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APPENDICES

SNEAK PREVIEW

Use FieldWorker to its full extent and you will be able to include sophisticated analyses as an integral part of field data collection.

Analysis

Do immediate on the spot analysis.... Deliver instructions based on complex analyses to an unskilled worker.

How? By using the Formula field. The Formula field delivers the statements you give it to the Newton language compiler and then displays the calculated result.

And More . . .

Use the Sketch to record signatures or cracks in pipelines.

Use Recordings for later reference for a written note. Record the sound of malfunctioning equipment or of background noise levels.

Tag information with a position taken directly from a GPS receiver, or calculated using triangulation or offset information.

Learning about FieldWorker

You can learn how to use FieldWorker by experimenting, but if you want to learn how to use it to its maximum advantage you will need to refer to this manual.

We have tried to make it easy. The first section, 'At a Glance' presents a quick preview of FieldWorker's main features and how they work. Choose something you find interesting and look it up.

The whole manual uses as many pictures and as few words as possible. It is more interesting that way.

FieldWorker's most powerful feature is the Formula field. You can use it as you would a calculation in a cell in a spreadsheet. Or you can create a screen with multiple Formula fields in which each one builds on the results produced by one or more of the others. Or you can access a function directly from NewtonScript.

Start by reading about the features you need and then, if you want more (and there is a lot here) come back to this manual to see what we have to offer.

If you have a problem (or an idea), talk to us. Our job is to act as a focal point to allow our customers to share and to build on the results of their combined acumen.

Sandy Browne
(sandy@fieldworker.com)

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October, 1997

BASIC CONCEPTS

Project

A project is a collection of screens needed to gather data for a specific purpose. It also refers to the collection of stations in which data has been collected. There is no limit to the number of projects you can create in FieldWorker. You can switch between projects at any time.

Station

A place that may have location and/or attribute data. Location data can include a name and a shape containing positions. Positions can be taken from a GPS receiver or calculated using triangulation offset techniques. Station data can be entered or imported from the desktop.

Screen

A named set of fields for data collection. You can define as many screens as you wish. The only limit is the practical one of the length of the list of screens.

Field

A line on the screen for data collection. You specify the name and type of data for each field on a screen. For projects created on your desktop there is no limit to the number of fields in a screen.

INTERFACE CONVENTIONS

Highlighted button indicates the function it represents is in use.

This button initiates computation. When tapped a GPS/UTM position or a field value will be calculated.

Tap a diamond inside or outside a button to see a list of choices.

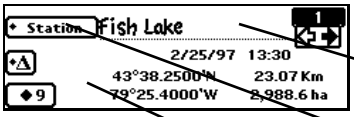
Help. Gives an explanation of expected response for a special type of data entry.

. . . LOOK LIKE

Project Section

Project List button

Project Menu button

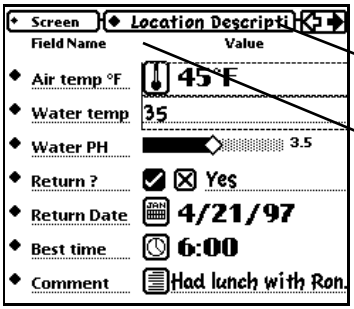


Station Location Section

Station name, number and arrows for movement between stations

Station activities, identification, information and navigation

Position, shape, and size of the station



Screen Section for Station Data

Screen action menu button, list and arrows for navigation between screens

Field type, name and data value entry area

Global + Display Controls

Date, time and battery level

About FieldWorker, context sensitive help, GPS *Test and Preferences*

Keyboard and dictionary for abbreviations

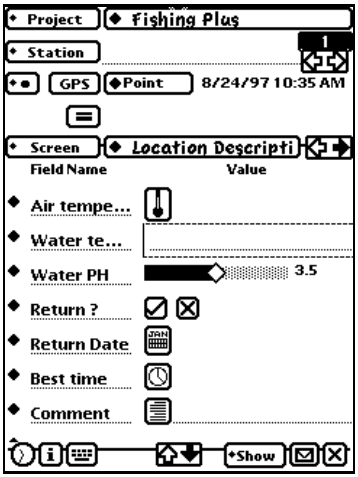
Close box to quit FieldWorker (only present if FieldWorker is not backdrop)

Routing button for data transfer

FieldWorker button offers a choice of how you view your data.

Navigation arrows for fields not shown in current screen view.

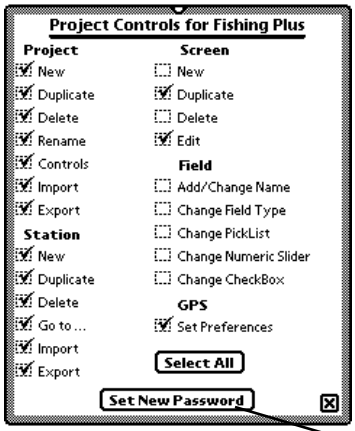
A PROJECT IN YOUR HAND



This is what a project looks like on the Newton when it is ready for data collection.

Projects can be set up on the Newton using the Project and Screen menu buttons together with the Field Type picklist.

Projects can also be developed on your desktop. When you do this you can develop features such as nested picklists, 'many to one' data collection screens, and length specific alphabetic fields.



Then set Project Controls to determine what changes can be made to your project when it is being used to collect data.

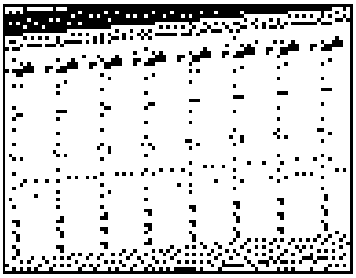
Each projects has its own set of Project Controls. If you do not want people to change the project you created, encourage them to create their own project or set of Newton Notes to record observations not included in your project.

Items in the Project, Station, Screen and GPS areas that are not ticked are not shown in the appropriate menu button.

Set a password to ensure that only you can make changes to your project.

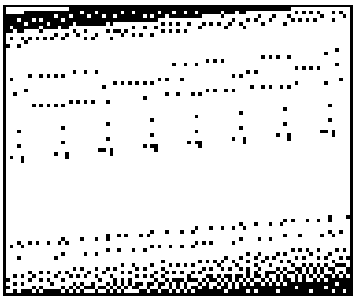
If you forget your password, export Project Controls with the project, and it will be displayed in your desktop file.

. . . AND ON YOUR DESK



This is what a project looks like when you define it using a spreadsheet on your desktop.

Of course, you do not have to use a spreadsheet. You can use Access or any other database program...or a word processor...or any program that will save files in text format.



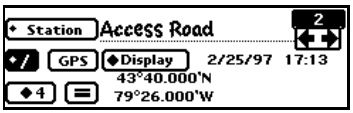
If you are defining the project for others to use to collect information for an existing database, you do not want them to change the structure of the data collection.

By setting project controls at the end of the project definition, you can make sure the people collecting data cannot make any changes that would interfere with effective data transfer.

N.B. Make sure that the last line of your project definition is a line with the word 'end' in column A.

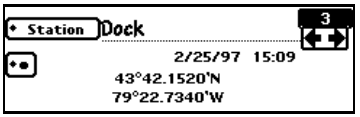
If you do not have an end statement, FieldWorker will wait after it has received your project file to make sure no more is coming.

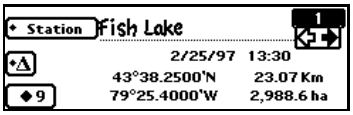
A STATION IN YOUR HAND



When you add a new station it is automatically assigned a number. After that you may (but do not have to) define

- the name of the station
- the shape (point, line or polygon)
- the nodes if not a point
- the position taken from the GPS receiver using the acquisition technique of choice or calculated using offset or triangulation





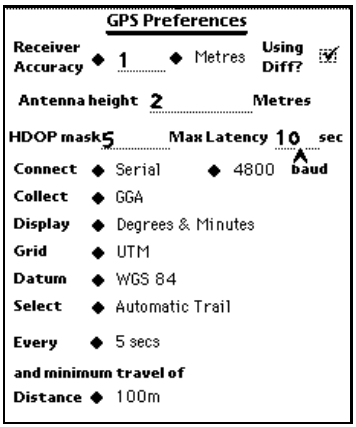
When you are finished defining a polygon (or line), the perimeter and area (or length) become part of the station information display.

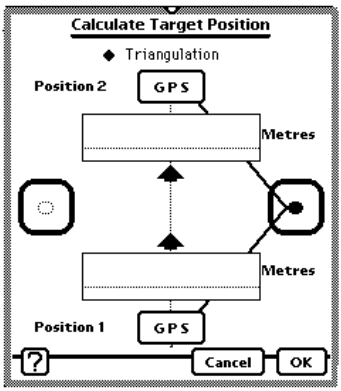
. . . AND ON YOUR DESK

This is what the station data looks like when it is exported in FieldWorker format.

You can choose position (UTM or latitude/longitude) format preferences for packages such as ArcView, ArcInfo or Mapinfo when you export your data from your Newton to your desktop.

LOCATION FOR A STATION





GPS Preferences form a background against which all location data is collected.

FieldWorker has been designed to accommodate

- the full range of real time GPS receiver accuracy
- the variety of mapping conventions and grids which have been developed to express position information in different places around the world
- the variation in requirements for GPS acquisition methods

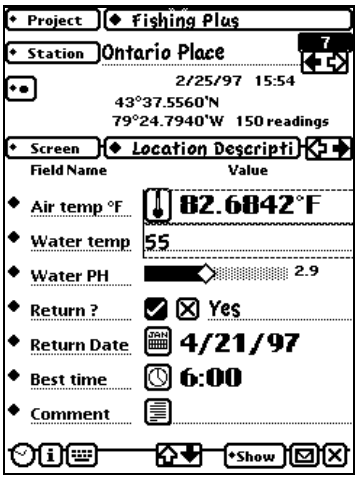
In those circumstances in which taking GPS readings is either not possible or efficient, FieldWorker allows you to choose alternative methods for position acquisition.

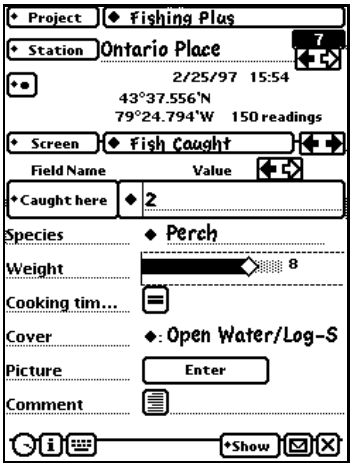
What does this mean? It means that you can sit in a boat in the middle of a lake and create a polygon to represent the lake using distance estimates and a compass. Or the readout from a laser gun.

It means that you do not have to get out of your car to locate lamp standards on a superhighway.

- Stop at the edge of the highway
- Collect a GPS reading
- Get your distance from a pole using a laser gun
- Move to another position and take new GPS and laser readings.

DATA IN YOUR HAND





Collecting data is easy. Most of the time you can do it with just the tap of your pen, but when necessary you can write words or longer comments, draw pictures or dictate longer notes to transcribe later.

If a Mandatory field has not been filled in, you will not be allowed to leave the current station or to export data using the Station Menu button.

Mandatory fields are surrounded by a dotted line to indicate their importance.

Fields can be assigned default values, e.g. last value plus one.

Fields containing computed values are indicated by a calculate button that contains an equal sign.

The icons at the beginning of each Field Value entry line tell you the type of information recorded on that line.

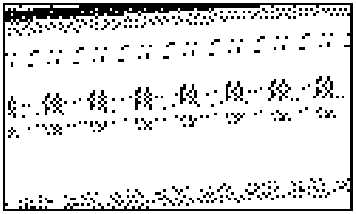
Finally, you can also record 'many to one' data relationships (e.g., many fish caught in the same place).

And when you have finished collecting data, you can export it to your desktop.

The great thing is you could be sending updates to data that was originally imported from your desktop.

For those times when you simply want to share your data with others, you have a choice of ways to do it.

. . . AND ON YOUR DESK



FieldWorker exports data as a tab or comma delimited text file. This is what the data recorded on the 'Location Description' screen on the opposite page looks like when displayed in a spreadsheet.

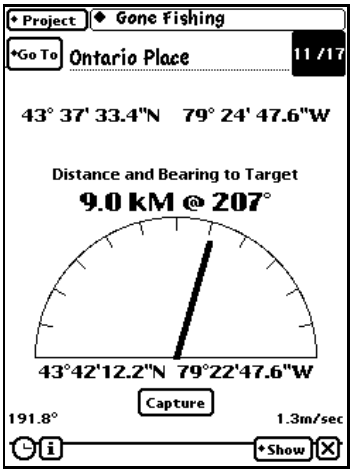
When 'many to one' types of data have been recorded, the special data is appended to the basic project data as a labeled supplementary set of data lines.

This is what data collected using the 'Fish Caught' screen shown on the opposite page looks like when it is exported.

Some of our customers have written programs designed to create data files adapted to specific programs such as ArcView, or in special formats such as DXF. If you are interested, check our web site for information. We post information on supplementary programs as they become available.

ONLY IN YOUR HAND

. . . NAVIGATE

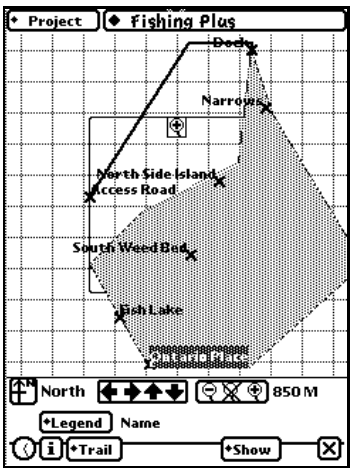


The Navigator view on the Newton helps you return to positions where data has been collected in the past.

If you want to go to a position for which you already have coordinates, use the Show button to move to the Navigator view. Go to the station with those coordinates and the Navigator view will display navigation information and a direction pointer.

Of course, you might want to ask FieldWorker to take you to a new position. In that case, add a new station in the Data Entry view and, when you select the Navigator from the Show button, enter the coordinates of the place you want to go.

. . . MAP



Because FieldWorker is designed to collect data related to locations, there is a Map view. The Map shows the shape and relative positions of all of the stations in the project.

The default is to label stations by name, but for pattern recognition purposes they can be labeled with any piece of data taken from any field on any screen.

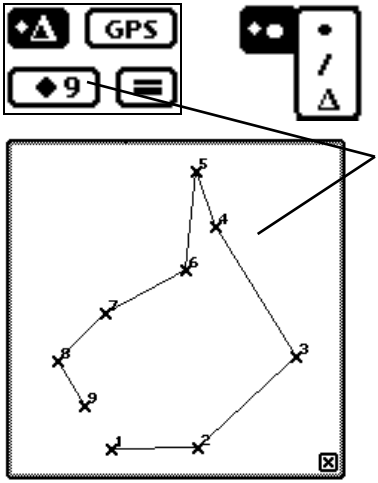
You can zoom in and out, set your own scale, and look at where you are relative to the stations shown on the Map.

You can even create your own Map by importing shape data on features pertinent to the field work you are about to do.

Use the Trail button to see where you are in relation to those features.

FOR PROFESSIONALS

GIS SHAPES

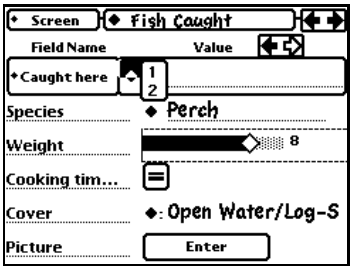


A location for which data is recorded may be one of three basic shapes: a point, a line or a polygon.

Lines and polygons have nodes and can be edited.

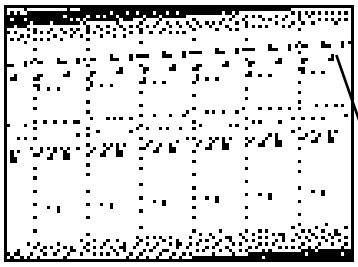
If you are in the middle of recording a shape and come across something that needs to be recorded in a separate station, just create a new station. After you make a note of the information, go back the original station to finish shape definition.

RELATIONAL DATA SCREENS



‘Many to one’ is a standard concept in relational databases because there can be many instances of a certain class of item at a single place. In our example, we catch many fish at a good spot.

In our sample project there is a Many screen that collects the same information about all fish caught in a given spot.



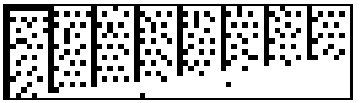
As a professional you may not be interested in keeping track of fishing trips, but you will be interested in many somethings (such as rocks or trees). The ability to define a field default as ‘same in many’ or ‘next in many’ (e.g., when making running tallies) can be extremely useful.

FIELD ATTRIBUTES

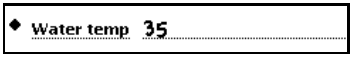
Mandatory fields have to be filled in before the user can move from the current station.

When a field MUST be filled in it is surrounded by a dotted line.

If it is not filled in before you attempt to leave a station, FieldWorker will refuse to move, sounding a chime and displaying an error message to tell you which field(s) have been left empty.



Fields can be assigned default values. A default may be set as a specific value or set relative to the value in the previous station or in the previous item in a many to one screen. Same and Next (add one to the previous value) are relative options.



Because the sample desktop project specified 'Default=Same', the temperature for this field is automatically filled in for each new station. This Field Value can be changed as data is collected.

The Modify field attribute allows you to override Project Controls with specific permission or denial of permission to change field characteristics.

Because 'Modify=no' was set in the field definition, there is no line to the right of the diamond. This visual clue is used to indicate that no change can be made to the picklist.

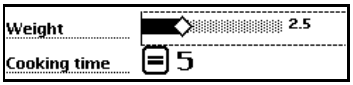
FORMULA FIELDS

A field type of 'Formula' allows you to calculate results based on data that has been collected at a station.

This formula specifies that the cooking time of the fish caught is a function of the air temperature and the weight of the fish. Fish weight is in the screen in which the calculation occurs. Air temperature is the first field in screen 1.

Define the formula the same way as you would if you wanted to perform a calculation from a cell of a spreadsheet. Instead of cell references (A1) you use screen and field references (s1.f1).

Values used in a formula may come from any field within any screen in a single station. This includes the GPS position and shape information contained in the hidden screen from which the data displayed in the station area of the screen is taken.



For sophisticated applications requiring complex analyses you can access NewtonScript logical and mathematical functions. Instead of writing and using macros, you can write your own NewtonScript functions and invoke them with statements such as this:

GetRoot().calcFunctions.base:DoIt(x,y)

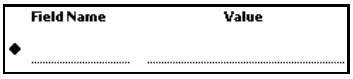
DEFINE FIELDS

Because FieldWorker is being used for data collection, we are starting the working portion of this manual with a discussion of data collection types and how you can fine tune them.

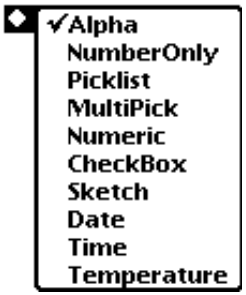
You can set up data collection using either your Newton or a desktop package that exports comma or tab delimited text files. This section will cover how you do both Newton and desktop operations, and the special controls you can implement.

To make it easier to explain the relationship of design elements, this manual refers to all desktop project design activities in spreadsheet terms. As long as it can produce a comma or tab delimited field, definitions can be done using packages such as Word or Access or FileMaker.

ON YOUR NEWTON



To define a field on the Newton write in the field name in the blank in the left column.

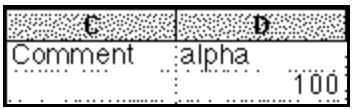


Choose the desired data type from the picklist at the left side of this column.

ON YOUR DESK

Enter the field name in column C.

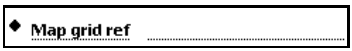
In column D enter the field type using one of the names shown on the Newton or in the list covered in this manual.



Attributes such as Mandatory, Default or Modify (covered later in this section) go in columns to the right.

Parameters that differ from the field type default are listed in column D of the following rows.

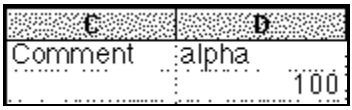
ALPHA



An alpha numeric field without a maximum length specification.

To create this field on the Newton enter the name in the 'Field Name' column. Alpha is the default field type so you do not have to select a field type from the picklist at the left of the column.

This is what an alpha numeric field with a size fixed to match database requirements looks like on the Newton.



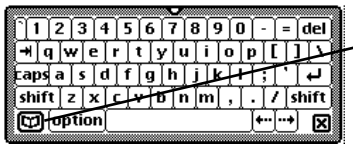
Field length must be specified on your desktop. Name and type are entered on one line with the maximum alpha numeric entry length immediately below the field type.

USING ABBREVIATIONS . . .

There is a Newton feature that can significantly expedite data entry for frequently used words.

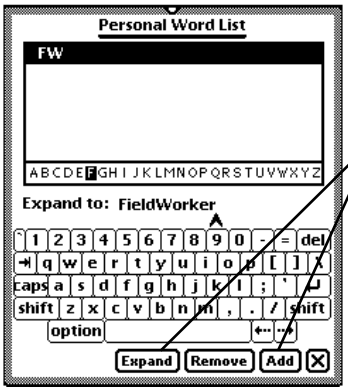
Your Newton allows you to store short forms of words you use all the time.

Tap on the Keyboard icon at the bottom of your screen.



Tap on the Dictionary icon.

. . . USING ABBREVIATIONS



Type the letters you want to use as an abbreviation.

Tap the Add button.

After the Newton adds the word to the list, tap the Expand button.

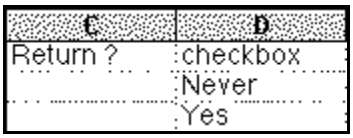
Type in the 'Expand to' version of the abbreviation.

Once you have created an abbreviation for a frequently used word, your Newton will expand that abbreviation to the full length word whenever you enter the abbreviation.

This gives you two options for rapid alpha numeric data entry: Alpha fields with abbreviations or Picklists as described later.

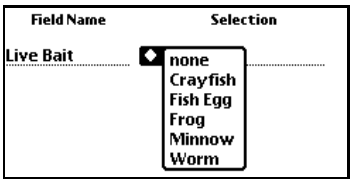
CHECKBOX

CheckBoxes are used to record simple two state data conditions. The default is yes/no, but the two states can be anything you define by scrubbing out the words that appear to the right of the '√' or 'x' and writing in new options...



... or by specifying them as parameters in column D of the project spread sheet.

PICKLIST



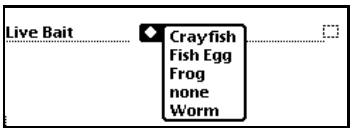
A picklist can be used to ensure consistency in data entry or ...

... to speed data entry by making it unnecessary to repeatedly write in a recurring response.

Tap the diamond to see the list, then tap a list item to select it.

If a tick is present in the box to the right of a value, the value shown is an entry in the picklist.

To remove an entry from a picklist, tap the square and remove the tick.

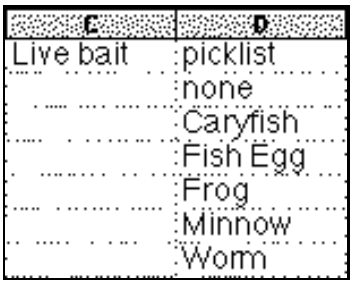


To add an entry write it on the dotted line and tap the square so the tick appears.

If you want to add a list of entries to a picklist

- Make one entry on the dotted line.
- Tap the box so it is ticked.
- Scrub out the entry.
- Write in the next entry and tick it.

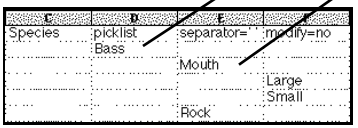
If controls have been set so that a picklist cannot be modified in this manner, no dotted line appears to the right of the diamond in the Field Value column.



To build a picklist on your desktop, enter the field name in column C and the field type in column D of the same row.

Picklist entries go in column D for as many rows as required.

NESTED PICKLIST



Nested picklists are picklists containing entries that have their own sub lists.

There is no limit on the number of levels of nesting, although there can be problems with active memory space when lists get too long**.**

Complete nested picklists can only be created on your desktop, but, field and Project Controls permitting, the lowest level of a nested picklist can be changed on your Newton.

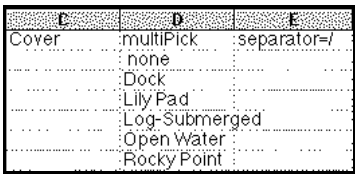
In a spreadsheet the highest level entries for the nested list occur in column D.

The first level of subordinate entries are entered in column E in the rows below the entry to which they apply.

Every column you move to the right represents another level of subordination.

If you want to export the full hierarchy associated with a nested picklist choice or see it on your Newton, set a Separator character as an attribute in the field definition row.

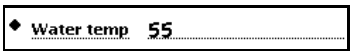
In both Nested Picklists and Multipicks the separator character is only surrounded with single quotes if it is a space.



MULTIPICK

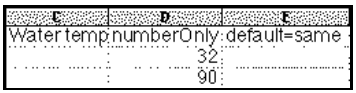
Use a Multipick when you want to make more than one instance than from a picklist. It can be set as a field type on the Newton, but the contents can only be defined on your desktop. It may not be nested. The default separator is ‘:’.

NUMBER ONLY



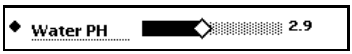
The NumberOnly field exists to make sure that when a number is written in, none of its digits are misinterpreted as letters.

If a letter is mistakenly entered, FieldWorker sounds a chime, flashes the message, "This entry must be a number. Please correct it or the entry will not be stored," and opens a number pad so you can type in the correction.

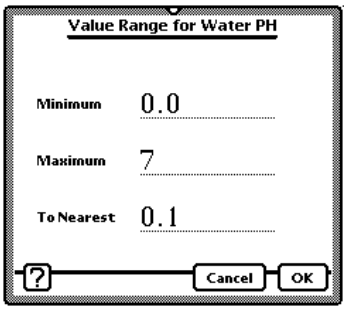


When defining a NumberOnly field on the desktop, you can specify the minimum and the maximum of any value entered in the field.

NUMERIC



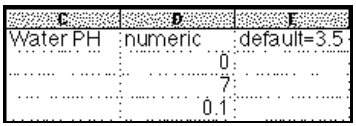
Using numeric sliders you can enter a number with the tap of a pen. Or you can move the diamond until the number on the right is what you want.



Numeric sliders are best used when you are working with a known range and an approximate number will do.

Tap on the number to change the range and increment for a numeric slider. If nothing happens, field or project controls have been set to stop it.

Scrub out the numbers you want to change and write in the new ones.



When you define a numeric slider, make sure the value of the increment is not less than 1% of the range between the minimum and the maximum.

DATE

Date fields allow you to set a valid date with the tap of your pen.

Tap the calendar icon . . .

and set the date you want to register.

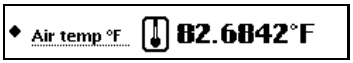
Defining a date field is simple: select it from the FieldWorker Field Type menu on the Newton or type 'date' in column D of a spreadsheet.

TIME

Tap the clock icon to set time to the Newton time or set it on a digital display.

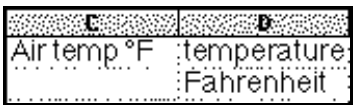
Define a time field on your desktop by specifying the field name in column C and the field type in column D.

TEMPERATURE



When you tap the thermometer icon the ambient temperature is taken from the thermometer built into some Newton devices (currently the MessagePad 2000).

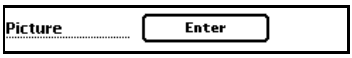
Choose 'Temperature' on the Newton or type temperature in column D or the spreadsheet. To change from the default of Celsius put 'Fahrenheit' in the next row of column D.



You can neither write nor erase a value for a temperature field on the Newton.

If a temperature field is part of a project on a Newton without an internal thermometer, tapping the icon will produce a value of 'N/A'.

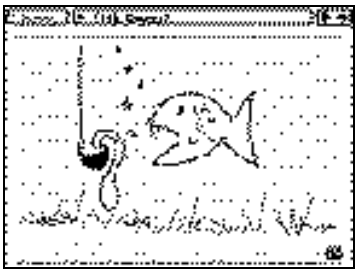
SKETCH

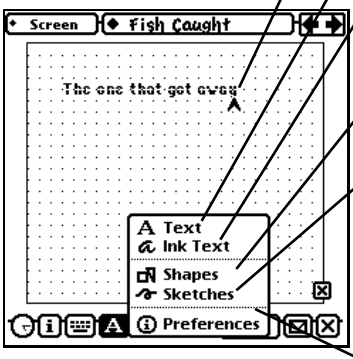


Tap the Enter button to start a drawing or enter a signature.

The sketch field allows you to draw a picture of something that cannot be adequately described in words.

N.B. A sketch field can also be used to record signatures in projects where chain of custody information is of critical importance.





If you are in text mode, the carat sign (^) can be located at a specific place by tapping your pen on the screen.

Entries will be interpreted as typed text.

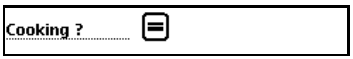
Entries will be taken as entered, but reduced to text size (a useful way of creating small drawings as well as cursive writing).

The Newton will do its best to transform pen strokes as regular shapes.

Pen strokes will be taken as entered. This is the default setting when the Sketch field is opened.

Takes you to the Handwriting Recognition facility offered in the Extras Drawer.

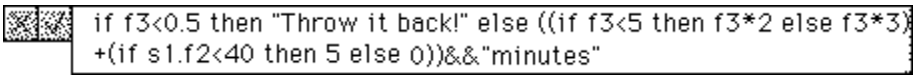
FORMULA . . .



Although it can be set up as a field type on the Newton, the computational definition of the contents of the Formula field must be done on the desktop.

It is almost impossible to overstate the potential power of the Formula field. A screen full of Formula fields is really a computer program.

Formula evaluation is done using standard operator precedence and evaluation order. Your formula is executed by the NewtonScript interpreter. The more complex your computation, the more you may want to know about NewtonScript.



Values in a formula

- Any field within any screen in the current station (e.g., s1.f2 refers to the 2nd field in the first screen)
- Any numeric value
- Any string value. (Strings are enclosed in double quotes.)
- kpi = value of Pi to 12 decimal places

Valid operations

- conditional and iterative statements
- string functions
- integer math functions (absolute, ceiling, floor and random)
- floating point math functions such as trigonometric and logarithmic functions
- Access functions from a library of utilities in a customized Newton package

Get more details from the web at www.newton-inc.com/dev/docs.html/

. . . FORMULA

Fields in the same screen in which the formula appears can be referred to without a screen reference as f1(field 1), f2, f3 ….

To refer to data from other screens, use a combination of screen number and field number, e.g. field 3 in screen 2 would be s2.f3

There is an implied Screen 0 that contains the background data on the location of the station at which you are currently located. The values in Screen 0 are referred to as:

s0.number	Station number
s0.name	Station name
s0.shape	Point, line or polygon
s0.date	From the Newton (mm/dd/yy)
s0.time	From the Newton (hh:mm)
s0.length	Line or polygon perimeter (meters/feet)
s0.area	Polygon (hectares/acres)
Position for point of last node in shape	
s0.gps.lat	In minutes
s0.gps.long	In minutes
s0.gps.alt	Meters
s0.gps.zone	Name or UTM number
s0.gps.easting	Meters
s0.gps.northing	Meters
s0.gps.utc	Atomic time (hhmmss)
s0.gps.satellites	# of satellites (if single reading)
s0.gps.readings	# of readings(if average)
s0.gps.range	Meters
s0.gps.azimuth	Degrees
s0.gps.distance	Meters

Global Values

kConversion.*name*

***name* may be**

radToDeg
degToRad
minToRad
radToMin
metresToFeet
metresToMiles
knotsToMperSec

ATTRIBUTES FOR ALL FIELD TYPES

FieldWorker offers field controls that set values or define what the user can do when recording data.

These attributes must be placed on the same line as the field name. They may be put in any column after column D, one attribute per column. There are no limitations on the number or sequence.

Some of our customers put attributes of the same type in the same column for the whole project so they can review attribute configurations with a single glance.

Unless leading or trailing blanks are required, you do not have to enclose text strings for an attribute in quotation marks. Use single quotation marks when blanks are required.

MODIFY

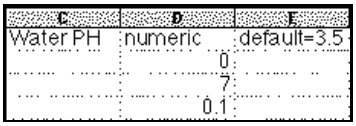
The Modify command allows you determine whether the contents of a field can be changed. A Modify field setting will override any equivalent Project Control settings.

You might want to set ‘modify=yes’ if the purpose of a Picklist is to allow the user to create a shortcut for alphabetic data repeatedly recorded entries.

If the entries from a Picklist field are to be entered into a database with strict controls on field contents, you would want to set ‘modify=no’.

DEFAULT

The Default attribute allows you to set a field value automatically. These default values may be



- A specific value as a number or a character string (depending on the field type)
- Same (as the equivalent value in the previous station)
- Next (numeric and numberOnly) - add one to value in previous station

ONLY FOR FIELDS IN MANY SCREENS

- SameInMany - carry forward entry from the previous instance in a given station, but not from the previous station.
- NextInMany - add one to entry for the last instance.

MANDATORY

The Mandatory attribute allows you to ensure that a field has been filled in before the person recording data can move to another station.

Failure to fill in a Mandatory field will produce an error message.

A ‘mandatory’ setting can be a major irritant when working in the field. Unless a field is of absolute importance, try to create a Formula field to provide a reminder that not all fields have not been filled in.

DEFINE SCREENS

Screens allow you to collect data into meaningful named groups. There is no limit to the number of screens you can have in a project. Each one must be assigned a name and a type.

When you define a screen on the Newton it may only have a maximum of seven fields. The only limit on the number of fields for a screen defined on the desktop is the practical one. Restrict the number of screens to make it easy for the person collecting data to remember where to find data fields.

Choose screen type according to your data collection requirements. On your desktop the screen name goes in column B, the type in column C.

SCREEN OPERATIONS

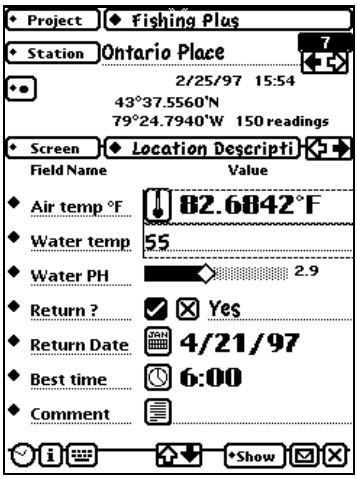
Duplicate copies the screen that is open on the Newton when the option is selected. Copy and paste is the desktop equivalent.

Generally used when similar data is collected for different attributes each of which has its own screen.

Delete eliminates the screen that is open on the Newton. On the desktop remove the lines in which the screen is defined.

Edit allows you to change the name or type of the current screen. Type options are the same as those for a new screen.

MIXED



A Mixed screen can have any of the types of fields covered in the previous section.

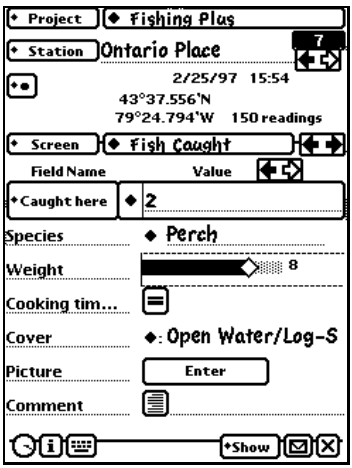
On the Newton select Mixed from the New Screen slip and the field type from the picklist at the left of the column. The default field type is Alpha.

When defining a Mixed screen on the desktop, enter the screen name in column B and the word ‘mixed’ in column C.

MANY

A Many screen is a special type of Mixed screen. It allows you to record standard information for each of multiple instances of a type of object found at a single location. The ‘many’ objects can be rocks or types of plants or, in our example, fish caught.

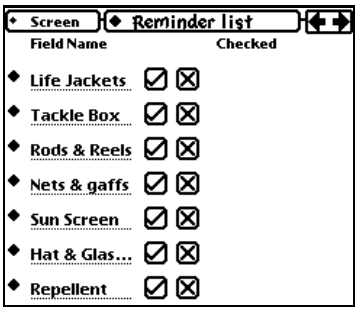
You cannot set a Many screen up on the Newton. If you are doing a preliminary project design in your hand, set up a Mixed screen and change it to a Many screen when you transfer the project to your desktop.



In a Many screen the PrimaryKey is the field that is the key to the ‘many’ that the screen is designed to capture. FieldWorker assumes the first field is the PrimaryKey but there may be occasions when, in order to conform with database standards, the ‘many’ field cannot be specified first.

Any field may be promoted to be the first field shown on a Many screen if ‘PrimaryKey‘ is entered after column D in the field definition row.

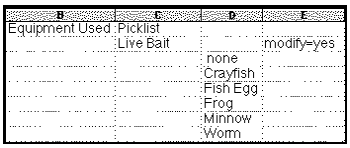
SAME TYPE SCREENS



FieldWorker offers you the ability to create screens that assume fields of only one type: Alpha, Checkbox, Picklist, or Numeric.

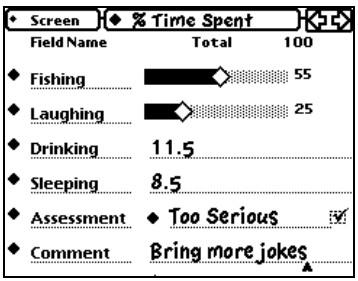
You might create a screen of checkboxes if you wanted a checklist of all of the activities that could or should be carried out at every station.

When you create a same type screen on the Newton, FieldWorker creates a Mixed screen that assumes that all of the fields are of the chosen type. This will save set up time without preventing you from changing the field type of any of the fields screen.



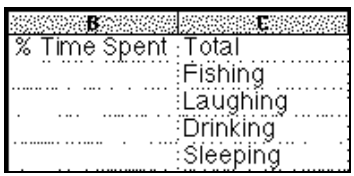
When you define a same type screen on the desktop, all you have to do is name the fields within the screen. If you want one of the fields to have a different type, you have to specify the type for that field.

TOTAL



The Total screen adds the numbers recorded in it.

Numeric is the assumed field type, but the Total screen will also include NumberOnly fields in the Total shown at the top of the screen. Any other screen types are ignored.



Use a Total screen to insure that percentage estimates add to 100 or just add numbers.

Or just add up costs of equipment while still having the freedom to make comments.

SKETCH

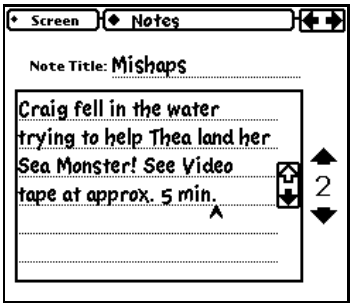
A Sketch can be a stand alone screen or...

... a field if the drawing (or signature) applies to the data collected in a specific screen.

Define a Sketch screen by choosing it from the list of screen types on the Newton, or by putting the name in column B and 'Sketch' in column C.

You can define a maximum of nine Sketch fields and screens per project.

NOTEPAD

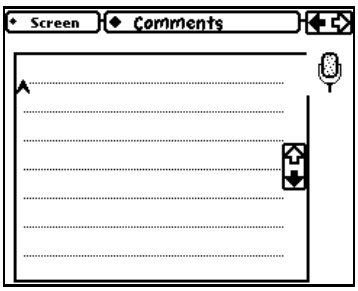


A NotePad screen allows you to keep a pad with up to seven titled pages. There is a 40 line limit to the length of the note for a page.

N.B. Any notes recorded on an untitled page will not be exported. FieldWorker treats page titles as field names and does not export any data for which there is no field name.

RECORDING

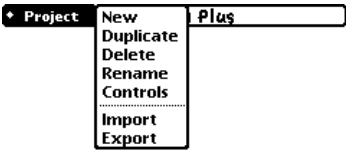
Tap the microphone to get the recording control bar. Once a recording has been made the microphone in the top right hand corner of the screen becomes a speaker.



Record voice notes for later transcription or record aural information such as the sound of faulty equipment or a background noise level.

Not available on any MessagePad issued before the 2000.

DEFINE PROJECTS



You can have continuous access to an unlimited number of projects. Each has its own set of screens and station data.

You can define these projects on the Newton or on your desktop. Sophisticated options such as field attributes, Formula fields, or Many screens can be fully defined only on your desktop.

Most of our customers use both techniques with projects:

- They rough them out on the Newton and then finish them on the desktop
- . . . or set them up on the desktop to match their database, and fine tune them on the Newton for usability.

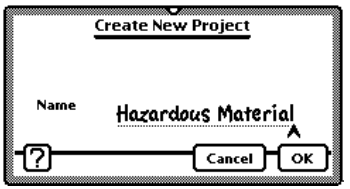
NEW

Creating a project on your desktop is easy:

Enter a name with a maximum length of 25 characters in cell A1.

Start entering screen and field definitions.

Finish defining a project and its Project Controls (if there are any) using a final line with the word 'end' in column A.

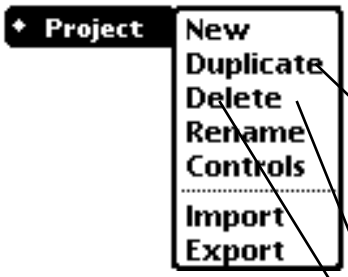


Creating a project on the Newton is just as easy.

Select New from the Project Menu and enter a name with no more than 25 characters in the Create New Project slip.

Start creating screens using the New option in the Screen Menu.

NEWTON ONLY



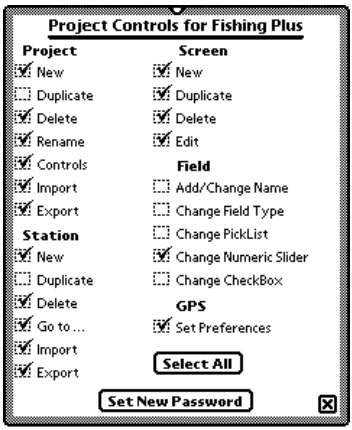
The options offered in the Project Menu are designed to meet specific Newton project management requirements.

Copy the project screens but none of the data. Use this when a new project is a minor variation of an existing one or someone wants to collect a new set of data without adding to losing the old.

Delete all screens and all station data.

Change the name of a project on the Newton so it will not be the same as that of a project about to be imported.

PROJECT CONTROLS



	A	B	C	D
138	control			
139		Project		
140			new	yes
141			duplicate	no
142			delete	yes
143			rename	yes
144			controls	yes
145			import	yes
146			export	yes

Project Controls are needed for applications in which a professional designs the project, but the data itself can be collected by a number of different people.

Controls allow the project designer to determine which items appear on the Newton menus and what modifications, if any, the user may make to the type of data being collected.

Each project has its own set of Controls. If, because of database interface, you want people to follow a fixed structure within the main project, allow them to create an project of their own for free form data entry.

Think carefully before disabling Project New and Project Delete.

Remember that Modify settings in a field definition from the desktop override 'Field' Project Controls.

IMPORT/EXPORT PROCEDURES

Procedures involved in the import and export of either data or projects are simple so it does not matter if you are unfamiliar with getting two computers to talk to each other.

Whenever you import or export projects or station data, FieldWorker provides you with step by step instructions. In case computer to computer communications is new to you, we have made a special effort to demystify the process by

- Including ready to go terminal communications program setups on the FieldWorker disks
- Including a special section in this manual on Newton to Desktop communications
- Including step by step by step do-it-yourself examples in the Tutorial
- Encouraging the development and dissemination of third party "one click does it all" desktop solutions. See our web site for an up to date listing of available programs.

There is a significant difference between station data and a project. A project defines the data to be collected in FieldWorker. Project import and export can only be done from the Project Menu button.

Station data is the data that has been collected in the field or is to be reviewed in the field: the Station Number must exist. All other data is optional. The information for the two logical components which may exist are:

- Attribute data collected using the project screens
- Location data has the station number, name, shape and position. Position may be calculated or taken directly from a GPS receiver.

Station data can be imported and exported from the Station Menu button or from the Routing button at the bottom of the screen.

From FieldWorker's and this manual's point of view Import refers to the operation of bringing project definitions or station data into FieldWorker. Export refers to the process of sending project definitions or station data to your desktop.

PROJECT IMPORT

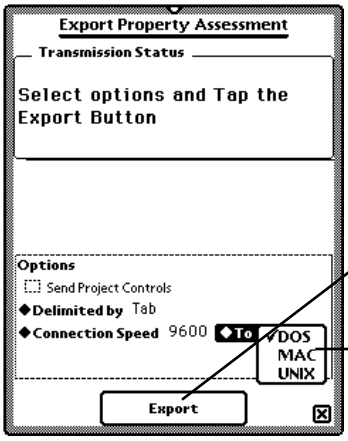
To move a project that was created or modified on your desktop to FieldWorker on the Newton, use the Import command from the Project Menu button.

When you start the import process, FieldWorker tells you that it is creating the project and names each screen as it is created. At the end of a successful import FieldWorker tells you that the project has been created and opens the project with a single empty station.

It takes time for FieldWorker to process the project definition it has received. Often your desktop will tell you it has finished sending the project file long before FieldWorker has finished processing it. This is particularly true if the definition does not terminate with an 'end' line.

You cannot import a project with the same name as one that already exists.

To eliminate the problem either Delete or Rename the existing project from the Newton and try again.



PROJECT EXPORT

This facility allows you to move a project from the Newton to the desktop for review and modification.

One way to find a Project Control Password that has been lost is to include Project Controls in a project export.

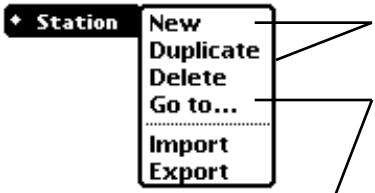
Different operating systems use different sequences of control characters to designate the end of a line in a file.

CAPTURE DATA

In FieldWorker all data is associated with a station. A station may have both attribute data and location data.

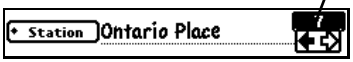
This section discusses the mechanics of attribute data collection. The following section discusses how you set the location with shape and position data.

SET YOUR STATION



Add a new station using 'New' or 'Duplicate'...

... or move to an existing station with 'Go to...[number]' or with the black Navigation arrows which move forward or backward one station.

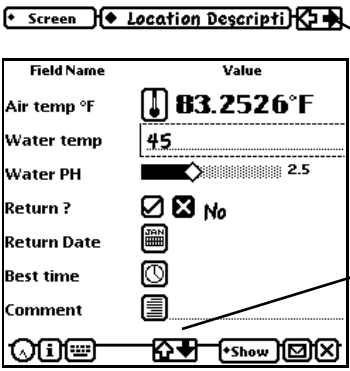


The number shown above the navigation arrows is the current station.

New stations are automatically assigned a number. It is easier to view the Map if you enter a name.

CHOOSE A SCREEN

Choose a screen from the list of screens belonging to your project...



...or use the black navigation buttons to move forward or backward one screen. A white arrow shows there are no more stations in that direction.

Fill in the field data by tapping or by writing in the appropriate information.

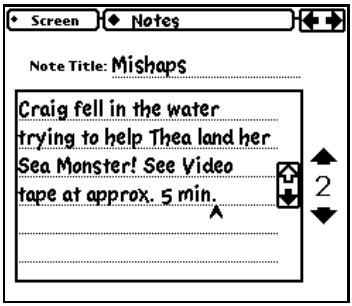
If there are more fields in a screen than can be displayed at a single time, use the black navigation arrows to move the display to show the hidden fields.

SPECIAL DATA ENTRY

The procedure for using most of the data entry options is obvious. Write in information, tap an icon, tap a diamond to get a picklist, or drag a diamond to set a value.

The Note Pad, the Recording and the Sketch are highlighted here because they are more complex types of data entry.

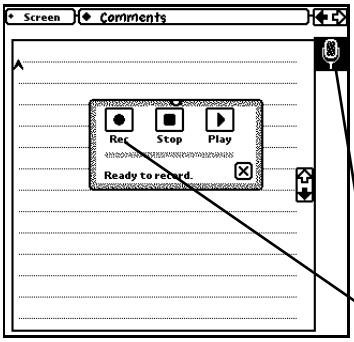
NOTE PAD



A NotePad screen allows you to keep a pad of up to seven titled notes. There is a 40 line limit to the length of each note.

Any notes without a title will not be exported. FieldWorker treats note titles as field names, and does not export any data for which there is no name.

RECORDING



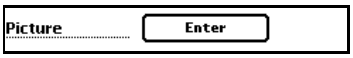
Record voice notes for later transcription. Also record any sound based information such as the sound of faulty equipment or background noise level.

Not available on models issued prior to the MessagePad 2000.

There is a maximum of one Recording screen per project.

Tap the microphone to start recording. The microphone becomes a speaker after a recording has been made.

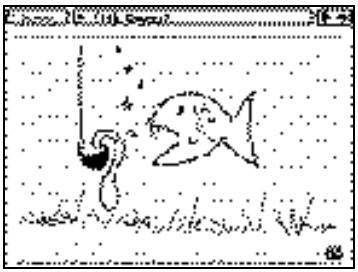
SKETCH



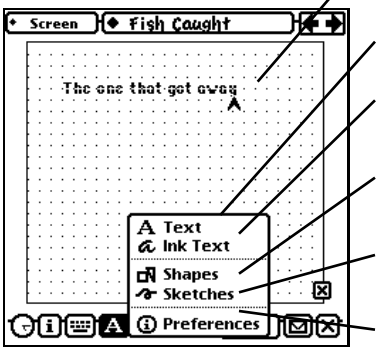
If you are entering a Sketch as a Field, tap the Enter button to start a drawing or enter a signature.

If the Sketch is a screen, the sketch pad will open as soon as you move to it.

The Sketch allows you to draw a picture of something that cannot be easily described in words.



N.B. A sketch field can be used to record signatures in projects where chain of custody information is of critical importance.



If you are in text mode, the carat sign (^) can be located at a specific place by tapping your pen on the screen.

Entries will be interpreted as typed text.

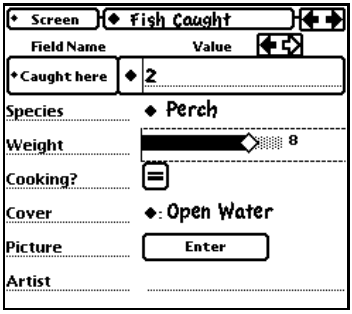
Pen strokes will be taken as entered, but reduced to text size.

The Newton will do its best to transform pen strokes as regular shapes.

Default setting. Pen strokes will be taken as entered.

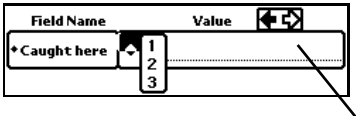
Takes you to the Handwriting Recognition facility offered in the Extras Drawer.

MANAGING A MANY



The Many screen looks different than any other. The PrimaryKey field is always shown as the first field in a Many screen.

The Field Name of the PrimaryKey is enclosed in a menu button to show that it has an associated menu of actions.



You can move between instances in a many screen by selecting from the list shown when you tap the central diamond

. . . or by using the black navigation arrows to move forward or backward by one instance.

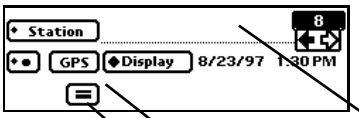
MANDATORY FIELDS

Mandatory fields have dots around them to indicate they must be filled in.

If you have not filled in a Mandatory field, you cannot use the Station Menu button to create a new station or to import or export station data. If you try you will be told the name(s) of the mandatory fields you have not completed.

It can be extremely frustrating and annoying to work with a project with a lot of Mandatory fields. Use them sparingly.

CAPTURE LOCATION

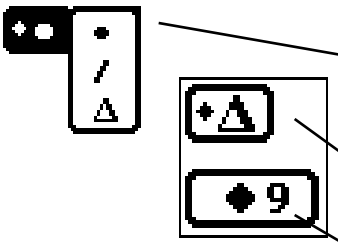


Whenever you create a new or duplicate station, you have to set up its shape and position.

It is generally easier to work with data if your stations are named.

The position(s) attached to the station may be set in different ways.

- *By using a GPS receiver*
- *By calculation*

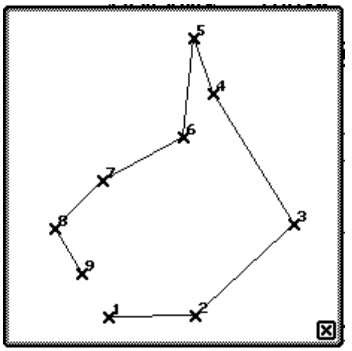


SHAPES

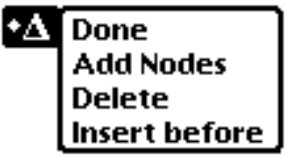
A station may be a point, a line or a polygon

Lines and polygons have nodes. . .

. . . and, at the touch of a button . . .



. . . node maps that allow you to select a node by tapping on its number . . .



. . . so you can edit the shape.

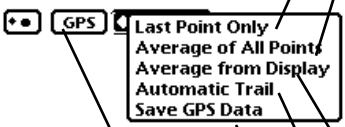
GPS OPTIONS

Points and nodes have positions taken from a GPS receiver or calculated.

The GPS collection option used for determining the latitude/longitude or grid references for a station will depend on your requirement.

When speed is important and the accuracy of a single reading from your GPS receiver is acceptable.

Improve accuracy by averaging all readings taken from open to close of the GPS connection.



For both average options, GPS readings can be collected in the background as data is recorded in the foreground.

FieldWorker sounds a bell to remind you not to move, and tells you how many observations have been recorded.

Review a scatter diagram of GPS readings so that outliers can be eliminated before an average is taken.

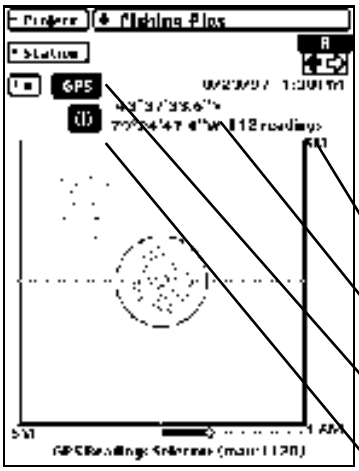
Use time and distance intervals for taking automatic readings. Distance between nodes/stations is calculated.

Saves NMEA sentences as they are received. Station position is set as the last 'Collect' sentence received.

The operative GPS option is indicated in the GPS Option Menu button as Point, Average, Display, Trail or Save. The displayed option is used for all GPS readings until it is changed.

Once a GPS option has been chosen, tap the GPS button to actually start collection.

AVERAGE FROM DISPLAY



This is the scatter diagram display that appears when you ask FieldWorker to collect a GPS position using Average from Display.

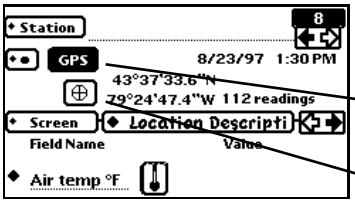
N.B. The DGPS monitor slip appears when 'Using Diff' has been ticked.

Radius determined by 'Receiver Accuracy' setting in GPS Preferences.

Display of acquisition status or number of readings to date.

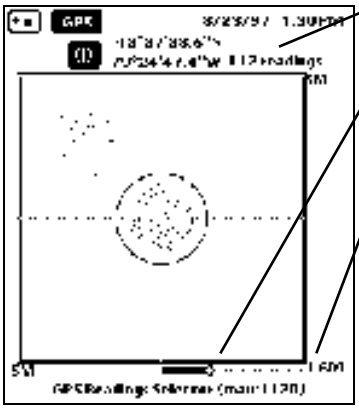
Black because GPS readings being acquired.

Black because display slip is open. Tap to close display to record data while collecting GPS readings.



Black because GPS readings still being taken.

White because the scatter diagram display slip is closed. Tap to reopen display.



The number of readings included in the display circle.

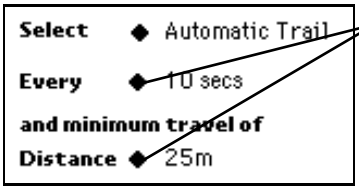
Reduce radius until the circle in the scatter diagram includes only those readings you want included in your average.

This number will give you information on the functional accuracy (as opposed to the rated accuracy) currently being achieved by your GPS receiver.

N.B. The accuracy of your receiver will vary depending on the positions of the constellation of satellites selected by your receiver and where you are in the world.

AUTOMATIC TRAIL

The default values for taking GPS readings for Automatic Trail are every 20 seconds or 100 meters.



If you are changing these readings in the GPS Preferences slip, set numbers using the diamonds All GPS readings are taken as single values.

Selecting Automatic Trail allows you to set time and distance minimums for recording GPS readings. Each reading is a new node when the station is a line or polygon; a new station when the station is a Point.

When you use this option, FieldWorker calculates the actual distances between nodes or stations and sends them with the FieldWorker position header.

You can make observations at a position by tapping the 'x' button that appears when the 'GPS' button is active.

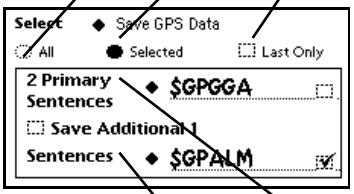
Tap the 'x' button to force a new GPS reading as a new node in a line or polygon or as a new station.

The 'x' button is white while GPS Trail is being recorded. To suspend GPS Trail so you can record data, tap the 'x' button so that it turns black.

When you are finished recording data, tap the 'x' button again (it will turn white) and resume taking automatic GPS readings.

When you tap the 'x' button while creating a line or polygon, FieldWorker creates a new node and allows you to collect data for the shape.

SAVE GPS DATA



Used when you want to collect the full range of the sentences delivered by your GPS receiver.

Tap when you want to store specific sentences taken from your GPS receiver.

Only the most recent occurrence of Primary and Additional sentences saved.

Primary sentences are stored every time they are received.

The number that appears here indicates the number of items currently in the list. Initially, this is an empty list.

Build the list of Primary sentences as you would any picklist defined on the Newton: In this case, though , it is a picklist with a difference: all members of the list are collected.

Additional sentences allow you to create a list of sentences. These sentences are only collected when the Save Additional box is ticked.

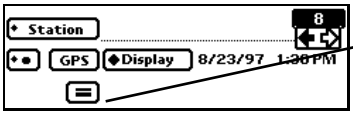
The number after 'Additional' tells you how many sentences are in this list.

N.B. All sentences specified for 'Save GPS Data' must be named in full (e.g., $GPGGA not GGA).

CALCULATE POSITION

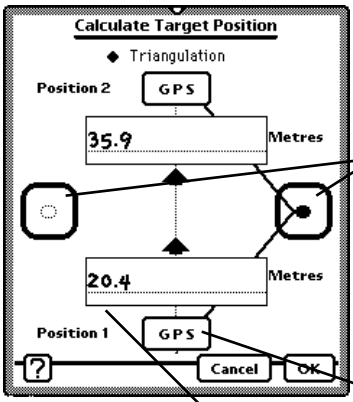
There are times when you want to use the calculate option. It could be that:

- Your GPS receiver will not be able to receive good signals.
- It is not possible to reach the place or object for which you want a position.
- It is much faster to collect positions for line of sight objects by estimating distances or supplementing GPS with other equipment such as a laser gun.



When you tap the calculate button you are given two options about the technique you want to use to derive position.

TRIANGULATION



This technique allows you to derive an unknown position by capturing two positions using GPS and two distances (generally by using a laser gun).

Tap the box that indicates whether the unknown object is on your right side or on your left.

FieldWorker will indicate the required direction of travel and sequence for GPS acquisition.

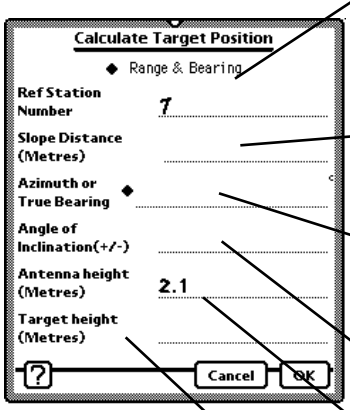
GPS positions are created by averaging all GPS readings received between the time you tap the GPS button once to the time you tap it a second time. During this interval a counter to the right of the GPS button tells the number of readings.

Write in the distance associated with your current position. The distance for the first position must be entered before second GPS reading is taken.

RANGE AND BEARING

Select 'Range and Bearing' from the picklist at the top of the Calculate Target Position slip.

Range and bearing information is most easily captured if you have a laser gun.



You must always have a station with an attached position to use this facility. The default is the station immediately preceding one.

Distance is in the same units as that given for the GPS receiver in GPS Preferences.

***Bearing must be relative to true North**. It may be given in decimal degrees or in degrees, minutes, seconds.*

Only necessary if the slope distance is not the horizontal distance.

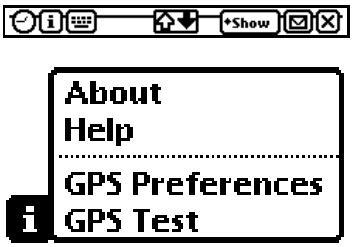
Correction factor used when accurate altitude readings are required. This is taken from the GPS Preferences slip if you are using Differential GPS.

A second correction factor for the determination of accurate altitude (or depth below surface level.)

Use this when you can see part of an object (such as a pole), but cannot actually see the part (e.g., the bottom of the pole) for which you want an altitude.

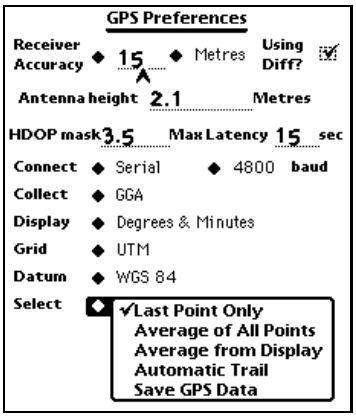
This should be the distance between the visible part and the part for which you want an altitude. Enter a negative number if the part you want is below the part you can see.

GPS PREFERENCES



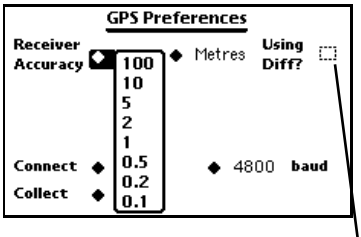
Because GPS receiver settings apply to all projects, access to GPS settings is contained in the 'i' button at the bottom of the screen. The context sensitive help is also contained in the button because it is always available.

After setting GPS Preferences, select GPS Test (see Appendix A) to insure you are communicating properly with your GPS receiver.



The GPS Preferences slip is divided into segments:

- Receiver accuracy information for GPS signal screening and averaging
- Newton to GPS receiver communication and display settings
- Mapping datum ellipsoid and grid definition information
- GPS acquisition options. These options can also be set using the GPS Option button in the Data Entry view.



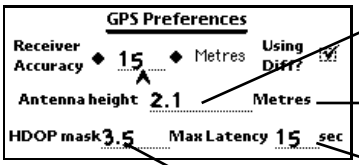
Choose one of the preset choices or write in a number.

Warning: This is not an offer to increase your receiver's rated accuracy. Enter the information given by the manufacturer or you will have problems when using GPS averaging.

Number and unit information must be equivalent to the accuracy/unit combination in the Receiver.

Tick only if you are working with a real time differential receiver.

REAL TIME DGPS



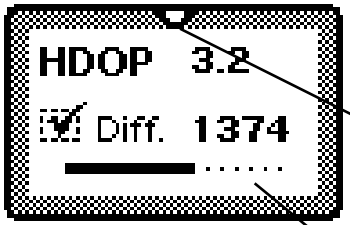
Can be set where exact altitude (or computed depth) are of major importance.

Units are the same as units used in receiver accuracy.

Latency is a measure of the amount of time since the last differential correction signal was received.

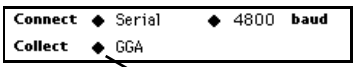
Horizontal Dilution of Precision is a measure of GPS reading quality. It is the ratio of the multiplier for the ranging error. 1 is the best rating.

Signals not meeting either HDOP or Max Latency settings are discarded and a chime sounded to notify the user that signals of unacceptable accuracy are being received.



When you are collecting real time Differential GPS, this floater will appear on the screen. If you want to move it, hold your pen down on the hanger and slide it to a better place on the screen.

All black = no latency. All gray = maximum latency reading reached.



CONNECT AND COLLECT

The connection information set for the Newton must match the settings on your GPS receiver.

Options are

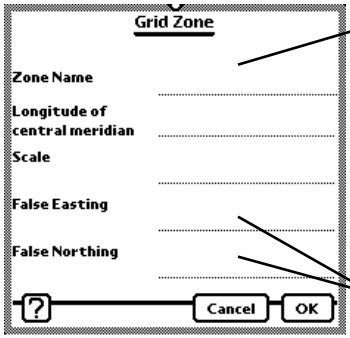
- *GGA to include altitude (need 4 satellites)*
- *GLL only requires 3 satellites*
- *RMC is the same as GLL but it includes navigation information.*

DISPLAY AND DATUM

May be degrees and minutes; degrees minutes and seconds; or a grid such as UTM or a user defined grid system.

Grid references are calculated regardless of the display option chosen. Only the latitude/longitude or the grid that is displayed is sent when data is exported.

UTM is the most frequently used grid. Select 'New' to define another Trans Mercator grid.

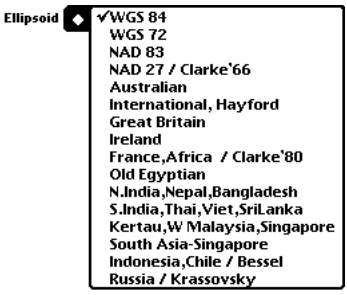


Name the zone so you can choose it another time. You may want to assign a compound name made up of the country and zone (e.g., FIN2 for Finland zone 2)

If the central meridian is an Eastern longitude of is expressed as a positive number. Western longitude is a negative number, e.g., 79˚W is -79.

False Easting and False Northing are the adjustments that are made to the grid so that all readings are expressed as positive numbers relative to the southwest corner of the grid.

We recommend *Map Projections - A Working Manual, USGS Professional Paper 1395* for a complete discussion of the principals of mapping.



The ellipsoids listed are the ones on which all other datums are based. WGS 84 and NAD 27 are the datums most frequently used in North America.

Choice of ellipsoid (mathematical statement of the shape of the earth) can make as much as one kilometer difference in apparent position.

VIEW DATA

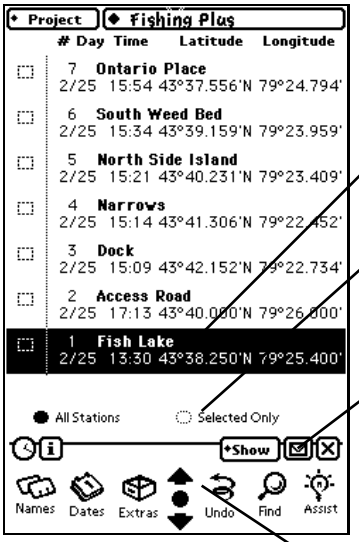
As you work with data in the field, there are times you want to review what you have done (or are going to do if you are working with imported data).

Or you may want to analyze what you have seen to decide what you want to do next.

The Show button at the bottom of the FieldWorker screen presents a list of different ways to view your data.

The views listed in the Show Menu are those which are available from the view in which you are currently working. This is the choice shown in the Data Entry view.

LIST



The List view lists the names and positions of all stations within a project. Stations are listed with the most recent at the top of the list.

The station from which the List view is opened is highlighted.

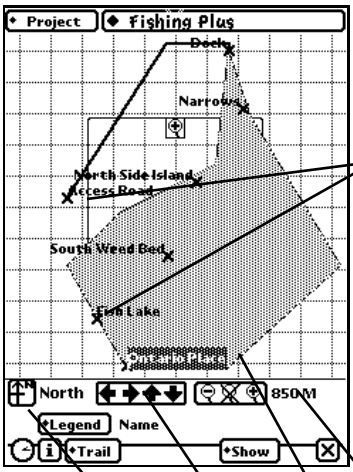
When you tap the square to the left of a station a tick appears in the box. Tapping the 'Selected Only' button will change the list to display only those stations.

When chosen from the List view, print, fax, mail and delete will process stations that have been ticked or ALL stations if none have been ticked.

To move to the Data Entry view of a station, tap its name.

Use the arrows in the Silk screen at the bottom of the Newton screen to change the stations shown in the List view.

MAP . . .



The Map view shows all of the stations for which position information exists. Station Names are shown when they have been entered. Point stations without names are shown as unlabelled circles.

The shapes of stations are shown with lines joining the nodes for line and polygon shapes. Polygons are shaded to make them easily visible features.

If you want a background map to use to orient yourself as you work, you can import major features as lines and polygons.

The default scale for the Map view is that which is required to incorporate all stations within the project.

The name of the station from which the map view was requested is highlighted. Tap the name of any station to move to the Data Entry view of that station.

Use the scrolling arrows to move around the Map view.

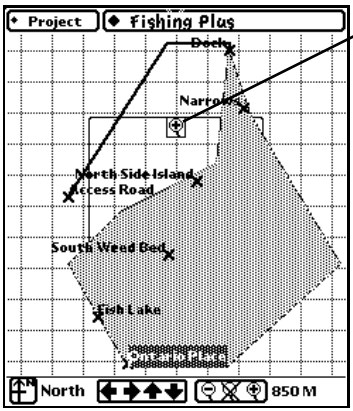
Orientation is assumed to be with North toward the top of the screen.

TRAIL

Tap the Trail button if you want to see where you are on the Map, or where you are relative to your objective. Your current position is shown with a large circle.

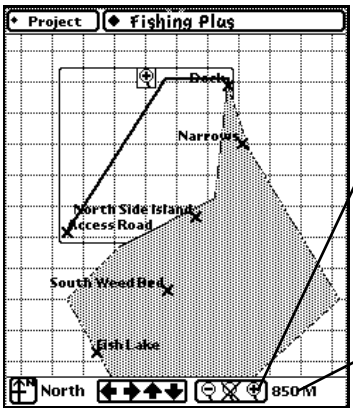
If you are assessing the route of a proposed pipeline, import the proposed route as a series of line segments. Then use trail to check your location and navigate along the proposed pipeline.

ZOOM



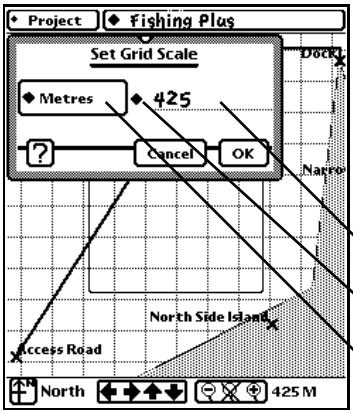
The area in the center of the screen that is outlined by a box is the area to which the zoom command applies.

The magnifying glass icon at the top of the square acts as a Newton 'picture hanger'. Tap the magnifying glass until it turns black; keeping the pen down, move the box until it is centered over the area that is of particular interest to you.



There are two ways to enlarge the map

- *Tap the magnifying glass with the '+' sign in it to enlarge the boxed in area by 100%. The glass with the '-' will reduce the whole map by 50%. The one with the 'x' returns to the scale originally selected by FieldWorker.*
- *Tap the number displayed beside the magnifying glasses to manually set the size of the grid (and hence the map display.*

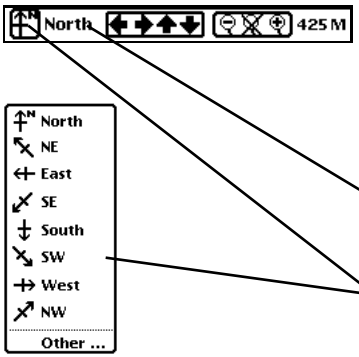


The area in the enlargement box of the previous map has been enlarged by tapping the '+' magnifying glass.

The number to the right of the magnifying glasses was tapped to open the 'Set Grid Scale' slip.

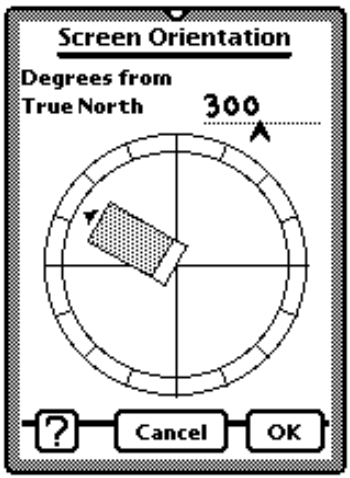
- *write in the size of the grid*
- *choose from prior sizes*
- *change grid scaling units*

ORIENTATION



Should your real life observations fail to come in an orientation in which the most information can be obtained by having a map with up as True North, you can reorient your Map view by

- *Tapping on the name associated with the compass*
- *Tapping on the compass to find a preset orientation which best fits you data*

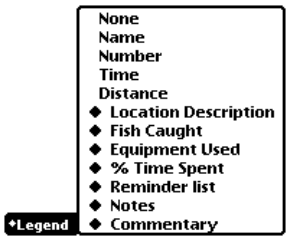


Tapping on the map orientation name (or tapping Other on the compass display) will produce this Screen Orientation slip. Use this when your preferred orientation does not come in 45˚ increments.

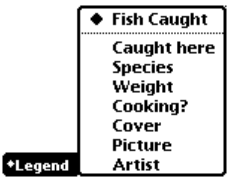
You can set the orientation by writing in the number you want . . .

. . . or by tapping on the picture of the Newton screen and dragging it around the screen. As your pen moves, so does the picture of the Newton. The number shown at the top of the slip matches the angle of the Newton screen picture.

LEGEND

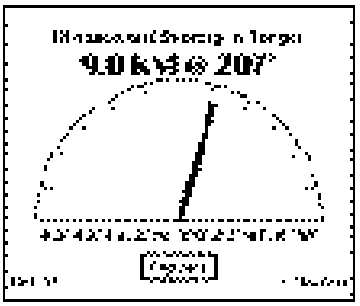


Name is the default label for the stations on the Map. Using the Legend button you can look at the stations on the Map relative to a piece of critically important information.



Tap the Legend button for a list of screens. By choosing an important field within a screen, the station labels on the Map change so you can look for patterns in station data.

NAVIGATOR



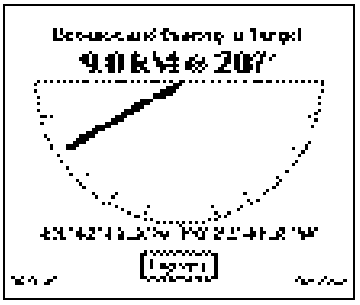
The Navigator view in FieldWorker allows you to use your GPS receiver to help you reach a specific destination.

To reach a station that already exists in your project.

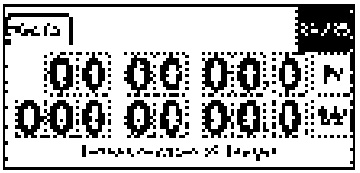
In order for the direction pointer to work

- You have to keep moving (because the required GPS informaton is only available when you are moving).
- You must set your GPS receiver to send the $GPVTG NMEA sentence.

N.B. The direction pointer will not work if you are using the Rockwell PLGR.



When you are moving away from your objective, the arrow display flips to show you are moving in the wrong direction.



If you want to reach a destination for which the position is not stored in a station, create a new station or go to a station without position information. Enter the destination coordinates.

If you switch from Navigator to Map view, FieldWorker opens the Trail option in the Map view so you can watch your progress as you move.

FieldWorker sounds a chime when you are within the area of your desired destination as defined by your receiver accuracy.

Tap the Capture button to record the current reading as the station position.

DESKTOP TO NEWTON

For users of programs other than those for which we provide preconfigured setup, you need to set:

Connection: Serial or Direct
Baud: 9600
Parity: none
Data bits: 8
Stop bits: 1
Flow Control: none
Local echo: ON
End lines with: CR
Wrap Text: OFF
if available,
File transfer: Text

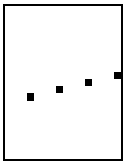
Your FieldWorker disk comes with a preconfigured communications document suitable for your machine. These programs automatically open the serial connection, but some programs require that you open communications as a separate operation.

Make sure communications is established before you start the Newton import or export operation.

If you do this, FieldWorker can send messages to the desktop to confirm the status of what is being done.

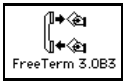
Move the 'FieldWorker Win95Connect' icon (for the PC) or the 'Free Term' icon (for the Mac) to a convenient folder on your desktop.

Make sure your Newton serial cable is connected to the Newton and your desktop computer.



PC: Double click on the Win95 Connect, or open it from HyperTerminal (in the Accessories folder). All of your settings are correctly done.

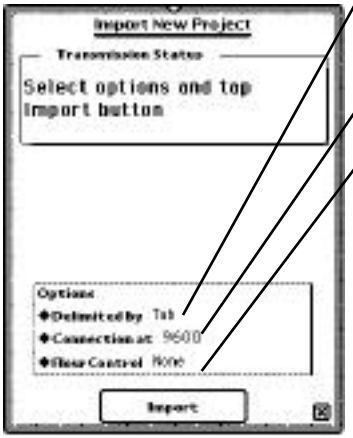
If you get a message telling you the wrong port is selected, open Properties and change the port to Com1.



Mac: Double click on the Free Term icon. If you do not get an immediate connection, change Port to Printer.

IMPORT A PROJECT

Choose Import from the Project Menu. You will get an error message if you have a project with the same name as the one that you are about to import.



The delimiter between fields may be a comma or a tab. Fishing Plus, our sample project is tab delimited.

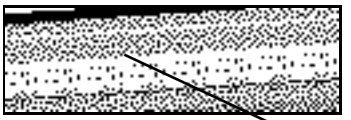
Communication speeds between your Newton and your desktop must match.

The Flow Control option should match that on your PC. Start with 'None'. If there is a problem with transmission, set Flow Control to 'Xon/Xoff' on both the Newton and the desktop. At connection speeds greater than 9600 select the 'Hardware' option.

N.B. If you are working in Windows you will get an error if the project you are sending is open on your desktop.

If you do not have an open connection between your desktop and your Newton, create one using the procedures given on the previous page.

HyperTerminal Session



Tap the Import button on the Newton screen. You will see a message on you desktop telling you to proceed with sending your file. If you do not see this message, check your cables and connection settings.

Mac Free Term Session

Select 'Send Text File' from the Transfer tab (PC) or 'Text Send' from the File Menu (Mac) and send your project file. FieldWorker displays status messages and closes the Import New Project slip as soon as it has finished processing the file.

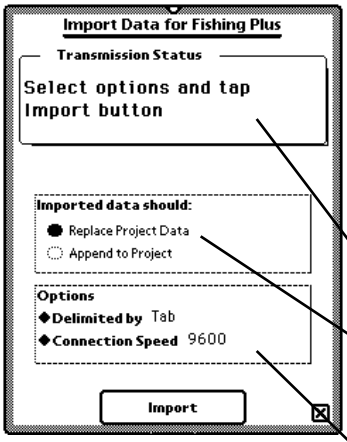
IMPORT STATION DATA

Choose import from the Station Menu. . .

. . . or from the Routing button at the bottom of the screen

Whichever you choose, remember these Import/Export options refer to station data. All actions relative to a project MUST be made from the Project Menu.

Windows you will give you an error message if the desktop data file you are sending is open.



Except for the choice about data placement the Import Data slip is identical in appearance and function to the Import Project slip.

Connect your desktop computer to the Newton making sure the file containing the data is not open on the desktop.

The message area will keep you informed about what is happening.

If you have just created a project or are organizing a new trip to the field, you will want to choose Replace data.

You must have the same settings on the desktop and the Newton. Default = None. Xon/Xoff if experience problems. Hardware if connection speed greater than 9600.

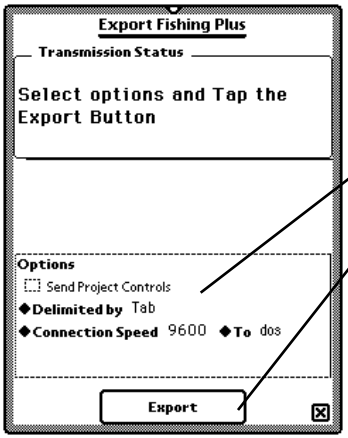
The slip will close when the imported data has been incorporated in the project.

N.B. Sketches cannot be imported as part of Station Data.

EXPORT A PROJECT. . .

FROM THE NEWTON

Choose Export from the Project Menu.



You may want to export a project

- to modify and improve it
- to use it as a model for a new project you are designing on your desktop
- to facilitate the transfer of the same project to multiple Newtons

Send Project Controls if you want to review or modify them on your desktop.

When your terminal program is running on your desktop and the connection is open, tap the Export button.

FieldWorker will send a message to your desktop terminal display saying, "Type OK and hit return or enter."

. . . EXPORT A PROJECT TO YOUR DESKTOP

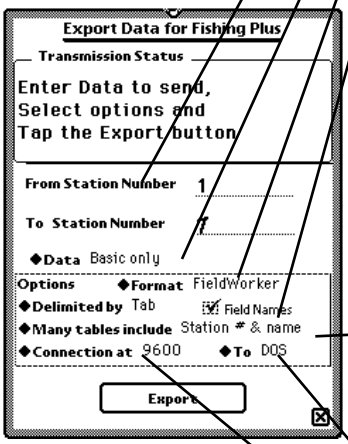
PC: ***Make sure you select 'Capture Text...' from the Transfer tab.***

Type OK and hit return on your desktop keyboard. FieldWorker will send the project text file. Your desktop will capture it using the file name and directory you are asked to specify after selecting 'Capture Text ...'

After FieldWorker has finished sending the text file, select 'Stop' from the Capture Text sub menu on your desktop.

Mac: Select 'Text Capture' from the File Menu. Name the file and the directory where the project is to be stored. Type 'OK' and hit enter. 'Stop Capture' when your project has been sent.

EXPORT STATION DATA



Default: first and last station Numbers.

Determines how much of the Station Data is sent.

Sets the format for Position data when it is exported.

This option should be turned off if data will be moved directly into a database, but left on if you want to look at your data on a spreadsheet .

If Field Names are sent, all files will be terminated with a final line containing the word ‘end’.

Use Field Names to make sure your heading information is correctly formatted to send data to FieldWorker.

Sets the station labels for data from a ‘Many’ screen by controlling the number and contents of the initial columns in the ‘Many’ data file.

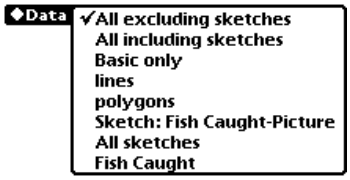
Sets the end of line character sequence to match your operating system.

Determines the speed at which your Newton and desktop communicate with each other.

If you have trouble transmitting the station data for a large project, change the Flow Control on the desktop and Newton to ‘Xon/Xoff’.

Set Flow Control to ‘Hardware’ if you are sending data at rates greater than 9600 baud or exporting Sketches.

DATA FORMATS . . .



The 'Data' diamond on the Export Station Data slip allows you to choose which of the station data files should be sent.

The choice offered depends on the types of fields and screens you have defined.

Each 'Many' and 'Sketch' screen and field is listed by name within this menu.

Station data is sent to your desktop in station number sequence.

'All' Data Options. The data files of all types (including or excluding sketches) are put into a single file.

If the Field Names option is ticked, each file within the master file has a header line with introductory information and a terminating line containing 'end'.

If Field Names are not sent, there is no 'end' line. All files except the basic data file are preceded by a header line in which the first entry is 'table' or 'sketch'.

Basic Data

P	Q	R	S
Location Description			
Air temp °F	Water Temp	Water PH	Return ?
45	35		Yes
75	40	4.2	No
76.5	38	2.7	Yes
78	39	2.1	Yes
83.2526	45	2.5	No
82.6842	55	3	Yes

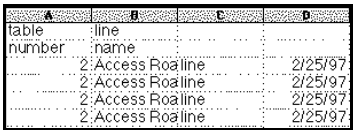
Basic Data is sent in the order in which the fields occur in the screens in the Screen List. Field data is sent in the order in which it appears in the screens.

When data is transmitted from a Note screen, it is sent a Note at a time. The Note name is used as the field name. The text is a string without embedded carriage returns. If you are uploading a comma delimited file, commas are deleted from all text.

Data is sent only for those fields or Notes that have been assigned a name.

. . . DATA FORMATS

Line Data



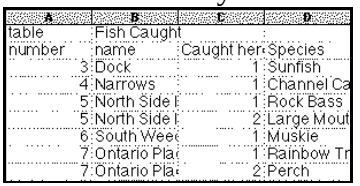
A	B	C	D
table	line		
number	name		
2	Access Roa	line	2/25/97
2	Access Roa	line	2/25/97
2	Access Roa	line	2/25/97
2	Access Roa	line	2/25/97

Lines and Polygons. Position information for all stations with the same type of shape is sent as a single text file.

Line data is sent in one file. Polygons are in a similar but separate text file.

Point data is embedded in the Basic Data.

Data from a Many Screen



A	B	C	D
table	Fish Caught		
number	name	Caught her	Species
3	Dock	1	Sunfish
4	Narrows	1	Channel Ca
5	North Side I	1	Rock Bass
5	North Side I	2	Large Mout
6	South Wee	1	Muskie
7	Ontario Pla	1	Rainbow Tr
7	Ontario Pla	2	Perch

Data for 'Many' screens is sent as a table headed by the name of the screen. Each station will appear as many times as necessary to record the instances at that station.

Initial columns contents may be

- Two columns with station number and name,
- One column with either station number or name, or
- No leading station identifier columns

Sketch files have the word 'sketch' instead of 'table' in the header line followed by a suggested name such as 'S1000405.gif'. This compound name provides a unique identifier for each picture. It is the name displayed as a place holder for the sketch in the data file in which the Sketch occurs.

- 'S1' indicates it is the first sketch in the project definition.
- '0004' is the station number in which it is found.
- '05' says it is a sketch referring to the fifth instance in a Many screen. If it is either a screen or a field in any other type of screen, these digits will be '00'.
- '.gif' is the graphic object format given as a suffix.

In an 'All' master file the 'gif' format, represented by an ASCII character string, starts in the row following the header line in the sketch file(s). This string always starts with a 'GIF87a' string, and ends with '0x00 0x3B'.

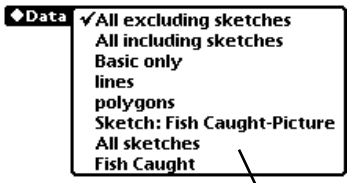
SKETCH FORMAT OPTIONS

	A	B	C	D	E	F	G	H
10	table	Fish Caught						
11	number	name	Caught	Species	Weight	Cooking	Cover	Picture
12	3	Dock	1	Sunfish	2.5	8	Dock	S1000301.gif

To interpret and store the ASCII sketch strings sent by FieldWorker, you will have to create a file for each sketch.

You can view the image by opening the file from a graphic package such as Adobe Photoshop.

If you want to include the images in a database, you can refer to them or store them as part of a database that deals with graphic objects.



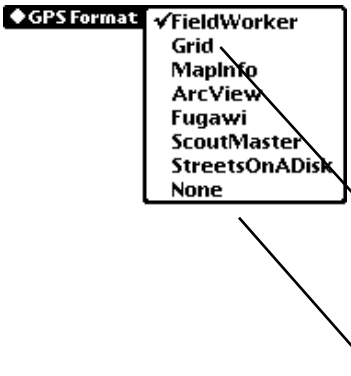
'All sketches' or 'All including sketches'. Sketches are sent as ASCII components in a single large text file. The desktop/Newton interaction is the same as that for exporting a project: establish the connection. Set 'Capture Text...' file from the Transfer tab. Type 'OK' and hit return. Stop capture on the desktop.

FieldWorker appends a line with the word 'end' when the final sketch has been sent. The 'end' statement does not appear between sketches.

'Sketch:*screen name*' or 'Sketch:*screen name-field name*' FieldWorker sends sketch files **one at a time** from all of the stations. No header or end of file lines are sent.

Before FieldWorker sends a sketch it displays the suggested name in the 'Transmission Status' area. Set 'Capture Text ...', type OK, and return. The sketch is sent. Stop capture and specify a new file for 'Capture Text...' for the next sketch. Then type OK and hit return.

POSITION HEADER FORMATS



This picklist determines the format of the text position header for station data.

All position data is given as latitude and longitude unless the Grid option is chosen.

Grid defines positions in terms of Northing and Easting data. The values set will depend on the Grid chosen within GPS Preferences at the time the position was recorded.

Eliminates all position data leaving only station name and number.

POSITION HEADER FIELDS . . .

FieldWorker

1. Station #
2. Station Name
3. Shape
4. Date (mm/dd/yy)
5. Time (24 hour clock)
6. Latitude - degrees
7. Latitude - minutes
8. N or S
9. Longitude - degrees
10. Longitude - minutes
11. W or E
12. Altitude
13. # Satellites or Readings
14. UTC (hhmmss)
15. Distance from previous station [GPS Trail only]

Grid

1. Station #
2. Station Name
3. Shape
4. Date (mm/dd/yy)
5. Time (24 hour clock)
6. Zone number or name
7. N or S
8. Easting
9. Northing
10. Altitude
11. # Satellites or Readings
12. UTC (hhmmss)
13. Distance from previous station [GPS Trail only]

N.B. Station Data being sent to Fieldworker must have position fields in **FieldWorker** or **Grid** format.

. . . POSITION HEADER FIELDS

MAPINFO

1. Latitude degrees (+N, -S)
2. Longitude degrees (+E, -W)
3. Altitude (meters)
4. Station number
5. Description
6. Date (mm/dd/yy)
7. Time hh:mm
8. UTC (hhmmss)
9. Distance (meters)

FUGAWI

1. Station number
2. Station name
3. Latitude degrees (+N, -S)
4. Longitude degrees (+E, -W)
5. Date/time (mm/dd/yy hh:mm)

STREETSONADISK

1. Station name
2. First field from first screen [Identification category for type of object, e.g. hospital, school, town, village.]
3. Latitude degrees (+N, -S)
4. Longitude degrees (+E, -W)
5. Date (mm/dd/yy)
6. Time (hh:mm)
7. UTC (hhmmss)
8. Distance (meters)

ARCVIEW

1. Station number
2. Longitude degrees (+E, -W)
3. Latitude degrees (+N, -S)
4. Altitude (meters)
5. Shape
6. Station name
7. Date (mm/dd/yy)
8. Time
9. UTC
10. Distance

SCOUTMASTER

1. # [Start record character]
2. Station number
3. Station name
4. N or S
5. Latitude (degrees)
6. Latitude (minutes)
7. E or W
8. Longitude (degrees)
9. Longitude (minutes)
10. Altitude (meters)
11. Date (dd-mmm-yy)
12. Time (hh:mm:ss)
13. Manual [as differential setting]
14. $[End of record]

None

1. Station number
2. Station name

When you choose a header format for a specific GIS or CAD program, the prompts that allow you to choose delimiters or send field names may disappear from the Export Data slip. These prompts are deliberately removed because there is only one format acceptable to the package to which the data is being sent.

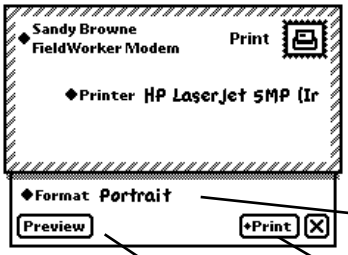
SHARE DATA

FieldWorker runs on a handheld computer so the data you collect can be sent to your desktop computer or to someone else or both.

The Routing button at the bottom of the FieldWorker screen offers the options you need to share your data.

N.B. Sketches cannot be Printed, Faxed or sent by e-mail.

Tap the Routing button to select the option you want.



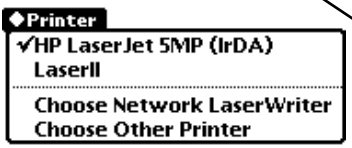
PRINT

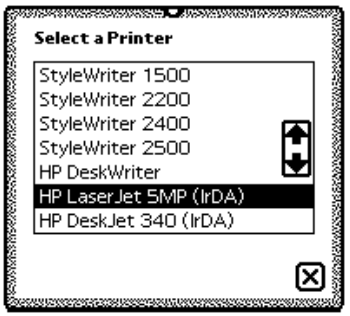
The print options allows you to print data for one station at a time or for each of the set of stations selected in the List view. The options offered include:

Choose between Portrait or Landscape orientation.

Decide when you want to print: Now or Later. If you choose Later, when you are ready to print you will find your report in the Out box in the Extras drawer.

Preview your report.



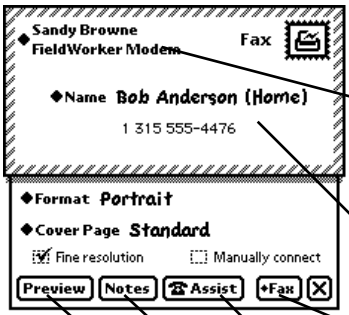


The Newton allows you to choose between a number of different printers:

The choice available on your Newton depends on the printer drivers you have.

If you need a printer driver that you do not have, you can buy drivers from most Newton vendors.

FAX



In order to send a fax, you have to have a fax modem for your Newton.

The fax can be sent on behalf of any of the people registered in your Newton; it can be sent from a standard modem location setting or from an other city.

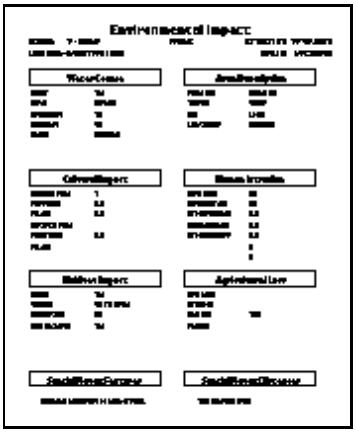
Choose the Name of the person to whom it is directed from a prestored list or from your Newton address book.

Send Now or Later. If you choose Later, the fax will be placed in your Out box until you are ready to send it.

Ask your Newton to dial the phone number for you.

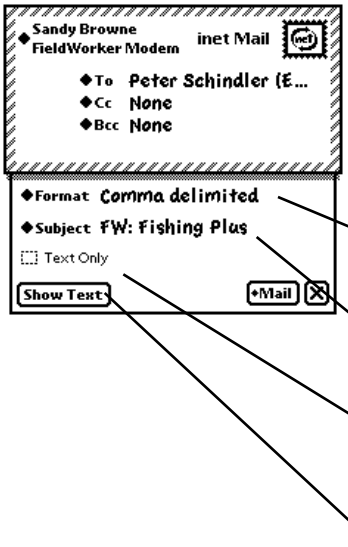
Add notes to your cover sheet.

Look at your fax before you send it.



The same report is produced for printing and faxing.

MAIL



Mail allows you to send Station Data to a recipient or as an e-mail message.

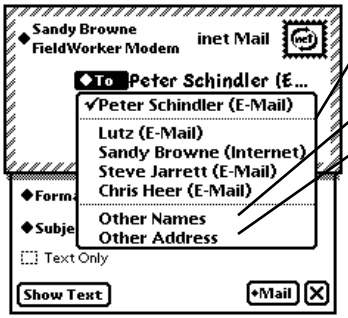
When you send data as an e-mail, the data for each station is sent as a separate message.

Comma or Tab delimited. Comma is best because tabs are replaced by spaces on the internet.

Opens a slip so you can modify the default Subject.

FieldWorker only sends text files. Sketches cannot be sent via e-mail from the Newton.

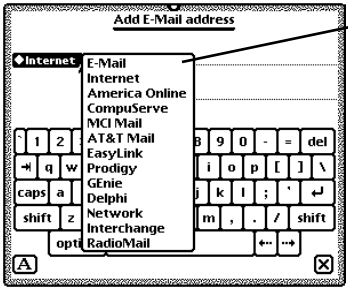
Shows body of the message



You can select as many addresses as you want for the 'To', 'Cc' and 'Bcc'.

Takes you to your Newton Names.

Enter the addresses you want to use.



This is the address slip which is opened when you choose 'Other Address'.

These are the options that you set up as part of your Newton Mail system setup.

HARDWARE AND SOFTWARE REQUIREMENTS

1. A handheld computer running the Newton 2.0 or 2.1 operating system. FieldWorker Pro will run on the MessagePad 120, 130 or 2000, although we do not recommend the 120. Due to equipment differences some types of data entry (such as voice notes) are available only on the MP 2000.

2. A desktop computer running Windows 95, Windows NT, DOS, Unix or the Mac operating system and

   · A terminal communication program. If you do not have a favorite program, FieldWorker supplies one on the program disk.

   · A spreadsheet, word processor, database, GIS or CAD program which will work with comma or tab delimited files.

APPENDIX A

NEWTON TO GPS CABLE

FieldWorker includes a cable to link the Newton to any GPS receiver.

If your receiver cable is terminated with loose wires, check the GPS user manual for the function of each wire and then match them to the FieldWorker cable.

To prevent any possibility of GPS signal interference, wrap the two unused plug endings in black electrical tape. This will ensure that the open connections will not create a short circuit in wet field conditions.

Din 8

For receivers such as the Trimble ScoutMaster, FlightMate and GeoExplorer with a Din 8 plug

Pinouts

1 GPS signal
7 Signal ground

DB9

Most frequently used connection for receivers such as those from Racal, Satloc, NovAtel and Omnistar.

Most companies with proprietary serial plugs (e.g. Garmin and Magellan) sell data cables which terminate in a DB9.

Pinouts

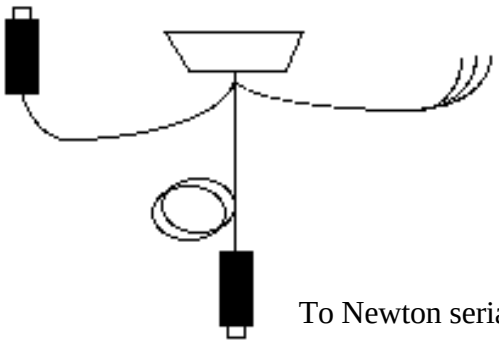
2 GPS signal
5 Signal ground

Free Wires

For receivers with loose wires or proprietary connectors for which DB9 data cables are not available.

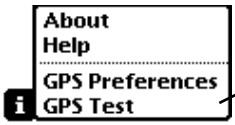
Free Wires

White GPS signal
Black Signal ground
Silver Frame ground
Red Unused

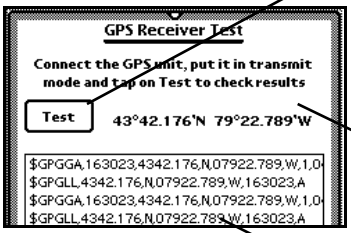


To Newton serial port

GPS TEST



After connecting your Newton to your GPS receiver, choose GPS Test from the Information button ('i') which appears at the bottom of the FieldWorker screen.



To start testing tap the 'Test' button. It turns black to tell you that FieldWorker is attempting to acquire NMEA sentences from your GPS receiver.

Tap the button again to stop testing.

Message display area. The status of the test procedure is displayed in this area. When your current latitude and longitude are displayed, successful communications has been established.

GPS signal display area

If no readings appear in the test display box, the Newton is not communicating with your GPS receiver. Try to correct the problem by

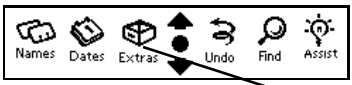
- Checking that your cable is plugged in properly.
- Checking that your cable is not faulty.
- Checking that your GPS receiver is set to transmit.
- Insuring the Newton and the GPS baud rates are matched.

If you can see information in the display area, but you are not getting a latitude and longitude, check that your GPS receiver is using the NMEA protocol for transmission.

If you have any other problems

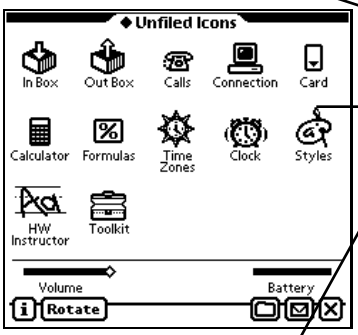
- Look in the Troubleshooting section of this manual.
- Call your GPS vendor for help.
- Look at the FAQ section of the FieldWorker web site
  http://www.fieldworker.com/FAQ/

FIRST TIME INSTALL . . .

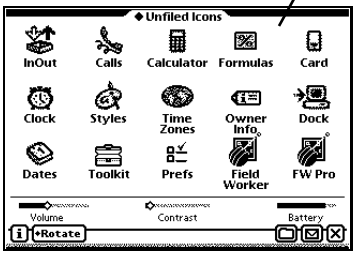


Plug your Newton into your desktop computer using the cable shipped with your Newton.

Tap the Extras drawer at the bottom of the screen.

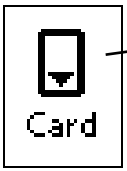


This is the Extras Drawer from the MessagePad 120 or 130.



This is the Extras Drawer from the MessagePad 2000.

To ensure that FieldWorker is always available when you need it, we will install it in your Newton's RAM.



Tap the Card icon.

If you do not have a PCMCIA card in your Newton, you will be shown a slip with the message, “No card is inserted”. If your Extras drawer does not show the Card icon, tap the diamond on the folder tab and select “Unfiled Icons”.

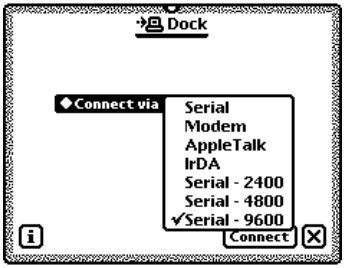
Make sure the box at the bottom of the Card slip is not ticked if you have a card in your Newton bit do not want your program to move with your card,.

Tap the close box.

. . . FIRST TIME INSTALL

MessagePad 120 or 130. *Tap the Connection icon to get ready to link to your desktop computer.*

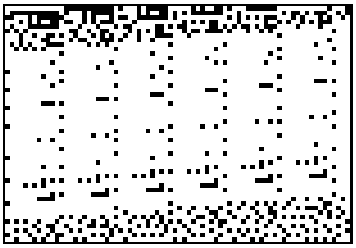
MessagePad 2000. *Tap the Dock icon to get ready to link to your desktop computer.*



In the Dock slip on the Newton, tap 'Connect Via' and select 'Serial- 9600' to connect to Win 3.1 or Win95.

Select 'Serial' to connect to a Mac.

The Connection slip in the MessagePad 120 and 130 has fewer options, but the ones you want is still 'Serial 9600' for Windows and 'Serial' for the Mac.



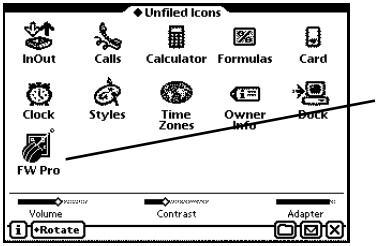
DESKTOP: Take the FieldWorker disk labeled "For the PC" and insert it into your computer floppy disk drive.

Double click on the 'FWPro.pkg' icon.

If you have installed the Backup or the Connection Utility software that came with your Newton on your desktop, you will get a message asking you to complete the connection to the Newton.

Tap the Connect button on the Newton and your package will be installed in the Unfiled Icons folder in the Extras drawer.

STARTING FIELDWORKER



FieldWorker is now in your Extras drawer.

Tap the FieldWorker icon to start running the program.

If you are likely to collect more than one megabyte of data, we recommend that you use a PCMCIA card to store data.

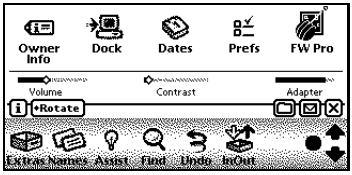
If you have a PCMCIA card, push it into a slot in the Newton. After the card is installed, tap the Card icon again and tap the "Save new info and packages on this card" line at the bottom of the Card slip.

If you have a MessagePad 2000 or a later model, you may want to move FieldWorker from the Extras drawer to the Silk screen at the bottom of the screen.

This procedure and the one required to make FieldWorker into a backdrop so that the program is always ready to run are discussed on the next page.

FIELDWORKER ALL THE TIME

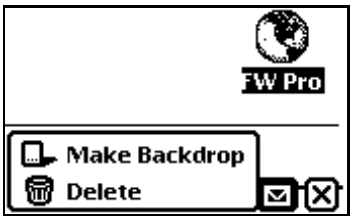
The MP 2000 allows you to move an icon from the Extras Drawer to the Silk screen so that it always available for you to use.



Open the Extras Drawer and tap and hold the pen on the FW Pro icon until the Newton squeaks. Lift the pen and then put the pen down again on 'FW Pro' and drag it onto the Silk screen area.

If the Silk screen is already full the Newton will ask you to confirm it is OK to move something else off.

Now you can start FieldWorker without having to open the Extras drawer each time.



Tap and hold the FW Pro icon until it squeaks and looks like this.

Tap on the routing button. Now select 'Make backdrop' and FieldWorker now replaces the notepad as the default application on your Newton.

ELECTRONIC NEWSLETTER

Our customers develop excellent ideas about what can be done using FieldWorker and how. They communicate these ideas to us but to date we have had no way to share them with you or to allow you to share them with each other.

We have started an electronic newsletter to allow us to share ideas and information with you. We will keep them short, informative and commercial free. Learn how to make the most out of FieldWorker Pro. Sign up at http://www.fieldworker.com/mailing.html

UPGRADING TO PRO

Pro coexists with the previous version of FieldWorker on the Newton. To transfer a project from a previous version to Pro, export the project and data from the older version to the desktop and re-import it into Pro.

APPENDIX D

GPS REFERENCE MATERIAL

You can buy a GPS receiver, plug it in and get started. If you are just starting to use GPS, you will find that GPS and mapping are complex subjects. This is an initial and far from exhaustive list of references for beginners. We have a far more extensive list on our web site at http://www.fieldworker.com/

Navtech GPS Supply

6121 Lincolnia Road Suite 400,
Alexandria, VA 22312-2707
USA.
Tel: (703)256-8900
Fax: (703)256-8988
gpsteach@interramp.com

www.navtechgps.com

GPS receivers, accessories, literature, and courses available internationally through their catalog.

Books

Getting started with GPS surveying, Simon McElroy et al, GPSCO, Land Information Centre, PO Box 143, Bathurst, NSW 2795, AUSTRALIA (GPSCO also organizes regular courses on GPS).

GPS A Guide to the Next Utility
and
Differential GPS Explained
Trimble, 645 North Mary Ave., P.O. Box 3642, Sunnyvale, CA 94088-3642, USA
Fax 408-481-7781
EU: +44 256-760150
Singapore:+65 738-6549

Books

GPS Positioning Guide
Geomatics Canada, Geodetic Survey Division, Information Services, 615 Booth Street, Ottawa, ON K1A 0E9, Canada
Tel: (613) 995-4410
Fax (613) 995-3215
information@geod.emr.ca

Guide to GPS Positioning, David Wells et al, Canadian Institute of Surveying and Mapping, Box 5378, Postal Station F, Ottawa, ON K2C 3J1
CANADA
Tel: (613) 224-9851

Special GPS and Datum Processing for Windows

Blue Marble Geographics,
46 Water Street, Gardiner, Maine 04345, USA
Tel: (207) 582-7001
Fax: (207)582-7001

Outstanding Web sites

hom.net/~mark/gps.html

Excellent reference to other sites covering all aspects of GPS usage

http://www.fieldworker.com/gps/

ROCKWELL PLGR

In order to use the Rockwell PLGR GPS receiver, which is issued by the US military, you need to set the NMEA messages to send to GGA and GLL ONLY. Do not attempt to use VTG as it can cause problems.

VTG does not help as the information usually provided in this sentence for navigation is not present. This means that the pointer on the Navigator view will not function. We are attempting to work with Rockwell on this issue and may be able to resolve this problem in a future release.

APPENDIX E

TROUBLESHOOTING

If you encounter a problem that is not covered in this section, we recommend that you go to www.fieldworker.com/faq/ where there is an extensive list of solutions to problems our users have brought to us.

NEWTON

What is the best solution when you get the error message "Another application seems to be using the communication port."?

Reset the Newton

Is there any solution to the unexpected errors that occur during import?

We have not experienced this problem directly, but we suggest that you reduce the baud rate or add a short delay or about 0.2 of a second between each line or activate Xon/Xoff. Many common programs allow you to do this in the settings for file/text transfer.

If my batteries die, will I lose all of my data?

No, FieldWorker saves any changes to internal memory or the PCMCIA card every time you change screens or are inactive for more than about five seconds.

Both the Newton and the PCMCIA card have flash memory so that even if all batteries including the backup battery die or are removed, your data will be saved intact. Just replace the batteries and all your data will be accessible again.

When opening FieldWorker I get an error message before the splash screen even has a chance to disappear. What should I do?

This kind of error is caused by a corrupted FW Pro preferences file.

Close the error message by tapping on its close box. Then tap anywhere on the splash screen to dispose of it. Then just close FieldWorker.

Open your Extras drawer and select Storage from the tab at the top of the file folder. Delete the icon labeled ‘FW Pro Prefs’ by scrubbing it out - put the pen down just to the left of the icon and execute a letter W over the icon. After confirming the deletion, go back to the Unfiled Icons folder and restart FW Pro.

TROUBLESHOOTING

DESKTOP COMPUTER

I have a Toshiba laptop and it will not communicate with my Newton.

Your PC may think that the Newton is actually a mouse. In the setup screen for the Toshiba (reached by typing setup), there are a number of groups of items for setup. In the group called others is a selection called Pointing Devices. The two options here are Auto-selected and Simultaneous. If you are running the laptop in simultaneous mode, all you have to do is change this option to Auto-selected.

I am using FreeTerm as my comm program on my 5300 PowerBook, and I'm having communications problems,

Turn off Apple Talk on your PowerBook, then Restart. Load up FreeTerm, and under settings, pick Modem Port instead of printer port. This will prevent the PowerBook from thinking that your Newton is a printer.

I want to print an overlay of GPS points on a map or photo.

Put data into the PC program MapSite that does exactly this for maps of any scale and any "projection" type.

Put data in Excel and print a scatter plot scaled to fit your photo.

What settings should I use for HyperTerminal in Windows 95?

We have included a file called FieldWorker Win95 Connect on your FieldWorker disk with all the settings you will need preset. Just double click it to start HyperTerminal.

I just used a spreadsheet to open the data I exported to my desktop, and it is completely scrambled, what happened?

One of the HyperTerminal settings automatically folds lines at 80 characters. This tends to produce files with interesting and unexpected appearances.

Use the HyperTerminal document we sent on the FieldWorker disk to eliminate this problem.

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