Station Name	Enter a message string which will be displayed on the top line of the CDU screen to identify the reference station.
Display Type	Specify the type of monitor attached to the PC. The possible choices are: *Monochrome* or *Color*.
Enable DEBUG Functions	This is a troubleshooting feature and should generally be set to *NO*. Selection of *YES* causes various troubleshooting features to be enabled, including the `Product Type' and 'Product Level' fields on this screen.

NMEA MESSAGE CONTROL SCREEN

This menu selection enables the user to control which sentences (Leica proprietary or NMEA) may be output on either the Control or Equipment ports. Refer to the Leica 12 Channel Technical Reference Manual for a detailed description of each sentence type.

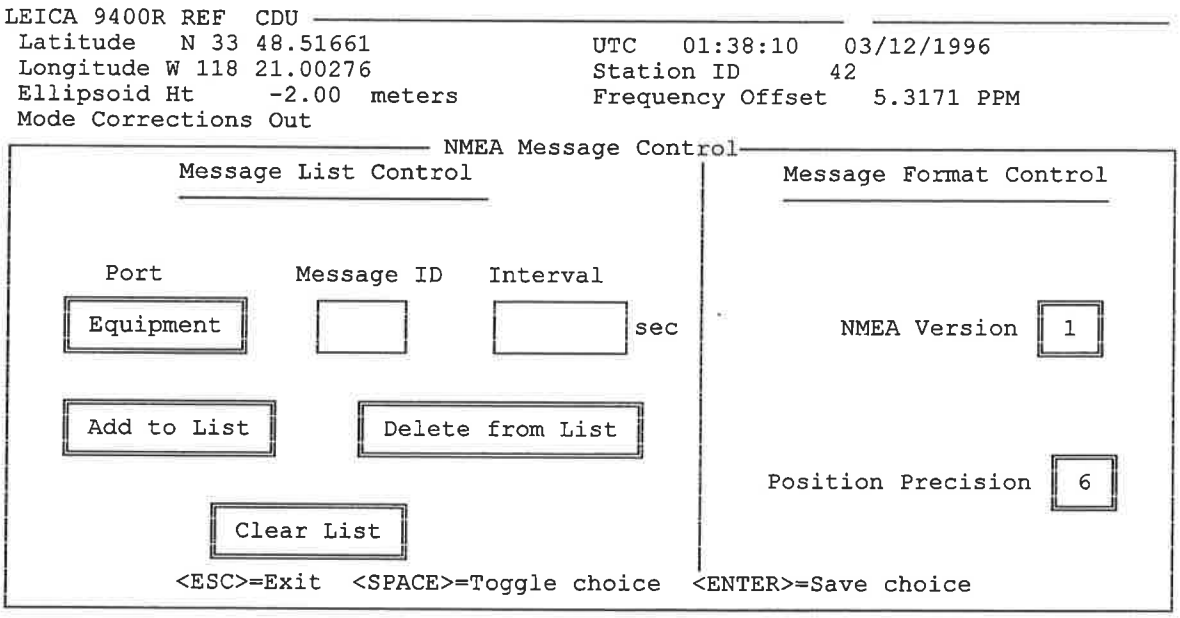

Figure 3-17. NMEA Message Control Screen

Port — The port choices are *Control* or *Equipment*. This identifies to which port the messages (either NMEA or Leica proprietary) will be output.

Message Id — Enter the full three digit/character message ID to be added/deleted from the output list. Valid selections are any Leica proprietary control output message or standard NMEA message that appear in the Leica 12 Channel Technical Reference Manual.
Note that the messages contained on the Time Recovery Screen (types 121, 123, 830 & 831,) are not affected by this screen and are controlled only by the fields of the Time Recovery screen.

Interval — Enter the output rate, in seconds, for the desired message type.

Add to List — Highlight this box with the cursor, and press the *Enter* key to add this output selection to the previous output list.

Delete From List — Highlight this box with the cursor, and press the *Enter* key to delete this output selection from the previous output list.

Clear List — Highlight this box with the cursor, and press the *Enter* key to clear the list of periodic messages output to the port specified.

NMEA Version

The possible choices are either *1* or 2. NMEA version 1 will cause the receiver to output the GGA and GLL NMEA messages in a format compatible with equipment which expects NMEA version 1 (such as the MX 4200). NMEA version 2 appends additional information, fields, and/or precision to the GGA and GLL messages. The following list identifies the modified fields in the GGA and GLL sentences.

GGA Sentence

Field	Version 1	Version 2
6: Quality Flag	0,1	0,1,2
8: HDOP	INT	FLOAT
9: Antenna Ht	INT	FLOAT
11: Geoidal Ht	INT	FLOAT
13: Age of DGPS	—	INT
14: Ref Stn ID	—	INT

GLL Sentence

Field	Version 1	Version 2
5: UTC Fix Time	—	INT
6: Status	—	`A'

where: — denotes not present

Position Precision

Select either *2, 3, or 4* for the number of decimal places used for the minutes field in the GGA and GLL messages.

RECEIVER PORT CONFIGURATION SCREEN

This menu selection enables the user to define the serial format of the data interfaced on the four ports. Only the Baud Rate fields and a single hardware handshake field may be modified as the Parity is fixed at *None* and the number of Data Bits are fixed at *8*.

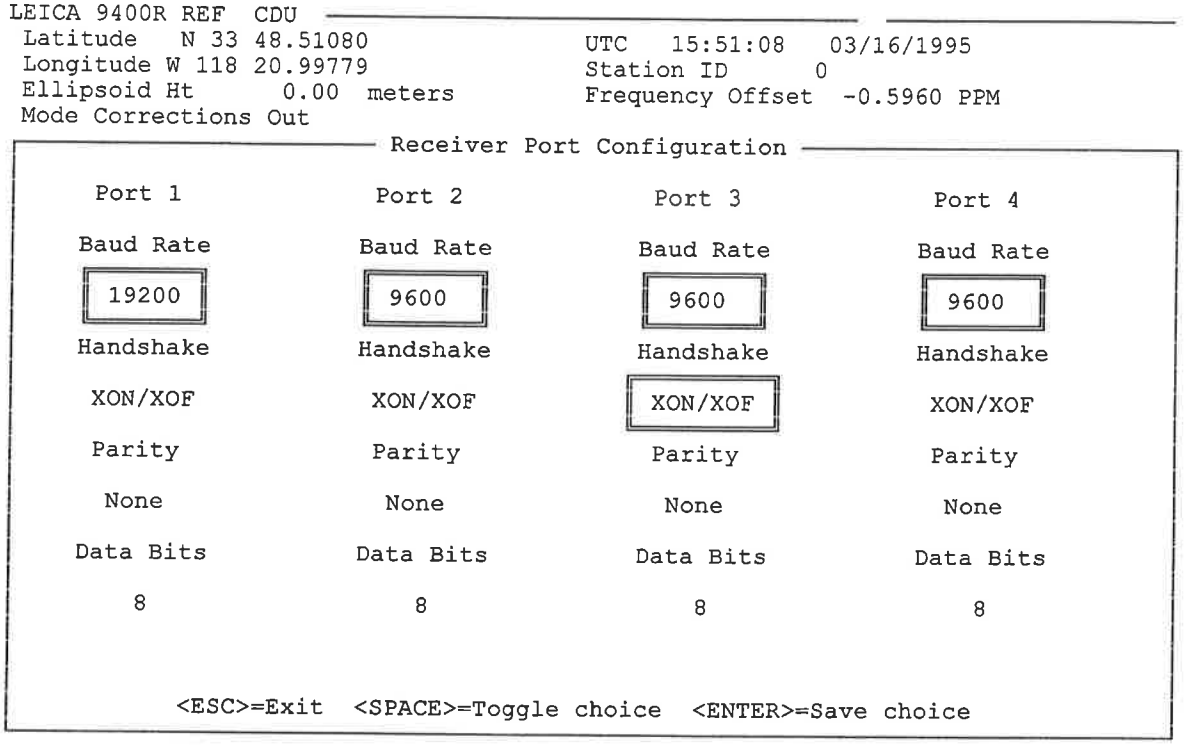

Figure 3-18. Receiver Port Configuration Screen

Baud Rate

The receiver will operate with any of the available baud rates, but lower baud rates can severely limit the amount of information available to the CDU. The Leica CDU program has been designed for the Control Port to operate at 2400 baud and higher. Response to operator commands is slower at 2400, and the displayed satellite information is updated slowly. For these reasons, operation at 9600 baud is recommended. Operation at 19200 baud is also supported, but only on PC's which are hardware compatible with an IBM PC-AT or PS/2. Other PCs may fail to operate or lock up when operation at 19200 baud is attempted.

The baud rate required for the Raw Data Port will depend upon the amount and type of data selected for output. Compressed raw measurements at a 1 Hz rate, with almanac and ephemeris data can be output at 2400 baud with little or no loss of data. If other records are added, then a higher baud rate will be required. For raw measurement rates above 2 Hz, 19200 baud is required.

Output of all available data, including uncompressed raw measurements, time recovery and Leica Proprietary Debug messages, can only be handled at 19200 baud. If compressed raw data is to be logged through the same port used for the CDU interface (for example, on a PC with only one COM port), then the baud rate must be at least 9600 and 19200 is recommended. When using 9600 or higher baud rates, a 'High Performance' (also known as 'buffered' or '16550') serial port is recommended. The possible choices are: 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400.

Handshake Port 3 (RTCM port default) has been designed to use the hardware handshake lines. The possible choices are: *XON/XOF* or *RTX/CTS*.

RECEIVER PORT ASSIGNMENT SCREEN

This menu selection enables the user to define the receiver function of the four serial ports. Since ports 1, 2 and 3 are RS-232, and port 4 is RS-422, care should be taken when assigning the functions. Any function may be assigned to any port, including multiple functions to a single port. However, since the RTCM information is binary, this function cannot be combined with any other, and as a result, cannot share port assignments. The Control Port is fixed at port 1.

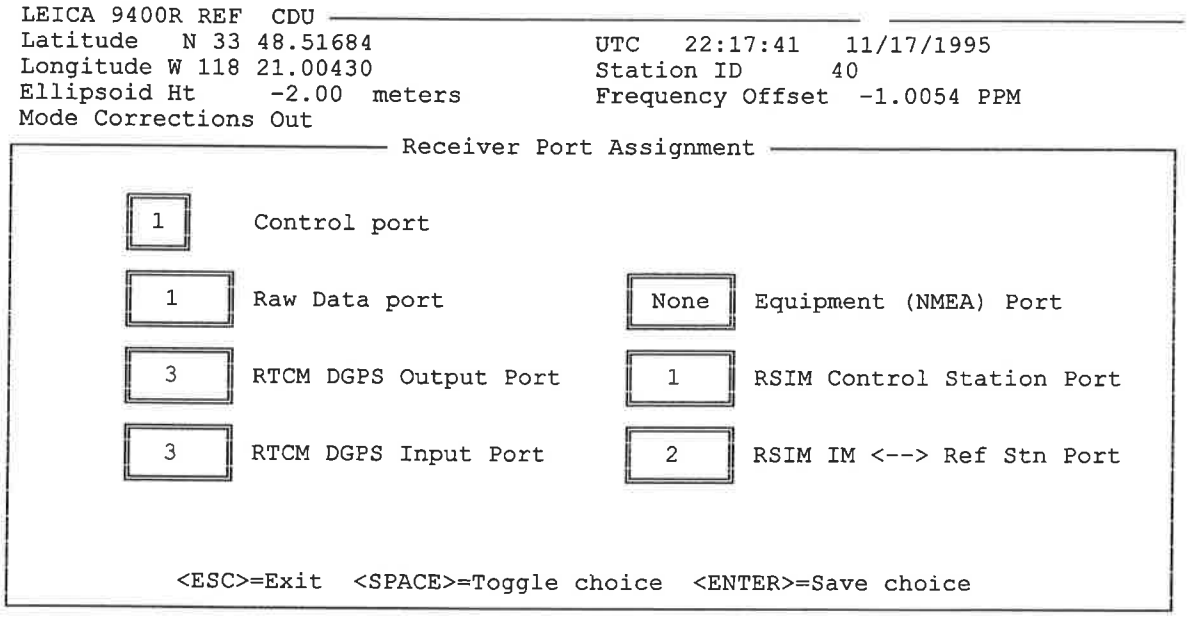

Figure 3-19. Receiver Port Assignment Screen

Control Port This is a display field which shows that the Control Port is fixed at *port 1*. This is the port which communicates with the CDU to send display information and to receive setup information.

Raw Data Port The Raw Data Port choices are: *None* or *ports 1 - 4*. This is the port which outputs records containing raw satellite measurement information. Please note that if the Raw Data Port is sharing a port assignment with another function, then the data file created by the CDU will contain the information generated from both functions.

RTCM Differential Output Port The RTCM Differential Output Port choices are: *None* or *ports 1 - 4*. This is the port which is dedicated to the transmission of the differential corrections to DGPS navigators. This port cannot share port assignments with any other function because the data is binary.

RTCM Differential Input Port The RTCM Differential Input Port choices are: *None* or *ports 1 - 4*. This is the port which is dedicated to the receipt of the differential corrections sent

from a reference station. This port cannot share port assignments with any other function because the data is binary. When the MX 9400R is used as a reference station, this field has no effect, however it's assignment cannot overlap the Control, Raw Data , or Equipment ports.

Equipment Port The Equipment Port choices are *None* or *ports 1 - 4*. This is the port which interfaces to Electronic Marine Devices using the NMEA-0183 standard.

RSIM Control Station Port The RSIM Control Station Port choices are *None* or *ports 1 - 4*. This is the port which interfaces to a control station using the RSIM communication protocol for receipt and transmission of control and status information.

RSIM IM <--> Ref Stn Port The RSIM IM <–> Reference Station Port choices are *None* or *ports 1 - 4*. This is the port which is connected directly from the DGPS receiver operating as an independent quality monitoring station (i.e. Integrity Monitor) to the reference station. Periodic RSIM #20 messages are transmitted from the Integrity Monitor to the reference station to report on the quality of the DGPS corrections.

RECEIVER RAW DATA CONTROL SCREEN

This menu selection enables the user to select which data records are to be output on the Raw Data Port of the receiver. Refer to the Leica 12 Channel Technical Reference Manual for a detailed description of each of these raw data records, including the contents and the individual output rates. Data logging on the PC is enabled in the *PC Raw Data Logging* screen.

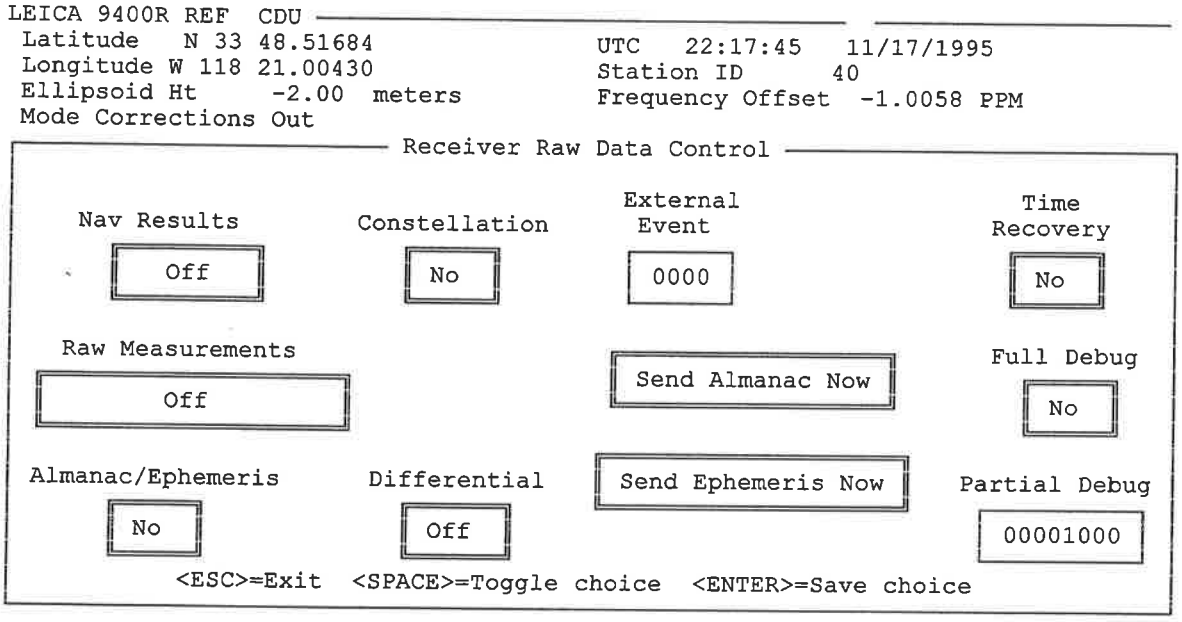

Figure 3-20. Receiver Raw Data Control Screen

Nav Results When enabled, this field causes the receiver to generate either type 8 or type 9 Position and Velocity records. When operating as a reference station, only the clock fields contain meaningful information. The possible choices are: *Off, Type 8* or *Type 9.*

Constellation When enabled, this field causes the receiver to generate type 401, and 411 - 422 Constellation records. These records contain the constellation information for the satellite being tracked on each channel. The possible choices are: *No, Yes.*

External Event When enabled, this field causes the receiver to generate a Type 10 External Event record when an external event is triggered. An external event is triggered when a contact closure is detected across pins 20 and 21 or pins 22 and 21 of the multiport interface or via the event input connector on the back of the unit. This record contains the extrapolated position at the Event Time. The possible choices are: *No, Yes.*

Time Recovery When enabled, this field causes the receiver to generate a type 969 time recovery record. The possible choices are: *No, Yes.*

Raw Measurements When enabled, this field causes the receiver to generate either type 1, 3, 5, 6, 12, 311, 321, 331 or 351 records. The possible choices are:

- *Off* — Disables output of raw measurement data. Please note that type 3 information is required for post-processing of the GPS data.
- *ASCII* — This selection enables output of the type 1 raw measurement data, and types 311, 321, 331 and 351 invalid satellite status records. This output type is intended for system test and troubleshooting and should not be used to log data for post processing.
- *Compressed Type 3* — This selection enables output of the type 3 compressed raw measurement data. This information is required for postprocessing purposes.
- *ASCII & Type 3* — This selection enables output of both type 1 and type 3 messages (not recommended).
- *Compressed Type 5* — This selection enables output of the type 5 and type 6 compressed measurements. This selection should be used when the measurement rate is greater than 1 Hz. This information is required for postprocessing purposes.
- *ASCII & Type 5* — This selection enables output of both type 1 and 5/6 messages (not recommended).
- *Compressed Type 12* — This selection enables output of the type 12 high precision compressed measurements. This record contains information similar to that in the type 5 record, however additional precision has been added to the raw measurements. This is the recommended selection when the measurement rate is greater than 1 Hz. This information is required for postprocessing purposes.
- *ASCII & Type 12* — This selection enables output of both type 1 and type 12 messages (not recommended).

Send Almanac Now When selected, this field causes the receiver to generate a set of type 100 - 150 almanac records once. These records are generated immediately after *Enter* is pressed.

Full Debug When enabled, this field causes the receiver to generate a complete set of diagnostic messages. These messages are generally used by Leica for troubleshooting purposes. Setting the Full Debug to *Yes* is equivalent to turning on all of the bits in the Partial Debug field. The possible choices are: *No, Yes. Note that explanations of debug records are not supported.*

Almanac/Ephemeris When enabled, this field causes the receiver to generate types 100 - 150, and 200 - 203 almanac and ephemeris records. The possible choices are: *No, Yes*

Differential When enabled, this field causes the receiver to generate type 601 - 665 RTCM records. The possible choices are:

- *Off* — Disables output of RTCM data.
- *Hex* — This selection enables output of the record types 601 - 664 records. These are the binary RTCM messages output in hex-ASCII.
- *Real* — This selection enables output of the type 665 record. This is a readable ASCII output which gives the differential correction for each satellite.
- *Both* — This selection enables output of both the hex and real record types listed above.

Send Ephemeris Now When selected, this field causes the receiver to generate a set of type 200 - 203 ephemeris records once. These records are generated immediately after *Enter* is pressed.

Partial Each of the four digits represents one set of debug messages which can be enabled or disabled. The bit fields from right to left are bit 0 .. 3, respectively. The debug messages corresponding to the bit fields are enabled by entering a 1 in the proper bit field. The list below identifies the general contents of the bit fields. *Note that explanations of debug records are not supported.*

Bit Field	Message Description
0	Initial Troubleshooting Messages (thruput)
1	Secondary Troubleshooting Messages
2	Internal Parameters
3	Beacon Messages

PC RAW DATA LOGGING SCREEN

This menu selection enables the user to log the information generated on the Raw Data Port of the receiver to a disk file located on the PC. If the PC contains only a single serial communications port, then both the CDU Port and the Data Port will be set to COM1 (see *PC Setup* screen). In the event that a single serial port is used in the PC, the CDU will parse through the data and log all non-control messages into the file specified below. The Leica Proprietary Time Recovery sentences ($PMVXG,830,...; $PMVXG,121,...; $PMVXG,123,...) may also be logged and displayed here, based on the output port selected on the *Time Recovery* screen. When two serial COMM ports are used, all information received on the port selected as the Data Port is logged.

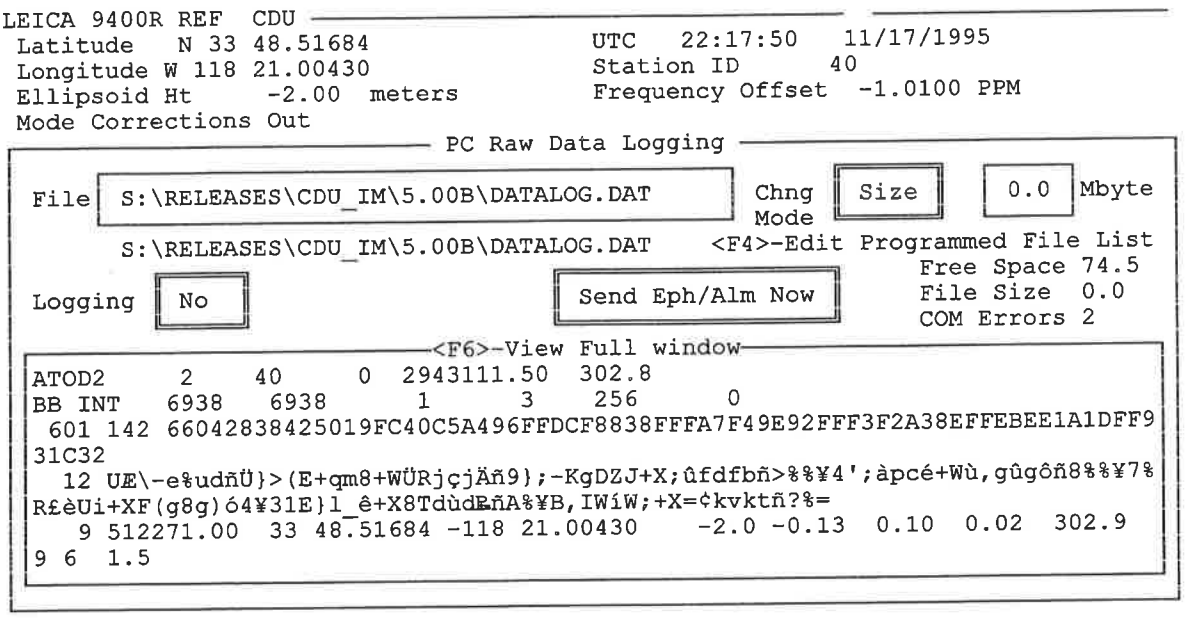

Figure 3-21. PC Raw Data Logging Screen

File Enter the file name (including drive and path) where the raw data is to be logged. If the file name extension is numeric, it will be treated as a 3 digit decimal number, which will be incremented automatically to create new file names as required. Special codes can be used to create filenames which contain the year, month, day, Julian day, hour, or minute that the file was created. The list below identifies the codes which can be used to create unique file names. All information is preceded by leading zeroes.

$Y - Year, 95 - 99
$M - Month, 01 - 12
$D - Day of the Month, 01 - 31
$JD - Julian Day, 001 - 366
$H - Hour of the Day, 00 - 23
$T - Minute of the Hour, 00 - 23

Examples:

SITE1$JD.$H would generate the following filenames:

SITE1001.00 - SITE1366.23 where 001 .. 366 is the Julian Day on which the file was created and 00 .. 23 is the hour.

SYM$D.DAT would generate the following filenames:

S950101.DAT - S951231.DAT

If the extension is non-numeric (or absent) and does not contain special code, automatic name generation is disabled.

Change Mode Select the method by which logging files are closed. The possible choices are: *Size, Time, List.* Selecting *'Size'* will cause the CDU to close the file when the specified file size (in Mbytes) as entered on the following field, has been reached. The *'Time'* selection will close the file when the elapsed time (in hours) has been reached. The *'List'* choice will use the operator entered list of logging file names and logging times as shown in the *<F4> Edit Programmed File List* screen (see next screen).

Max Size Enter the maximum file size. When the file reaches this size, it is closed and another file is created with the extension incremented by 1. If the file name extension is non-numeric (or absent), data logging is terminated (with an error message) when the maximum size has been reached. Note that versions of DOS previous to 5.0 may not support files larger than 32 Mbyte. If a size of 0.0 is entered, then a single file is created which can be as large as the available disk space. In time mode, the maximum file size will be a function of the logging time. Files will be closed and created when the logging period expires.

<F4> - Edit Programmed File List Press the <F4> softkey to access the *Programmed Logging File* screen. This screen enables the user to enter a list of files and their corresponding starting and ending logging times (see next screen).

Logging Select *Yes* to enable data logging, or *No* to disable.

Send Eph/Alm Now When selected, this field causes the receiver to generate a set of type 200 - 203 ephemeris records and a set of type 100-150 almanac records once. These records are generated immediately after *Enter* is pressed. This field performs the same function as the field on the *Raw Data Control* screen. This function is automatically exercised whenever a data logging file is opened.

Free Space This is a display field which reports the amount of available disk space, in

megabytes, on the selected drive.

File Size

This is a display field which reports the size, in megabytes, of the current logging file.

COM Errors

This is a display field which reports the number of errors (lost characters) detected on the PC Data Port. These characters will be incorrect or missing in the logged data.

If cabling and communication parameters are correct, the next most likely cause of excessive errors is a PC which is too slow (8088 or 80286). PC's which are apparently identical may behave differently in this regard, due to subtle differences in video boards, disk interfaces, network adapters, etc. When using 9600 or higher baud rates, a `High Performance' (also know as `buffered' or `16550') serial port(s) is recommended.

Some `Computer Viruses' and TSR programs may also cause excessive COM errors. These problems may also be alleviated with a High Performance serial port(s).

PROGRAMMED LOGGING FILE SCREEN

This screen is accessed by pressing the <f4> softkey while in the *PC Raw Data Logging* screen. The *Programmed Logging File* screen is designed to allow the user to setup a maximum of eight variable logging periods to a set of unique files. The user specifies the starting date and time to begin the logging process. Each file will be closed when the end time has been reached. Additionally, the filename specification may be composed of special identifiers which will create the filename with the Julian day, time, hour, or month as identified by the user (see *Filename* below). Filenames can be entered in any order. The entire list is scanned prior to creating the log file.

```
LEICA 9400R REF  CDU
Latitude   N 33 48.51684                UTC   22:17:53   11/17/1995
Longitude W 118 21.00430                Station ID      40
Ellipsoid Ht     -2.00  meters          Frequency Offset  -1.0088 PPM
Mode Corrections Out
          Programmed Logging File List Edit Screen
      (referenced to PC time)   PC time = 14:18:57  @  UTC   = 22:17:53
     Date        Start       End      Filename
 1 11/17/1995  00:00:00  00:00:00
 2 11/17/1995  00:00:00  00:00:00
 3 11/17/1995  00:00:00  00:00:00
 4 11/17/1995  00:00:00  00:00:00
 5 11/17/1995  00:00:00  00:00:00
 6 11/17/1995  00:00:00  00:00:00
 7 11/17/1995  00:00:00  00:00:00
 8 11/17/1995  00:00:00  00:00:00
  * = current or next file to be logged

    <ALT-D> = clears the current field (except Date; changed to today)

Activate LIST logging by selecting Yes from Logging field on previous screen

          <ESC>=Exit  <SPACE>=Toggle choice  <ENTER>=Save choice
```

Figure 3-22. Programmed Logging File Screen

Date Enter the starting date to begin logging to the file. The dates can be entered in any order. The CDU program automatically scans the entire list to find the date and time equal to or before the current time.

Start Enter the time in hours, minutes, and seconds to begin logging to the file.

End Enter the time in hours, minutes, and seconds to terminate logging to the file. If the end time is earlier than the start time, the CDU will terminate logging on the following day. This will give a maximum of approximately 24 hours of information in a single file.

Filename Enter the complete filename (including drive and path). Special codes can be used to create filenames which contain the year, month, day, Julian day, hour, or minute that the file was created. The list below identifies the codes which can be used to create unique file names. All information is preceded by leading zeroes.

$Y - Year, 95 - 99

$M - Month, 01 - 12
$D - Day of the Month, 01 - 31
$JD - Julian Day, 001 - 366
$H - Hour of the Day, 00 - 23
$T - Minute of the Hour,00 - 23

Examples:

SITE1$JD.$H would generate the following filenames:

SITE1001.00 - SITE1366.23 where 001 .. 366 is the Julian Day on which the file was created and 00 .. 23 is the hour.

SYM$D.DAT would generate the following filenames;
S950101.DAT - S951231.DAT

Note: The date and time in the *List File Edit* screen are referenced to **PC TIME.**

VIEW RAW DATA DISPLAY SCREEN

This menu selection gives a full screen report of the messages received on the Data Port of the PC. This display can be activated at any time by pressing the *F6* soft key. The display continuously scrolls upward, adding new messages to the bottom. You may pause the display at any time by pressing the *Space Bar*. Press the *Space Bar* once again to resume the display of new information.

```
                          LEICA 9400R REF CDU
ATOD2      1     39      0  2937111.69  301.8
BB INT    6938    6938       1       3     256       0
 601 142 66042838BC5019FCD456A416FE1C21830FFA91D79E12FF37ABA38EFFE8F71A9D00070A3
2
SAT 19 CH  3 FAILED SEARCH    1713
 IDW    3 19 231  0    1710    2048      512291117  -1585  -1585
 ID2    1 19              0     512291117  3080  1710 2048
DW  0 0 0 0 0 0 0 0 0 0 0 0A 1 2
  12 UÆj5e%udñÜ}>(C`kgz+WÜXjîjìú9};-LBb\ê+X;ÿfcfbñ>%%¥4'9¥r^{+Wù6gïgôú8%%¥7%TQMj
8+XF6g:g*ó5¥31F9ùdè+X8Vd¥dÆñA%¥B,JESU`+X=ókrktñ?%R
   9 512280.00   33 48.51684 -118 21.00430     -2.0 -0.13  0.10  0.02  301.7  9 6
 1.5
STAT     0    0    2    2    0    2    2    0    0    2    0    2    512291000     16
RXMD    18   18   17    0   18    0   17   18   18    0   18    0    5   163395
ATOD2      3     39      1  3395111.69  301.7
BB INT    6938    6938       1       3     256     256
 601 142 66042838CD5019FCE67BA416FE2746830FFA93F49E12FF35D0A30EFE73971A9D00080C3
2
  12 UÆk}e%udñ¢}>(CIsZ-+WÜWjçjìú9};-LLAU:+X;Öfafbñ>%%¥4'9â^dò+Wù0gôgôñ8%%¥7%Te%U
v+XF3g:g*í5¥31F@>tÆ+X8UdÆdÆñA%¥B,JQ6[S+X=ñksktñ?%;
   9 512281.00   33 48.51684 -118 21.00430     -2.0 -0.13  0.10  0.02  301.5  9 6
 1.5

 <Esc>=Exit  <Space>=Pause          Logging disabled.
```

Figure 3-23. View Raw Data Display Screen

PC CDU DATA LOGGING SCREEN

This menu selection enables the user to log the information generated on the Control Port of the receiver to a disk file located on the PC. If the PC contains only a single serial COMM port, then both the CDU Port and the Data Port will be set to COM1 (see *PC Setup* screen). In the event that a single serial port is used in the PC, the CDU will parse through the incoming data and log all control (Leica proprietary) messages into the file specified below. The Leica Proprietary Time Recovery sentences ($PMVXG,830,...; $PMVXG,121,...; $PMVXG,123,...) may also be logged and displayed here, based on the output port selected on the *Time Recovery* screen. When two serial communications ports are used, all information received on the port selected as the CDU Port is logged.

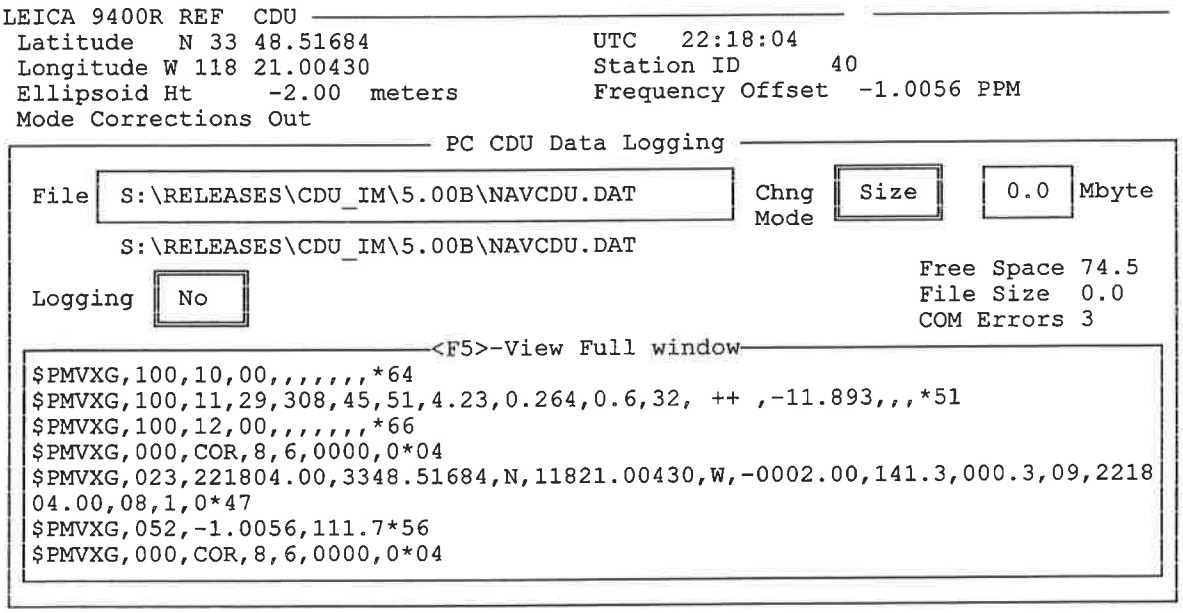

Figure 3-24. CDU Data Logging Screen

File Enter the file name (including drive and path) where the raw data is to be logged. If the file name extension is numeric, it will be treated as a 3 digit decimal number, which will be incremented automatically to create new file names as required. Special codes can be used to create filenames which contain the year, month, day, Julian day, hour, or minute that the file was created. The list below identifies the codes which can be used to create unique file names. All information is preceded by leading zeroes.

$Y - Year, 95 - 99
$M - Month, 01 - 12
$D - Day of the Month, 01 - 31
$JD - Julian Day, 001 - 366
$H - Hour of the Day, 00 - 23
$T - Minute of the Hour, 00 - 23

Examples:

SITE1$JD.$H would generate the following filenames:

SITE1001.00 - SITE1366.23 where 001 .. 366 is the Julian Day on which the file was created and 00 .. 23 is the hour.

SYM$D.DAT would generate the following filenames:

S950101.DAT - S951231.DAT

If the extension is non-numeric (or absent) and does not contain special code, automatic name generation is disabled.

Change Mode Select the method by which logging files are closed. The possible choices are: *Size* and *Time*. Selecting *'Size'* will cause the CDU to close the file when the specified file size (in Mbytes) as entered on the following field, has been reached. The *'Time'* selection will close the file when the elapsed time (in hours) has been reached.

Max Size Enter the maximum file size. When the file reaches this size, it is closed and another file is created with the extension incremented by 1. If the file name extension is non-numeric (or absent), data logging is terminated (with an error message) when the maximum size has been reached. Note that versions of DOS previous to 5.0 may not support files larger than 32 Mbyte. If a size of 0.0 is entered, then a single file is created which can be as large as the available disk space. In time mode, the maximum file size will be a function of the logging time. Files will be closed and created when the logging period expires.

Logging Select *Yes* to enable data logging, or *No* to disable.

Free Space This is a display field which reports the amount of available disk space, in megabytes, on the selected drive.

File Size This is a display field which reports the size, in megabytes, of the current logging file.

COM Errors This is a display field which reports the number of errors detected on the PC CDU Port. Since the CDU program verifies the checksum on incoming CDU data, occasional COM errors will have no effect. Larger numbers of COM errors may cause erratic displays and time-out (`Data Not Available Communication Lost') errors.

VIEW PC CDU DISPLAY SCREEN

This menu selection gives a full screen report of the messages received on the CDU Port of the PC. This display can be activated at any time by pressing the *F5* soft key. The display continuously scrolls upward, adding new messages to the bottom. You may pause the display at any time by pressing the *Space Bar*. Press the *Space Bar* once again to resume the display of new information.

```
$PMVXG,000,COR,8,6,0000,0*04
$PMVXG,023,221810.00,3348.51684,N,11821.00430,W,-0002.00,141.3,000.3,09,221810.0
0,08,1,0*47
$PMVXG,052,-1.0086,111.7*5B
$PMVXG,533,17,11,1995,,,*4F
$PMVXG,000,COR,8,6,0000,0*04
$PMVXG,023,221811.00,3348.51684,N,11821.00430,W,-0002.00,141.3,000.3,09,221811.0
0,08,1,0*47
$PMVXG,052,-1.0093,111.5*5D
$PMVXG,100,01,25,045,27,45,-15.06,-0.033,0.6,A4, ++ ,7.493,,,*02
$PMVXG,100,02,22,112,43,51,-9.43,-0.083,0.6,83, ++ ,1.990,,,*43
$PMVXG,100,03,19,231,00,00,,,,,SRCH,,,,*78
$PMVXG,100,04,00,,,,,,,*61
$PMVXG,000,COR,8,6,0000,0*04
$PMVXG,023,221812.00,3348.51684,N,11821.00430,W,-0002.00,141.3,000.3,09,221812.0
0,08,1,0*47
$PMVXG,052,-1.0100,111.7*54
$PMVXG,100,05,15,206,23,44,-30.22,-0.298,0.6,9E, ++ ,21.695,,,*3E
$PMVXG,100,06,00,,,,,,,*63
$PMVXG,100,07,04,322,05,00,,,,,SRCH,,,,*76
$PMVXG,100,08,18,288,17,41,-7.52,-0.388,0.6,A3, ++ ,-1.338,,,*1A
$PMVXG,000,COR,8,6,0000,0*04

 <Esc>=Exit  <Space>=Pause          Logging disabled.
```

Figure 3-25. View PC CDU Display Screen

PC MODEM CONTROL SCREEN

This screen is intended for use when the CDU PC is connected to the receiver via a modem connection. The *PC Modem Control* screen allows commands to be sent to the modem but can also be used to send commands to the receiver using the proprietary NMEA messages as described in the Leica 12 Channel Technical Reference Manual.

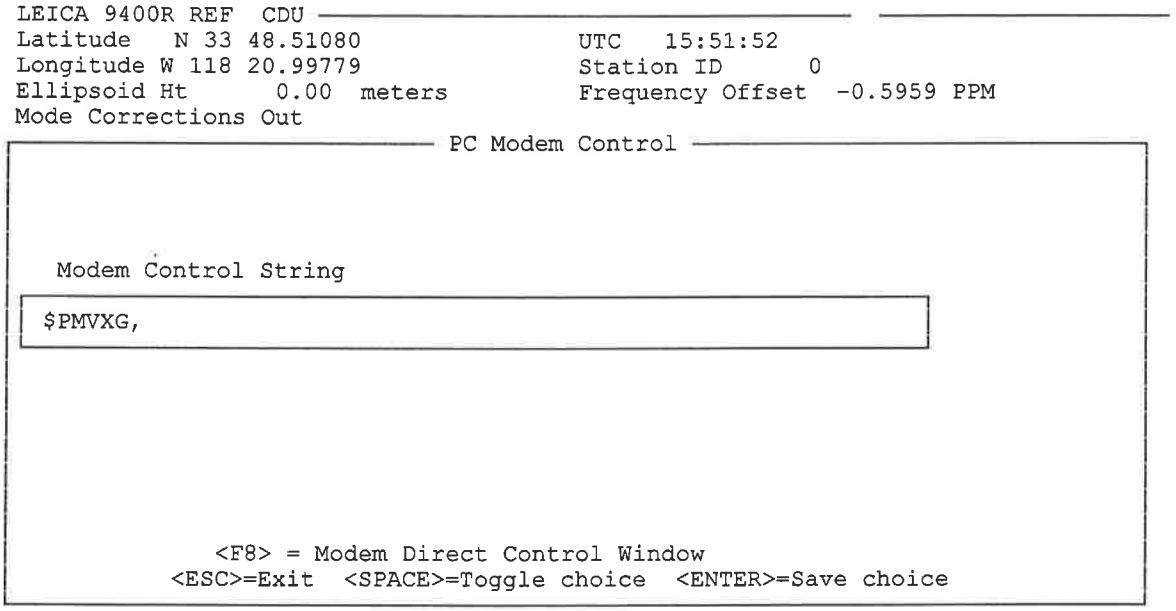

Figure 3-26. PC Modem Control Screen

Modem Control String — Enter the modem command or control string to be sent to the receiver. The string is transmitted when the Title Bar is highlighted and the *Enter* key is pressed.

<F8> Modem Direct Control Window — Selecting the *<F8>* softkey presents a full screen which acts like a terminal emulator. All interface communications are shown on the display and are updated in real-time.

ABOUT SCREEN

This menu selection reports the CDU version number, CDU release date and time, the unit model number, the nav software version number and the receiver firmware (baseband) version number.

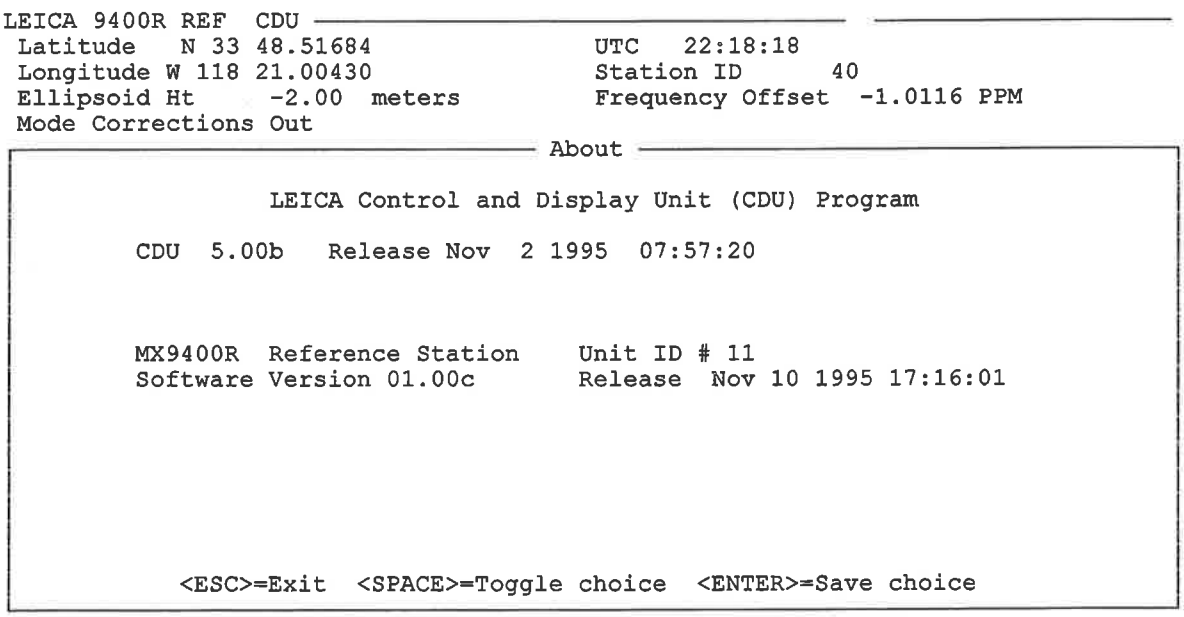

Figure 3-27. About Screen

DOS SHELL

The DOS Shell allows the user to execute other programs or DOS commands while the CDU program remains resident in memory. Selecting the DOS Shell will present the screen shown below. To return to the CDU program, type *EXIT* in response to the DOS prompt followed by *Enter*.

Note that while the DOS Shell is active, data logging being performed by the CDU program is suspended. Data logging will resume after exiting the shell.

Since the CDU program remains resident in memory, only a limited amount of memory is available while in the DOS SHELL. Insufficient memory may be available for DOS commands, such as MSBACKUP and HELP.

```
Type EXIT to return to CDU
Shell d:\cdu>
```

Figure 3-28. DOS Shell Screen

RESTART CDU

This menu selection clears and redraws the PC screen and also issues a new set of start commands to the receiver. If the program halts or appears to be malfunctioning it is sometimes useful to restart the CDU. The use of this command while the system is operating normally will have no noticeable effect. The screen will blank briefly and then return. Use this command first, before attempting either a warm start or a tepid start.

EXIT

This menu selection causes the CDU program to terminate immediately.

-A-

Acceleration Mode	A specific range of constants applied to the navigation filter that characterizes the motion dynamics of the receiver. In the receiver, four states for acceleration are suggested: sea (high or low), static (stationary), land and air. These constants enhance the receiver's ability to model the real-time.
Acquisition	The receiver has locked onto the GPS satellite signal.
Age Limit	The duration (in seconds) that the receiver will wait to receive a subsequent differential correction for a satellite measurement. The receiver applies the last received correction to the new satellite measurement during the time limit period entered on the differential correction screen. If the period expires without a new correction, the satellite measurement is dropped from the position calculation.
Almanac	Library of coarse satellite orbital characteristics used to calculate satellite rise times, set times, angles of elevation, etc. Almanac data is valid for 181 days.
Altitude	Antenna height above mean sea level in meters. GPS uses average mean sea level (MSL) as its reference altitude, which is the fixed altitude for marine navigation.
Altitude Constrained	Use of a fixed value for altitude so that navigation can be performed with three satellites.
Azimuth	The angular displacement in the horizontal plane between the point of observation and the Greenwich meridian. For GPS satellites, azimuth is measured clockwise from true north.

-B-

Backup Copy	An additional copy of a diskette containing formatted data. The copy is safeguarded so that if the information on the diskette in use is accidentally erased or lost, the copy is used to retrieve the lost information.
Baud Rate	The rate at which serial information is transmitted, in bits/second.
Bearing	The angular direction (expressed in degrees) between two objects referenced to true north.
Bit	The smallest element of data in a binary-coded message.
Boot	A restart for a PC terminal that has locked itself into a mode of no response to normal keyboard commands. Boots are generally of

	two types: a normal boot and a hard boot. A normal boot requires several keystrokes in a specified sequence. A hard boot requires shutting off the PC completely, then turning it back on.
Byte	A group of eight bits of binary data or one ASCII character.
	-C-
Capture to Disk	Transferring information from the PC's memory, or hard disk to a diskette.
CDU Program	The program supplied by Leica on diskette that allows a PC to operate as the receiver controller.
CDU Startup Screen	The screen with which you enter PC configuration data.
COM1, COM2	The two serial data ports through which the PC controller communicates with the receiver.
Configuration Data	Data entered to the CDU program that defines the characteristics of the controlling PC.
Constellation	A group of GPS satellites visible to the receiver. The size of a usable constellation is a minimum of three satellites. A valid position update may be computed from a: • Four (or more) satellite constellations without altitude constrained. • Three-satellite constellations with altitude constrained.
Control and Display Unit (CDU)	A device with a readable display and operating controls. It allows you to control operation of, and extract visual data from, a device with no display.
Course Over Ground (COG)	Heading relative to the ocean floor or direction relative to land (in degrees).
Critical Initialization Entry Fields	Values of latitude, longitude, time, date and altitude.
Cursor	A line segment beneath or superimposed over a display character position that indicates either a) the character already there may be changed via the keyboard, or b) a character may be entered in that position via the keyboard. The cursor may be either blinking or steady.
	-D-

Data Logging	Sending data to either a printer or a disk file for later observation.
Default	The assumed condition prior to user modification.
Differential Correction	The difference between the computed and the observed position at a GPS reference station. The correction is transmitted by the GPS reference station to the remote GPS receiver (such as the receiver), where it is incorporated with the remote receiver's own measurements to obtain better accuracy.
Differential GPS	A method of improving the accuracy of the GPS position by applying pseudorange corrections computed at the GPS reference station.
Dilution of Precision (DOP)	A measure of quality of the GPS derived position and time estimates, based on the geometry of the satellite constellation. A smaller DOP indicates better geometry which yields a better solution. Generally, the more spread out the satellites, the lower the DOP. The DOPs used for GPS satellite tracking are as follows: NDOP - Dilution of precision in the north axis. EDOP - Dilution of precision in the east axis. VDOP - Dilution of precision in the vertical axis. TDOP - Dilution of precision with respect to time. HDOP - Horizontal dilution of precision. PDOP - Position dilution of precision. GDOP - Geometric dilution of precision.
DOS	Disk Operating System. The basic file management software for a disk or memory based computer.
Dynamic Mode	The time recovery mode when the receiver is moving.

-E-

Edit	To modify existing displayed data with the backspace and data entry keys, rather than clearing the existing data and replacing it with new information.
Electrical/Interface	Electronic circuits that permit the passage of data between different types of devices.
Elevation Angle	The angle made by the line-of-sight range to the satellite and the horizontal plane of the receiver antenna. Thus, the elevation angle is 90 degrees when the satellite is overhead and 0 degrees when it first appears on the horizon. Satellites whose maximum elevation angle is less than 5 degrees are not good candidates for providing an accurate position update.

Entry Field	Area on a display where you enter, change, or delete data using the PC keyboard.
Ephemeris	Tabulation of accurate data describing position and health of the satellites over a 24-hour period. The data is up-loaded from a ground control station to the satellites every 12 hours.
	-F-
Filename	The identity or name of a file. Filenames are assigned to files when they are first opened. They can be any combination of letters and numbers that are eight characters or less, followed by a period (.) and zero to three characters know as the extension.
	-G-
Geometry (of satellites)	The spatial relationships of the GPS satellites with respect to each other and the receiver.
Global Positioning System (GPS)	The NAVSTAR Global Positioning System, consisting of orbiting satellites, a network of ground control stations, and user positioning and navigation equipment. When fully operational, they system will have 21 satellites in six orbital planes about 20,200 kilometers above the earth. Three additional satellites will be strategically stationed in orbit as spares in the event of on-line satellite malfunctions.
	-H-
Heading	Direction in which the receiver is proceeding. Heading is referenced to true north.
HDOP Limit	Value normally set between 10 and 15. The recommended value is 10. When exceeded, 2-D navigation is suspended. Navigation resumes when the HDOP returns to within the tolerance.
	-I-
Initialize	To enter key operating constants into the receiver, enabling it to start producing accurate positioning and/or navigation data. The constants are latitude, longitude, time, date and altitude.
	-L-
Latitude	The identification of a point on the earth's surface located along a parallel plane.

Local Time Offset	The number of hours by which the local time differs from Universal Time Coordinated (UTC).
Longitude	The identification of a point on the earth's surface located along a meridian plane.
Loran-C	A ground-based navigation system that operates in the low frequency range. Its coverage is limited to selected portions of the earth's surface.

-M-

Maximum Time Error	Allows the user to select the maximum range, between 50 and 1000 nanoseconds, within which a time pulse is considered valid. The default value is 100 nanoseconds.
Megabyte	One million bytes (see BYTE).
Menu	A list of functions displayed on the PC screen. Selection of a function from the list is accomplished with the cursor control and *Enter* keys.
Modem	Modulator/Demodulator. Electronic circuitry used at each end of a telephone line. At the transmission end, the modem converts binary coded digital data to audio signals for transmission over commercial telephone lines and equipment. At the receiving end, the modem converts the audio signal back to digital form for processing.
Monitor	The screen component of a PC. Monitors can be either black and white, or color.
Motion Dynamics	The rate of change of a moving object.

-N-

Nanosecond	A billionth (0.000000001) of a second.
Nautical Mile	A unit of distance used on most maritime charts. In the U.S., 1 nm is equal to 1852 meters (6076.115 feet).
Navigation Modes	The two basic navigation modes of the receiver are altitude constrained and unconstrained (see ALTITUDE CONSTRAINED). When altitude is constrained, a fixed value of altitude is used in the position solution so that only three satellites are required. In the unconstrained mode, position, time, and altitude are solved for, so four satellites are required.

Navigation Plot	The graphic representation of a changing position (track).
Navigator	As it applies to satellite navigation, an electronic system that uses received satellite measurements to product a position fix.
NMEA	National Maritime Electronics Association.
	-O-
Omega	A ground-based navigation system operated by the U.S. Coast Guard that operates in the very low frequency range.
	-P-
Parameter	A value contained in a data entry field.
Path	When referring to DOS files on the PC, the path specifies the location of the file within the directories on the file system. The path consists of a backslash (\) representing the root directory, optionally followed by one or more sub-directory names, each ending in a backslash. Sub-directory names follow the same rules as file names, except that the extension is normally not specified. Refer to your DOS documentation for further details.
Port	The medium through which one channel of data enters and/or leaves a device. The receiver has four ports accessed through the MULTI-PORT INTERFACE connector.
Position Source	The source of position update information: either GPS, external equipment, or dead reckoning.
Pseudorandom Noise (PRN)	GPS satellite generated noise used to fingerprint and identify the satellites. An identification number is assigned to the noise print of each GPS satellite ranging from 1-32.
Prompt	A message on the monitor screen instructing the operator to make a keyboard entry.
Pseudorange	As it applies to GPS, the distance from an orbiting satellite to a GPS receiver. The pseudorange is calculated by measuring the time it takes for the satellite transmission to reach the GPS receiver, and then dividing the result by the speed of light.
	-R-
Raw Data	GPS signal measurement received at the antenna.
Reference Station	A GPS receiver located at a precisely known position. The receiver

	produces corrections to its computed position by differencing the `known' and the `computed' positions. It passes the differential corrections to remote GPS receivers to improve accuracy at the remote location.
RSIM	Communication protocol for interfacing reference stations with independent quality monitoring systems referred to as integrity monitors.
RS-422 TO RS-232	A device that converts data transmitted via an RS-422 interface (the receiver) to data compatible with an RS-232 interface (the PC).
	-S-
Satellite Health	Describes the operational status and/or quality of measurement data from a satellite.
Scrolling	Moving the cursor continuously through `pages' of screen data.
Signal-to-Noise Ratio (S/N)	Quantitative relationship between the useful and non-useful part of the received satellite signal. A minimum value of 32 dB is needed for tracking. Average values range from 38-41 for low-elevation satellites and 42-50 for mid-to-high-elevation satellites.
Speed Over Ground	Speed (in knots) relative to the ocean floor or land. (SOG)
Static Mode	The time recovery mode of receiver when stationary, thus limiting velocity to zero, and solving for position, altitude and time.
	-T-
Time Mark	A 1 PPS signal that occurs on the leading edge of each second.
Time Offset	The time difference between local time and UTC.
Time Recovery	A process that pinpoints the exact time, within 50 nanoseconds, of the navigation solution.
Track	The path that the receiver has taken to reach the current position.
Tracking Elevation	Minimum satellite elevation, in degrees, necessary (or desirable) for tracking. Satellites below this elevation will not be selected for tracking by the receiver. This value is normally set between 5 and 10 degrees. The recommended value is 5.
	-U-
Universal Time	Greenwich mean time corrected for polar motion of the earth and

Coordinated (UTC)	seasonal variation in the earth's rotation.
	-V-
VDOP Limit	The navigation limit used when operating in 3-D mode. 3-D navigation is suspended when the VDOP exceeds its established limit, and resumes when the value is again within the entered tolerance. The VDOP limit is normally set between 10 and 15. The recommended value is 10.
	-W-
Waypoint	A destination point (or position). The waypoint location is the basis of the navigation plot calculation.
WGS-84 Datum	The basic reference frame and geometric figure for the earth provided by the World Geodetic Survey of 1984. The datum is used by the GPS satellites.
	-2-
2-D GPS	A navigation mode whereby latitude, longitude and time are computed from three satellites using a fixed value for altitude.
2-D DGPS	A navigation mode whereby differentially corrected latitude, longitude and time are computed from three satellites, using a fixed value for altitude.
2D P-DGPS	A navigation mode whereby differentially corrected (using Leica Accucode™ corrections) latitude, longitude and time are computed from three satellites, using a fixed value for altitude.
	-3-
3-D GPS	A navigation mode whereby latitude, longitude, altitude and time are computed from four satellites.
3-D DGPS	A navigation mode whereby differentially corrected latitude, longitude, altitude and time are computed from four satellites.
3D P-DGPS	A navigation mode whereby differentially corrected (using Leica Accucode™ corrections) latitude, longitude, altitude and time are computed from four satellites.

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