the "Area: Logging/Select the Feature Screen" on page 38 (Figure 3.23).

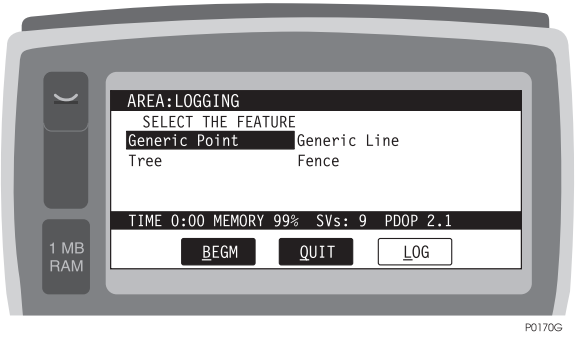

Figure 3.23: Area: Logging/Select the Feature Screen

2. Since the stone fence is a **line** feature, select **Fence** and press U and L (LOG). The Area: Logging\Line: Logging screen appears, as shown in Figure 3.24.

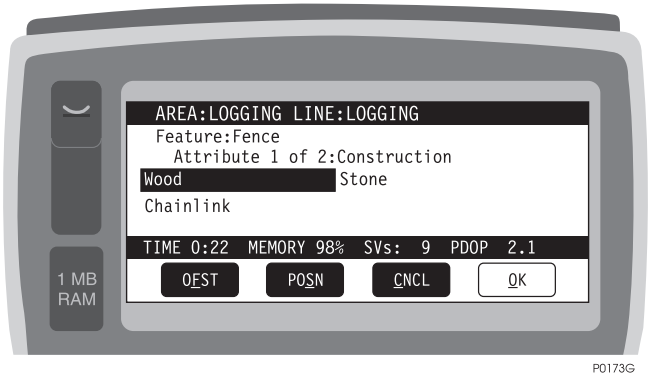

Figure 3.24: Area:Logging Line:Logging Screen-1

3. Enter the attribute of the fence and press U and O (OK). The Area: Logging\Line:Logging screen appears and shows all the attributes entered for the fence, Figure 3.25.

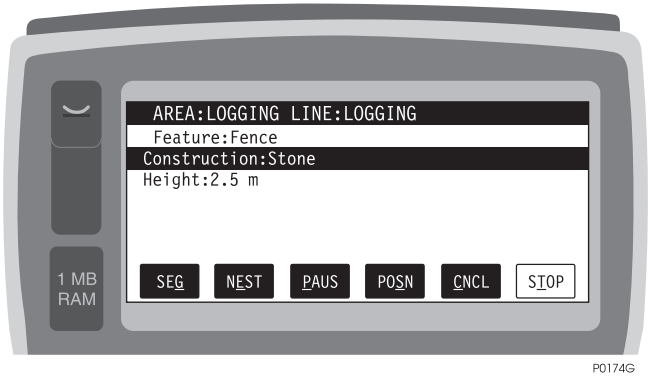

Figure 3.25: Area: Logging Line:Logging Screen-2

4. Press U and T (STOP) to stop logging the fence. The Area Logging\Select Feature screen appears (Figure 3.26).

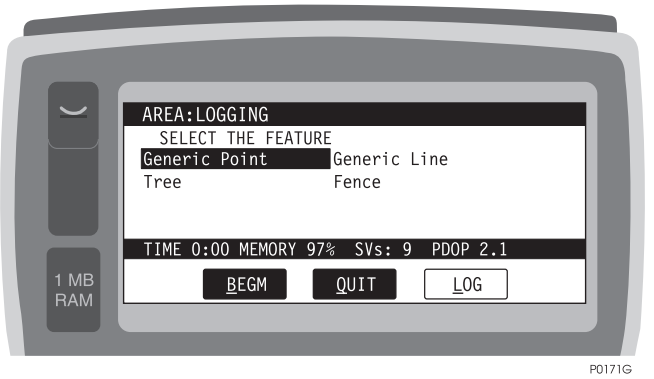

Figure 3.26: Area Logging\Select Feature Screen

5. Press U and Q (QUIT) to return to the Area:Logging Screen, Figure 3.27.

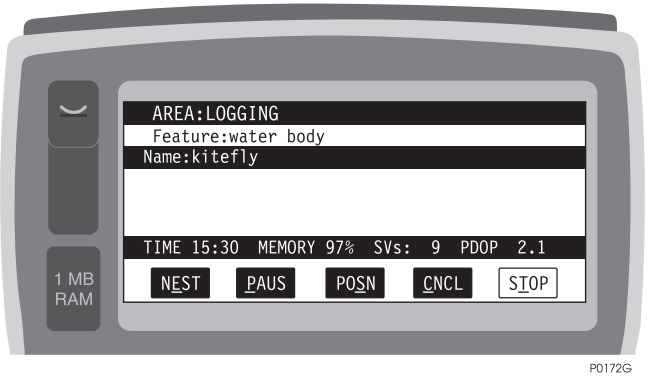

Figure 3.27: Area:Logging Screen

Ending The Session

Perform the following steps to end the session:

1. Press U and T to end the line logging when the fence has been navigated.
2. Press U and Q to indicate that no more nested features will be logged.
3. Press U and T to indicate that the perimeter of the lake has been logged.
4. Press U and Q to exit the logging screen and return to the FAM main screen.
5. At this point, the tutorial session is complete.
6. Press U and R to return to the FAMlog screen.
7. Press U and P to turn off the receiver. Note that the receiver can also be turned off by pressing and holding the receiver power switch for 3 seconds. However, the recommended method of turning the receiver off is via the Workabout POWR key.

Data Logging Guidelines

Many new Reliance users inadvertently create multiple fragmented receiver files, each containing only a few minutes of GPS data and a handful of features. Feature accuracy is compromised because the Reliance processor can not properly postprocess these fragmented files. To avoid multiple receiver files, follow these guidelines.

Do not change the recording interval on the Datalogging Setup screen except at the beginning of your survey. Lowering the recording interval while occupying a point will not increase the accuracy, but will actually decrease the accuracy.

Do not access the following screens while a session is in progress:

- Session Setup
- Feature File Selection
- Receiver Reset

These screens send parameters to the receiver which cause a new file to be created. If any one of these screens is accessed while a session is in progress, use CNCL to exit the screen.

Do not interrupt receiver power during a session. Disconnecting the receiver batteries, disconnecting the receiver interface cable, or pressing the receiver power switch, will cause a new file to be created in the receiver. Avoid power interruptions by always using two freshly charged Panasonic batteries to power the receiver. If for any reason there is a power interruption during a session stop all point, line, and area feature logging and EXIT the program. This will cause a new file to be created, but it

should be performed in order to avoid D-file corruption. After you have corrected the power problem, restart the program. Re-collect any features that were being logged when the power interruption occurred.

Do not exit the program during a session. Exiting and restarting the program on the Workabout causes several empty files to be created. It is good practice at the start of a survey to configure all of the session parameters, and then to use the Receiver File Management screen to delete any superfluous files.

Finally, **do not change the Data to Log type** on the Receiver Setup screen while a session is in progress. This setting should always be Code Only (or Code and Carrier, depending upon the receiver option you purchased) if the data is going to be post-processed.

Downloading Data

After you have completed a data collection session, you must download the receiver data to a PC for viewing, filtering, post-processing, and exporting. These procedures are described in Reliance

Uploading New Feature and Waypoint Files

Uploading files from the PC to the Workabout requires a data connection between the PC and the Workabout, as described in the following procedure:

1. Exit the program on the Workabout.
2. Disconnect the Workabout from the receiver.
3. Connect the Workabout to the PC COM port.
4. At the prompt M> on the Workabout, type HCOM.

The Workabout is now ready to receive file transfers.

You may upload feature and waypoint files directly from the PC program. Refer to the Reliance Office Guide for a detailed explanation of this operation.

Workabout Battery Check

From the command processor prompt M>, check the condition of the Workabout batteries by simultaneously pressing **Shift, CTRL**, and **B**. The Workabout displays the battery status as shown in Figure 3.28.

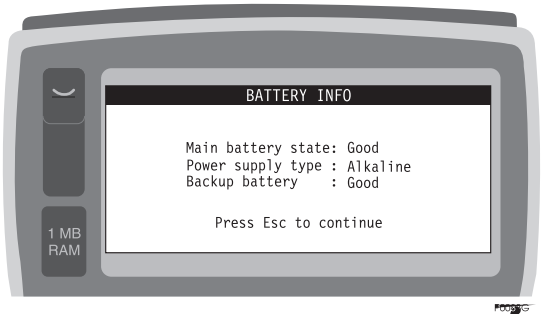

Figure 3.28: Workabout Battery Status

Press **Esc** to continue.

Low Power Warning

The Workabout monitors its internal battery status and displays the message **Replace Main Batteries** when the battery voltage is approaching a low level. Remove and replace the AA batteries when this message appears. The program files will not be lost if the backup battery is good.

Workabout Battery Management

Replacing Batteries

To replace batteries in the Workabout, perform the following steps:

1. Turn the Workabout off.
2. Locate the battery release at the upper left corner of the Workabout front panel. The battery release will be a small hole. Insert the supplied key or an object such as a paper clip into the hole and press HARD until the battery tray releases.
3. Pull the battery tray all the way out.
4. Install fresh batteries, being sure to observe polarity as marked.

5. Push tray back into Workabout until tray snaps into position.
6. Turn on Workabout and check operation.

CAUTION
Non-rechargeable batteries must NOT be recharged. Always use batteries of the same type and charge state - do not mix fresh and used batteries, or rechargeable and non-rechargeable batteries. Observe the instructions printed on the battery. Replace only with batteries approved by your supplier.

CAUTION
Dispose of or recycle used batteries according to the manufacturer's instructions. Nickel-cadmium rechargeable batteries must be recycled or disposed of properly.

CAUTION
BATTERY CHEMICAL LEAKAGE IS CORROSIVE. In the unlikely event of battery leakage, do not touch. In case of accidental contact, flush immediately with copious amounts of water.

Rechargeable Batteries

Alkaline batteries are supplied with the Workabout, and are recommended for continued use.

However, an optional rechargeable Ni-Cd battery pack can be supplied. Rechargeable batteries are not charged when new, so you will have to charge them before use.

A Ni-Cd battery can be charged in three ways:

1. By placing the Ni-Cd battery pack directly in a Workabout docking station.
2. By placing a Workabout in which the battery is fitted into a Workabout docking station.
3. By connecting a Workabout in which the battery is fitted to an AC source using a docking holster and an AC adapter.

In the first two methods, the battery will be fast charged, requiring about an hour to fully charge a discharged battery.

The third method is much less effective, being a trickle charge, and will require up to 14 hours to fully charge a discharged battery.

After charging, the rechargeable battery must be momentarily removed and then replaced into the Workabout to reset the battery monitoring level to 100%.

System Information

Check your hardware and software configuration with the INFO (information) screen. The screen map inside the front cover shows that the path to the INFO screen is MAIN

(FAMlog)\ INFO. Following this path, from the MAIN (FAMlog) screen, press U and I. This calls the INFO screen, Figure 3.29.

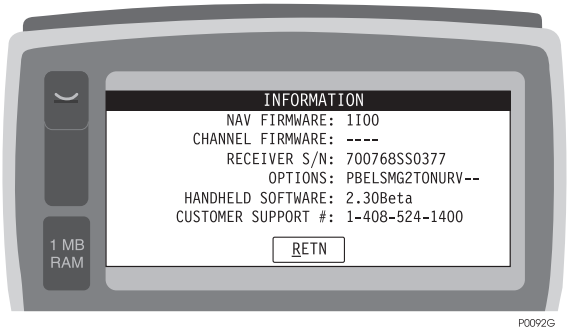

Figure 3.29: Information Screen

The INFO screen lists your hardware and software configuration. Your actual numbers may be different from those shown in the illustration. If you need to contact Ashtech regarding your system, we will need to know this information. Since the numbers are on the screen now, it is recommended that you write them in the space below for future reference.

NAV firmware:_____

Channel firmware:_____

Receiver S/N:_____

Options:_____

Handheld software:_____

Field Checklist

Before leaving the office to collect FAM data, check the following:

1. Workabout batteries fresh/charged
2. SCA-12 batteries charged

3. SCA-12 receiver battery management configured
4. Feature file uploaded to Workabout
5. Correct antenna height entered on Receiver Setup screen
6. Correct interval entered on Datalogging screen
7. Correct interval being used on base station
8. Base station recording

After completing FAM data collection, check the following:

1. SCA-12 receiver off
2. Program exited
3. Workabout off
4. Base station recording stopped

Waypoint Navigation

If you are using waypoints, the Workabout displays navigation information to guide you to these points. Follow this procedure to navigate to a point:

1. Press **On/Esc** until the FAM Main menu appears, Figure 3.30.

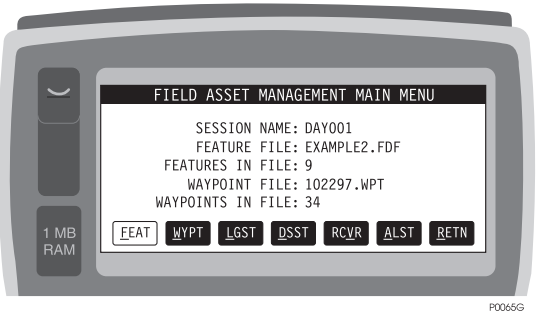

Figure 3.30: FAM Main Menu

2. Next, press U and W (WYPT). The Waypoint Navigation screen appears, Figure 3.31. .

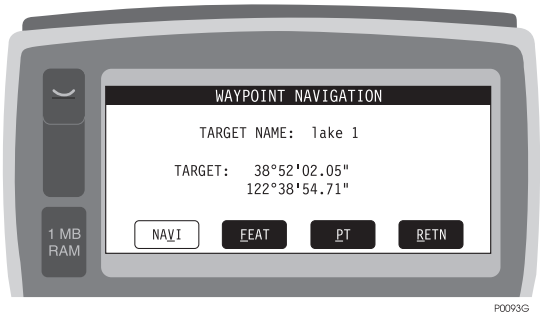

Figure 3.31: Waypoint Navigation Screen

This screen shows you the coordinates of a target point.

3. To navigate to the target point, press U and V (NAVI). The Horizontal Line Navigation screen appears, as shown in Figure 3.32.

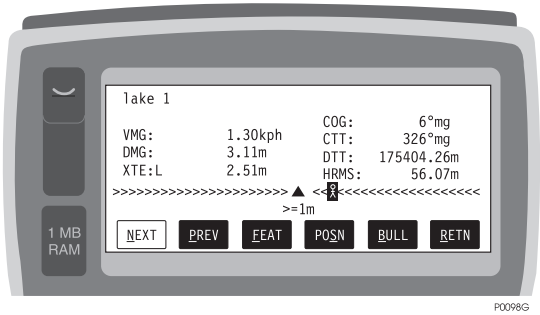

Figure 3.32: Horizontal Line Navigation Screen

This screen directs you to the desired waypoint, as follows:

Table 3.2: NAV Field Descriptions

Field	Description
POLE #	Desired waypoint
COG	Current course over ground, where **tr** = true north, **mg** = magnetic north
CTT	Required course to target, where **tr** = true north, **mg** = magnetic north
DTT	Distance to target

Table 3.2: NAV Field Descriptions (continued)

Field	Description
ETA	Estimated time of arrival (in hours)
VMG	(Velocity Made Good) is your velocity toward the target
DMG	(Distance Made Good) is the distance traveled toward the target
XTE	(Cross Track Error) is the distance traveled perpendicular to the line connecting your starting point and the waypoint.

The >>>▲<<< display tells you whether you are left or right of the course to target.

In the display above, the stick figure tells you that you are left of the course to target; since your COG (course over ground) is 243° and the CTT (course to target) is 162°.

The >=**1m** indicator shows the scale of the >>>▲<<< display, 1 meter per marker. The scale automatically varies with DTT (distance to target).

4. For a more accurate position, switch to the Bullseye Navigation screen by pressing **U** and B (BULL). The Bullseye Navigation screen appears, Figure 3.33.

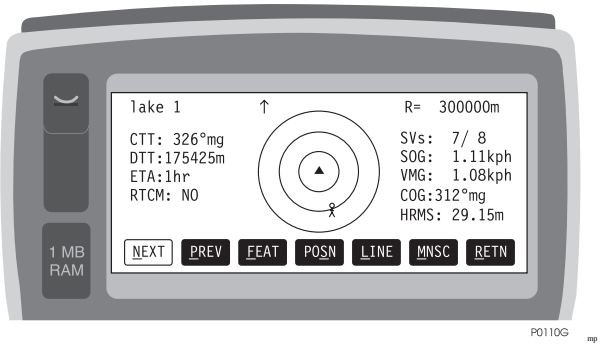

Figure 3.33: Bullseye Navigation Screen

The Bullseye Navigation screen is a map-like plot of the area surrounding the target point, with the target point indicated by a triangle at the center. Distance from the target point is represented by concentric circles. North is at the top center of the screen (called a “north up” display). When you are closer to the target point than the distance indicated by the outer circle, your position appears as a • on the display, tracking your movement. As you navigate to the target point, the display scaling changes automatically with distance from target.

5. An alternative display of navigation information is provided by the Vertical Line Navigation screen. Press U and L (LINE) from the Bullseye Navigation screen. The Vertical Line Navigation screen appears, as shown in Figure 3.34.

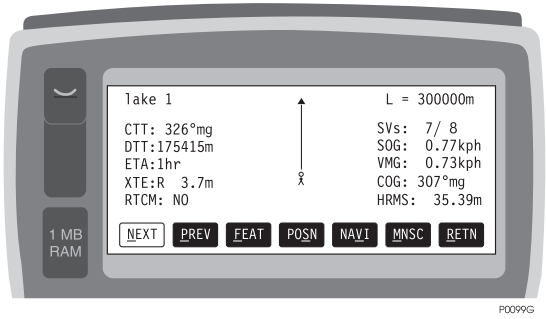

Figure 3.34: Vertical Line Navigation Screen

The Vertical Line Navigation screen is oriented so that your current heading is at the top center of the screen, that is, “heading up,” rather than “north up” as in the Bullseye screen.

In this display, the target point is shown as a small black triangle at the top center of the screen, with a vertical line showing the direct path to the target point. The vertical line replaces the >>>▲ <<< heading display of the Horizontal Line Navigation screen discussed previously. Your trajectory as you approach the target point will appear as a dotted line near the vertical line.

Waypoint navigation in the field is limited by the approximately 100 meters accuracy of a single receiver. If more accuracy is needed for navigation to waypoints, the real-time differential (RTCM) option must be used.

Advanced Feature Collection

Repeating a Point Feature

If a point is to be logged that is identical to the preceding point feature, the repeat (REPT) function can be used to speed up data collection.

1. Remain on the Point Logging screen after the point feature has been logged (do not press DONE: U and D).
2. Move to the next point feature.

3. Press REPT: U and P. Point logging will immediately begin using the same feature and its attributes, including and point offsets.

Pausing Nested Lines

If a line has been nested in an area and the **PAUS** key is pressed, both the line and the area will be paused to allow logging of a point feature that is not on the line or on the area. After the point has been logged, the line and area will be continued simultaneously when **CONT** is pressed.

Offsetting Features Manually

If a feature is physically inaccessible, it can still be accurately logged. Some examples of inaccessible features are manholes on busy roadways, points under overpasses, steep terrain, etc. These features can be logged as point features by pressing the **OFST** key while entering the attributes for the point feature. The offset can be specified by distance and azimuth (true or magnetic). After the offset is entered, press OK to return to attribute entry, then press OK to view the Feature Logging screen. Offset features are preceded by an asterisk on this screen. If an offset point is repeated, the offset information will be carried over to the new point.

Offsetting Features using the LRF

Offsetting the currently occupied point:

1. Select the point feature to be logged from the Feature Selection screen.
2. Enter necessary attribute information but do not select OK until the LRF measurement has been made.
3. If this is the first time using the LRF for the current session, select OFST from the menu. Next set the LRF communication parameters using the LCOM menu. Finally select CONN menu item to connect to the LRF. Press RETN to return to the Point Logging screen.

After selecting CONN, a new menu item DCON should be displayed. It is used to disconnect from the LRF, if needed. If this item does not appear, the handheld has not successfully connected. Check that the cable is connected correctly. IF it still does not connect after this, you need to exit the program. Go to the system menu by pressing MENU and verify that the system serial communication software is turned off.

4. You may now make the LRF measurement according to the manufacturers instructions. When the handheld receives the LRF data, it will beep and a counter will appear in the upper right corner of the screen. The counter indicated the number of seconds since the last LRF data was received.

If you make a mistake and need to repeat the measurement, you may do so as many times as necessary. The post-processing software will use only the last offset entered when computing the offset point position.

5. Edit the LRF data using the OFST screen if needed.

When viewing the LRF data in the OFST screen, make sure the true azimuth, slope distance and inclination of Feature Offset screen are the same as the LRF device has displayed. If the parameters are different, you need to go to LCOM screen, verify the LRF communication parameters and repeat the measurements.

6. Return to the Feature Selection screen when finished.

Offsetting Lines or Areas

1. Line and areas are offset using the same procedure as that for point features except that you will select a line or area feature.

The post-processing software will determine your direction of travel and offset the line perpendicular to it. It is not necessary to make the measurement perpendicular to your direction of travel.

Offsetting Multiple Points

1. Select BEGM from the Feature Selection screen.
2. Follow the same procedure as for offsetting single points.

Measuring Offsets with a Laser Rangefinder

The system can accept range and azimuth data from a laser rangefinder (LRF). This provision is useful when you want to measure a feature that is difficult or impossible to access or occupy physically, such as a marker on the other side of a deep ravine. The system supports the Criterion LRF made by Laser Technology, the Generation II LRF made by MDL, and the Advantage LRF made by Laser Atlanta. Other LRFs should work if they provide output data in the same format, ASCII strings via an RS-232 interface.

The laser range and azimuth data are gathered by the Workabout, and sent to the receiver where they are stored.

The laser range finder can be used to perform the following actions:

1. Offsetting the currently occupied point feature.
2. Offsetting lines or areas perpendicular to the line of travel.

3. Offsetting multiple points from the currently occupied point.

Figure 3.35 shows equipment configuration when using a laser rangefinder.

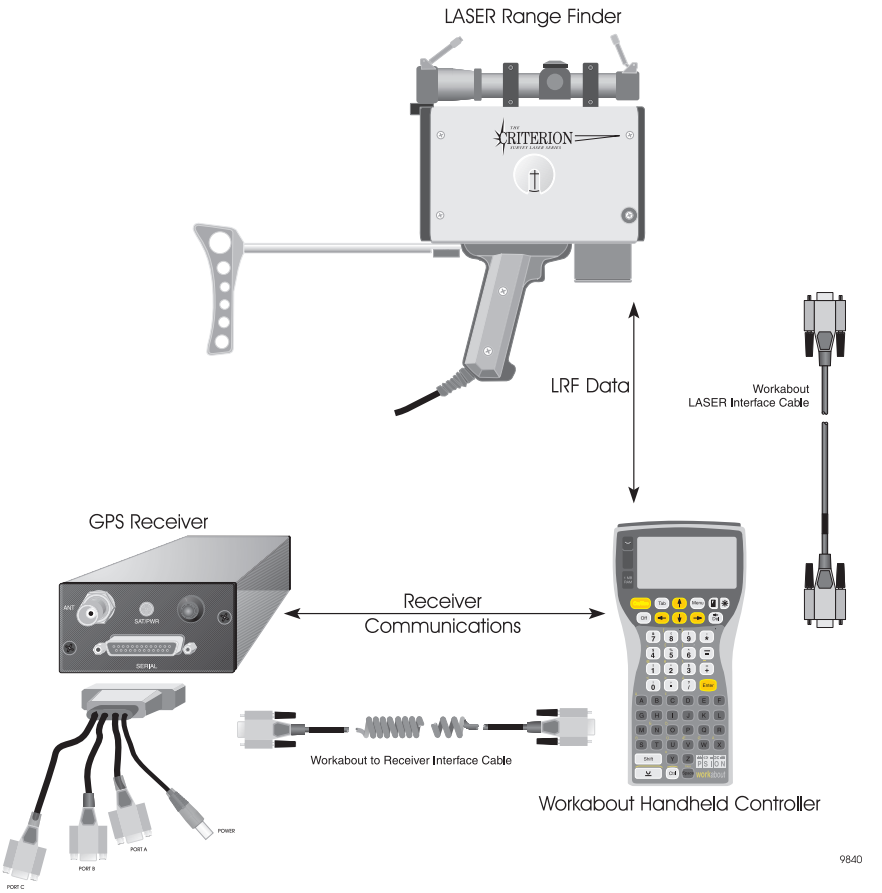

Figure 3.35: Configuration with LRF

The laser must always connect to Com B and use the Workabout laser interface cable shown in Figure 3.35.

Below is the procedure for using a laser rangefinder.

1. Connect the GPS antenna to your receiver.
2. Connect the Workabout to port C of your receiver.

3. Connect the LRF to port B of the Workabout.
4. Turn on the equipment.
5. On the Workabout, call the FAMLog screen, Figure 3.36.

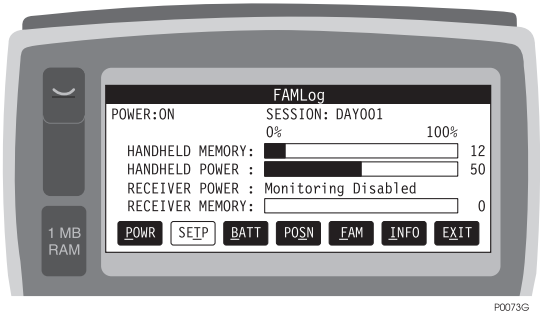

Figure 3.36: FAMLog Screen

6. Select FAM and press MENU, calling the Field Asset Management screen, Figure 3.37.

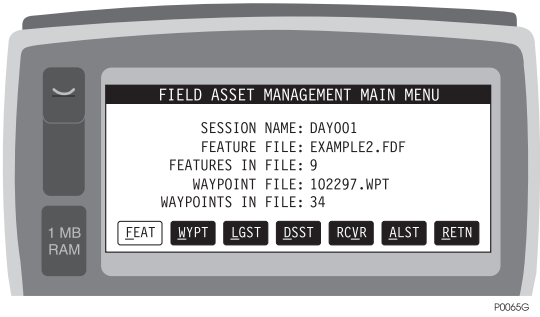

Figure 3.37: Field Asset Management Screen

7. Select FEAT and press MENU, calling the Feature Select screen, Figure 3.38.

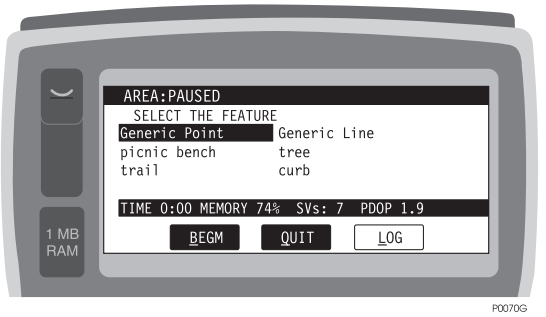

Figure 3.38: Feature Select Screen

8. Select a point feature, tab to LOG, and press MENU. The Point: Logging screen will appear and allows you to enter the attributes of the feature, Figure 3.39.

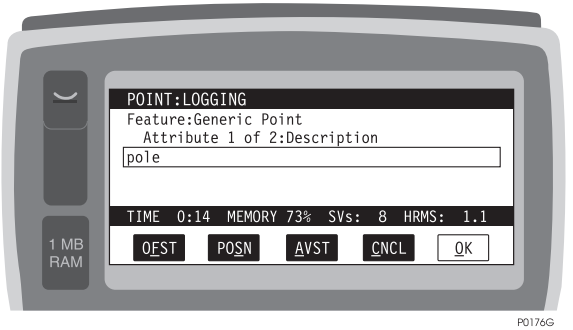

Figure 3.39: Point: Logging Screen

9. In the Point: Logging screen, tab to OFST, and press MENU, calling the Feature Offset screen, Figure 3.40.

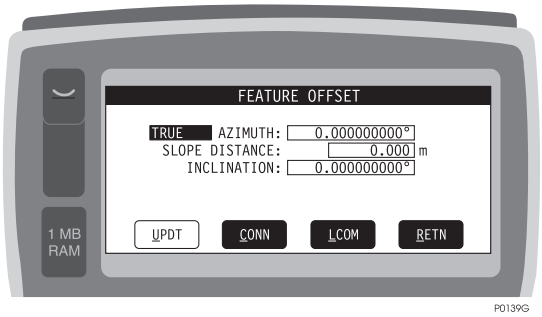

Figure 3.40: Feature Offset Screen

10. In the Feature Offset screen, tab to LCOM and press MENU. The display shows the LRF parameters to be set up for the particular LRF device you are using, Figure 3.41. Then press OK to return to the Feature Offset screen.

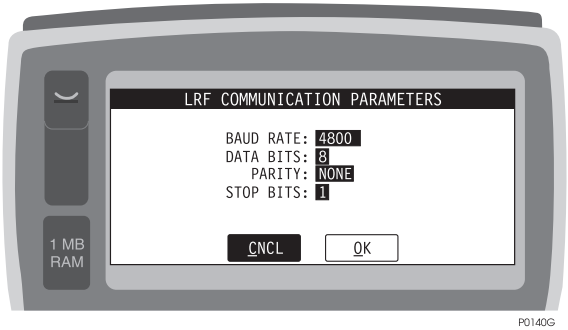

Figure 3.41: LRF Communicator Parameter Screen

11. After verifying that the offset information from the LRF is correct on the Feature Offset screen, tab to UPDT and press MENU to update this offset information to the feature.

Improving Feature Accuracy

The following techniques can be used while collecting feature data to measurably improve the post-processed feature position accuracy.

1. On the Datalogging Setup screen, increase the Time On Point from the default 0.33 minutes to 1 minute or more. Under heavy tree canopy or other severe multipath environments, record at least 60 epochs for the post-processing two-sigma filter to work effectively. Refer to the *Office User's Guide* for more information on the two-sigma filter.
2. On the Datalogging Setup screen, decrease the Interval if you need line and area contours to have greater resolution or accuracy. Of course, the base station recording interval must be the same as the rover in order to process every epoch. Remember not to change the Interval if features have already been logged for a session; changing the Interval forces a new session to begin.
3. At the start of field data collection, power on the receiver and connect the GPS antenna. Allow up to four minutes for all available satellites to lock before logging the first feature. The number of satellites available, used, and locked can be viewed on the POSN screen. At least four satellites must be in use for optimum post-processing accuracy. If more than four satellites are available, wait until they are in use before logging the first feature.
4. After a new session is started, always wait for at least a minute before logging the first feature. This will result in greater accuracy for that first feature.
5. While a session is in progress, avoid losing lock on satellites (such as by walking under bridges or tipping the GPS antenna), even if a feature is not currently being logged. This will prevent gaps from occurring in the GPS data, resulting in greater feature accuracy when a feature is logged. If for whatever reason satellite lock is lost, stop and wait for at least four satellites to re-lock before logging the next feature.
6. If you are collecting data under heavy tree canopy, the feature accuracy will be significantly reduced if the number of satellites drops to four or less for more than a minute or so. Users report that moving to an area of light canopy and waiting at least two minutes for five or more satellites to lock measurably improves feature accuracy.
7. While logging a point feature, keep the GPS antenna as motionless as possible.
8. Record at least twenty minutes of data for each session. Even if only a few minutes of feature data are logged, let the receiver collect at least twenty minutes of data for more accurate post-processing.

9. Use the Mission Planning program included with the Reliance Office software to find the best time to collect data at obstructed sites that have little satellite visibility. While GPS can not be used in every possible site, proper planning will allow you to achieve optimum accuracy at many obstructed sites.

Adding Features in the Field

Overview

The Workabout software allows you to add features to the FDF while in the field. An example might be an unusual feature or an attribute that was not anticipated when the FDF was created in the office.

Adding features is not complicated, but the procedure must follow an exact sequence:

1. Tell the Workabout that you are adding a **new feature**.
2. Specify the **feature type** - point, area, or line
3. Specify the **feature name** - Windmill, stop sign, fire hydrant, lake, fence, etc.
4. Specify the **number of attributes** you want to enumerate - e.g., to enumerate **height** and **condition**, you would specify **2** attributes
5. Specify **attribute name** - height, condition, diameter, color, etc.
6. Specify **length** - the maximum number of characters you will need to describe the attribute

Figure 3.42 shows the applicable screens and the process for adding features. The pages following Figure 3.42 present detailed instructions for adding features.

Note that GENERIC.FDF is included so as to allow the creation of "NEW" FDF files completely in the field.

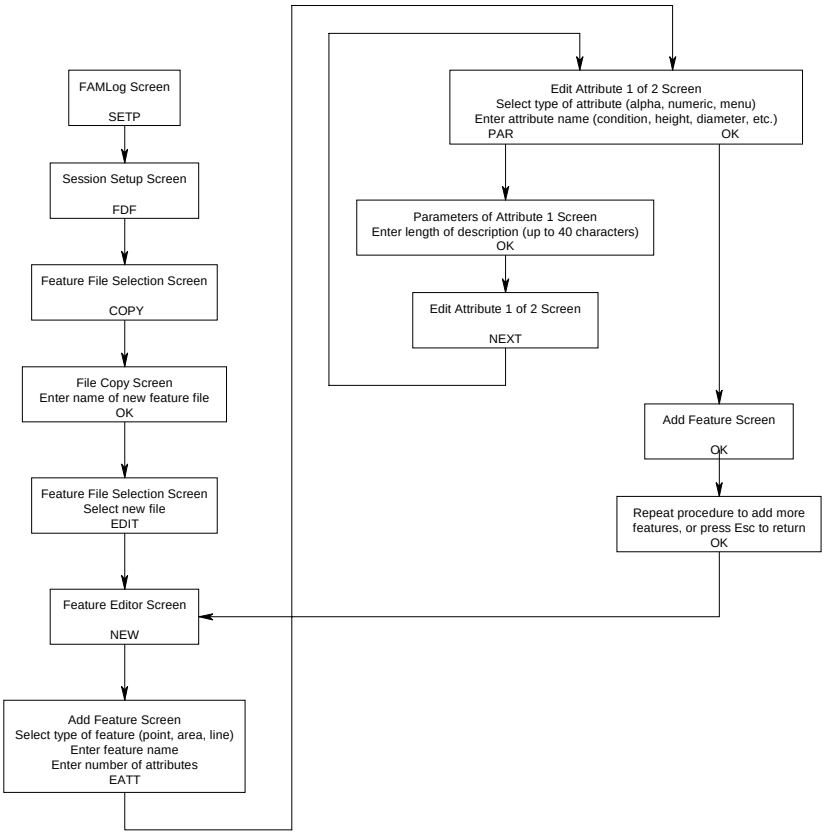

Figure 3.42: Screens and Process for Adding Features

Procedure for Adding Features

1. To add a feature, begin by calling the FAMLog screen, Figure 3.43.

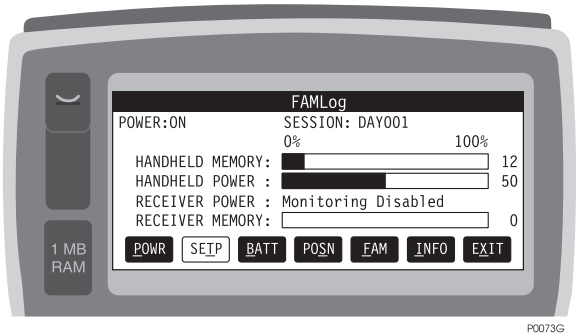

Figure 3.43: FAMLog Screen

2. Press U and T (SETP), calling the Session Setup screen, Figure 3.44.

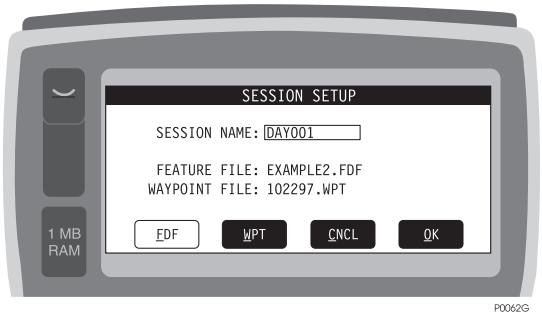

Figure 3.44: Session Setup Screen

3. Press U and F (FEDF), calling the Feature File Selection screen, Figure 3.45.

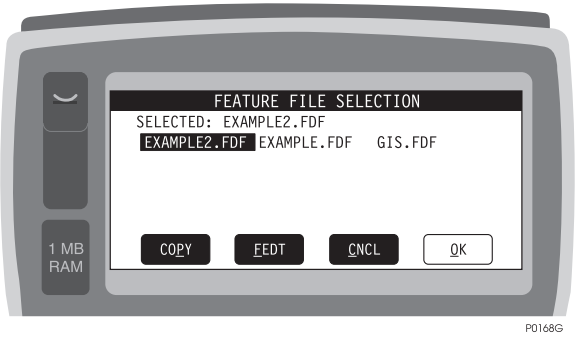

Figure 3.45: Feature File Selection Screen

This screen presents two options: COPY and FEDT. COPY lets you copy the Feature File (*.FDF) to another file. FEDT brings up the Feature Editor screen, which allows you to add features and attributes to existing Feature Files. Be aware that "editing", in this context, means **additions** to the new file, **not changes** to parameters already defined in the file.

4. Press U and P (COPY) to call the File Copy screen, Figure 3.46.

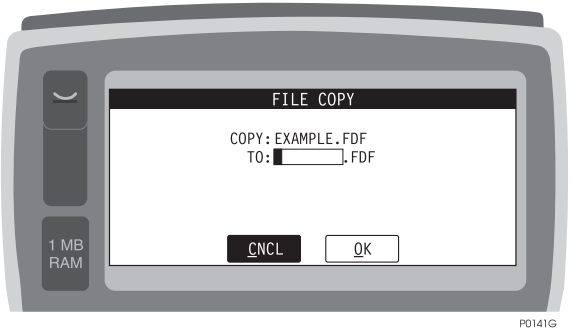

Figure 3.46: File Copy Screen

5. This screen presents a field where you must enter a name for the new file that you are going to edit. Enter a name for the new file, call it *newfile*, and

then press U and O (OK) to accept the name. The new file name now appears in the Feature File Selection screen, as shown in Figure 3.47.

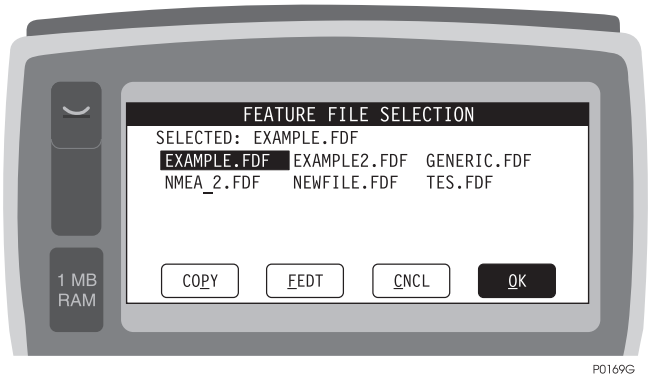

Figure 3.47: New File in Feature File Selection Screen

6. Select NEWFILE.FDF and press U and F (FEDT), calling the Feature Editor screen, Figure 3.48.

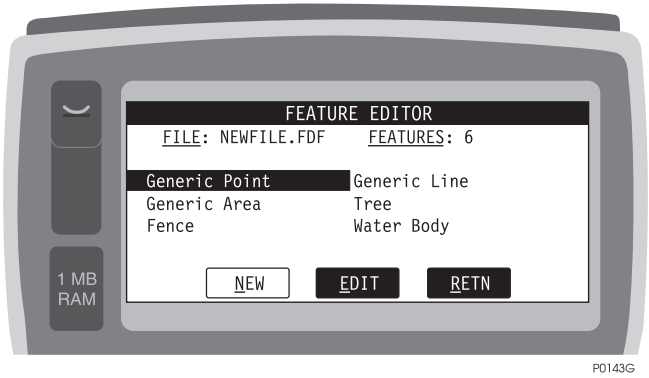

Figure 3.48: Feature Editor Screen

7. Press U and N (NEW) to call the Add Feature screen, Figure 3.49.

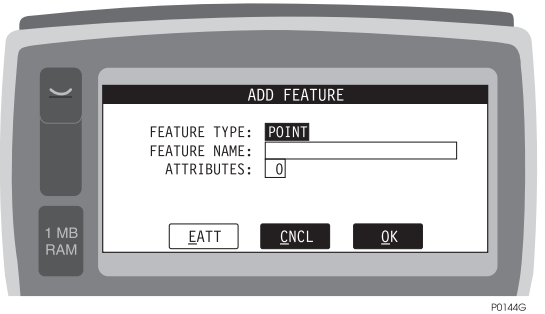

Figure 3.49: Add Feature Screen

This screen lets you specify the feature **type**, **name**, and **number of attributes**.

8. The Space key lets you toggle the **feature type: point**, **area**, or **line**. For this exercise, select **point**. Arrow down to the **feature name** field, and enter a name for the new feature, e.g., **windmill**. Move to the **attributes** field, and specify the number of attributes; e.g. if you wanted to enumerate two attributes, **condition** and **style**, you would enter 2. Press U and O (OK) to accept the entries, calling the Edit Attribute 1 of 2 screen Figure 3.50.

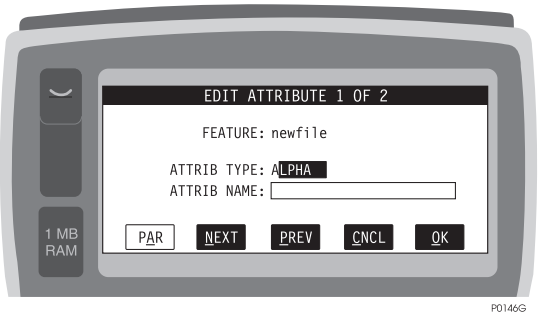

Figure 3.50: Edit Attribute 1 of 2 Screen

This screen provides a field where you must enter a **type** and a **name** for the new attribute. Use the space key to select **attrib type**, alpha, numeric, or menu. For this exercise, select **alpha**, then arrow down to the **attrib name** field. Enter a name for attribute 1, e.g., **condition**.

9. Press U and A (PAR) to call the Parameters of Attribute 1 screen, Figure 3.51.

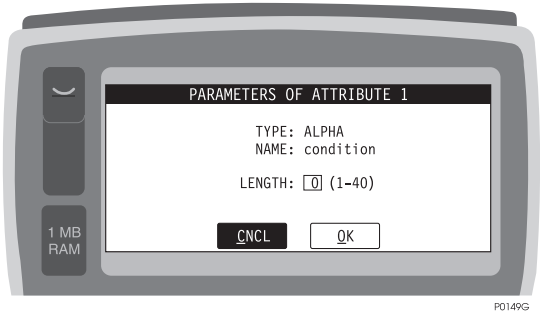

Figure 3.51: Parameters of Attribute 1 Screen

This screen requires you to enter a parameter for the new attribute, i.e., **length**. Length is the maximum number of characters you will need to annotate the attribute. Enter an appropriate number, then press U and O (OK) to accept the entry and return to the Edit Attribute 1 of 2 screen, Figure 3.52.

If you have to enter a 2-digit number, you must move the cursor to the left edge of the field using the left arrow.

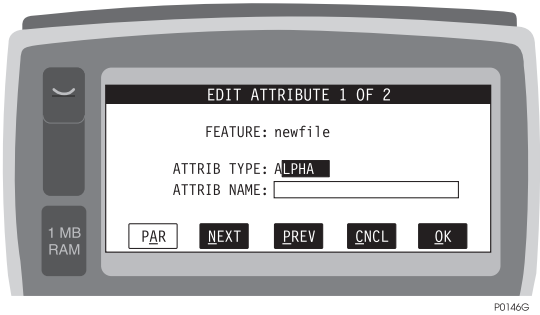

Figure 3.52: Edit Attribute 1 of 2 Screen

10. Press U and N (NEXT) to call the Edit Attribute 2 of 2 screen, Figure 3.53.

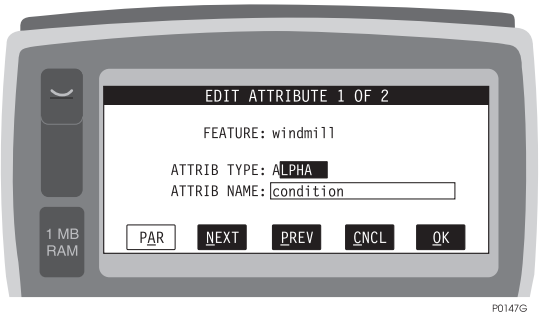

Figure 3.53: Edit Attribute 2 of 2 Screen

As described for attribute 1 above, this screen requires you to specify **type** and **name**. Use the Space key to select **attrib type** from **alpha**, **numeric**, or **menu**. For this exercise, select **alpha**, then arrow down and specify **attrib name**, e.g., **style**. Press U and O (OK) to accept the entry and return to the Add Feature screen, Figure 3.54.

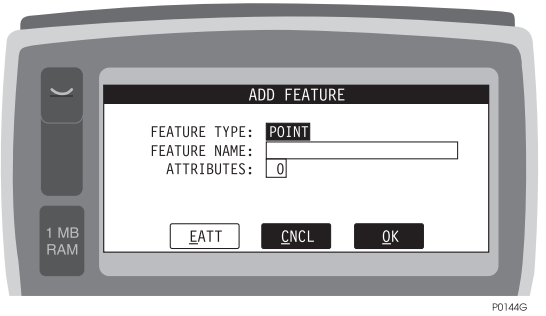

Figure 3.54: Add Feature Screen

At this point, you have added a new feature and defined two attributes for the new feature. If you have more features to add, repeat the above procedure. If you are finished adding new features, repeatedly press Esc to return to the FAMLog main menu.

Point Averaging

If your receiver has the RTCM option installed, you can do point averaging during your survey. You will need a radiobeacon receiver, such as the Ashtech BR2™, to supply differential corrections.

1. Connect the GPS antenna to your receiver.
2. Connect the Workabout to your receiver.
3. Connect the radiobeacon receiver to port B of your receiver.
4. Turn on the equipment.
5. On the Workabout, call the FAMLog screen, Figure 3.55.

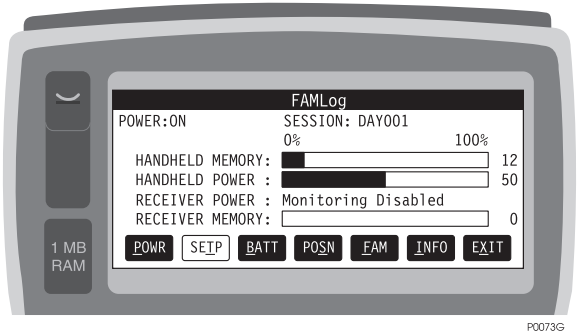

Figure 3.55: FAMLog Screen

6. Select FAM and press MENU, calling the Field Asset Management screen, Figure 3.56.

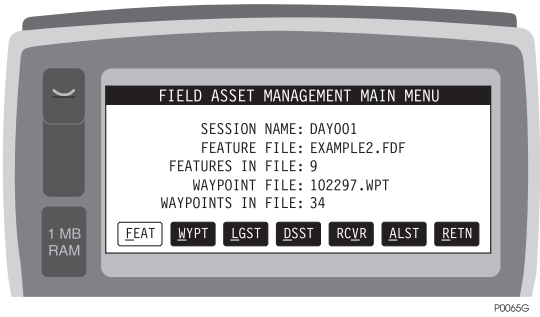

Figure 3.56: Field Asset Management Screen

7. Select RCVR and press MENU, calling the Receiver Setup screen, Figure 3.57.

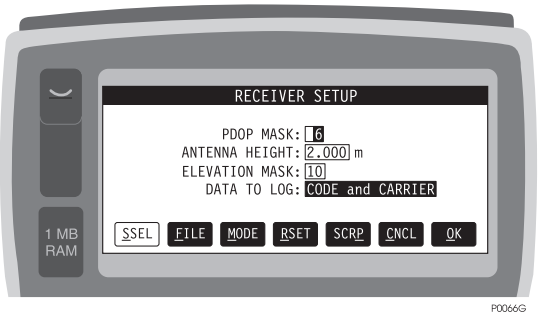

Figure 3.57: Receiver Setup Screen

8. Select MODE and press MENU, calling the Differential Mode screen, Figure 3.58.

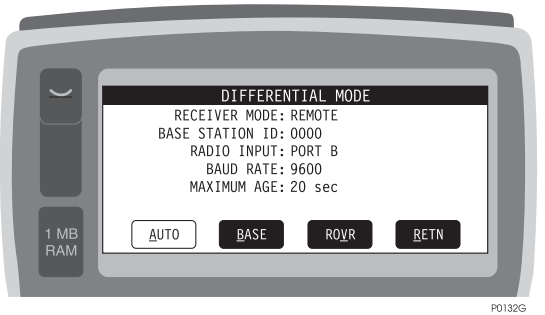

Figure 3.58: Differential Mode Screen

9. Select ROVR and press MENU, calling the RTCM Rover Station setup screen, Figure 3.59.

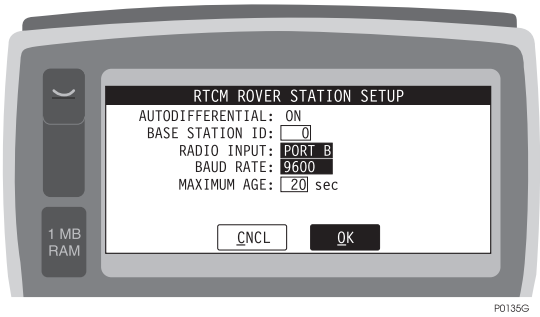

Figure 3.59: RTCM Rover Station Setup Screen

10. Set or verify the following parameters:

    AUTODIFFERENTIAL: ON (If necessary, toggle with **Space** key)

    BASE STATION ID: Select ID, 0 is default.

    RADIO INPUT: Select port where corrections come in to the receiver.

    BAUD RATE: Select baud rate of input corrections, 9600 is default.

    MAXIMUM AGE: Max age of corrections, 20 is default.

11. Tab to OK and press MENU, calling the Receiver Setup screen. Press Esc until the Field Asset Management screen appears, as shown in Figure 3.60.

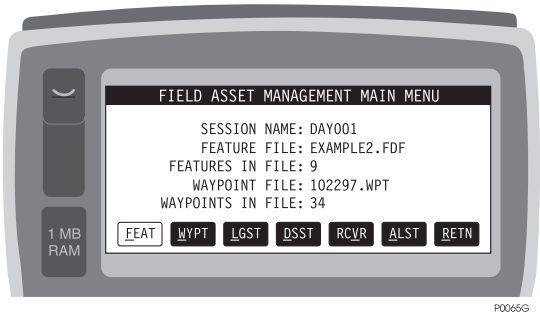

Figure 3.60: Field Asset Management Screen

12. Select FEAT and press MENU, calling the Select the Feature screen, Figure 3.61.

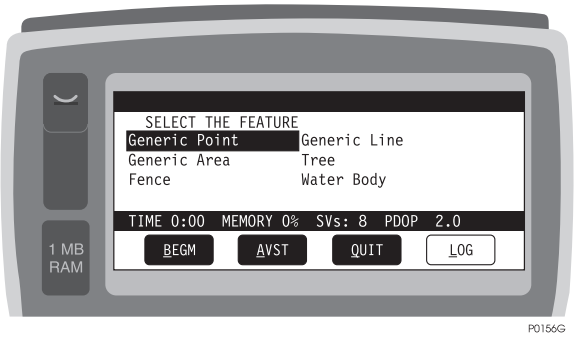

Figure 3.61: Select the Feature Screen

Note that the screen now shows an additional button, AVST.

13. Tab to AVST and press MENU, calling the Average Position Setup screen, Figure 3.62.

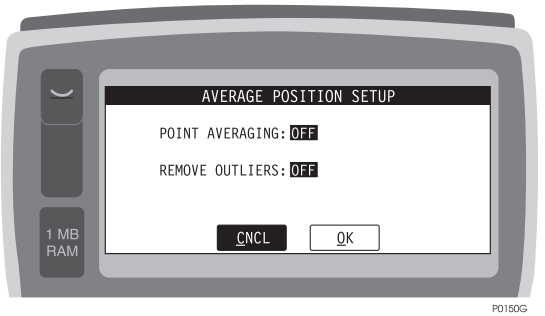

Figure 3.62: Average Position Setup Screen

Use the **Space** key to toggle the POINT AVERAGING and REMOVE OUTLIER fields to ON.

Automatic Area Calculation - RTCM Mode Only

If you are operating in RTCM mode, the system can provide a continuous real-time indication of the area covered by your survey. Area, in this context, is defined as the area bounded by your trajectory and a straight line back to your starting point, as shown in Figure 3.63; the total area of your survey is indicated when you return to your starting point. You will need a radiobeacon receiver, such as the Ashtech BR2™, to supply differential corrections to your receiver.

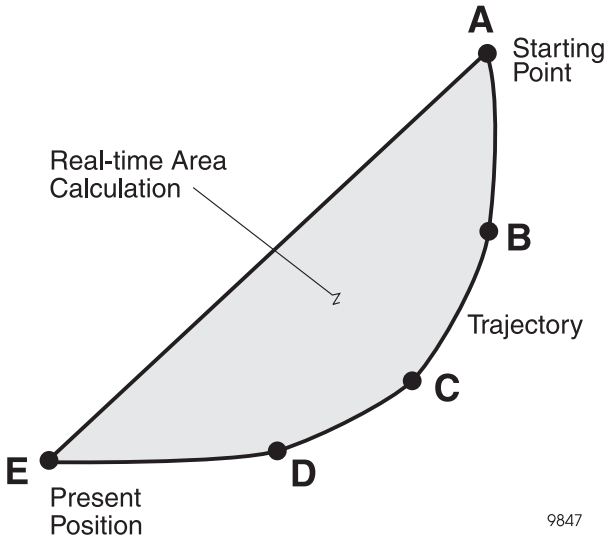

Figure 3.63: Automatic Area Calculation - RTCM Mode Only

1. Connect the GPS antenna to your receiver.
2. Connect the Workabout to your receiver.
3. Connect the radiobeacon receiver to port B of your receiver.
4. Turn on the equipment.

5. On the Workabout, call the FAMLog screen, Figure 3.64.

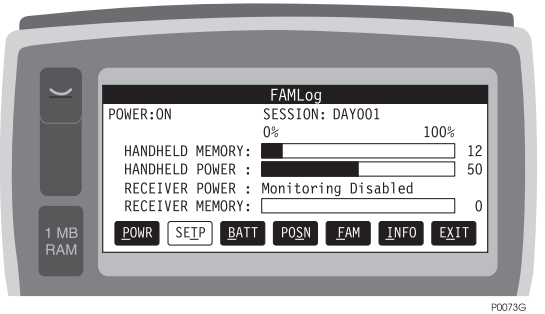

Figure 3.64: FAMLog Screen

6. Select FAM and press MENU, calling the Field Asset Management screen, Figure 3.65.

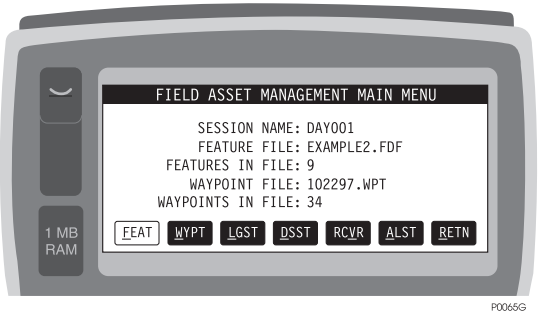

Figure 3.65: Field Asset Management Screen

7. Select DSST and press MENU, calling the Display Setup screen, Figure 3.66

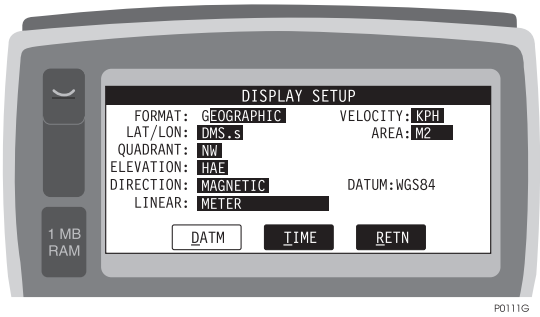

Figure 3.66: Display Setup Screen.

8. Use the down arrow to select AREA, then use the **Space** key to select the units you want to use. Units are:

   ACRE - acre

   SQMI - square mile

   M2 - square meter

   HA - hectare

   KM2 - square kilometer

   SQFT - square feet

   SQYD - square yard

9. Tab to RETN and press MENU, recalling the Field Asset Management screen. In the Field Asset Management screen, tab to FEAT and press MENU, calling the Feature Select screen, Figure 3.67.

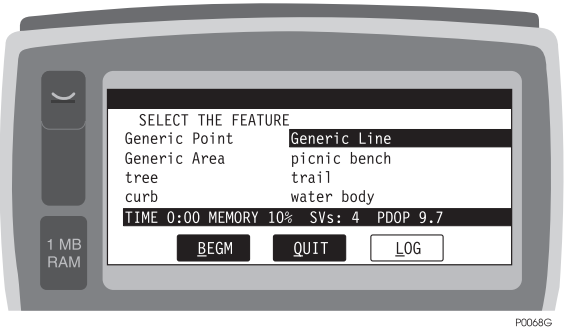

Figure 3.67: Feature Select Screen

10. Select Generic Area, tab to LOG, and press MENU, calling the Feature Logging screen, Figure 3.68. The area calculation is shown at the top of the screen as Area:xxx, where xxx is the real-time area calculation.

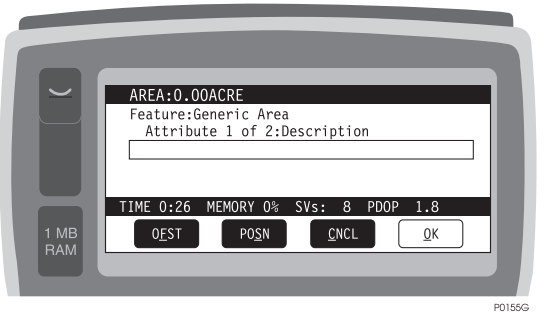

Figure 3.68: Feature Logging Screen, Real-Time Area Calculation

11. When you transfer the area data to your PC as instructed in the *Office User's Guide*, the area data is stored in a D-file.
12. Open the D-file and make sure the D-file command contains the following parameters:

    Site (4-character site ID)

    Latitude and longitude from WGS-84 coordinates (radians)

    Elevation above ellipsoid (meters)

13. Transfer data from receiver to PC with averaging ON. Using Map View in Reliance Processor, compare with data when averaging is OFF; should be difference between ON and OFF in Map View.

Removing Position Outliers

When operating in real-time differential mode, sometimes the position jumps if there is a problem receiving corrections from the base station. This could affect point positioning accuracy. Therefore, follow the procedure below to remove these position jumps, called “outliers”.

To remove position outliers, your receiver must have the RTCM option installed, and you need a radiobeacon receiver, such as the Ashtech BR2™, to supply differential corrections to your receiver.

1. Connect the GPS antenna your receiver.
2. Connect the Workabout to to port A of your receiver.
3. Connect the radiobeacon receiver to port B of your receiver.
4. Turn on the equipment.
5. On the Workabout, call the FAMLog screen, Figure 3.69.

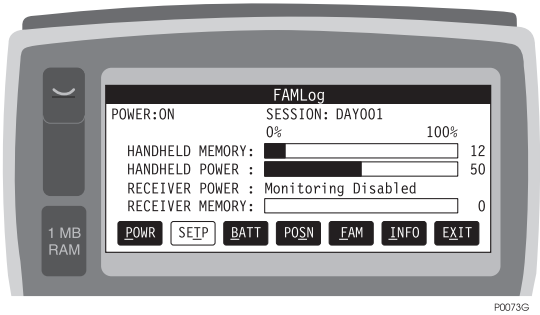

Figure 3.69: FAMLog Screen

6. Select FAM and press MENU, calling the Field Asset Management screen, Figure 3.70.

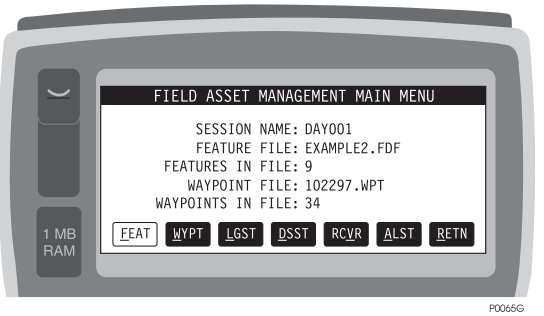

Figure 3.70: Field Asset Management Screen

7. Select FEAT and press MENU, calling the Feature Select screen, Figure 3.71.

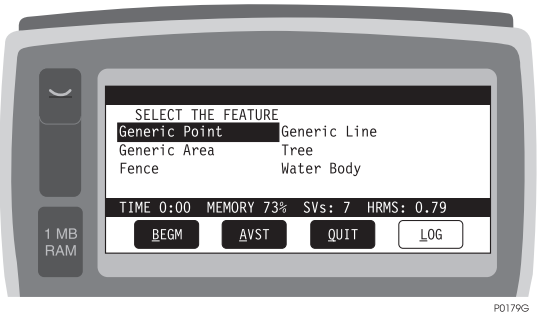

Figure 3.71: Select the Feature Screen

8. Select the feature of interest.

9. Select AVST and press MENU, calling the Average Position Setup screen, Figure 3.72.

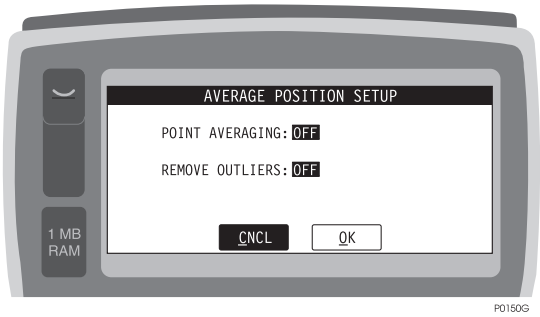

Figure 3.72: Average Position Setup Screen

10. Use the arrow key to select POINT AVERAGING. Use the space key to set POINT AVERAGING to ON.
11. Use the arrow key to select REMOVE OUTLIERS. Use the Space key to set REMOVE OUTLIERS to ON.
12. Select OK and press MENU.
13. Log the feature, and repeat the procedure for the next feature. Continue as required.
14. When logging is finished, exit from the FAMLog program and transfer the data to the PC in accordance with the *Office User's Manual*. The data will be found in the appropriate D-file.
15. Open the D-file and verify that the outliers were removed; 0 indicates removed, 1 indicates not removed.

Creating Route by Copying & Editing Waypoint File

You can create a new route by copying a waypoint file to a new file, then editing the new file. Your receiver must have the RTCM option installed, and you need a radiobeacon receiver, such as the Ashtech BR2™, to supply differential corrections to your receiver.

1. Connect the GPS antenna your receiver.
2. Connect the Workabout to to port C of your receiver.
3. Connect the radiobeacon receiver to port B of your receiver.

4. Turn on the equipment.
5. On the Workabout, call the FAMLog screen, Figure 3.73.

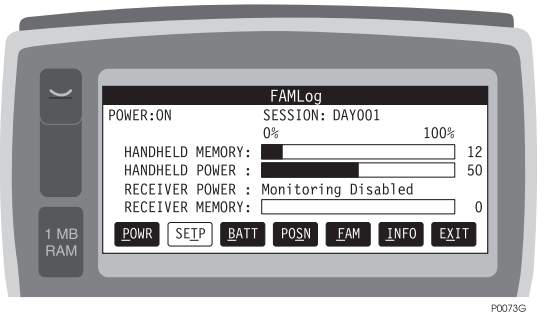

Figure 3.73: FAMLog Screen

6. Select FAM and press MENU, calling the Field Asset Management screen, Figure 3.74.

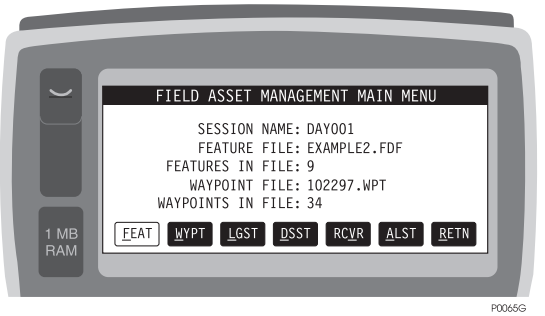

Figure 3.74: Field Asset Management Screen

7. Select WYPT and press MENU, calling the Waypoint Navigation screen, Figure 3.75.

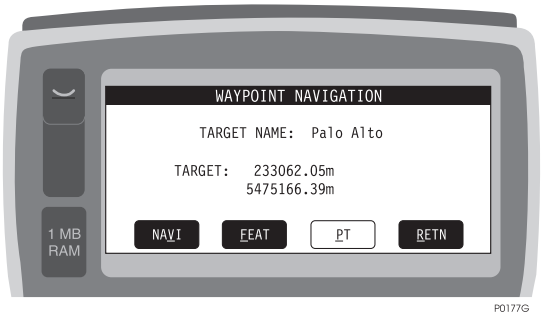

Figure 3.75: Waypoint Navigation Screen

8. Select PT and press MENU, calling the Point Selection screen, Figure 3.76.

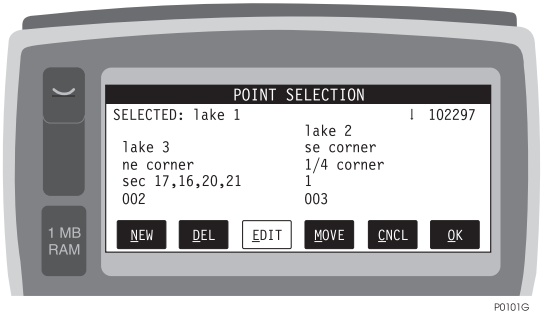

Figure 3.76: Point Selection Screen

9. Use the arrow keys to select a waypoint. Tab to EDIT and press MENU, calling the Edit Point screen, Figure 3.77.

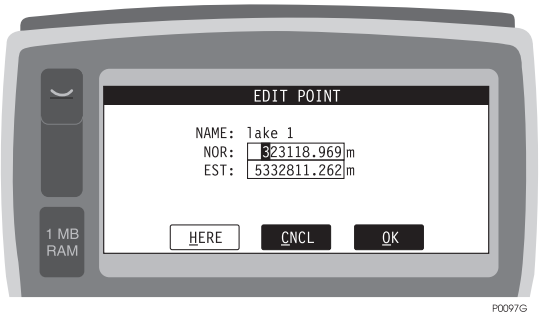

Figure 3.77: Edit Point Screen

10. In the Edit Point screen, verify or change the name of the point. Enter latitude (or northing) and longitude (or easting) of the point. Tab to OK and press MENU, returning to the Point Selection screen.
11. In the Point Selection screen, tab to NEW and press MENU, calling the New Point screen, Figure 3.78.

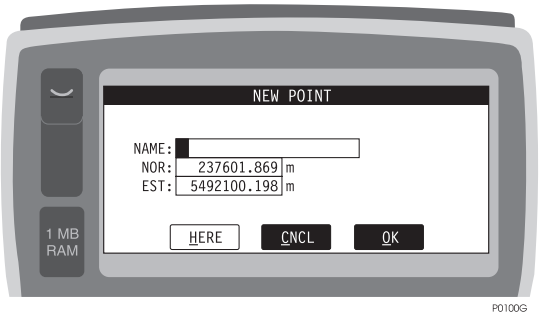

Figure 3.78: New Point Screen

12. In the New Point screen, add the parameters (NAME, NOR, EST) for the new point to be added to the waypoint file.
13. Tab to HERE and enter the receiver's current position.
14. Tab to OK and press MENU, accepting the settings and returning to the Point Selection screen.

15. In the Point Selection screen, tab to MOVE and press MENU, calling the Point Order screen, Figure 3.79.

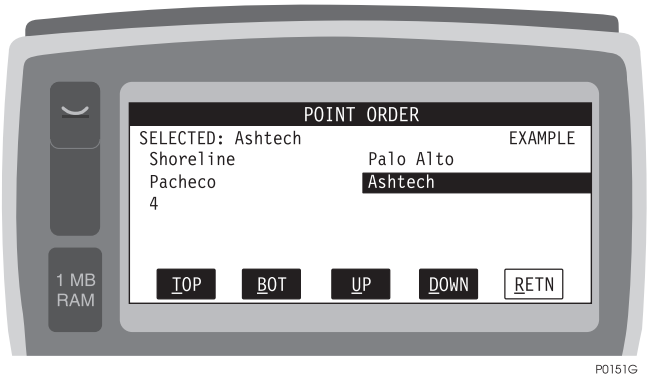

Figure 3.79: Point Order Screen

16. The Point Order screen lets you change the routing by changing the sequence of the points; verify the following:

    TOP moves the selected point to the top of the list

    BOT moves the selected point to the bottom of the list

    UP moves the selected point up one line

    DN moves the selected point down one line

    Arrange the points in the sequence you want.
17. Tab to RETN and press MENU, returning to the Point Selection screen.
18. In the Point Selection screen, use DEL to delete points you do not want to use.
19. Continue until you have defined the new route.
20. Press Esc repeatedly to return to the FAMLog screen.

Scripts for NMEA Commands

This version of software includes provision for automatically sending pre-recorded commands to the receiver. These commands, called scripts, are standard frequently-used keystroke sequences that would otherwise have to be manually entered by pressing numerous keys on the Workabout. Scripts are prepared in the office on a PC, then downloaded to the Workabout. Script files are created using standard ASCII text editors. Simply type in the set commands you want, followed by a <CR><LF>, (e.g., $PASHS,ELM,10 sets the receiver satellite elevation mask to 10 degrees.) The following steps describe how to use the scripts.

1. On the Workabout, call the FAMLog screen, Figure 3.80.

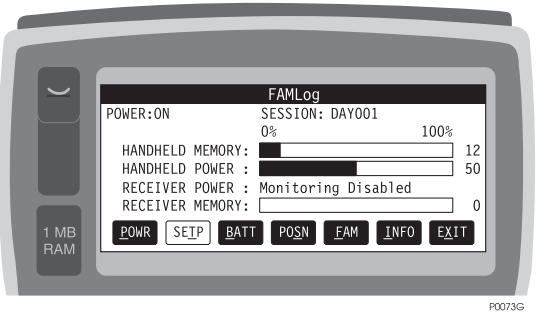

Figure 3.80: FAMLog Screen

2. Select FAM and press MENU, calling the Field Asset Management screen, Figure 3.81.

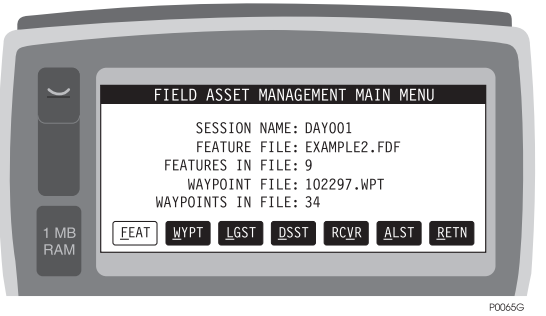

Figure 3.81: Field Asset Management Screen

3. Select RCVR and press MENU, calling the Receiver Setup screen, Figure 3.82.

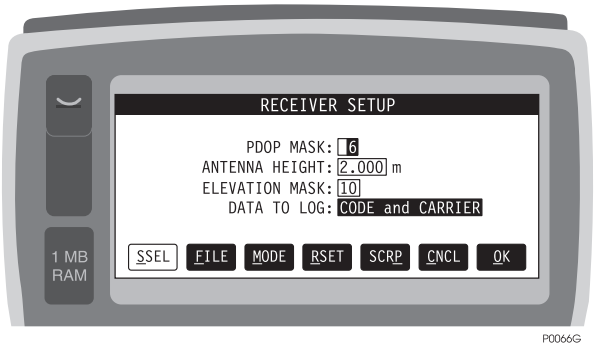

Figure 3.82: Receiver Setup Screen

4. In the Receiver Setup screen, select SCRP and press MENU, calling the Script Selection screen, Figure 3.83.

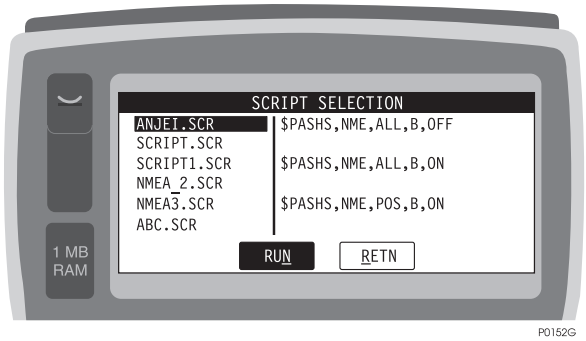

Figure 3.83: Script Selection Screen

This screen presents a list of pre-recorded scripts, files with the extension.SCR. The left side of the screen lists the scripts, and the right side displays the contents of each script.

5. Use the arrow keys to select the script you want to use. Select RUN and press MENU. You will see the Script Runner screen, Figure 3.84, which displays **End of Script File** after the script is loaded into the receiver.

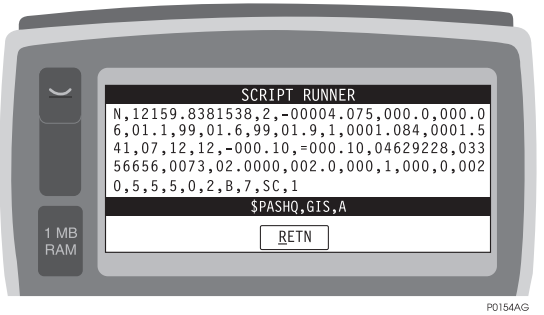

Figure 3.84: Script Runner Screen

Press **Esc** repeatedly to return to the FAMLog screen.

Creating Scripts in the Field

Although not recommended, you can create scripts in the field, using the Workabout, as described in the following steps.

1. Reset the Workabout to the DOS mode by simultaneously pressing U, Ctrl, and Del. The Psion copyright menu appears.
2. Press MENU. The Special menu appears.
3. If necessary, use the arrows to select **Command processor**.
4. Press **Enter**. The M> prompt appears.
5. Type the words **edit M\filename.scr** and press **Enter. M** is the root directory of the Psion, and **filename** is the name you want to assign to the script file. Be sure to append the extension**.scr**).
6. The displays asks if you want to create a file. Press Y. A black triangle prompt appears on the display.
7. Type in the commands you want in the script. Your receiver manual explains the function and structure of the commands you can send to the receiver.
8. When you have typed the commands, press MENU. The display presents several options, one of which is SAVE. Arrow down to SAVE and press **Enter**. The black triangle prompt reappears.
9. Exit the edit mode by simultaneously pressing U, Ctrl, and Del. The Psion copyright menu reappears.
10. Select **Command processor** and press **Enter**.
11. The M> prompt appears.
12. Type **DIR *.SCR**. You will get a menu that lists the script file you just created.
13. Press r and Enter to activate Reliance.
14. The logo appears. Press any key, calling the FAMLog screen.
15. In the FAMLog screen, tab to FAM and press MENU, calling the Field Asset Management screen.
16. In the Field Asset Management screen, tab to RCVR and press MENU. The Receiver Setup menu appears.
17. In the Receiver Setup menu, tab to SCRP and press MENU. A list of available scripts appears. Your new script should be on the list.
18. Run the script in the usual manner.

Local Coordinate Transformation (Grid-to-Grid)

You can configure and apply a local coordinate transformation to your survey as shown in Figure 3.85, where your local grid is rotated with respect to your zone.

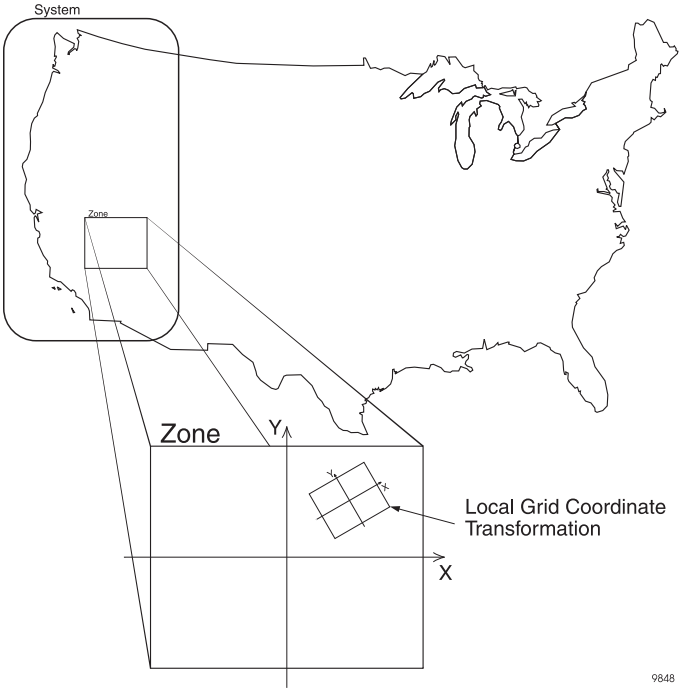

Figure 3.85: Local Coordinate Transformation

1. Call the Field Asset Management screen, Figure 3.86.

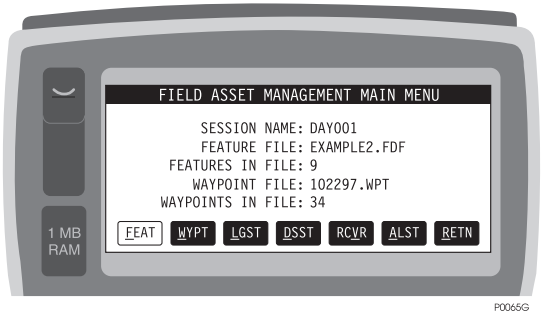

Figure 3.86: Field Asset Management Screen

2. Press U and D (DSST), calling the Display Setup screen, Figure 3.87.

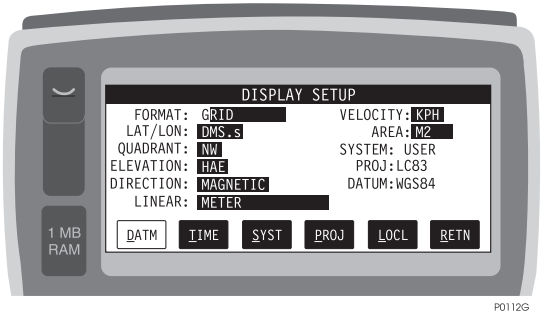

Figure 3.87: Display Setup Screen

3. Verify that FORMAT is set to GRID; if FORMAT is GEOGRAPHIC, use the **Space** key to toggle the setting from GEOGRAPHIC to GRID.

4. Press Shift U and L (LOCL), calling the Grid to Local Transformation screen, Figure 3.88.

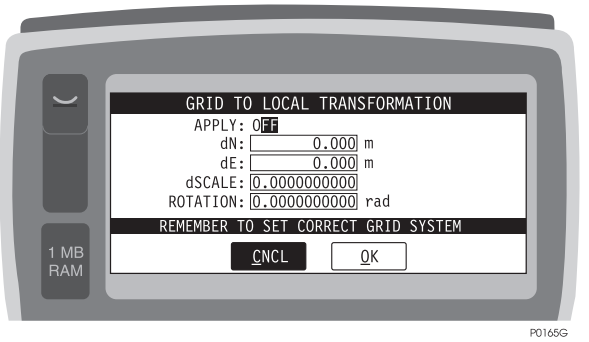

Figure 3.88: Grid to Local Transformation Screen

This screen lets you specify parameters for your local grid: dN, dE, dSCALE, and ROTATION.

5. If APPLY is **OFF**, use the **Space** key to toggle it **ON**.
6. Enter your local parameters for dN and dE in meters, dSCALE in decimal, and ROTATION in radians.
7. Press U and O (OK) to accept the specified local parameters, then press U and O (OK) again to return to the Display Setup screen.

Answers to Frequently Asked Questions

Q: How do I turn the receiver off?

A: There are three ways to turn the receiver off:

1. Press U and P from the FAMlog for Workabout menu on the Workabout
2. Press the receiver power switch (black pushbutton) until the PWR/SAT light stops flashing.
3. Disconnect the receiver batteries

Of the three, pressing U and P on the Workabout is the preferred method.

Q: How long will the receiver batteries last?

A: A new, fully-charged lead-acid type Panasonic camcorder battery should last 8 hours at a temperature of 25℃. Always carry a spare battery.

Q: How long will the Workabout batteries last?

A: A set of AA alkaline batteries will last approximately 50 hours at a temperature of 25°C. Always carry a spare set of batteries.

Q: What is stored in the Workabout and what is stored in the receiver?

A: The program, the feature files, and the waypoint files are stored in the Workabout. The **dir** command displays all files located in the Workabout. GPS measurement data and descriptions of features logged in the field are stored in the receiver.

Q: How long will receiver memory last?

A: For an average of six satellites, the standard 4.5 Mb storage of the receiver will record continuous GPS measurements at a one-second interval for about 8 hours. Using a five-second recording interval, the receiver will record data continuously for about 40 hours. If you log position-only data (no post-processing), you can extend the aforementioned durations by a factor of about 40.

Q: What recording interval should I use?

A: If you want to produce detailed lines and areas, select the shortest interval, 1 second. However, a 1-second interval will quickly fill the receiver memory. Longer sessions can be recorded by using a recording interval of 2 or 5 seconds, but lines and areas will not be as detailed. Note that the base station recording interval must be less than or equal to the rover recording interval for post-processing of all collected data.

Q: How many sessions can I record?

A: The receiver can record up to 100 sessions or until memory is full. The number of sessions in a project is limited only by the memory available on the PC.

Q: Can I log more than one feature at a time?

A: Yes, provided the features are of different types. A point can be logged simultaneously with a line or area, a line can be logged simultaneously with an area, and a point, line, and area can all be logged simultaneously.

Q: How do I log point features which are obstructed?

A: After selecting the point feature, use the Point Offset (OFST) screen to enter a bearing and distance, or easting and northing from your current position to the point of interest.

Q: How do I set the receiver to run for a long period on a point?

A: Time on Points up to 60 minutes can be entered on the Data Logging Setup (LGST) screen.

Q: How do I create and navigate to waypoints?

A: Individual waypoints can be created either on the PC in Map View, or on the handheld in the New Point (NEW) screen by entering the coordinates. To navigate to a waypoint, select the waypoint on the Point Selection screen of the Workabout, and then press NAVI to view the Course To Target and Distance To Target navigation information.

Q: How do I know if I'm computing a *good* position?

A: The Position screen on the Workabout provides several indications of the accuracy of the position being computed. Most importantly, the number of satellites (SVs) must be four or greater for accurate post-processing of the data. The PDOP, which indicates the satellite constellation geometry, should be 6 or less. The HRMS indicates the stand-alone accuracy of a single receiver. This accuracy will be greatly improved by post-processing. If real-time corrections are being used (RTCM), the HRMS will indicate the accuracy of the corrected position.

Q: How far away from the base station can I be and still get accurate positions?

A: As the distance to the base station increases, the post-processed accuracy decreases by 1 ppm of the baseline length. Thus, for the decimeter receiver with a 100 km distance between the rover and the base station, accuracy will be decreased by 10 cm. Distances beyond 100 km will also become increasingly less accurate because of differences in the ionospheric distortion of the satellite signals received by the base and rover.

The base and rover must simultaneously track the same four (or more) satellites.

Reference

Overview

This section presents a detailed description of the various command and display screens on the Workabout controller.

Conventions

Small black rectangles at the bottom of the screen indicate functions activated by pressing the **U key** and the **underlined** letters in the applicable black rectangle.

Black rectangles not located at the bottom of the screen indicate toggle boxes or highlight Fields selected from a list. The contents of the toggle box are changed by using the **Space** key.

White boxes (not filled) indicate editable fields where you key in information.

Large boxes on the right of the screen display descriptions of selected Fields.

Bold caps represent screen headers.

The following naming conventions are used for the objects entered and displayed on the Workabout controller screen.

A **Session Name** is identified with a 12-character alphanumeric ID consisting of an 8-character name, a period, and a 3-character extension. The Feature File name is a valid DOS file name. An example session name might be TUESDATA.FDF.

A **Waypoint Navigation File** is identified with a 12-character alphanumeric ID consisting of an 8-character name, a period, and a 3-character extension. The waypoint navigation file name is a valid DOS file name. An example waypoint file name might be WAYPOINT.WPT.

A Waypoint Navigation Target is identified with a 20-character alphanumeric ID.

Function Keys

There are three methods for using the function keys. In the first method, to select a function, simultaneously press the U key (lower left corner of panel) and the **letter that is underlined** in the button symbol.

A second method of using the functions is to use the current screen's **numerical position** of the black button, from the left side of the display, instead of the underlined letter.

A third method is by using the **active button**. On the controller display, the active button is white instead of its normal black. To call the function indicated by the active button, press the **Menu** key. You can change the active button with the **Tab** key; each time **Tab** is

pressed, the active button advances one position to the right. To move the active button to the left, press **Shift** and **Tab**.

Screen Map

You can reach a particular screen by following the path shown on the screen map, Figure 4.1.

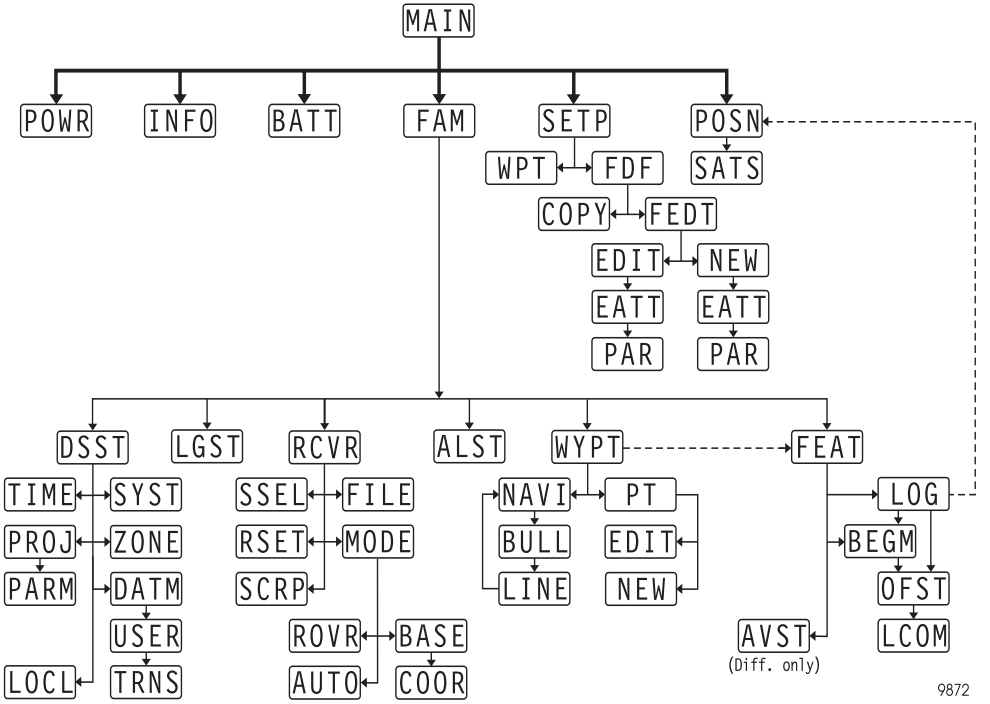

Figure 4.1. Screen Map

FAMLog for Workabout (MAIN)

The FAMLog screen, Figure 4.2, is your starting point. It shows you the memory and power status for the receiver and the Workabout, and the entry points for the various functions - setup, position, FAM, etc. Table 4.1 describes the functions shown in the screen.

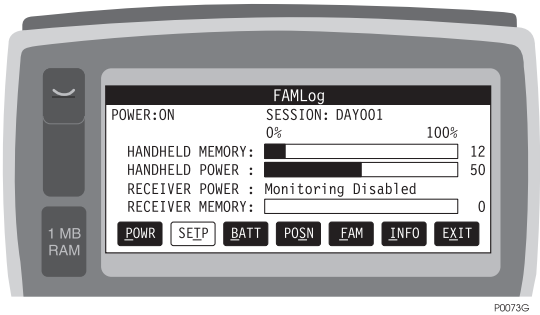

Figure 4.2: FAMlog Main Screen (MAIN)

Table 4.1: FAMlog Main Screen (MAIN)

Field	Description
POWER ON or OFF	Indicates current power status of the receiver. If POWER is shown as ???, this indicates that the controller is not communicating with the receiver. Check the cables, then cycle power on using POWR.
SESSION	Displays current session name. Blank until you enter a session name on the SETP screen, or shows the previous session name.
HANDHELD MEMORY	Displays remaining controller memory in percent.
HANDHELD POWER	Displays remaining controller power in percent.
RECEIVER POWER	Displays remaining receiver power in percent. When a charged receiver battery is connected, the Battery Management screen must be used to set REMAINING POWER to 100 percent, otherwise the handheld will not detect that a new battery has been installed.
RECEIVER MEMORY	Displays remaining receiver memory in percent.
POWR	Pressing U and P, or pressing U and 1, or pressing **Menu** while **POWR** is active, turns receiver on or off.

Table 4.1: FAMlog Main Screen (MAIN) (continued)

Field	Description
SETP	Pressing U and T, or pressing U and 2, or pressing **Menu** while **SETP** is active, calls the Session Setup Screen.
BATT	Pressing U and B, or pressing U and 3, or pressing **Menu** while **BATT** is active, calls the Battery Management Screen.
POSN	Pressing U and S, or pressing U and 4, or pressing **Menu** while **POSN** is active, calls the Position Screen.
FAM	Pressing U and F, or pressing U and 5, or pressing **Menu** while **FAM** is active, calls the FAM Screen.
INFO	Pressing U and I, or pressing U and 6, or pressing **Menu** while **INFO** is active, calls the Information Screen.
EXIT	Pressing U and X, or pressing U and 7, or pressing **Menu** while **EXIT** is active, exits the program.

Information Screen (INFO)

The INFO screen, similar to Figure 4.3, displays your hardware and software configurations. Table 4.2 describes the parameters displayed on the screen. You will need this information if you have to call customer support.

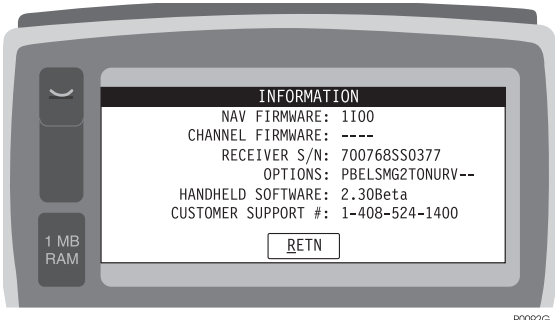

Figure 4.3: Information Screen (INFO)

Table 4.2: Information Screen (INFO)

Field	Description
NAV FIRMWARE	Displays receiver firmware version number.
CHANNELFIRMWARE	Displays receiver channel firmware version number.
RECEIVER S/N	Displays receiver serial number.
OPTIONS	Displays options installed in the receiver.
HANDHELD SOFTWARE	Displays controller software version number.
CUSTOMER SUPPORT #	Displays customer support telephone number.
RETN	Pressing U and R (or pressing U and 1, or pressing **Menu**) recalls the previous screen.

Session Setup Screen (SETP)

The Session Setup screen, Figure 4.4, lets you set up session parameters, such as session name, feature file, and waypoint file, for a data recording session.

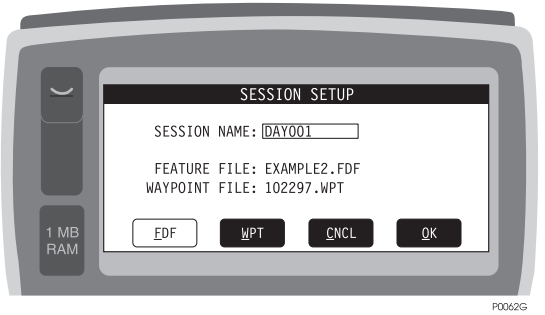

Figure 4.4: Session Setup Screen (SETP)

Table 4.3: Session Setup Screen (SETP)

Field	Description
SESSION NAME	Editable field. Current session name.
FEATURE FILE	Currently selected feature definition file.
WAYPOINT FILE	Currently selected waypoint file.
FDF	Pressing U and F (or pressing U and 1, or pressing **Menu** while **FDF** is active) calls the Feature File Selection Screen.
WPT	Pressing U and W (or pressing U and 2, or pressing **Menu** while **WPT** is active) calls the Waypoint File Selection Screen.
CNCL	Pressing U and C (or pressing U and 3, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes.
OK	Pressing U and O (or pressing U and 4, or pressing **Menu** while **OK** is active) accepts current session name and recalls the previous screen.

Feature File Selection Screen (FDF)

The Feature File Selection screen, Figure 4.5, lets you select a feature definition file.

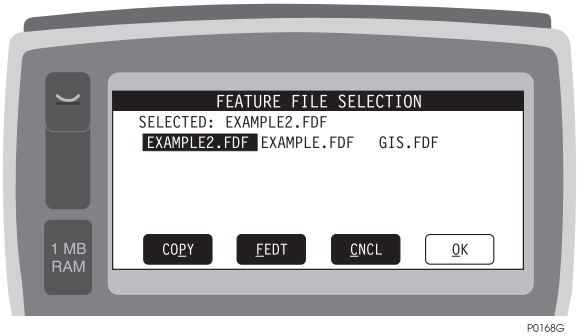

Figure 4.5: Feature File Selection Screen (FDF)

Table 4.4: Feature File Selection Screen (FDF)

Field	Description
SELECTED	Displays currently selected feature file.
COPY	Pressing U and P (or pressing U and 1, or pressing **Menu** while **COPY** is active) copies the highlighted file to a new file, which you can name.
FEDT	Pressing U and F (or pressing U and 2, or pressing **Menu** while **FEDT** is active) allows you to add features and attributes to the highlighted file.
CNCL	Pressing U and C (or pressing U and 3, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in selection.
OK	Pressing U and O (or pressing U and 4, or pressing **Menu** while **OK** is active) accepts the current choice (displayed in reverse video) and recalls the previous screen.

Waypoint File Selection Screen (WPT)

The Waypoint File Selection screen, Figure 4.6, allows you to select a waypoint file.

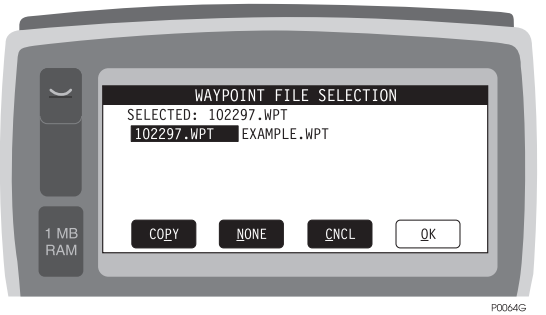

Figure 4.6: Waypoint File Selection Screen (WPT)

Table 4.5: Waypoint File Selection Screen (WPT)

Field	Description
SELECTED	Displays currently selected waypoint file or **NONE** if a waypoint file is not selected.
COPY	Pressing U and P, or pressing U and 1, or pressing **Menu** while **COPY** is active, copies the highlighted waypoint file to a new file, which you can name.
NONE	Pressing U and N, or pressing U and 2, or pressing **Menu** while **NONE** is active, deselect a waypoint file if any were selected, and recalls the previous screen.
CNCL	Pressing U and C, or pressing U and 3, or pressing **Menu** while **CNCL** is active, recalls the previous screen without any changes in selection.
OK	Pressing U and O, or pressing U and 4, or pressing **Menu** while **OK** is active, accepts the current waypoint file (displayed in reverse video), and recalls the previous screen.

Field Asset Management Main Menu (FAM)

The Field Asset Management main menu, Figure 4.7, lets you start feature logging, start waypoint navigation, set up logging parameters, and set up display parameters.

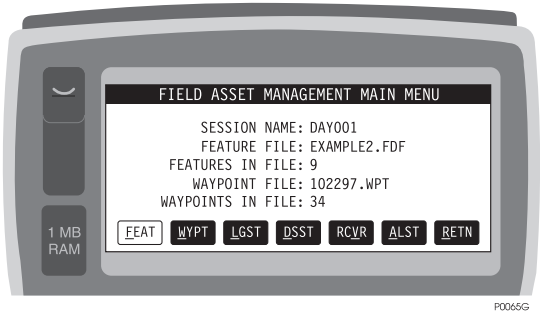

Figure 4.7: FAM Main Menu (FAM)

Table 4.6: Field Asset Management Screen (FAM)

Field	Description
SESSION NAME	Current session name.
FEATURE FILE	Current feature file name. File extension is.FDF.
FEATURES IN FILE	Number of features in the current feature file.
WAYPOINT FILE	Current waypoint file name. File extension is.WPT.
WAYPOINTS IN FILE	Number of points in the current waypoint file.
FEAT	Pressing U and F, or pressing U and 1, or pressing **Menu** while **FEAT** is active, calls the Feature Logging Screen.
WYPT	Pressing U and and W, or pressing U and 2, or pressing **Menu** while **WYPT** is active, calls the Waypoint Navigation Screen.
LGST	Pressing U and and L, or pressing U and 3, or pressing **Menu** while **LGST** is active, calls the Datalogging Setup Screen.
DSST	Pressing U and and D, or pressing U and 4, or pressing **Menu** while **DSST** is active, calls the Display Setup Screen.
RCVR	Pressing U and and V, or pressing U and 5, or pressing **Menu** while **RCVR** is active, calls the receiver Setup Screen.
ALST	Pressing U and A, or U and 6, or pressing **Menu** when **ALST** is active, calls the Alarm Setup screen.
RETN	Pressing U and and R, or pressing U and 7, or pressing **Menu** while **RETN** is active, recalls the previous screen.

Waypoint Navigation Screen (WYPT)

The Waypoint Navigation screen, Figure 4.8, lets you prepare the system for waypoint navigation.

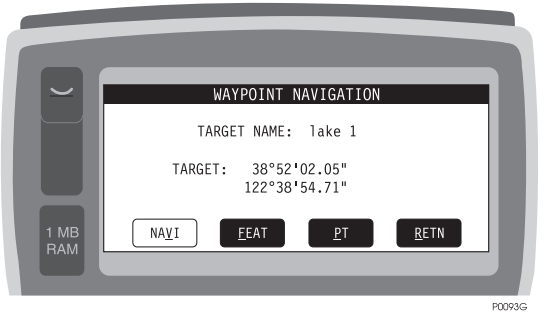

Figure 4.8: Waypoint Navigation Screen (WYPT)

Table 4.7: Waypoint Navigation Screen (WYPT)

Field	Description
TARGET NAME	Shows current target point name.
TARGET	Shows current target point location (latitude and longitude).
NAVI	Pressing U and V (or pressing U and 1, or pressing **Menu** while **NAVI** is active) calls the Horizontal Line Navigation Status Screen.
FEAT	Pressing the U and F (or pressing U and 2, or pressing **Menu** while **FEAT** is active) calls the Feature screens.
PT	Pressing U and P (or pressing U and 3, or pressing **Menu** while **PT** is active) calls the Point Selection Screen.
RETN	Pressing U and R (or pressing U and 4, or pressing **Menu** while **RETN** is active) recalls the previous screen.

Point Selection Screen (PT)

The Point Selection screen, Figure 4.9, allows you to select a navigation target point, add a new waypoint, or edit an existing waypoint.

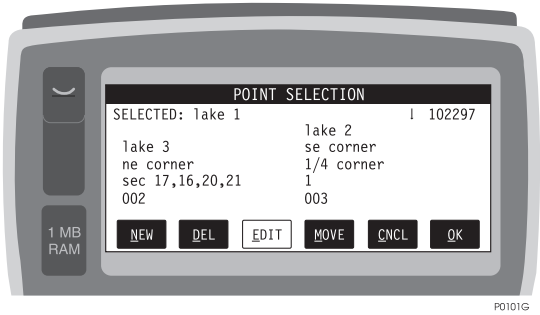

Figure 4.9: Point Selection Screen (PT)

Table 4.8: Point Selection Screen (PT)

Field	Description
SELECTED	Displays currently selected point and waypoint file.
NEW	Pressing U and N (or pressing U and 1, or pressing **Menu** while **NEW** is active) calls the New Point Screen (NEW).
EDIT	Pressing U and E (or pressing U and 2, or pressing **Menu** while **EDIT** is active) calls the Edit Point Screen (EDIT). Highlighted point will be edited.
CNCL	Pressing U and C (or pressing U and 3, or pressing **Menu** while **CNCL** is active) will recall the previous screen without any changes in selection.
OK	Pressing U and O (or pressing U and 4, or pressing **Menu** while **OK** is active) will accept the current choice (displayed in reverse video), and recall the previous screen.

New Point Screen (NEW)

This screen allows you to add a new point to the Point file (Figure 4.10).

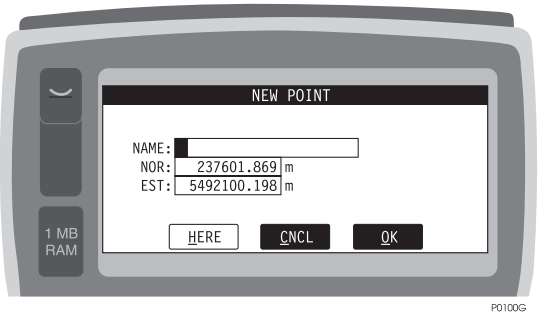

Figure 4.10: New Point Screen (NEW)

Table 4.9: New Point Screen (NEW)

Field	Description
NAME	Editable field where you enter the name of the point (maximum 20 characters).
LAT (or NOR)	Editable field where you enter latitude (or northing) of the point.
LON (or EST)	Editable field where you enter longitude (or easting) of the point.
HERE	Pressing U and H (or pressing U and 1, or pressing **Menu** while **HERE** is active) sets LAT and LON (or NOR and EST) fields to current position.
CNCL	Pressing U and C (or pressing U and 2, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in the waypoint file.
OK	Pressing U and O (or pressing U and 3, or pressing **Menu** while **OK** is active) adds the point to the waypoint file and recalls the previous screen.

Edit Point Screen (EDIT)

This screen allows you to edit a point from the waypoint file (Figure 4.11).

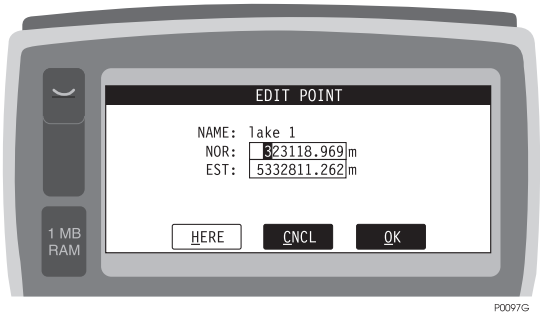

Figure 4.11: Edit Point Screen (EDIT)

Table 4.10: Edit Point Screen (EDIT)

Field	Description
NAME	Displays name of the point.
LAT (or NOR)	Editable field where you enter latitude (or northing) of the point.
LON (or EST)	Editable field where you enter longitude (or easting) of the point.
HERE	Pressing U and H (or pressing U and 1, or pressing **Menu** while **HERE** is active) sets LAT and LON (or NOR and EST) fields to the current position.
CNCL	Pressing U and C (or pressing U and 2, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in the waypoint file.
OK	Pressing U and O (or pressing U and 3, or pressing **Menu** while **OK** is active) updates the point in the waypoint file and recalls the previous screen.

Position Screen (POSN)

This screen displays current position and solution quality information (Figure 4.12).

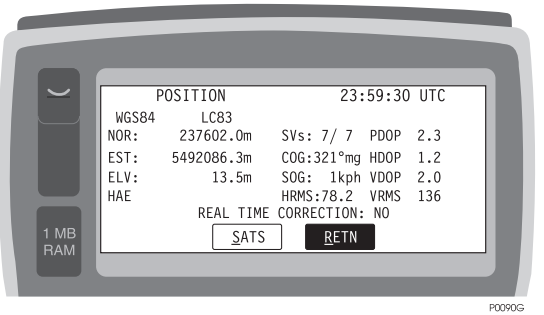

Figure 4.12: Position Screen (POSN)

Table 4.11: Position Screen (POSN)

Field	Description
11:07:25 UTC	Current time and time zone.
SPC83 CA_3	Displays system and zone, or datum that the current position is referenced to.
NOR (or LAT), EST (or LON), ELV	Displays current position.
HAE	Elevation mode of current position being displayed. HAE = Height above ellipsoid. MSC = Height above Mean Sea Level geoid model
REAL TIME CORRECTION: YES	YES Indicates that the position displayed is differentially corrected. If not, this field will display REAL TIME CORRECTION: NO.
SVS	Indicates the number of satellites used in the computation of the displayed position versus number of satellites locked.
COG	Course Over Ground. **tr** indicates true north. **mg** indicates magnetic north.
SOG	Speed Over Ground.
PDOP	Current PDOP value.
HDOP	Current HDOP value.
VDOP	Current VDOP value.
HRMS	Current horizontal RMS value (2 decimal digits).
VRMS	Current vertical RMS value.
SATS	Pressing U and S (or pressing U and 1, or pressing **Menu** while **SATS** is active) calls the Satellite Constellation Screen.
RETN	Pressing U and R (or pressing U and 2, or pressing **Menu** while **RETN** is active) recalls the previous screen.

Satellite Constellation Screen (SATS)

This screen, Figure 4.13, displays the current satellite constellation.

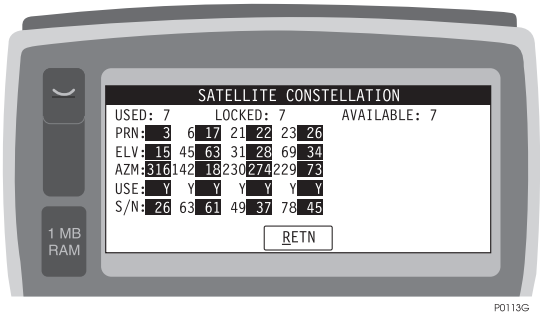

Figure 4.13: Satellite Constellation Screen (SATS)

Table 4.12: Satellite Constellation Screen (SATS)

Field	Description
USED	Indicates number of satellites used in position computation.
LOCKED	Indicates number of satellites locked.
AVAILABLE	Indicates number of satellites available.
PRN	Shows the PRN number of each satellite locked.
ELV	Indicates elevation angle of each satellite.
AZM	Indicates azimuth of each satellite.
USE	Y indicates that satellite is used in position computation; N indicates not used.
S/N	Indicates signal-to-noise ratio for each satellite.
RETN	Pressing U and R (or pressing U and 1, or pressing **Menu**) will recall the previous screen.

Horizontal Line Navigation Status Screen (NAVI)

This screen displays the status of the navigation mission with a horizontal line display showing your location with reference to the true line. Your perspective is from a cross section of the line looking forward to the next waypoint (Figure 4.14).

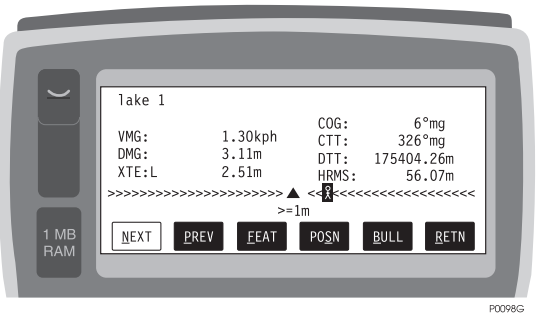

Figure 4.14: Horizontal Line Navigation Screen (NAVI)

Table 4.13: Horizontal Line Navigation Screen (NAVI)

Field	Description
POLE#0245-586	Displays ID of the target point.
VMG	This field indicates the Velocity Made Good in the direction of the line.
DMG	This field indicates the Distance Made Good traveled down the line, referenced to the From waypoint.
XTE	This field indicates your distance off line (cross track error). If you are off line to the right of line, an L is displayed to indicate that you should steer left to get back on course. An R will be displayed if you are off line to the left.
COG	Display of Course Over Ground. **tr** indicates true north, **mg** indicates magnetic north.
CTT	Displays the Course to Target. The target is the next waypoint being navigated to. **tr** indicates true north. **mg** indicates magnetic north.
DTT	Displays the Distance to Target. The target is the next waypoint being navigated to.
HRMS	Displays current horizontal RMS value.
>>>▲<<<	The Cross Track Error Display indicates how far off the line you are located. The ▲ is on line. The stick figure on the display indicates your position with reference to the line. If the stick figure is on the left side of the ▲, you must go right to get back on line. Each > indicates a certain amount of distance off line. The magnitude or each > changes depending upon how far off line you are.
>=1 m	Indicates the scale of each >. If the stick figure is on the 4th > to the left of the ▲, this indicates you are left of line by 4 meters and you must go right to get back on line. The scale changes automatically.

Table 4.13: Horizontal Line Navigation Screen (NAVI) (continued)

Field	Description
NEXT	Pressing U and N (or pressing U and 1, or pressing **Menu** while **NEXT** is active) switches the target point. The next sequential point of the waypoint file is selected.
PREV	Pressing U and P (or pressing U and 2, or pressing **Menu** while **PREV** is active) switches the target point. The previous sequential point of the waypoint file is selected.
FEAT	Pressing U and F (or pressing U and 3, or pressing **Menu** while **FEAT** is active) calls the Feature Logging Screen.
POSN	Pressing U and S (or pressing U and 4, or pressing **Menu** while **POSN** is active) calls the Position Screen.
BULL	Pressing U and B (or pressing U and 5, or pressing **Menu** while **BULL** is active) calls the Bullseye Navigation Status Screen.
RETN	Pressing U and R (or pressing U and 6, or pressing **Menu** while **RETN** is active) recalls the previous screen.

Bullseye Navigation Status Screen (BULL)

This screen displays the status of the navigation mission in the form of a bullseye where the position being navigated to is at the center of the screen. Your perspective is again from above (Figure 4.15).

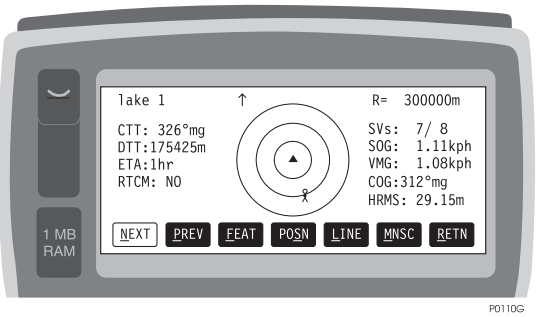

Figure 4.15: Bullseys Navigation Status Screen (BULL)

Table 4.14: Bullseye Navigation Status Screen (BULL)

Field	Description
lake 1	Displays ID of the target.
R=300000m	Displays radius of the external circle.
CTT	Displays the Course to Target. The target is the next waypoint being navigated to. **tr** indicates true north. **mg** indicates magnetic north.
DTT	Displays the Distance to Target. The target is the next waypoint being navigated to.
ETA	Estimated time of arrival (in hours).
RTCM	Displays (YES or NO) if the positions are differentially corrected.
SVS	Indicates the number of satellites **used** in the computation of the displayed position versus the number of satellites **locked**.
SOG	Display of Speed Over Ground.
VMG	Display of Velocity Made Good.
COG	Display of Course Over Ground. **tr** indicates true north. **mg** indicates magnetic north.
HRMS	Displays current horizontal RMS value.
NEXT	Pressing U and N (or pressing U and 1, or pressing **Menu** while **NEXT** is active) switches the target point. The next sequential point of the waypoint file is selected.

Table 4.14: Bullseye Navigation Status Screen (BULL) (continued)

Field	Description
PREV	Pressing U and P (or pressing U and 2, or pressing **Menu** while **PREV** is active) switches the target point. The previous sequential point of the waypoint file is selected.
FEAT	Pressing U and F (or pressing U and 3, or pressing **Menu** while **FEAT** is active) calls the Feature Logging Screen.
POSN	Pressing U and S (or pressing U and 4, or pressing **Menu** while **POSN** is active) calls the Position Screen.
LINE	Pressing U and L (or pressing U and 5, or pressing **Menu** while **LINE** is active) calls the Vertical Line Navigation Status Screen.
MNSC (or AUSC)	Pressing U and M (or U and A) (or pressing U and 6, or pressing **Menu** while **MNSC** (or **AUSC**) is active) toggles the scaling method to manual or to automatic. In automatic scaling, the radius of the bullseye circle is adjusted automatically. In manual scaling, use the arrow keys to scale the display.
RETN	Pressing U and R (or pressing U and 7, or pressing **Menu** while **RETN** is active) recalls the previous screen.

Vertical Line Navigation Status Screen (LINE)

The Vertical Line Navigation Status screen, Figure 4.16, displays the status of the navigation mission. The display shows your present and past location with reference to the true line being navigated. Your perspective is from a point directly above the line being navigated, with the direction of travel toward the top of the screen.

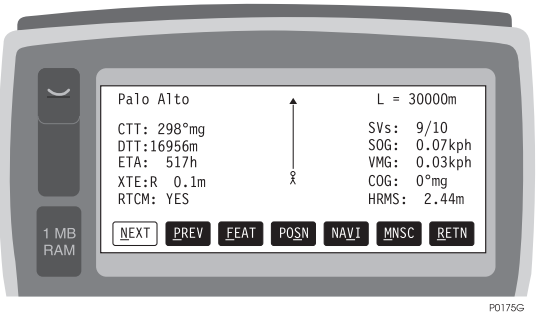

Figure 4.16: Vertical Line Navigation Status Screen (LINE)

Table 4.15: Vertical Line Navigation Status Screen (LINE)

Field	Description
lake 1	ID of the target point.
L=300m	Length of line displayed.
CTT	Course to Target. The target is the next waypoint being navigated to. **tr** indicates true north, **mg** indicates magnetic north.
DTT	Distance to Target. The target is the next waypoint being navigated to.
ETA	Estimated time of arrival (in hours).
SVS	Number of satellites **used** in the computation of the displayed position versus number of satellites **locked**.
XTE	Distance off line (cross track error). L or R indicates if you are off line to the right or to the left.
RTCM	Displays (YES or NO) if the positions are differentially corrected.
SOG	Speed Over Ground.
VMG	Velocity Made Good.
COG	Course Over Ground. **tr** indicates true north. **mg** indicates magnetic north.
HRMS	Current horizontal RMS value.
NEXT	Pressing U and N (or pressing U and 1, or pressing **Menu** while **NEXT** is active) switches the target point. The next sequential point of the waypoint file is selected.

Table 4.15: Vertical Line Navigation Status Screen (LINE) (continued)

Field	Description
PREV	Pressing U and P (or pressing U and 2, or pressing **Menu** while **PREV** is active) switches the target point. The previous sequential point of the waypoint file is selected.
FEAT	Pressing U and F (or pressing U and 3, or pressing **Menu** while **FEAT** is active) calls the Feature Logging Screen.
POSN	Pressing U and S (or pressing U and 4, or pressing **Menu** while **POSN** is active) calls the Position Screen.
NAVI	Pressing U and V (or pressing U and 5, or pressing **Menu** while **NAVI** is active) calls the Horizontal Line Navigation Status Screen.
MNSC (or AUSC)	Pressing U and M (or U and A) (or pressing U and 6, or pressing **Menu** while **MNSC** (or **AUSC**) is active) toggles scaling method (to manual or to automatic). In automatic scaling, the height of the display is adjusted automatically. In manual scaling, use the arrow keys to scale the display.
RETN	Pressing U and R (or pressing U and 7, or pressing **Menu** while **RETN** is active) recalls the previous screen.

Display Setup Screen (DSST)

The Display Setup screens, Figure 4.17 (geographic) and Figure 4.18 (grid), let you customize certain aspects of the displays and data entry.

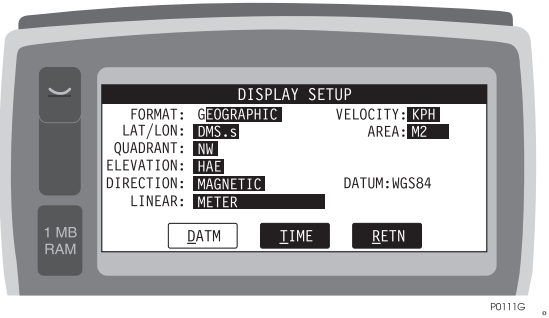

Figure 4.17: Display Setup Screen (DSST), Geographic

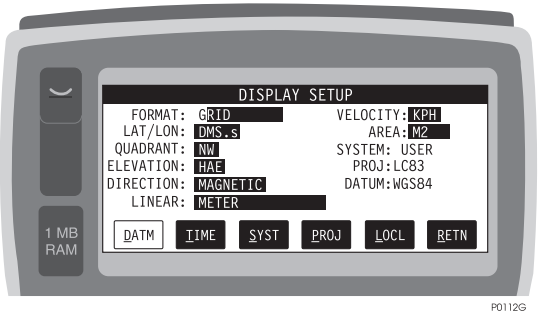

Figure 4.18: Display Setup Screen (DSST), Grid

Table 4.16: Display Setup Screen (DSST)

Field	Description
FORMAT	Toggle field allows you to select the format for displaying coordinates. Toggle values are GEOGRAPHIC and GRID. Use the **Space** key to toggle.
LAT/LON	Toggle field allows you to select the format for displaying geographic coordinates. Toggle values are D.d, DM.m, and DMS.s. Use the **Space** key to toggle.
QUADRANT	Toggle field lets you select quadrant to display positive latitude and longitude. Toggle values are NE (default), NW, SE and SW. Use **Space** key to toggle.
ELEVATION	Toggle field lets you select elevation system, HAE (Height Above Ellipsoid) or MSL (Mean Sea Level), for displayed elevations. Use **Space** key to toggle.

Table 4.16: Display Setup Screen (DSST) (continued)

Field	Description
DIRECTION	Toggle field lets you select reference, true or magnetic north, for displayed direction information. Values are MAGNETIC or TRUE. **Space** key toggles.
LINEAR	Toggle field allows you to select the units for displaying linear information. Toggle values are METER, FEET, U.S. FEET, YARD, US YARD, KILOMETER, MILE, and NAUTICAL MILE. Use **Space** key to toggle.
VELOCITY	Toggle field allows you to select the units for displaying velocity information. Toggle values are KPH, MPH and KNOTS. Use **Space** key to toggle.
AREA	Operational only in differential mode. Displays area bounded by your trajectory and a straight line back to your starting point. Shows total area covered when you return to your starting point. **Space** key selects units: acres, square feet, square yards, square miles, square meters, square kilometers, hectares
RIGHT PANE DISPLAY	Displays information about currently selected system. Information consists of: 1. Datum, if format is GEOGRAPHIC. 2. Datum, ellipsoid, projection, if format is GRID and system is user-defined. 3. System and zone, if format is grid and system is from set of predefined systems.
DATM	Pressing U and D (or pressing U and 1, or pressing **Menu** while **DATM** is active) calls the Datum Selection Screen (DATM). This button exists when: 1. format is GEOGRAPHIC or 2. format is GRID and system is user-defined.
ZONE	Pressing U and Z (or pressing U and 1, or pressing **Menu** while **ZONE** is active) calls the Zone Selection Screen (ZONE). This button exists only when format is GRID and system is selected from the set of predefined systems: UTM, SPC27 or SPC83.
TIME	Pressing U and T (or pressing U and 2, or pressing **Menu** while **TIME** is active) calls the Time Zone Screen (TIME).
SYST	Pressing U and S (or pressing U and 3, or pressing **Menu** while **SYST** is active) calls the System Selection Screen (SYST). This button exists only when format is GRID.
PROJ	Pressing U and P (or pressing U and 4, or pressing **Menu** while **PROJ** is active) calls the Projection Selection Screen (PROJ). This button exists only when format is GRID and system is user-defined.
LOCL	Pressing U and L (or pressing U and 3, 4, or 5 - depends upon which DISPLAY SETUP screen is selected, or pressing **Menu** while **LOCL** is active) brings up the Grid to Local Transformation screen.
RETN	Pressing U and R, or U and 4, 5, or 6, - depends upon which DISPLAY SETUP screen is chosen, or pressing **Menu** while **RETN** is active - recalls previous screen.

System Selection Screen (SYST)

The System Selection screen, Figure 4.19, allows you to select one of several predefined grid systems.

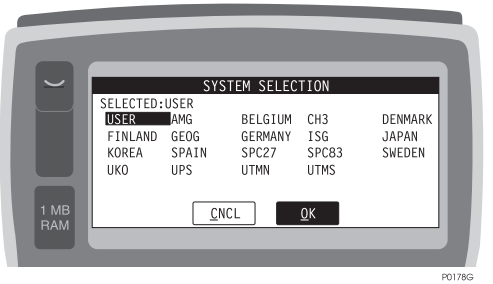

Figure 4.19: System Selection Screen (SYST)

Use the arrow keys or enter the first letter of the system to highlight a system.

Table 4.17: System Selection Screen (SYST)

Field	Description
SELECTED	Displays currently selected system.
CNCL	Pressing U and C (or pressing U and 1, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in system selection.
OK	Pressing U and O (or pressing U and 2, or pressing **Menu** while **OK** is active) accepts current choice (system displayed in reverse video) and recalls the previous screen.

Zone Selection Screen (ZONE)

This screen allows you to select the zone where the survey is performed. Figure 4.20 shows a typical zone selection screen. Not all systems have zones; those that do are listed in Table 4.19.

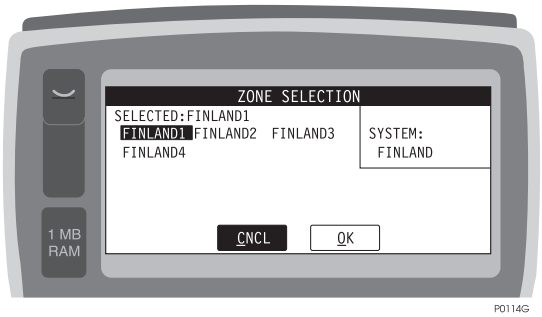

Figure 4.20: Typical Zone Selection Screen (ZONE)

Use the arrow keys or the first letter of the zone to highlight a zone.

Table 4.18: ZONE Selection Screen

Field	Description
SELECTED	Displays currently selected UTM, SPCS27 or SPCS83 zone.
RIGHT PANE DISPLAY	Displays information about highlighted zone. The highlighted zone is displayed in reverse video.
CNCL	Pressing U and C (or pressing U and 1, or pressing **Menu** while **CNCL** is active) will recall the previous screen without any changes in zone selection.
OK	Pressing U and O (or pressing U and 2, or pressing **Menu** while **OK** is active) will accept current choice (zone displayed in reverse video) and recall the previous screen .

Table 4.19: Systems with/without Zones

System	Zones
Finland	Yes
Korea	Yes
SPC27	Yes
AMG	Yes
CH3	Yes

Table 4.19: Systems with/without Zones (continued)

System	Zones
Germany	Yes
Denmark	Yes
SPC83	Yes
UPS	Yes
UTMN	Yes
Spain	Yes
ISG	Yes
UTMS	Yes
Sweden	No
UKO	No
Georgia	No
Belgium	No
Japan	No

Projection Selection Screen (PROJ)

This screen allows you to select the projection to be used in the grid coordinates computations (Figure 4.21).

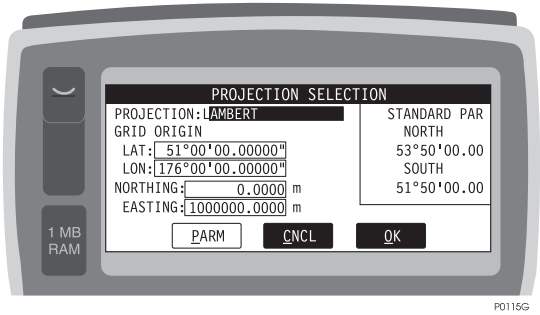

Figure 4.21: Projection Selection Screen (PROJ)

Table 4.20 describes the screen parameters.

Table 4.20: Projection Selection Screen (PROJ)

Field	Description
PROJECTION	Toggle field selects projection. Values are LAMBERT, TRANSVERSE MERCATOR, OBLIQUE MERCATOR and POLAR STEREOGRAPHIC.
LAT, LON	Editable fields let you enter coordinates of grid origin.
NORTHING, EASTING	Editable fields let you enter the value of false origin.
RIGHT PANE DISPLAY	Displays additional projection parameters.
PARM	Pressing U and P, or U and 1, or pressing **MENU** while **PARM** is active, calls the Projection Parameters Screen (PARM).
CNCL	Pressing U and C, or U and 2, or pressing **MENU** while **CNCL** is active, recalls the previous screen without any changes in projection selection.
OK	Pressing U and O, or U and 3, or pressing **MENU** while **OK** is active, accepts current choice (projection, grid, false origin) and recalls previous screen .

Projection Parameters Screen (PARM)

This screen allows you to enter projection-specific parameters (Figure 4.22, 4.23, 4.24, 4.25).

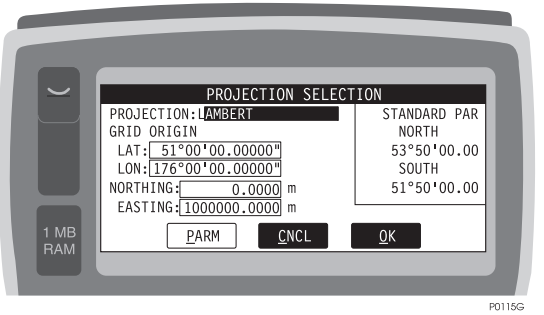

Figure 4.22: Projection Parameters (PARM) - 1

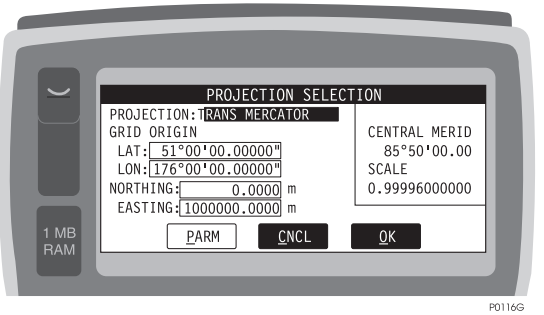

Figure 4.23: Projection Parameters (PARM) - 2

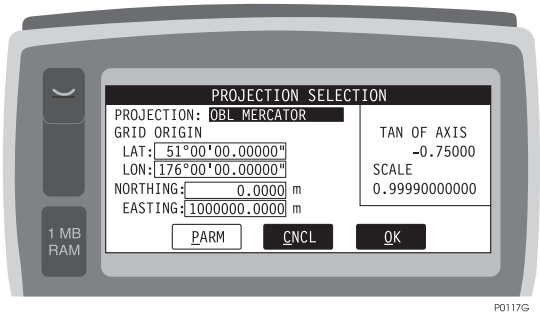

Figure 4.24: Projection Parameters (PARM) - 3

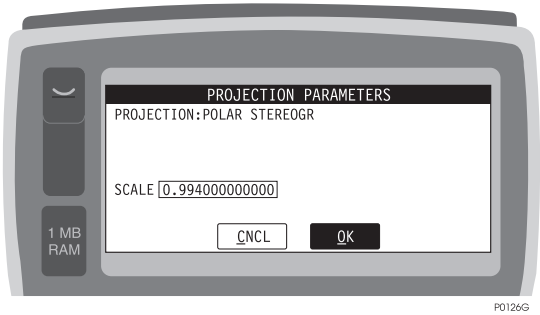

Figure 4.25: Projection Parameters (PARM) - 4

Table 4.21: Projection Parameters (PARM)

Field	Description
PROJECTION	Displays name of the projection.
EDITABLE FIELDS	Editable fields let you enter projection-specific parameters: - standard parallels for Lambert projection and central meridian, inverse scale for Transverse Mercator projection, tangent of axis azimuth and inverse scale for Oblique Mercator projection, and scale for Polar Stereographic projection
CNCL	Pressing U and C (or pressing U and 1, or pressing **Menu** while **CNCL** is active) will recall the previous screen without any changes in projection parameters.
OK	Pressing U and O (or pressing U and 2, or pressing **Menu** while **OK** is active) will accept the current choice (projection parameters) and recall the previous screen .

Datum Selection Screen (DATM)

The Datum Selection screen, Figure 4.26, allows you to select a predefined datum.

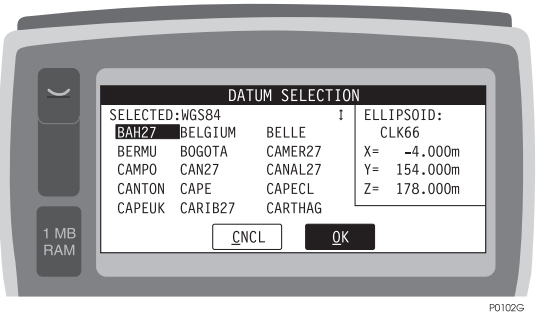

Figure 4.26: Datum Selection Screen (DATM)

Use the arrow keys or the first letter of the datum to highlight a datum.

Table 4.22: Datum Selection Screen (DATM)

Field	Description
SELECTED	Displays currently selected datum.
RIGHT PANE DISPLAY	Displays information about highlighted datum: ellipsoid and translation parameters between highlighted datum and WGS84. The highlighted datum is displayed in reverse video.
USER	When USER is not the highlighted Field (datum), this button is dimmed and cannot be active. Otherwise, pressing U and U (or pressing U and 1, or pressing **Menu** while **USER** is active) calls the User Datum Definition Screen (UDAT).
CNCL	Pressing U and C (or pressing U and 2, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in datum selection.
OK	Pressing U and O (or pressing U and 3, or pressing **Menu** while **OK** is active) accepts the current choice (datum displayed in reverse video) and recalls the previous screen.

User Datum Definition Screen (USER)

The User Datum Definition screen, Figure 4.28, lets you define ellipsoid and translation values.

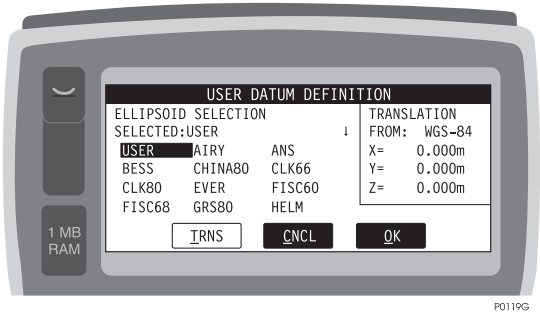

Figure 4.27: User Datum Definition Screen (USER)

Table 4.23: User Datum Definition Screen (USER)

Field	Description
SELECTED	Displays currently selected ellipsoid.
RIGHT PANE DISPLAY	Displays x, y, z: offset of the datum origin from WGS84 origin.
TRNS	Pressing U and T (or pressing U and 1, or pressing **Menu** while **TRNS** is active) calls the Translations Screen (TRNS).
CNCL	Pressing U and C (or pressing U and 2, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in ellipsoid selection.
OK	Pressing U and O (or pressing U and 3, or pressing **Menu** while **OK** is active) accepts the current choice (ellipsoid displayed in reverse video) and recalls the previous screen .

Translations Screen (TRNS)

The Translations screen, Figure 4.28, allows you to enter translation parameters between the origin of the current datum and WGS84.

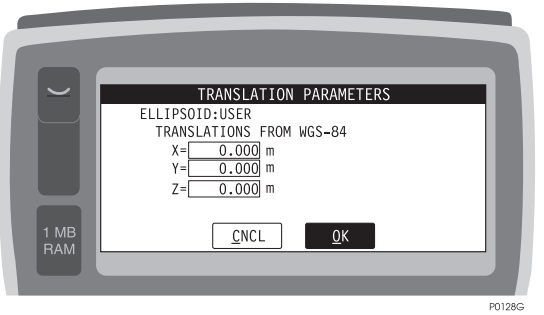

Figure 4.28: Translations Screen (TRNS)

Table 4.24: Translations Screen (TRNS)

Field	Description
ELLIPSOID	Displays currently selected ellipsoid.
X, Y, Z	Editable fields where you can enter offsets of the ellipsoid center from the WGS84 ellipsoid.
CNCL	Pressing U and C (or pressing U and 1, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in translation parameters.
OK	Pressing U and O (or pressing U and 2, or pressing **Menu** while **OK** is active) accepts current translation parameters and recalls the previous screen.

Grid to Local Transformation Screen (LOCL)

The Grid to Local Transformation screen, Figure 4.29, lets you apply local transformation parameters to your survey.

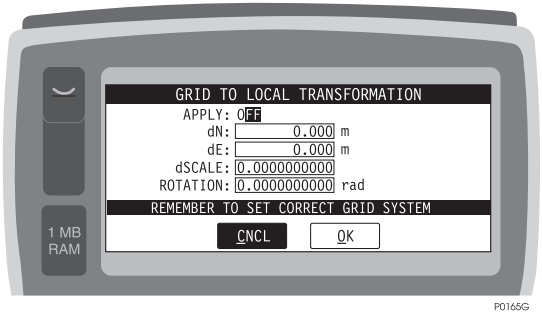

Figure 4.29: Grid to Local Transformation Screen (LOCL)

Table 4.25 describes the fields in the Grid to Local Transformation screen.

Table 4.25: Grid to Local Transformation Screen (LOCL)

Field	Description
APPLY	Press the **Space** key to toggle this field OFF to disable local transformation, or ON to apply local transformation.
dN	Enter delta northing in meters
dE	Enter delta easting in meters
dScale	Enter delta scale value from 1.0000.
ROTATION	Enter rotation of coordinate system in degrees.
CNCL	Pressing U and C, or pressing U and 1, or pressing **Menu** while **CNCL** is active, returns to the Display Setup screen without saving any changes.
OK	Pressing U and O, or pressing U and 2, or pressing **Menu** while **OK** is active, returns to the Display setup screen, saving the changes.

Time Zone Screen (TIME)

The Time Zone screen, Figure 4.30, allows you to name the time zone, and enter the offset from UTC.

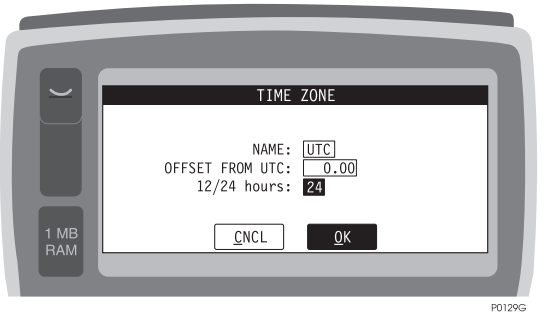

Figure 4.30: Time Zone Screen (TIME)

Table 4.26: Time Zone Screen (TIME)

Field	Description
NAME	Editable field where you can enter a three-character abbreviation of the time zone.
OFFSET FROM UTC	Editable field where you can enter offset of the local time zone from UTC. Offset = local time - UTC
12/24 HOURS	Toggle field. Possible values are: 12, and 24. Sets the clock as 12- or 24-hour clock.
CNCL	Pressing U and C (or pressing U and 1, or pressing **Menu** while **CNCL** is active) will recall the previous screen without any changes in parameters.
OK	Pressing U and O (or pressing U and 2, or pressing **Menu** while **OK** is active) will accept current parameters and recall the previous screen .

Datalogging Setup Screen (LGST)

The Datalogging Setup screen, Figure 4.31, lets you set up required parameters for logging data during data acquisition.

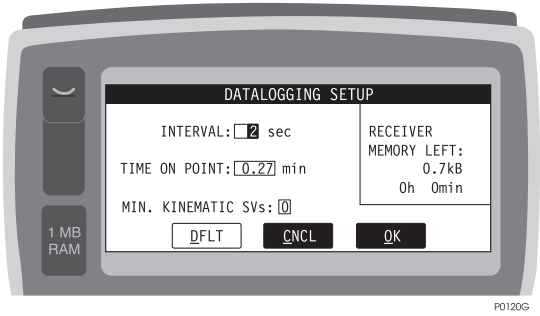

Figure 4.31: Datalogging Setup Screen (LGST)

Table 4.27: Datalogging Setup Screen (LGST)

Field	Description
INTERVAL	Editable field allows you to set a data recording interval (default value 2 seconds).
TIME ON POINT	Editable field allows you to enter the amount of time to spend on a static station. Valid values for this field are 0 - 60 minutes. Default value is 0.33 minute. This value is not used when recording lines or polygons.
MIN. KINEMATIC SVs	Editable field allows you to enter required minimum number of satellites for kinematic survey. When the number of locked SVs drops below this setup number the alarm sounds and an error message will be displayed.
RECEIVER MEMORY LEFT	Displays memory available for data collection. Number of hours depends upon the number of satellites and the recording interval.
DFLT	Pressing U and D (or pressing U and 1, or pressing **Menu** while **DFLT** is active), changes the settings back to their default values.
CNCL	Pressing U and C (or pressing U and 2, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in log settings.
OK	Pressing U and O (or pressing U and 3, or pressing **Menu** while **OK** is active) accepts current settings and recalls the previous screen .

Receiver Setup Screen (RCVR)

The Receiver Setup screen, Figure 4.32, lets you set up receiver parameters.

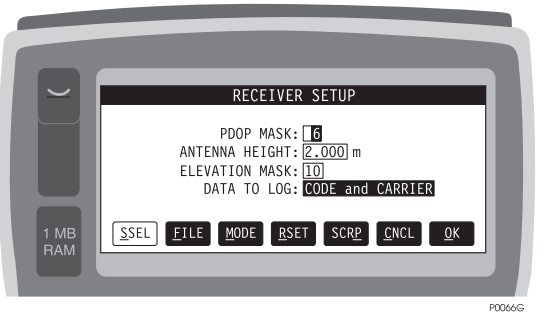

Figure 4.32: Receiver Setup Screen (RCVR)

Table 4.28: Receiver Setup Screen (RCVR)

Field	Description
PDOP MASK	Editable field. If PDOP value is greater then PDOP MASK data is not recorded to the receiver. Default value is 6.
ANTENNA HEIGHT	Editable field to allows you to enter the antenna height. Valid values are 0 - 6.5 meters. Default is 2.0 meters
ELEVATION MASK	Editable field allows you to enter elevation cut-off value. Data from satellites below this mask is not recorded into receiver memory. Default is 10.
DATA TO LOG	Toggle field. Toggle values are CODE ONLY, or POSITION ONLY (default is CODE ONLY). If Carrier Phase option is installed in receiver, toggle values are CODE & CARRIER, or POSITION ONLY (default is CODE & CARRIER).
SSEL	Pressing U and S (or pressing U and 1, or pressing **Menu** while **SSEL** is active) calls the Satellite Selection screen (SSEL).
FILE	Pressing U and F (or pressing U and 2, or pressing **Menu** while **FILE** is active) calls the File Management screen (FILE).
MODE	Pressing U and M (or pressing U and 3, or pressing **Menu** while **MODE** is active) calls the Differential Mode screen (MODE).
BATT	Pressing U and B (or pressing U and 4, or pressing **Menu** while **BATT** is active) calls the Battery Management screen (BATT).
RSET	Pressing U and R (or pressing U and 5, or pressing **Menu** while **RSET** is active) calls the receiver Reset screen (RSET).
CNCL	Pressing U and C (or pressing U and 6, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in receiver settings.
OK	Pressing U and O (or pressing U and 7, or pressing **Menu** while **OK** is active) accepts current settings and recalls the previous screen .

Satellite Selection Screen (SSEL)

The Satellite Selection screen, Figure 4.33, allows you to select or deselect the satellites used in position computation.

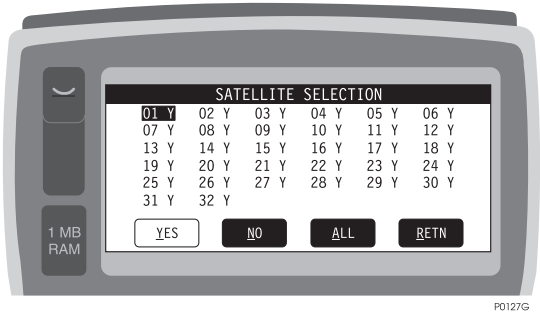

Figure 4.33: Satellite Selection Screen (SSEL)

Table 4.29: Satellite Selection Screen (SSEL)

Field	Description
YES	Pressing U and Y (or pressing U and 1, or pressing **Menu** while **YES** is active) selects the highlighted satellite. Selection is made using arrow keys.
NO	Pressing U and N (or pressing U and 2, or pressing **Menu** while **NO** is active) deselects the highlighted satellite. Selection is made using arrow keys.
ALL	Pressing U and A (or pressing U and 3, or pressing **Menu** while **ALL** is active) selects all displayed satellites.
RETN	Pressing U and R (or pressing U and 4, or pressing **Menu** while **RETN** is active) recalls the previous screen .

Receiver File Management Screen (FILE)

The Receiver File Management screen, Figure 4.34, allows you to delete files stored in the receiver.

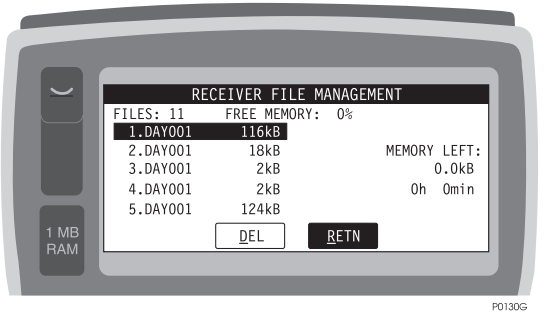

Figure 4.34: Receiver File Management Screen (FILE)

Table 4.30: Receiver File Management Screen (FILE)

Field	Description
FILES	Displays number of files stored in the receiver.
FREE MEM	Displays in percent amount of memory left in the receiver.
DEL	Pressing U and D (or pressing U and 1, or pressing **Menu** while **DEL** is active) delete s the selected file. Depending upon the number of files and the sizes, deleting a file can take from several seconds to several minutes. Do not disconnect the receiver power during this period, otherwise the receiver memory may be corrupted.
RETN	Pressing U and R (or pressing U and 2, or pressing **Menu** while **RETN** is active) recalls the previous screen .

Battery Management Screen (BATT)

The Battery Management screen, Figure 4.35, lets you set up parameters of the receiver battery.

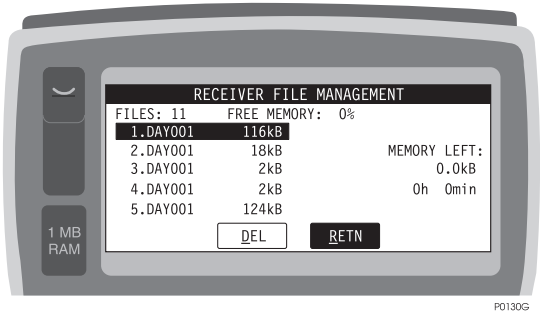

Figure 4.35: Battery Management Screen (BATT)

Table 4.31: Battery Management Screen (BATT)

Field	Description
BATTERY CAPACITY	Editable field allows you to enter capacity in mAh of the receiver's batteries. The default value is 0. For the Panasonic batteries supplied with the system, this value is 2300 mAh. If two Panasonic batteries are connected, this value is 4600 mAh.
POWER REMAINING	Editable field allows you to set the power remaining in the receiver battery. After connecting a fully charged battery, this field should be set to 100%.
WARNING	The value displayed in the POWER REMAINING field is calculated based on the assumption that there are no other devices, such as an RTCM radio, or external receiver (echo sounder, laser range finder, etc.) attached to the Reliance system batteries.
VOLTAGE	Editable field allows you to set the voltage of the receiver battery.
WARNING LEVEL	Editable field allows you to adjust percentage of the battery power remaining after the warning indication. Enter 0% to disable receiver battery management if you are powering the receiver using a power supply.
CNCL	Pressing U and C (or pressing U and 1, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in receiver settings.
OK	Pressing U and O (or pressing U and 2, or pressing **Menu** while **OK** is active) accepts current settings and recall the previous screen.

Receiver Reset Screen (RSET)

The Receiver Reset screen, Figure 4.36, allows you to reset the receiver.

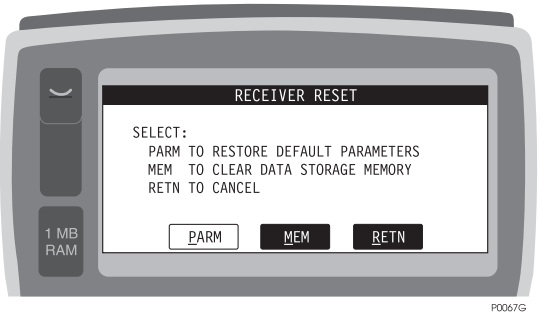

Figure 4.36: Receiver Reset Screen (RSET)

Table 4.32: Receiver Reset Screen (RSET)

Field	Description
PARM	Pressing U and P (or pressing U and 1, or pressing **Menu** while **PARM** is active) restores default receiver parameters.
MEM	Pressing U and M (or pressing U and 2, or pressing **Menu** while **MEM** is active) clears receiver memory without resetting parameters.
RETN	Pressing U and R (or pressing U and 3, or pressing **Menu** while **RETN** is active) recalls the previous screen .

Differential Mode Status Screens (MODE)

The differential mode screens, Figure 4.37, Figure 4.38, and Figure 4.39, show the differential modes of the receiver. From these screens you can access the RTCM differential setup screens.

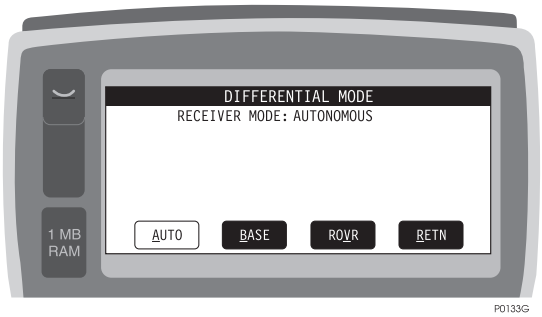

Figure 4.37: Differential Mode Status Screen (MODE) - 1

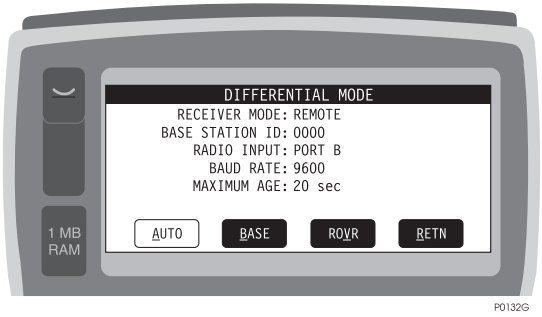

Figure 4.38: Differential Mode Status Screen (MODE) - 2

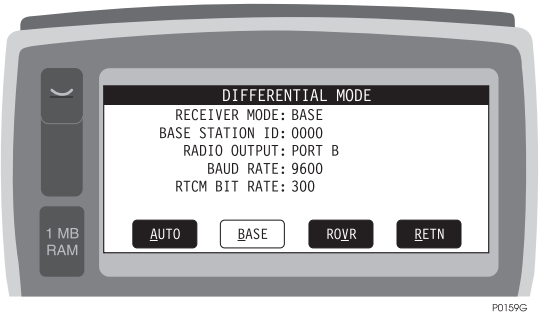

Figure 4.39: Differential Mode Status Screen (MODE) - 3

Table 4.33: Differential Mode Status Screens (MODE)

Field	Description
RECEIVER MODE	Mode of operation. Possible values are AUTONOMOUS, REMOTE, and BASE.
BASE STATION ID	ID of the base station. If the receiver operates as a base station this ID is sent out along with differential corrections. If the receiver operates as a remote station and this value is 0000, the receiver accepts differential corrections from any base station. If the receiver operates as a remote station and this value is not 0000, the receiver accepts differential corrections only from a base station with this ID.
RADIO INPUT	Remote station only. Port selected for collection of differential corrections. Possible values are PORT A, PORT B and PORT C.
RADIO OUTPUT	Base station only. Port selected for output of differential corrections. Possible values are PORT A, PORT B and PORT C.
BAUD RATE	Baud rate for collection (remote station) or output (base station) of differential corrections. Possible values are 300, 600, 1200, 2400, 4800, 9600, 19200 and 38400.
MAXIMUM AGE	Remote station only. Maximum age of a correction at which time the correction will no longer be used. Possible values are 0 - 999 seconds.
RTCM BIT RATE	Base station only. Speed of RTCM messages. Possible values are 25, 50, 100, 110, 150, 200, 250, 300 and 1500.
AUTO	Pressing U and A (or pressing U and 1, or pressing **Menu** while **AUTO** is active) sets the receiver into autonomous mode.
BASE	Pressing U and B (or pressing U and 2, or pressing **Menu** while **BASE** is active) calls the RTCM Base Setup Screen (BASE). This is an option of the receiver. If the option is not activated, then when you press the key a message appears: "**Option not yet installed on your system. Please contact your dealer or call 1-800-229-2400 to order this option."**

Table 4.33: Differential Mode Status Screens (MODE) (continued)

Field	Description
ROVR	Pressing U and V (or pressing U and 3, or pressing **Menu** while **ROVR** is active) calls the RTCM Rover Setup Screen (ROVR). This is an option of the receiver. If the option is not activated, then when you press the key a message appears: "**Option not yet installed on your system. Please contact your Ashtech dealer or call 1-800-229-2400 to order this option."**
RETN	Pressing U and R (or U and 4, or pressing **Menu** while **RETN** is active), recalls the previous screen .

RTCM Rover Station Screen (ROVR)

The RTCM Rover Station screen, Figure 4.40, allows you to setup parameters for RTCM rover station.

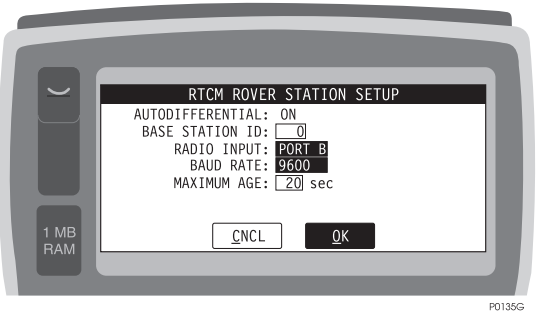

Figure 4.40: RTCM Rover Station Screen (ROVR)

Table 4.34: RTCM Rover Station Screen (ROVR)

Field	Description
AUTODIFFERENTIAL	Toggle allows you to determine if autonomous position will be used if RTCM corrections are not available (ON), or if the position computation will stop when RTCM corrections are not available (OFF).
BASE STATION ID	Editable field allows you to enter the ID of the base station. Valid values are 0 to 1023. Default value is 0. This ID is sent out along with differential corrections from the base station. If the receiver operates as a remote station and this value is zero, the receiver accepts differential corrections from any base station. If the receiver operates as a remote station and this value is not zero, the receiver accepts differential corrections only from a base station with this ID.
RADIO INPUT	Toggle allowing you to select the port for collection of differential corrections. Toggle values are PORT A, PORT B and PORT C. Default is PORT B.
BAUD RATE	Toggle allowing you to select the baud rate for collection of differential corrections. Toggle values are 300, 600, 1200, 2400, 4800, 9600, 19200 and 38400. Default is 9600.
MAXIMUM AGE	Editable field allowing you to enter the maximum age of a correction at which time the correction will no longer be used. Valid values are 0 - 60 seconds. Default value is 20.
CNCL	Pressing U and C (or pressing U and 1, or pressing **Menu** while **CNCL** is active) will recall the previous screen without any changes in receiver settings.
OK	Pressing U and O (or pressing U and 2, or pressing **Menu** while **OK** is active) will accept current settings and recall the previous screen .

RTCM Base Station Setup Screen (BASE)

The RTCM Base Station Setup screen, Figure 4.41, allows you to set up parameters for the RTCM base station.

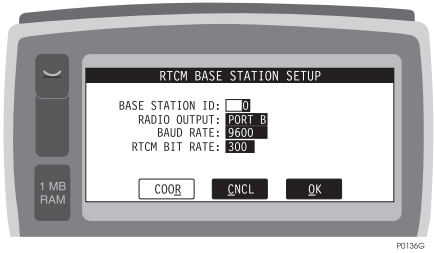

Figure 4.41: RTCM Base Station Setup Screen (BASE)

Table 4.35 describes the fields in the screen.

Table 4.35: RTCM Base Station Setup Screen (BASE)

Field	Description
BASE STATION ID	Editable field lets you to enter ID of the base station. Valid values are 0 - 1023. Default value is 0. If the receiver operates as a base station this ID is sent out along with differential corrections. If another receiver operates as a remote station and this value is zero, the receiver accepts differential corrections from any base station. If another receiver operates as a remote station and this value is not zero, the receiver accepts differential corrections only from a base station with this ID.
RADIO OUTPUT	Toggle allows you to select the port for output of differential corrections. Toggle values are PORT A, PORT B and PORT C. Default is PORT B.
BAUD RATE	Toggle allows you to select the baud rate for output of differential corrections. Toggle values are 300, 600, 1200, 2400, 4800, 9600, 19200 and 38400. Default is 9600.
RTCM BIT RATE	Toggle allows you to select the bit rate of RTCM messages. Toggle values are 25, 50, 100, 110, 150, 200, 250, 300 and 1500. Default is 300.
COOR	Pressing U and R (or pressing U and 1, or pressing **Menu** while **COOR** is active) calls the Base Station Coordinates Screen (COOR).
CNCL	Pressing U and C (or pressing U and 2, or pressing **Menu** while **CNCL** is active) recalls the previous screen without any changes in receiver settings.
OK	Pressing U and O (or pressing U and 3, or pressing **Menu** while **OK** is active) accepts current settings and recalls the previous screen.

Base Station Coordinates Screen (COOR)

The Base Station Coordinates screen, Figure 4.42, lets you set up the coordinates of the base station.

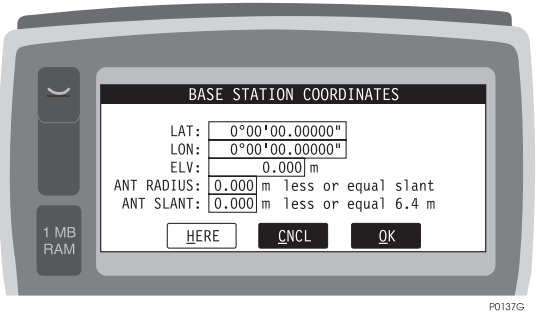

Figure 4.42: Base Station Coordinates (COOR)

Table 4.36 describes the fields in the screen.

Table 4.36: Base Station Coordinates (COOR)

Field	Description
LAT	Editable field lets you enter latitude of the base station.
LON	Editable field lets you enter longitude of the base station.
ELV	Editable field lets you enter elevation of the base station antenna. If the antenna is mounted above a monument, enter the antenna radius and slant.
ANT RADIUS	Editable field lets you enter the radius of the base station antenna. For the Marine IV antenna, this is 7.9 cm (0.079 m). If the height above the monument is already known, set the radius to zero and enter the height in the ANT SLANT field.
ANT SLANT	Editable field lets you enter the slant (the distance from the edge of the antenna to the monument) of the base station antenna. If a tripod or bipod is being used, enter the distance from the edge of the antenna to the monument. Antenna slants up to 6.4 m can be entered.
HERE	Pressing U and H, or U and 1, or pressing **Menu** while **HERE** is active, sets LAT, LNG, and ELV fields to the current position.
CNCL	Pressing U and C, or U and 2, or pressing **Menu** while **CNCL** is active, recalls the previous screen without any changes in base station coordinates.
OK	Pressing U and O, or U and 3, or pressing **Menu** while **OK** is active, accepts entered values, sets coordinates of the base station, and recalls the previous screen.

Feature Logging Screen (FEAT)

On the Feature Logging screen, Figure 4.43, you assign features and attributes from the current feature file. These screens have many variations, depending upon current logging status. When you first enter the screen, you can select from three types of features: **areas**, **lines**, and **points**. You can **nest** the features. Within areas, you can nest lines and/or points. Within a line, only points can be nested. No features can be nested within a point. The top line shows the current logging status. The bottom line (above the function buttons) shows: feature logging time, receiver memory, number of satellites, and Position Dilution of Precision (PDOP) or estimated horizontal accuracy (HRMS), when RTCM corrections are used.

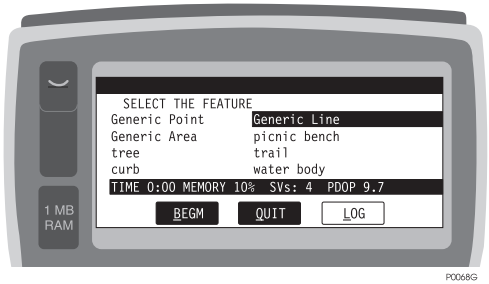

Figure 4.43: Feature Logging Screen (FEAT)

Features are sorted alphabetically. Use arrow keys to move between features. Press a letter to quickly jump to the first feature beginning with that letter. Table 4.37 describes the fields in the screen.

Table 4.37: Feature Logging Screen (FEAT)

Field	Description
BEGM	Pressing U and B, or U and 1, or pressing **MENU** while **BEGM** is active, starts multiple point-feature logging on a single site. This is useful when more than one feature is visible from the occupied site. Distance and azimuth from the occupied site are obtainable with a laser range finder. The receiver starts collecting data as soon as this button is pressed.
AVST	An additional button, not shown, appears when the receiver is in RTCM mode. This button calls the Average Position Setup screen.
QUIT	Pressing U and Q, or U and 1, or pressing **MENU** while **QUIT** is active, recalls the previous screen.
LOG	Pressing U and L, or U and 2, or pressing **MENU** while **LOG** is active, accepts the highlighted feature and immediately starts logging data to the receiver.

Attribute Selection Screen (LOG)

To accept the current value of an attribute press **Enter**, calling the next attribute (or to the first one if the one you accepted was the last one on the list), as shown in Figure 4.44.

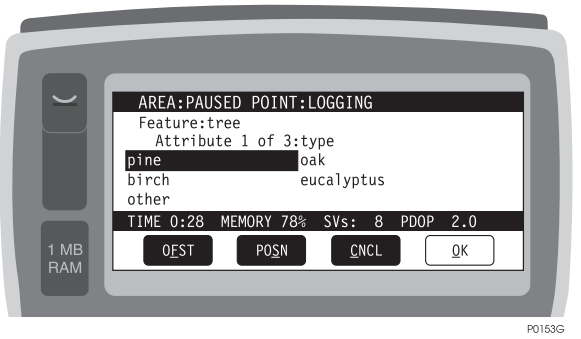

Figure 4.44: Attribute Selection Screen (LOG)

For point features, time counts down to 0 from the number you selected as the TIME ON POINT value in the DATALOGGING SETUP Screen (LGST).

Table 4.38 describes the fields in the screen.

Table 4.38: Attribute Selection Screen (LOG)

Field	Description
OFST	This selection is available only for POINT features. Pressing U and F, or U and 1, or pressing **MENU** while **OFST** is active, calls the Offset screen (OFST).
POSN	Pressing U and S, or U and 2, or pressing **MENU** while **POSN** is active, calls the Position screen (POSN).
CNCL	Pressing U and C, or U and 3, or pressing **MENU** while **CNCL** is active, cancels logging of the current feature and calls the Feature Selection screen, or the Attribute View screen if the cancelled feature were nested.
OK	Pressing U and O, or U and 4, or pressing **MENU** while **OK** is active, confirms values of all attributes and calls the Logging Status screen.

Logging Status Screen - Points Only (LOG)

The Logging Status screen, Figure 4.45, displays the attributes that you have selected.

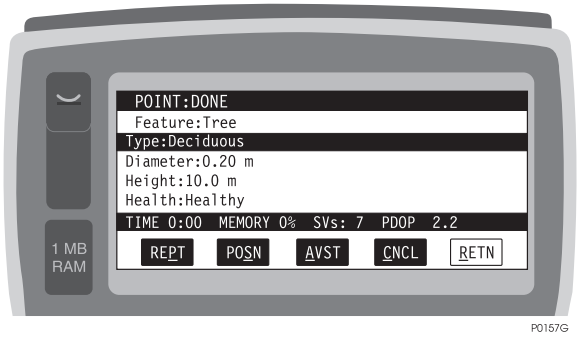

Figure 4.45: Logging Status Screen - Point (LOG)

An asterisk (*) before the feature name indicates that the feature position will be adjusted by the offset entered manually via the controller, or from LRF data.

Table 4.39 describes the fields in the screen.

Table 4.39: Logging Status Screen (Points Only) (LOG)

Field	Description
REPT	This selection is available only when LOGGING is DONE. Pressing U and P (or pressing U and 1, or pressing **Menu** while **REPT** is active) will repeat logging of the last feature (with the same attributes).
POSN	Pressing U and S, or U and 2, or U and 1 when LOGGING is in progress, or pressing **MENU** while **POSN** is active, calls the Position Screen POSN.
AVST	Pressing U and A, or U and 3, or U and 2 when LOGGING is is progress, or pressing MENU while AVST is active, brings up the Average Position Setup screen. This button is active only in RTCM (differential) mode.
CNCL	Pressing U and C, or U and 4, or U and 3 when LOGGING is in progress, or pressing **MENU** while **CNCL** is active, cancels logging of the current feature and calls the Feature Selection Screen, or the Logging Status Screen if the cancelled feature were nested.
DONE	This selection is available only when LOGGING is in progress. Pressing U and D, or U and 4, or pressing **MENU** while **DONE** is active, finishes logging the current point feature (before the time set for logging a point features expired).
RETN	This selection is available only when LOGGING is DONE. Pressing U and R, or U and 4, or pressing **MENU** while **RETN** is active, calls the Feature Selection Screen.

Logging Status Screen (Areas & Lines) (LOG)

For area features time counts up from zero until you hit STOP, U and T, or U and 6 (or U and 5 - if the feature is an area), or **Menu** while **STOP** is active) (Figure 4.46).

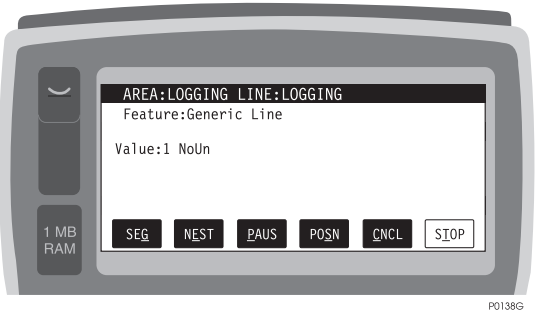

Figure 4.46: Logging Status Screen - Areas and Lines (LOG)

Table 4.40 describes the fields in this screen.

Table 4.40: Logging Status Screen - Areas and Lines (LOG)

Field	Description
SEG	This selection is available only for LINE features. Pressing U and G, or U and 1, or pressing **MENU** while **SEG** is active, starts another segment of the same LINE. You will be able to enter new values of the attributes.
NEST	This selection is available only when LOGGING in progress. Pressing U and E, or U and 2, or U and 1 - if the features is an AREA feature, or pressing **MENU** while **NEST** is active, allows you to nest features using the Feature Selection Screen. For area features, all line and point features are available for nesting, and for the line features all point features can be nested.
FEAT	This selection is available only when LOGGING is paused. Pressing U and F, or pressing U and 2 or U and 1 - if the feature is an AREA feature, or pressing **MENU** while **FEAT** is active, calls the Feature Selection Screen.
PAUS / CONT	Pressing U and P, or pressing U and 3, or U and 2 - if the feature is an AREA feature, or pressing **MENU** while **PAUS** is active, lets you pause logging the area and/or line feature. When logging is paused, the **PAUS** button is replaced by the **CONT** button. Pressing U and N, or U and 3 or U and 2 - if the feature is an AREA feature, or pressing **MENU** while **CONT** is active, you can resume logging area and/or line feature.
POSN	Pressing U and S, or U and 4, or U and 3 - if the feature is an AREA feature, or pressing **MENU** while **POSN** is active, calls the Position Screen (POSN).

Table 4.40: Logging Status Screen - Areas and Lines (LOG) (continued)

Field	Description
CNCL	Pressing U and C, or U and 5, or U and 4 - if the feature is an AREA feature, or pressing **MENU** while **CNCL** is active, cancels logging of the current feature and calls the Logging Status Screen (if the canceled feature were nested).
STOP	Pressing U and T, or U and 6,or U and 5 - if the feature is an AREA feature, or pressing **MENU** while **STOP** is active, stops logging the feature and calls the Logging Status Screen (if the feature were nested), or calls the Feature Selection Screen.

Offset Screen (OFST)

The OFST screen for points, Figure 4.47, allows you to manually enter an offset for a feature. This screen can also be used to monitor measurements sent from a laser range finder. If the laser range finder is not equipped with a compass, you must enter the azimuth manually.

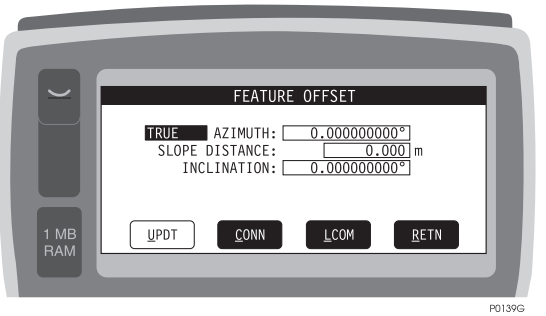

Figure 4.47: Offset Screen (OFST) - Points

Lines and areas are offset perpendicularly to the line of travel by direction, distance, and inclination, as shown in Figure 4.48.

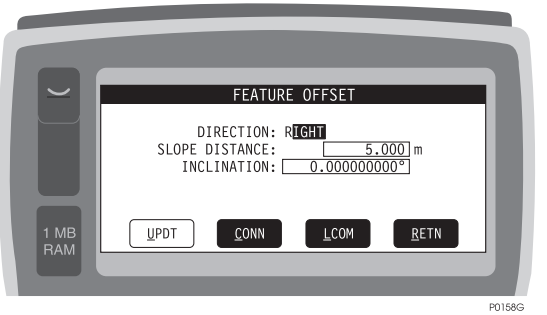

Figure 4.48: Offset Screen (OFST) - Lines and Areas

Table 4.41 describes the fields in this screen.

Table 4.41: Offset Screen (OFST)

Field	Description
MAGNETIC/TRUE	For point offsets only. True or magnetic north. Is using a laser range-finder, make sure the LRF and FAMLog are both set to the same system.
AZIMUTH	For point offsets only. Offset azimuth.
SLOPE DISTANCE	Offset distance along the slope.
INCLINATION	Angle between a horizontal and the offset point or line. If the offset is approximately level, use 0.00.
DIRECTION	For line/area offsets only. Offset direction relative to path of travel. Toggle LEFT or RIGHT.
UPDT	Pressing U (or pressing U and 1, or **Menu** while **UPDT** is active) accepts current parameters.
CONN	Pressing U and C (or pressing U and 2, or **Menu** while **CONN** is active) establishes connection with LRF. Available only if connection to the LRF has not been established.
DCON	Pressing U and D (or pressing U and 2, or **Menu** while **DCON** is active) closes communication with LRF. Available only if connected to LRF.
LCOM	Pressing U and L (or pressing U and 3, or **Menu** while **LCOM** is active) opens the LRF Communications Parameters screen.
RETN	Pressing U and R (or pressing U and 4, or **Menu** while **RETN** is active) returns to the Feature Attribute screen. Values manually entered on this screen are accepted only if UPDT was pressed.

LRF Communications Parameters Screen (LCOM)

The LRF Communications screen, Figure 4.49, lets you set up communications parameters for a laser range finder. Supported laser range finders are:

- Criterion by Laser Technology
- Advantage by Laser Atlanta
- Generation II by MGL

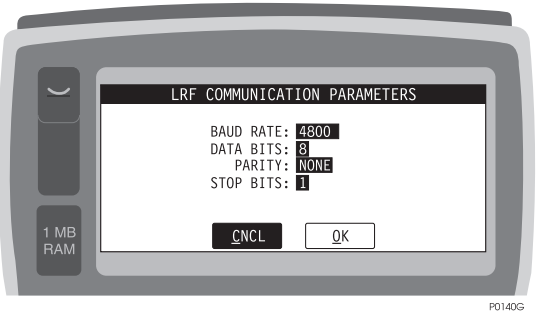

Figure 4.49: LRF Communications Parameters Screen (LCOM)

Table 4.42: LRF Communications Parameters Screen (LCOM)

Field	Description
BAUD RATE	Toggle field lets you set baud rate. Selectable values are 300, 600, 1200, 2400, 4800, 9600, 19200, and 38400.
DATA BITS	Toggle field, lets you set number of data bits. Possible values are 7 and 8. Default is 8.
PARITY	Toggle field lets you select parity. Selectable values are NONE, ODD, and EVEN. Default is NONE.
STOP BITS	Toggle field lets you set number of stop bits. Selectable values are 1 and 2. Default is 1.
CNCL	Pressing U and C (or pressing U and 1, or pressing **Menu** while **CNCL** is active) will recall the previous screen without changes to this screen.
OK	Pressing U and O (or pressing U and 2, or pressing **Menu** while **OK** is active) will accept the current settings and returns to the previous screen.

Multipoint Screen (BEGM)

The Multipoint screen, Figure 4.50, lets you select a feature as part of a multiple point. Multipoint is useful when combined with a laser rangefinder (LRF). Set the GPS antenna on one point and “shoot” nearby points with the LRF. This procedure lets you collect point features quickly and easily.

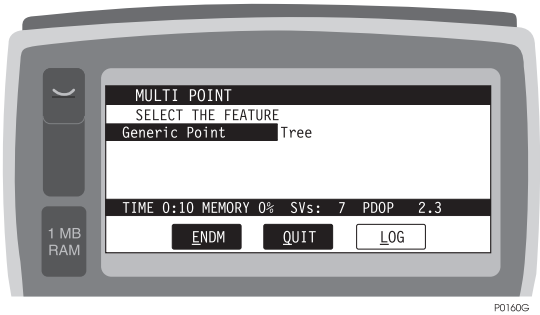

Figure 4.50: Multipoint Screen (BEGM)

Table 4.43 describes the fields in the Multipoint screen.

Table 4.43: Multipoint Screen

Field	Description
SELECT THE FEATURE	Choose the feature to be logged as part of a multipoint.
ENDM	Pressing U and E (or pressing U and 1 or **Menu** while **ENDM** is active) ends the multipoint mode and returns to the Feature Logging screen.
QUIT	Pressing U and Q (or pressing U and 2 or **Menu** while **QUIT** is active) ends the multipoint mode and returns to the Field Asset Management screen.
LOG	Pressing U and L (or pressing U and 3 or **Menu** while **LOG** is active) logs the selected point feature as part of a multipoint.

Average Position Setup Screen (AVST)

The Average Position Setup screen, Figure 4.51, lets you average points and remove outliers.

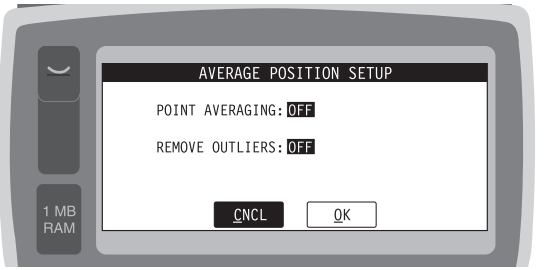

Figure 4.51: Average Position Setup Screen (AVST)

Table 4.44: Average Position Setup Screen (AVST)

Field	Description
POINT AVERAGING	Lets you enable point averaging. Use **Space** key to toggle ON or OFF.
REMOVE OUTLIERS	Lets you remove outliers. Use **Space** key to toggle ON or OFF.
CNCL	Pressing U and C, or pressing U and 1, or pressing **MENU** while **CNCL** is active, cancels the changes.
OK	Pressing U and O, or pressing U and 2, or pressing **MENU** while **OK** is active, saves the changes.

Alarm Setup Screen (ALST)

The Alarm Setup screen, Figure 4.52, gives you a warning if the RTCM link is lost.

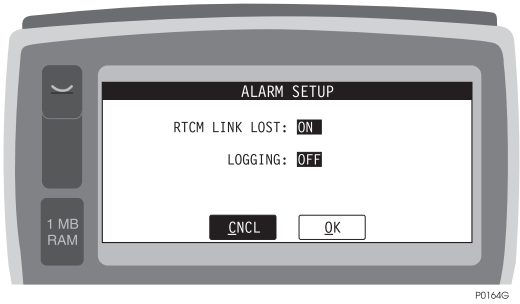

Figure 4.52: Alarm Setup Screen (ALST)

Table 4.45 describes the fields in the Alarm Setup screen.

Table 4.45: Alarm Setup Screen (ALST)

Field	Description
RTCM LINK LOST	Toggle the field by pressing the **Space** key to turn the warning message ON or OFF.
LOGGING	Toggle the field by pressing the **Space** key to turn on the beeper to indicate record logging.
CNCL	Pressing U and C, or U and 1, or **MENU** while **CNCL** is active returns to the previous screen without saving changes.
OK	Pressing U and O, or pressing U and 2, or pressing **MENU** while **OK** is active returns to the previous screen and saves the changes.

File Copy Screen (COPY)

The File Copy screen, Figure 4.53, lets you copy a selected feature definition file to a new file. The new file is necessary if you want to add features and attributes to an FDF while in the field; i.e., you can not change an FDF that was created in the office, but you can copy the file and make additions to the copy.

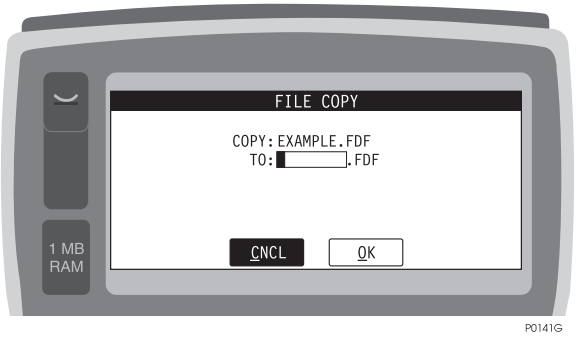

Figure 4.53: File Copy Screen (COPY)

Table 4.46 describes the fields in the screen.

Table 4.46: File Copy Screen (COPY)

Field	Description
COPY	Displays the selected feature definition file (the FDF must be selected using the Feature File Selection screen.
TO	Editable field requires you to enter a name for the copied file.
CNCL	Pressing U and C, or U and 1, or pressing **MENU** while **CNCL** is active, exits screen without saving.
OK	Pressing U and O, or U and 2, or pressing **MENU** while **OK** is active, saves entry and returns to Feature File Selection screen.

Feature Editor Screen (FEDT)

The Feature Editor screen, Figure 4.54, lets you select the type of feature: point, area, or line.

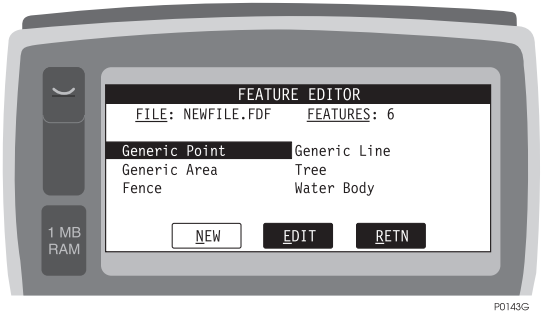

Figure 4.54: Feature Editor Screen (FEDT)

Table 4.47 describes the fields in the screen.

Table 4.47: Feature Editor Screen (FEDT)

Field	Description
FILE	Displays the name of the new FDF that you are creating.
FEATURES	Displays the number of features in the new FDF.
Generic Point, Generic Line, Generic Area, etc.	Selectable fields. Use arrow keys to select.
NEW	Pressing U and N, or U and 1, or pressing **MENU** while **NEW** is active, calls the Add Feature screen.
EDIT	Pressing U and E, or U and 2, or pressing **MENU** while **EDIT** is active, calls the Edit Feature screen.
RETN	Pressing U and R, or U and 3, or pressing **MENU** while **RETN** is active, calls the Feature File Selection screen.

ADD Feature Screen (NEW)

The Add Feature screen, Figure 4.55, allows you to add a feature to a feature definition file while in the field. This provision is useful when you wish to annotate an unusual or unexpected feature that is not included in an existing FDF.

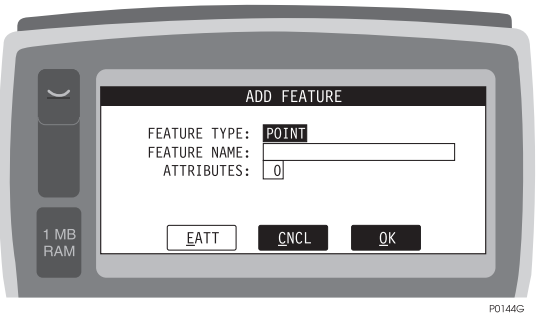

Figure 4.55: Add Feature Screen (NEW)

Table 4.48 describes the screen parameters.

Table 4.48: Add Feature Screen (NEW)

Field	Description
FEATURE TYPE	Toggle field lets you select the type of new feature: point, area, or line. Use the **Space** key to toggle.
FEATURE NAME	Editable field requires you to enter a name for a new feature, e.g., road, pole, hydrant, etc.
ATTRIBUTES	Editable field requires you to specify the number of attributes you want to annotate, e.g., you would enter 3 if you wanted to annotate 3 attributes such as height, condition, and diameter.
EATT	Pressing U and E, or U and 1, or pressing **MENU** while **EATT** is active, calls the Edit Attributes screen.
CNCL	Pressing U and C, or U and 2, or pressing **MENU** while **CNCL** is active, cancels entries without saving.
OK	Pressing U and O, or U and 3, or pressing **MENU** while **OK** is active, saves entries.

Edit Feature Screen (EDIT)

The Edit Feature screen, Figure 4.56, displays the selections and entries you have made while adding a new feature to the FDF.

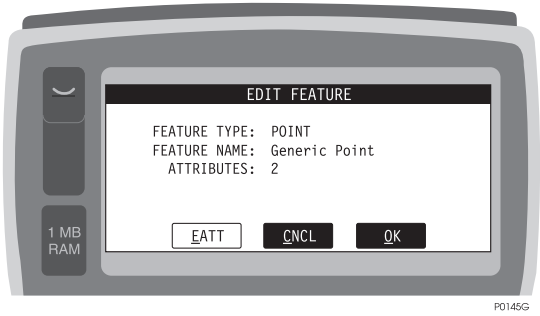

Figure 4.56: Edit Feature Screen (EDIT)

Table 4.49 describes the fields in the screen.

Table 4.49: Edit Feature Screen (EDIT)

Field	Description
FEATURE TYPE	Displays the type of feature that you are adding.
FEATURE NAME	Displays the name of the feature that you are adding.
ATTRIBUTES	Displays the number of attributes that you specified.
EATT	Pressing U and E, or U and 1, or pressing **MENU** while **EATT** is active, calls the Edit Attribute screen.
CNCL	Pressing U and C, or U and 2, or pressing **MENU** while **CNCL** is active, returns to the Feature Editor screen without saving changes.
OK	Pressing U and O, or U and 3, or pressing **MENU** while **OK** is active, returns to the Feature Editor screen and saves changes.

Edit Attributes Screen (EATT)

The Edit Attributes screen, Figure 4.57, lets you edit the attributes of a new FDF. “Edit” means assign attributes in a new FDF, not change attributes of an existing FDF. There may be several EATT screens, depending upon the number of attributes that you assign to a new feature.

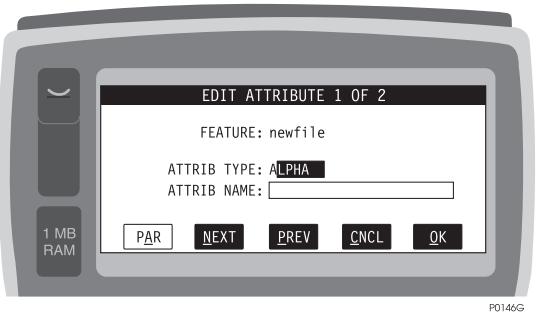

Figure 4.57: Edit Attributes Screen (EATT)

Table 4.50 describes the fields in the Edit Attribute screen.

Table 4.50: Edit Attribute Screen (EATT)

Field	Description
FEATURE	Displays the name that you assigned to the new FDF.
ATTRIB TYPE	Toggle field selects type of attribute from alpha, numeric, or menu. **Space** key toggles.
ATTRIB NAME	Editable field requires you to enter a name for a new attribute, e.g., height, diameter, etc.
PAR	Pressing U and A, or U and 1, or pressing **MENU** while **PAR** is active, calls the Parameters of Attribute screen.
NEXT	Pressing U and N, or U and 2, or pressing **MENU** while **NEXT** is active, calls the Edit Attribute screenfor the next attribute (if any).
PREV	Pressing U and P, or U and 3, or pressing **MENU** while **PREV** is active, returns to the Edit Attribute screen.
CNCL	Pressing U and C, or U and 4, or pressing **MENU** while **CNCL** is active, returns to the Feature Editor screen without saving entries or selections.
OK	Pressing U and O, or U and 5, or pressing **MENU** while OK is active, saves selections and entries, and exits to the Edit Feature screen.

Parameters of Attribute Screen (PAR) - Alpha

Figure 4.58 shows the Parameters of Attribute Screen (PAR) for alphabetical attributes.

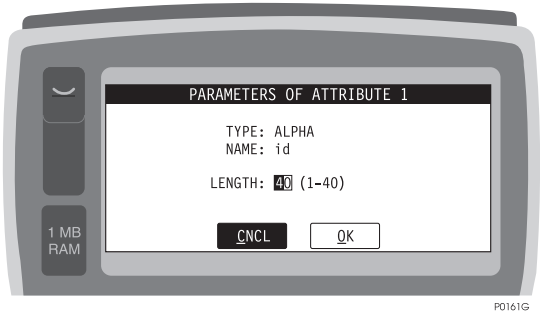

Figure 4.58: Parameters of Attribute Screen (PAR) - Alphanumerics

Table 4.51 describes the fields in the screen.

Table 4.51: Attribute Screen (PAR) - Alpha

Field	Description
TYPE	Displays the type of attribute, either Alpha, Numeric, or Menu.
NAME	Displays the attribute name.
LENGTH	For alpha attributes, enter the maximum length of the text field.
CNCL	Pressing U and C, or U and 1, or **MENU** while **CNCL** is active, returns to the Edit Attribute screen without saving changes.
OK	Pressing U and O, or U and 2, or **MENU** while **OK** is active, returns to the Edit Attributes screen and saves changes.

Parameters of Attribute Screen (PAR) - Numeric

The Parameters of Attribute screen, Figure 4.59, lets you assign values to attributes.

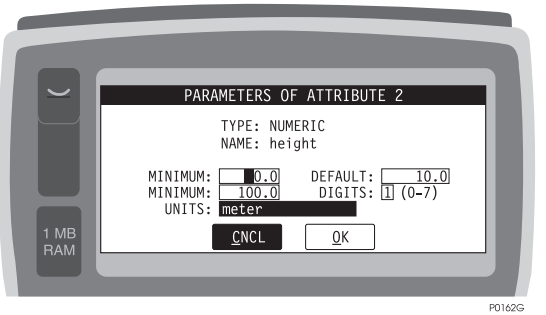

Figure 4.59: Parameters of Attribute Screen (PAR)

Table 4.52 describes the fields in the screen.

Table 4.52: Attribute Screen (PAR) - Numerics

Field	Description
TYPE	Displays the type of attribute.
NAME	Displays the attribute name.
MINIMUM	Editable field to enter the minimum value allowed.
MAXIMUM	Editable field to enter the maximum value allowed.
DEFAULT	Editable field to enter the default value.
DIGITS	Editable field to enter the number of digits after the decimal place.
UNITS	Press **Space** to select the units of the numeric value.
CNCL	Pressing U and C, or U and 1, or pressing **MENU** while **CNCL** is active, returns to the previous screen without saving changes.
OK	Pressing U and O, or U and 2, or pressing **MENU** while **OK** is active, returns to the previous screen and saves changes.

Parameters of Attribute Screen (PAR) - Menu Type 1

Figure 4.60 shows the Attribute Screen for Menu Type 1.

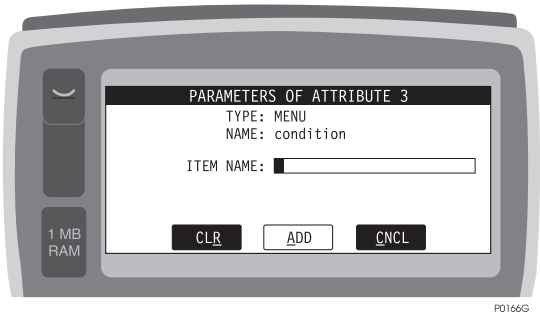

Figure 4.60: Attribute

Table 4.53 describes the fields in the Menu Type 1 screen.

Table 4.53: Attribute Screen - Menu Type 1

Field	Description
TYPE	Displays the type of attribute.
NAME	Displays the attribute name.
ITEM NAME	Editable field to enter the name of the menu selection.
CLR	Pressing U and R, or U and 1, or pressing **MENU** while **CLR** is active, clears the name field.
ADD	Pressing U and A, or U and 2, or pressing **MENU** while **ADD** is active, adds the item name to the list of possible selections for the menu attribute.
CNCL	Pressing U and C, or U and 3, or pressing **MENU** while **CNCL** is active, returns to the previous screen without saving changes.

Parameters of Attribute Screen (PAR) - Menu Type 2

Figure 4.61 shows the Attribute screen for Menu Type 2.

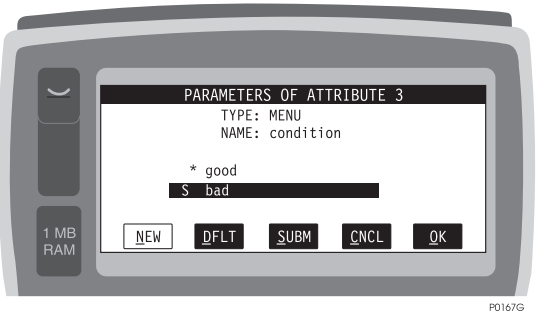

Figure 4.61: Attribute Screen - Menu Type 2

Table 4.54 describes the fields in the Attribute screen for Menu Type 2.

Table 4.54: Attribute Screen - Menu Type 2

Field	Description
TYPE	Displays the type of attribute.
NAME	Displays the attribute name.
NAME	Editable field to enter the name of the menu selection.
NEW	Pressing U and N, or U and 1, or pressing **MENU** while **NEW** is active, brings up the Parameters of Attribute screen for Menu Attribute - Type 1.
DFLT	Pressing U and D, or U and 2, or pressing **MENU** while **DFLT** is active, sets the highlighted menu item as the default selection.
SUBM	Pressing U and S, or U and 3, or pressing **MENU** while **SUBM** is active, brings up the Submenu Items screen. This is only available for menu items that have submenus.
CNCL	Pressing U and C, or U and 4, or pressing **MENU** while **CNCL** is active, returns to the previous screen without saving changes.
OK	Pressing U and O, or U and 5, or pressing **MENU** while **OK** is active, returns to the previous screen and saves changes.

Script Selection Screen (SCRP)

The Script Selection screen, Figure 4.62, lets you select and run recorded command sequences.

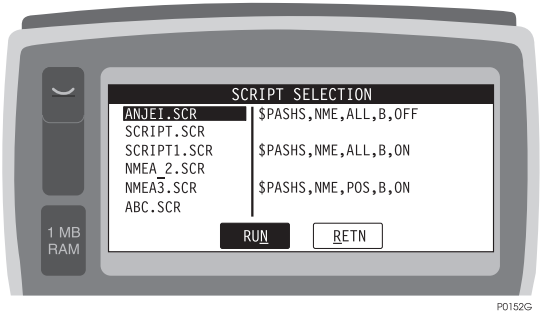

Figure 4.62: Script Screen (SCRP)

Table 4.55 describes the fields in the screen.

Table 4.55: Script Screen (SCRP)

Field	Description
SCRIPT SELECTION	Highlight the file from the list on the left-hand side of the screen by using the arrow keys. The right-hand side of the screen displays the contents of the scripts.
RUN	Pressing U and N, or U and 1, or pressing **MENU** while **RUN** is active, runs the highlighted script file, which brings up a Script Runner screen that displays the commands being sent to the receiver.
RETN	Pressing U and R, or U and 2, or pressing **MENU** while **RETN** is active, exits the screen.

Cable Information

The configuration and connector pinouts of the Reliance system cable are shown in Figure A.1.

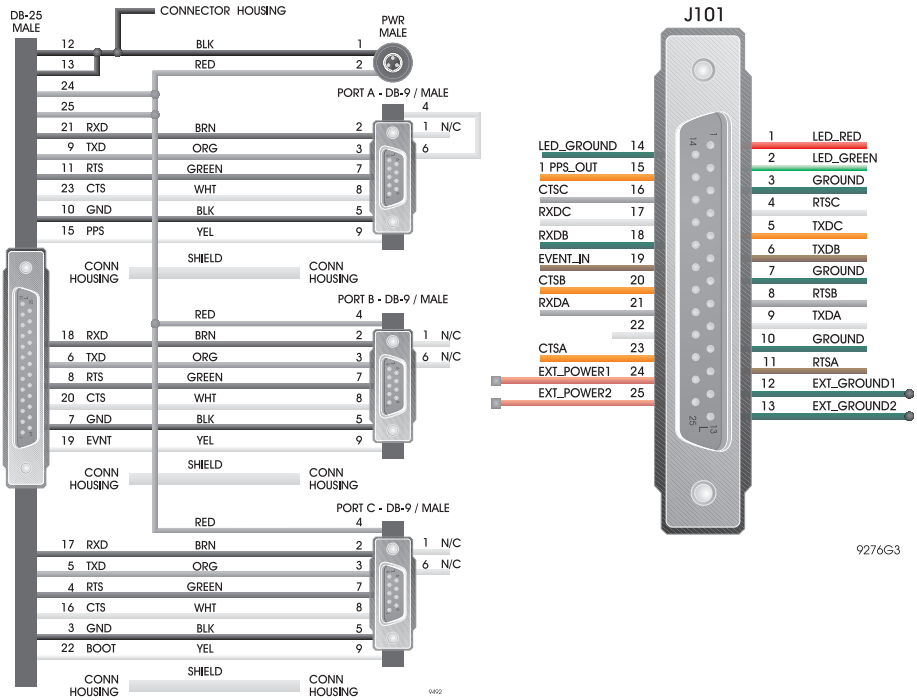

Figure A.1: Interface Cable

It is equipped with several possible connections. The DB-25 connector on the left side of the figure plugs into the receiver. The four connectors on the right side are, from top to bottom, as follows: the power connector, which connects to a cable with two Panasonic camcorder batteries; a male DB-9 (Port A), which connects to the Workabout interface cable that has a 15-pin, high density, connector which connects to the Workabout; a male DB-9 (Port B) connector, which connects to an RTCM radio (optional); and a female DB-9 (Port C) connector, which connects to a PC (personal computer) interface cable.

Upgrading Software

On occasion, upgrades to the FAMlog software may become available. Either a diskette will be sent to you containing the upgrade, or the software will be placed on the Ashtech Bulletin Board System (BBS) available for download.

CAUTION
This procedure will work ONLY in true DOS. Not a "DOS window" started in Windows NT.

Follow these steps to load the FAMlog software onto the Workabout.

Step 1. Copy all the files on the disk to your PC:

1. If you are not already at the C: prompt in DOS, exit Windows and type CD\ to change to the root directory.
2. Type MD WORKABT to create a new directory on your PC.
3. Type CD WORKABT to change to the new directory.
4. Type COPY A:\ *.* (or COPY B:*.*) to copy all files from the floppy disk to the WORKABT directory.

Step 2. Enter the Workabout command processor environment.

The Workabout command processor environment is similar to a DOS environment, however an "M>" prompt appears, rather than the DOS "C:" prompt.

1. Press the **On\Esc** key to turn the Workabout on.
2. If you see a graphical Workabout logo screen, press the **Menu** key, then the **Enter** key to choose the command processor menu option. If you see an **M>** prompt on the screen, you are already in the command processor environment.
3. If the FAMlog program is running, press the EXIT button on the FAMlog screen.

Step 3. Link the Workabout to your PC.

1. Connect your PC to the Workabout with the supplied RS-232 cable, using the standard 9-pin COM port on your PC and the 9-pin HD-RS232 port on the Workabout.
2. On the Workabout, type LINK and press **Enter**.

Step 4. Set the MCLINK COM port.

1. Type MCLINK on your PC to start the transfer program.

2. Type either:

   SET-P1 (if the Workabout is connected to your PC COM 1 port, or

   SET-P2 (if the Workabout is connected to your PC COM 2 port.

3. Type EXIT to stop the transfer program.

Step 5. Transfer the software files to the Workabout.

1. Start the transfer batch file by typing SEND.
2. The SEND batch file will then transfer the following files to the Workabout:

config.gis	generic.fdf
dsst.img	geo.dat
dylanim.dyl	geo.dyl
dylctop.dyl	graph.dyl
dylglib.dyl	hcom.img
dylmicc.dyl	logogis.pic
dylmipp.dyl	r.img
example.fdf	script.scr
example.wpt	script1.scr
example2.fdf	streng.lng
fetr.img	strpor.lng
	sys$8087.ldd

Step 6. Stop the Workabout link.

1. After the batch file completes, type STOP LINK and press Enter on the Workabout.
2. Type Y at the prompt to exit the LINK program.
3. Disconnect your Workabout from the PC cable.

Step 7. Start Reliance.

1. Connect the Workabout to the receiver interface cable.
2. Connect the interface cable to the receiver.
3. Connect a camcorder battery to the interface cable.
4. Press **R** and then **Enter** on the Workabout to start the Reliance software.
5. The Reliance logo screen will appear. Press any key to continue.

Alarm Messages

Reliance sounds an alarm and shows a pop-up window to alert you to error conditions. The following list explains in detail what each message means.

Old Coordinates. Not enough satellites.

The sensor can not compute a position because not enough satellites are being tracked. This error will almost always occur for a short time when the sensor is first turned on. Verify that the GPS antenna is attached and pointed up towards the open sky. Also, check the Elevation Mask on the Receiver Setup screen. Typically this mask is set to 10°, which excludes the use of satellites which are less than 10° above the horizon. Fewer satellites will be used if the mask is set higher.

Connection to Receiver Lost

The Workabout controller can not communicate with SCA-12 . This may be because the sensor batteries are dead. Install freshly charged batteries and turn the sensor on by pressing the POWR key on the Reliance screen. The Power field on the upper left of the screen should say ON. If the sensor is on but the Workabout controller can not communicate with it, check that the cable is connected to the controller and to the sensor.

Old Coordinates

The controller is not receiving position information from the sensor. This error message displayed alone indicates that the sensor needs to be powered on using the controller. On the Reliance screen, press shift U and P to turn on the sensor. POWER ON should be displayed in the upper left corner of the screen after the controller has turned on the sensor. If the sensor can not be powered on, check the cabling and the sensor batteries.

Old Coordinates. No differential corrections.

The RTCM rover sensor can not compute a position because the differential corrections are not being received by radio from the RTCM base. Most commonly this message indicates a temporary loss of the base station radio signal and will require repositioning the rover radio antenna. This message can also indicate that the Base Station ID setting at the rover does not match the base. If the Base Station ID setting is 0000 at the rover, corrections from any base will be used. If data collection is to continue even if differential corrections are lost, set the rover Auto Differential to ON.

Old Coordinates. PDOP value too high.

The sensor can not compute a position because the PDOP, position dilution of precision, exceeds the limit set by the PDOP mask. PDOP is a measure of the quality of the satellite geometry. If all of the satellites being tracked are grouped to the east, for example, the PDOP will be large. If satellites are being tracked from all directions, the PDOP will be low. PDOP typically varies from 1 to 5 during a 24 hour period. When fewer satellites are tracked, the PDOP may increase to 10 or higher. By default, the PDOP mask is set to 6 so that you are alerted to large uncertainties in position. These uncertainties can be reduced by post-processing the data.

Low Receiver Power

The sensor battery is low, according to the Receiver Power Message. Access this screen from the Reliance screen by pressing BATT. The Power Remaining field must be set to 100% each time a fresh battery is connected to the sensor. The alarm can be disabled by setting the Warning Level to 0%.

Low Receiver Memory

The sensor data storage memory is nearly full; less than 100 Kb of free memory remains. When the sensor memory is full, no further data can be recorded until the data files are downloaded and deleted. Use the Receiver File Management screen to delete individual files, or use the Receiver Reset screen to completely clear data storage memory.

Low Handheld Power

The controller has less than 7% of battery power left. Install new batteries and configure the controller according to the *Controller Battery Management* instructions in Chapter 2, **Survey Planning**.

Low Disk Space

The controller has less than 1% of disk space left. Delete unused Feature or Waypoint files to increase the available disk space.

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