



ETL Field Computer User Guide



Installation Checklist

- If radars are operating, use the [LAP-XM](#) software to verify that the correct configuration files are loaded and running, and that the appropriate data types are being acquired (e.g., moments, spectra, etc.).
- If GPS instruments are operating, configure and enable the [Clock Synchronization](#) software.
- Configure the [File Manager](#) software to automatically backup acquired data sets.
- If applicable, configure the [Data Products](#).
- Verify that all data types are being archived for all operating instruments by browsing the [EtlData](#) folder.
- Ensure that every serial line that connects to the computer has inline surge suppression.
- Connect an external USB/Firewire hard disk to the computer, and verify that the appropriate drive letter is assigned.
- Configure and enable the [Data Watch Dog](#) software to monitor data sets of interest.

Maintenance Visit Checklist

- Verify that data are actively being acquired from all instruments by browsing the [EtlData](#) folder. Also, see the [Data Acquisition](#) section for instructions on how to monitor and control the different data acquisition systems.
- Verify that automated backups of the data types specified in the [File Manager](#) software are present on the removable USB/Firewire hard disk.
- Perform a data backup according to the instructions outlined in the [Data Backup](#) software description.
- Use the [Clock Synchronization](#) software to verify that the computer clock is synchronized.

Removal Checklist

- Disable data acquisition for all operating instruments.
- Perform the final data backup to an external hard disk using the [Data Backup](#) software.
- Disable the [Data Watch Dog](#) software.

Data Acquisition

All data acquisition software is composed of two components, namely a data acquisition engine and a configuration and control utility. The data-acquisition-engine components run as Windows Services. Thus, no user logins or running Windows Applications are required for data acquisition and archiving to occur. The configuration and control components are used to interface with the services, and are described below in detail for each data acquisition system:

Ceilometer

Detailed hardware and communication information for the [ceilometer](#) can be obtained from the Instrument section in this guide.

For the purpose of data quality controlling and instrument troubleshooting, the ceilometer data can be visualized in real time using the [CT-View](#) software. However, ETL software is used to automatically acquire and archive the ceilometer data, and is described as follows:

To configure ceilometer data acquisition, run the [Ceilometer Acquisition Setup](#) software. The default settings are as follows:

The screenshot shows the 'Ceilometer Acquisition Setup' dialog box. It is divided into three sections:

- Archive Settings:**
 - Site Name: LAB
 - Reflectivity Path: d:\EtlData\CeiloVaisala25k\Reflectivity (with a Browse button)
 - Cloud Base Path: d:\EtlData\CeiloVaisala25k\CloudBase (with a Browse button)
- Communication Settings:**
 - Com Port: COM1
 - Input Format: Vaisala 25K
 - Baud Rate: 9600
 - Parity: Even
 - Stop Bits: 1
 - Data Bits: 7
- Data Acquisition:**
 - Enabled (radio button)
 - Disabled (radio button, selected)

Buttons for 'Apply' and 'Exit' are located at the bottom right of the dialog.

These data are acquired at the sample transmission rate of the instrument, which is typically every 15 - 30 seconds. Every time the data are acquired, the data are archived to files on disk. The reflectivity data are archived to a daily file format with a file-naming convention of SSSYYJJ.ref, where SSS = Site Name, YY = two-digit year, and JJJ = Julian day. The cloud-base data are archived to a hourly file format with a file-naming convention of SSSYYJJHH.cld, where HH = hour. All time elements in the filenames represent the start time of the archive. These files can be viewed from the [EtlData](#) folder structure. Status and error messages are written to log files, which are stored in the CeilometerAcquisition folder in [EtlLogs](#).

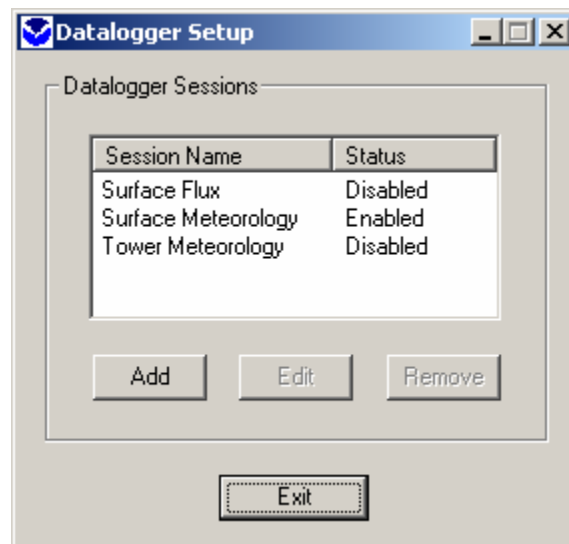
Datalogger

Detailed hardware and communication information for the [datalogger](#) can be obtained from the Instrument section in this guide.

Datalogger hardware and software should be setup in the following order:

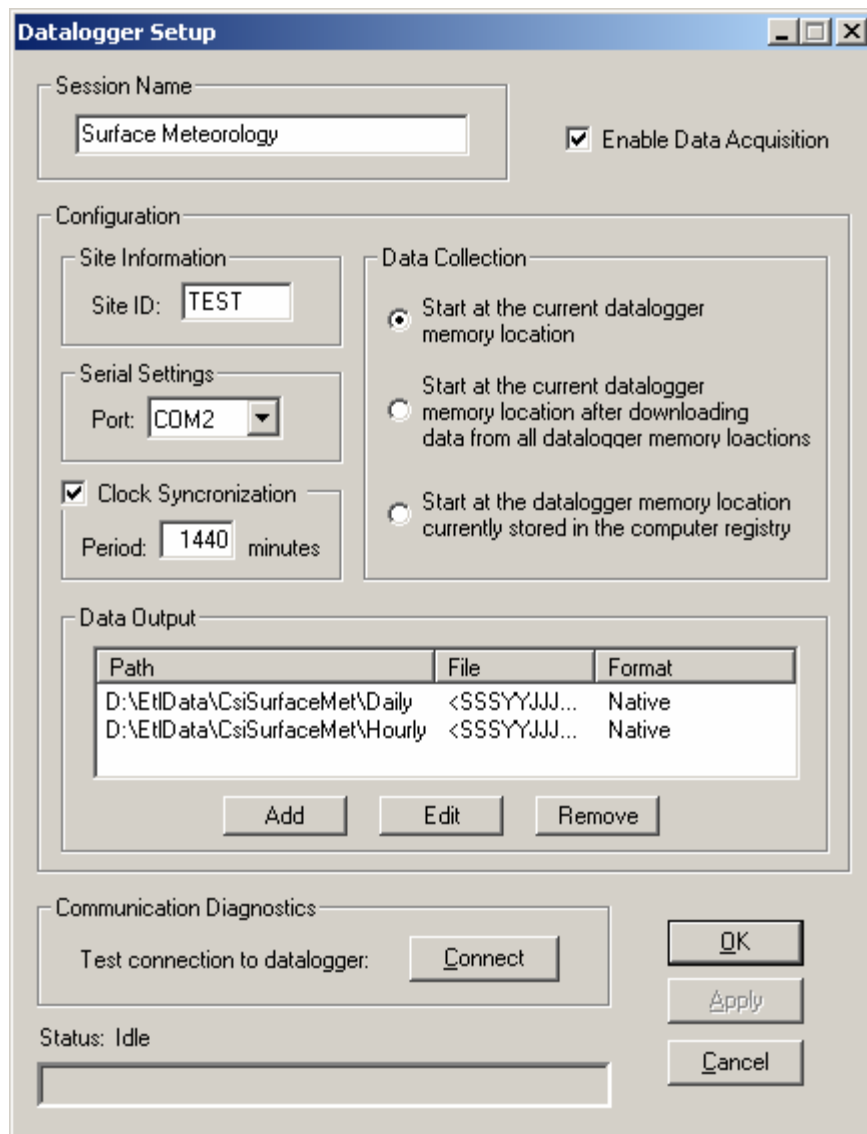
- 1) Disable datalogger data acquisition using the [Datalogger Setup](#) software.
- 2) Clear datalogger memory.
- 3) Connect datalogger serial line to PC serial port.
- 4) Load datalogger program using the [LoggerNet](#) software.
- 5) Configure the datalogger session using the Datalogger Setup software.
- 6) Test the datalogger connection using the Datalogger Setup software.
- 7) Begin automated datalogger data acquisition using the Datalogger Setup software.

To configure datalogger data acquisition, run the [Datalogger Setup](#) software. The default settings are as follows:



Choose an appropriate session name or add a new session to best suit the datalogger data acquisition needs. The three default sessions are Surface Flux, Surface Meteorology, and Tower Meteorology. The Surface Flux session is typically used to collect data from dataloggers that acquire atmospheric radiation and soil measurements. The Surface Meteorology session is used to collect mean data from dataloggers that acquire standard surface-meteorology measurements (e.g., pressure, temperature, relative humidity, and wind). The Tower Meteorology session is used to collect data from dataloggers that acquire measurements from a variety of instruments at multiple levels on a tower. Typically, these towers are higher than 10 meters. If multiple dataloggers exist for a particular session type, simply add additional sessions that mimic the template of the default session of interest.

The following example illustrates the default settings for the Surface Meteorology session, and is obtained by editing the Surface Meteorology session:

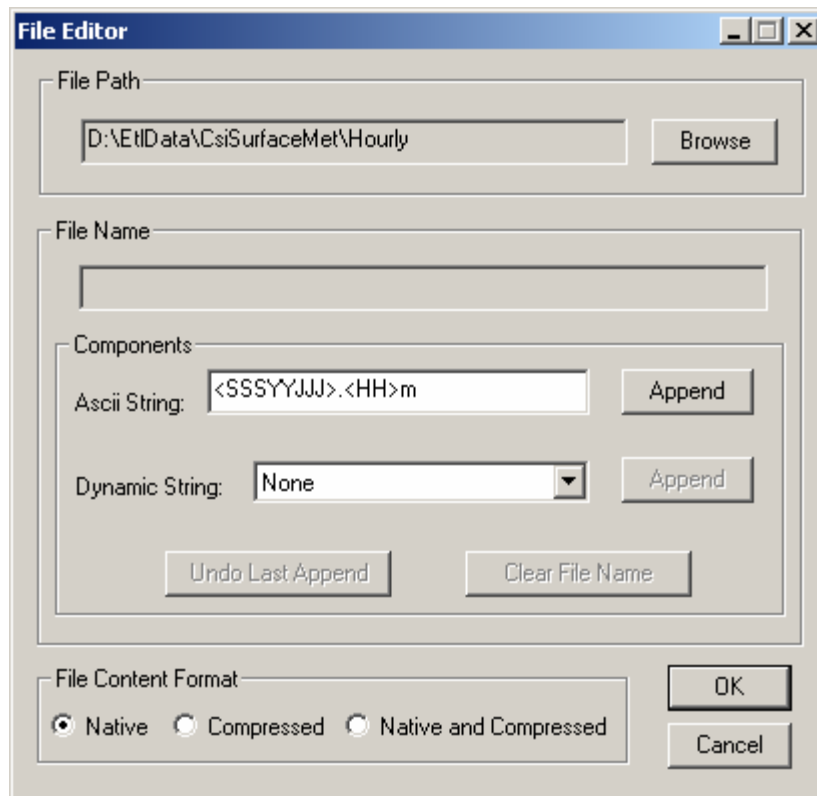


Once every minute, the software checks if there are any data in the datalogger memory to be transferred. The criteria that are used for determining this are partially determined by the settings in the Data Collection box. When the “Start at the current datalogger memory location” option is selected, the software acquires and stores the current datalogger data pointer when the OK or Apply buttons are clicked. For every minute thereafter, data are collected from the datalogger memory locations that lie between the last saved data pointer and the current data pointer on the datalogger. This is the most common configuration, and is the default Data Collection setting. If the datalogger has been acquiring and internally storing data for a period of time before the software is enabled, these data can be downloaded by selecting the “Start at the current datalogger memory location after downloading data from all datalogger memory locations”. The third option, “Start at the datalogger memory location currently stored in the computer registry”, should be selected if the software was previously enabled using one of the first two Data Collection methods, but changes need to be made to any of the settings in the Datalogger Setup window. This prevents the loss of data between automated data acquisition queries.

The Clock Synchronization feature is used to synchronize the datalogger clock with the PC clock. This feature should **only** be used if the PC clock is synchronized with a GPS or another network PC that is synchronized with a GPS (see the Clock Synchronization description under the Utilities section). For

standard datalogger setups, the default synchronization update period is one day. The clock update time is referenced from 00 hours, 00 minutes, and 30 seconds UTC.

Data archive settings are configured in the Data Output box. An example of an archive to hourly files is as follows:



The file naming convention supports dynamic time objects, which are contained in the Dynamic String drop-down list. The example ASCII string will produce a filename with a three-letter site name, two-digit year, three-digit Julian day, and two-digit hour. All time elements in the filenames represent the start time of the archive. The timestamp in each data sample that is acquired from the datalogger is examined to determine the filename of the archive file. Thus, when a large block of data (e.g., spanning multiple days) are downloaded from the datalogger at one time, each datalogger sample will be correctly parsed and archived to the appropriate hourly archive file. For standard ETL applications, the file content format is specified as Native (ASCII), but file compression (in ZIP format) functionality is available if needed for more space intensive datasets.

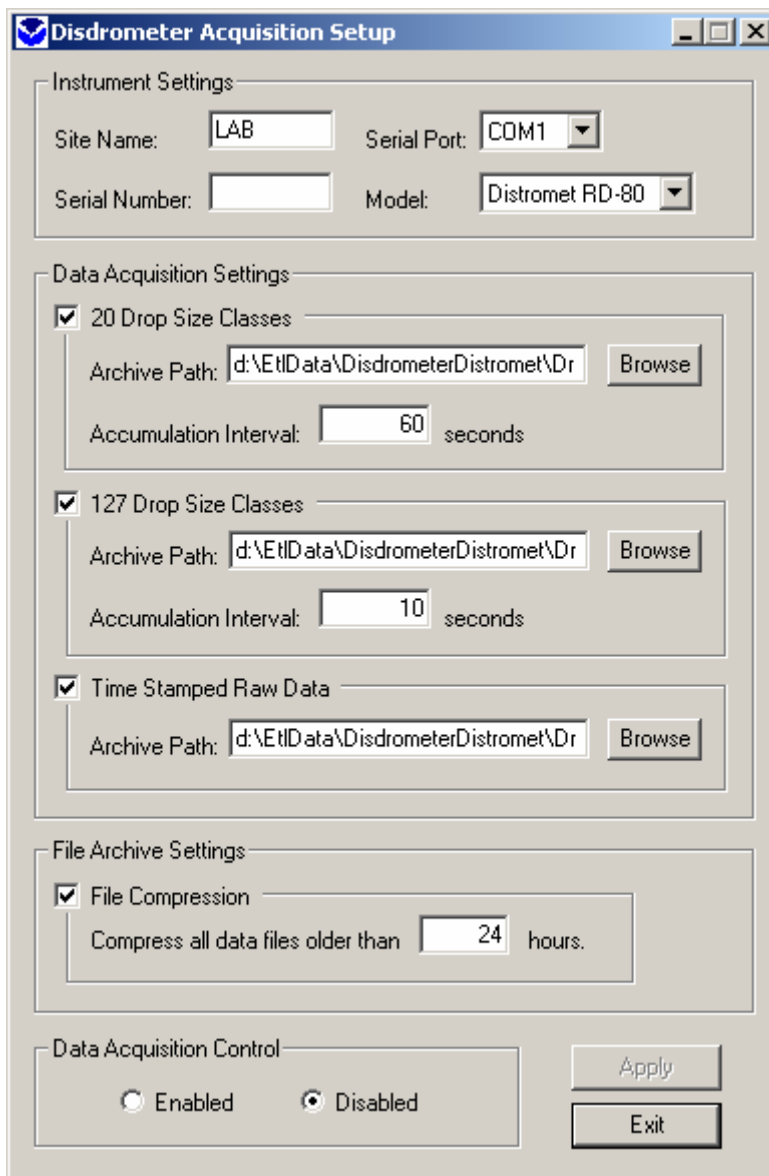
Lastly, there is a utility in the Communication Diagnostics box for testing the connection to the datalogger. The connect button can be used to test the connection before the other settings are saved with the OK or Apply buttons. This allows the user to test the datalogger connection on different serial ports without having to restart the automated data acquisition every time the Serial Port Setting is changed. Archive data files can be viewed from the [EtlData](#) folder structure. Status and error messages are written to log files, which are stored in the DataloggerAcquisition folder in [EtlLogs](#).

Disdrometer

Detailed hardware and communication information for [disdrometers](#) can be obtained from the Instrument section in this guide.

IMPORTANT NOTE: The disdrometer data acquisition software is designed to accurately time stamp the incoming drop-size data. This requires connecting the disdrometer data cable to a high-performance serial port on the data acquisition computer. Please refer to the [disdrometer](#) instrument description, for detailed setup instructions.

To configure disdrometer data acquisition, run the [Disdrometer Acquisition Setup](#) software. The default settings are as follows:



The screenshot shows the 'Disdrometer Acquisition Setup' window. It is divided into several sections:

- Instrument Settings:** Site Name: LAB, Serial Port: COM1, Serial Number: (empty), Model: Distromet RD-80.
- Data Acquisition Settings:**
 - 20 Drop Size Classes: Archive Path: d:\EtIData\DisdrometerDistromet\Dr, Accumulation Interval: 60 seconds.
 - 127 Drop Size Classes: Archive Path: d:\EtIData\DisdrometerDistromet\Dr, Accumulation Interval: 10 seconds.
 - Time Stamped Raw Data: Archive Path: d:\EtIData\DisdrometerDistromet\Dr.
- File Archive Settings:** File Compression: Compress all data files older than 24 hours.
- Data Acquisition Control:** Radio buttons for Enabled and Disabled (Disabled is selected).

Buttons for 'Apply' and 'Exit' are located at the bottom right.

Drop-size data are acquired and time stamped from the serial port when they are received. These data are archived to ASCII files on disk at approximately 60 – 70 second intervals. The Site Name is used in naming the archived data files, and the Serial Number and Model are logged in the archive data files.

IMPORTANT NOTE: Each disdrometer has a unique set of calibration parameters that are used to post-process the data for scientific analyses. Logging the serial number, which is located on the bottom of the disdrometer sensor, will ensure that the appropriate calibration parameters will be used.

Three different types of data can be archived, namely 20 drop-size classes, 127 drop-size classes, and raw time-stamped, drop-size data. At the minimum, the 20 drop-size class data must be acquired, and this is ensured by the software. For standard ETL setups, all three types of data are archived. In addition, the default accumulation period for the 20 drop-size and the 127 drop-size class is 60 seconds and 10 seconds respectively.

The archive file-naming convention is as follows:

20 drop-size class data:	SSSYYJJHHb20.txt
127 drop-size class data:	SSSYYJJHHb127.txt
Time-stamped raw data:	SSSYYJJHHraw.txt

where SSS = Site Name, YY = two-digit year, JJJ = Julian day, and HH = hour. All time elements in the filenames represent the start time of the archive.

The archive files may also be compressed. This feature should be enabled if the 127 drop-size class data or the raw data are being archived, as these files can consume a significant amount of disk space in their native ASCII format. By default, files for all data types are compressed when they are at least 24 hours old, and the native files are deleted. Files that are younger than 24 hours will remain in the native format to accommodate real-time data transfers and remote/on-site troubleshooting.

Archive data files can be viewed from the [EtlData](#) folder structure. Status and error messages are written to log files, which are stored in the DisdrometerAcquisition folder in [EtlLogs](#).

LAP-XM

The [LAP-XM software system](#) is used to control and acquire data from S-Band and wind profiling radars. Detailed information about LAP-XM can be obtained from the [LAP-XM Technical Reference](#).

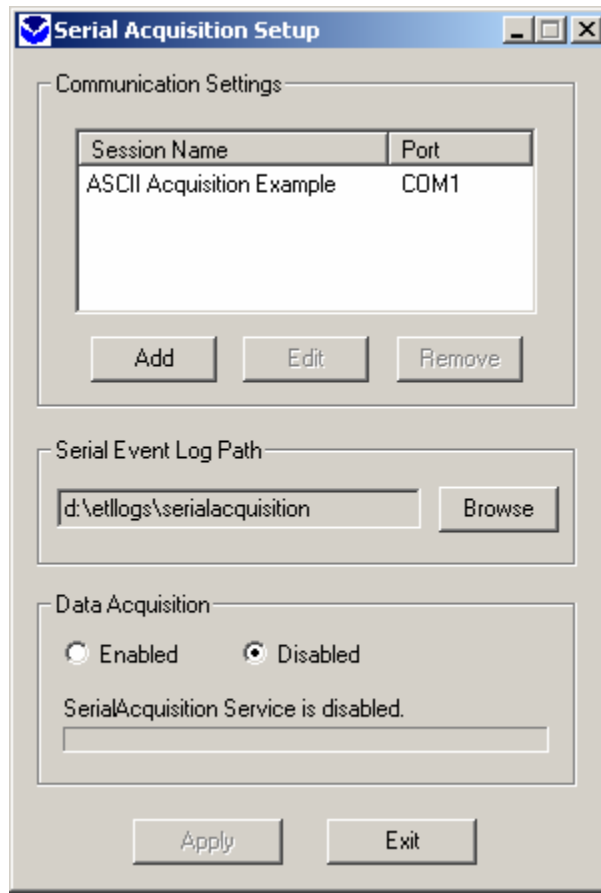
Archive data files can be viewed from the [EtlData](#) folder structure under the appropriate Radar folder. Spectra and moments daily data are archived to *.SPC files. If only moments are archived, the daily data are stored in *.MOM files. Both of these configurations store the data in the SpecMom folder. If enabled, the consensus wind data are archived to daily files in the WindTemp folder. Status and error messages can be viewed from the LAP-XM Event Log, which is accessed from the main LAP-XM interface. A daily archive of these log files can also be viewed from the LapXM folder in [EtlLogs](#).

Serial

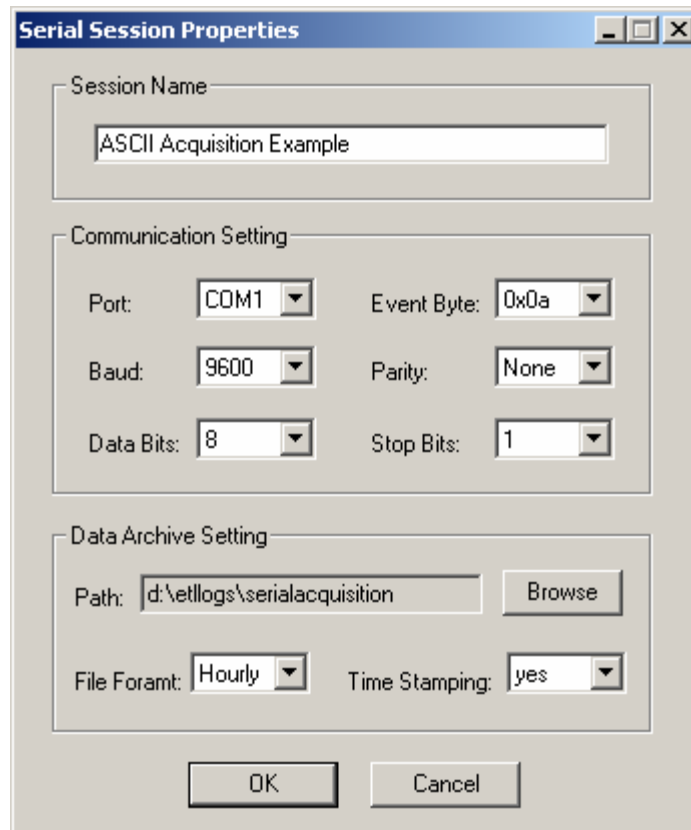
Detailed hardware and communication information, for the various instruments that the Serial software can interface with, can be obtained from the [Instrument section](#) in this guide. The serial acquisition software is used to acquire serial data streams from a variety of instruments. To configure serial data acquisition, run the [Serial Acquisition Setup](#) software.

IMPORTANT NOTE: The serial data acquisition software has the capability to accurately time stamp instrument samples. If this feature is used, the serial data cables must be connected to high-performance serial ports on the data acquisition computer. If this feature is not needed for a particular instrument, disable the Time Stamping parameter for that instrument session (described below), and connect the serial line to any serial port on the data acquisition computer.

The default settings are as follows:



The software supports simultaneous data acquisition from multiple serial ports, which can be created by using the Add button. In the example above, ASCII data will be acquired on COM1. The communication specifics of this example can be viewed and/or changed by editing the "ASCII Acquisition Example" session:



Data are acquired from the serial-port buffers when an event byte, specified in the Event Byte drop-down list, is received. For acquiring ASCII data streams, the line-feed byte, 0x0a, should be used. If the Time Stamping drop list is set to 'yes', a time stamp is applied to each acquired sample at the time that the event byte is detected. This time is output to the nearest millisecond, but the accuracy is limited to ten milliseconds because of the coarseness of the Windows operating system clock. Time stamping is typically used for high-speed data flows that are greater than or equal to one sample per second. In addition, these more space intensive data sets should be archived to the smaller hourly file format. However, any data set (with small or large data rates) that needs to be transferred back to Boulder in near real time should be archived in the hourly format. Use the File Format drop-down box to specify either a daily or hourly format for the archive data. Lastly, specify the archive path for the output files by browsing to the appropriate instrument folder under D:\EtlData.

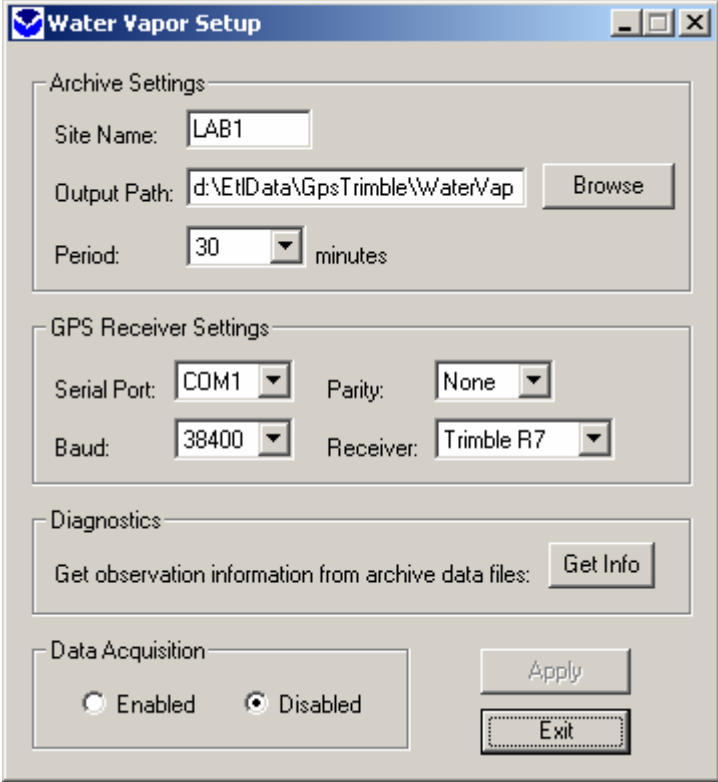
Archive data files can be viewed from the [EtlData](#) folder structure. The archive filenames are YYJJJ.PNN and YYJJJHH.PNN for the daily and hourly formats, where YY = year; JJJ = Julian Day; HH = hour; and NN = COM port number. All time elements in the filenames represent the start time of the archive. Status and error messages are written to log files, which are stored in the SerialAcquisition folder in [EtlLogs](#).

Water Vapor

Detailed hardware and communication information for the [water vapor GPS receivers](#) can be obtained from the Instrument section in this guide. The GPS receiver should first be configured according to the steps described in the setup guide for the appropriate receiver before starting and configuring the Water Vapor Setup software described below.

IMPORTANT NOTE: The real-time water vapor product is derived in Boulder using both raw GPS data and surface meteorology data. The acquisition of GPS data and Datalogger data should occur on the same computer to allow for both of these data sets to be promptly communicated back to Boulder twice an hour.

To configure water vapor data acquisition, run the [Water Vapor Setup](#) software. The default settings are as follows:



The screenshot shows the 'Water Vapor Setup' dialog box with the following settings:

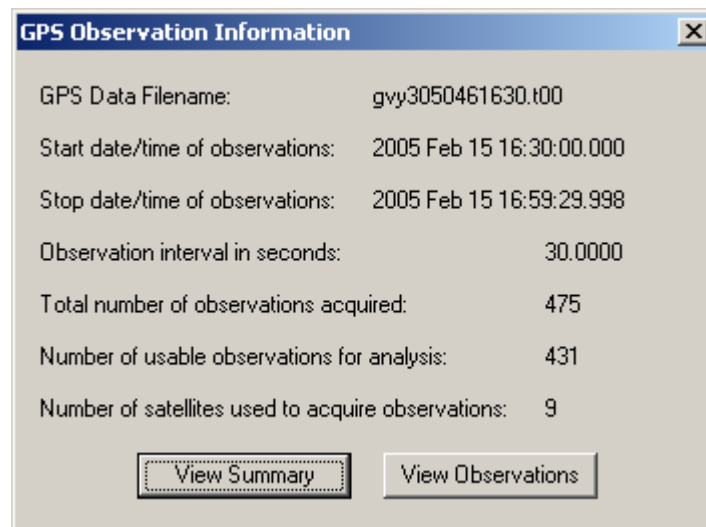
- Archive Settings:**
 - Site Name: LAB1
 - Output Path: d:\EtlData\GpsTrimble\WaterVap (with a 'Browse' button)
 - Period: 30 minutes
- GPS Receiver Settings:**
 - Serial Port: COM1
 - Parity: None
 - Baud: 38400
 - Receiver: Trimble R7
- Diagnostics:**
 - Get observation information from archive data files: (with a 'Get Info' button)
- Data Acquisition:**
 - Enabled (radio button) / Disabled (radio button)

Buttons at the bottom include 'Apply' and 'Exit'.

The Site Name is used to name the archive files, and the index value in the forth-character position represents the installation instance which is base referenced at 1. The GPS data are acquired and archived at the Period specified in the Archive Settings box, and the default period is 30 minutes. The acquisition period is referenced from 00 hours, 00 minutes, 00 seconds. From the Receiver drop-down list, specify the appropriate GPS receiver that is being connected, and the corresponding communication settings.

IMPORTANT NOTE: The installation-instance index in the Site Name is determined by FSL and ETL before installation. Please verify that the specified Site Name matches the predetermined name. Also note that the baud rate may differ between receivers. See the description of [water vapor GPS receivers](#) for more detailed information.

Once data files have been acquired from the receiver, the contents of these files can be investigated to verify the quality of the GPS observations. The Get Info button located in the Diagnostics section is used to display this information. After clicking the Get Info button, select the path and name of the file to be examined. After selecting a file, the GPS Observation Information window will be displayed:



Based on the sampling parameters in the above example, the maximum number of observations that could have been acquired was 540 (60 samples from 9 satellites over a 30 minute period). The total number of observations that were acquired was 475, of which 431 observations were determined usable for water-vapor calculations. All of these observation statistics are in acceptable operating ranges, i.e., $TotalObservations / MaxObservations \sim 85\%$; $UsableObservations / TotalObservations \sim 90\%$. If more detailed information is needed, clicking on the View Summary and View Observations buttons will display the complete summary and observation data in Wordpad.

Archive data files can be viewed from the [EtlData](#) folder structure. The archive filenames are in the SSSSYYJJHHMM.R00 format, where SSSS = Site Name; YY = year; JJJ = Julian Day; HH = hour; MM = minute; and R = 'r' and 't' for a Trimble 4000 and Trimble R7 receiver respectively. All time elements in the filenames represent the start time of the archive. Status and error messages are written to log files, which are stored in the WaterVaporAcquisition folder in [EtlLogs](#).

To manually troubleshoot communication or GPS receiver problems, use the command-line [R-Utilities](#). The R-Utilities execute advanced receiver operations, and should only be used after all other setup procedures and instructions described above have been followed.

Data Products

The data product software derives new data types from existing raw data types that are acquired using the [Data Acquisition](#) software.

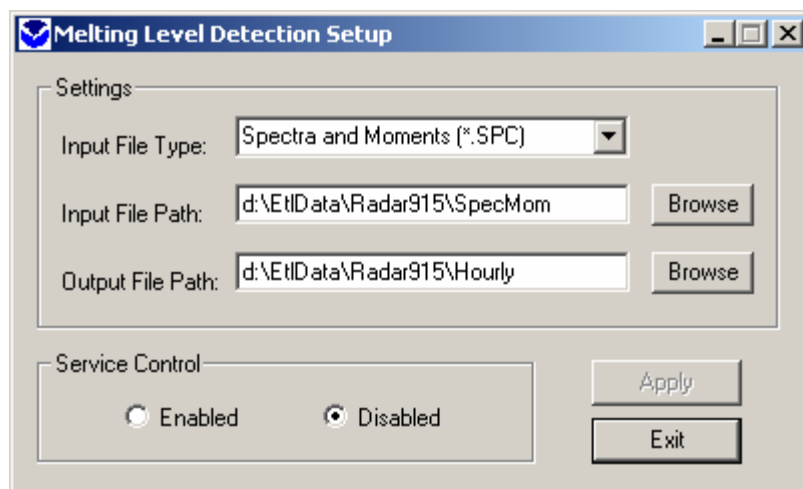
Boundary Layer Detection

The Boundary Layer Detection software derives boundary layer depths from radar wind profiler spectra. Before enabling the software, verify that radar spectra are being archived by LAP-XM in the appropriate Radar – SpecMom folder under the [EtlData](#) data structure. The Boundary Layer Detection software runs as a Windows service. It does not have any user-configurable parameters, and thus, does not have a user-interface configuration tool. To start and stop the service, use the Windows Service Manager Console by running services.msc from the Start- Run dialog box. Typically, this software is enabled for during the warm seasons, and should not run at the same time as the Melting Level Detection software described below. To date, the Boundary Layer Detection system only works on 915 MHz wind profiler data.

Archive data files can be viewed in the Radar915\Hourly folder in the [EtlData](#) folder structure. The archive filenames are in the SSSYYJJJ.HHz format, where SSS = Site Name; YY = year; JJJ = Julian Day; and HH = hour. Status and error messages are written to log files, which are stored in the MeltingLevelDetection folder in [EtlLogs](#).

Melting Level Detection

The Melting Level Detection software derives melting level height from radar wind profiler moments. Before enabling the software, verify that radar moments are being archived by LAP-XM in the appropriate Radar – SpecMom folder under the [EtlData](#) data structure (SPC or MOM files can be used). To date, the Melting Level Detection system only works on 915 MHz wind profiler data. To configure the detection system, run the [Melting Level Detection Setup](#) software. The default settings are as follows:

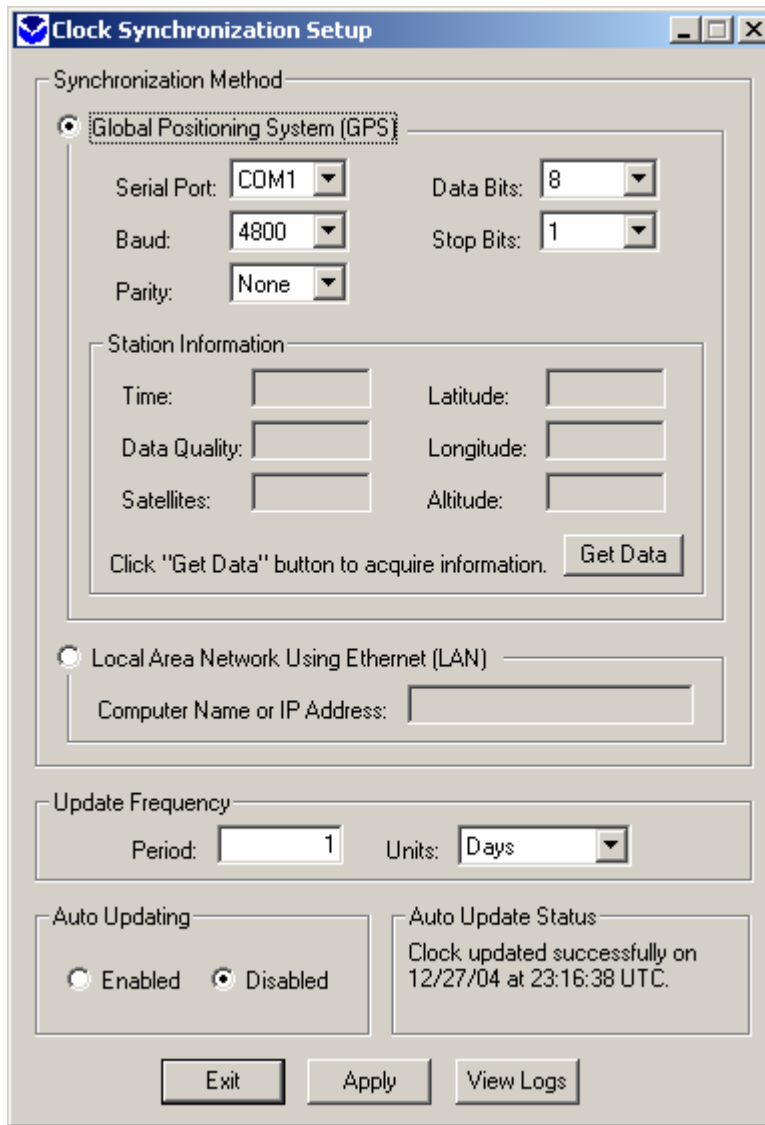


Archive data files can be viewed in the Radar915\Hourly folder in the [EtlData](#) folder structure. The archive filenames are in the SSSYYJJJ.HHb format, where SSS = Site Name; YY = year; JJJ = Julian Day; and HH = hour. Status and error messages are written to log files, which are stored in the MeltingLevelDetection folder in [EtlLogs](#).

Utilities

Clock Synchronization

The [Clock Synchronization Setup](#) software is used to configure automated computer clock synchronization using GPS. The default settings are as follows:



The screenshot shows the 'Clock Synchronization Setup' window. It features a 'Synchronization Method' section with a radio button selected for 'Global Positioning System (GPS)'. Below this, there are dropdown menus for 'Serial Port' (COM1), 'Data Bits' (8), 'Baud' (4800), 'Stop Bits' (1), and 'Parity' (None). A 'Station Information' section contains input fields for 'Time', 'Latitude', 'Data Quality', 'Longitude', 'Satellites', and 'Altitude', along with a 'Get Data' button. Below this is a radio button for 'Local Area Network Using Ethernet (LAN)' with an empty text field for 'Computer Name or IP Address'. The 'Update Frequency' section has a 'Period' field set to 1 and a 'Units' dropdown set to 'Days'. The 'Auto Updating' section has radio buttons for 'Enabled' and 'Disabled', with 'Disabled' selected. The 'Auto Update Status' section displays the message 'Clock updated successfully on 12/27/04 at 23:16:38 UTC.'. At the bottom are buttons for 'Exit', 'Apply', and 'View Logs'.

The computer clock can be synchronized using two different methods. First, if a GPS is connected directly to the computer, select the default Global Positioning System (GPS) option. Once the serial communication settings are configured, the connection to the GPS can be tested by clicking on the Get Data button in the Station Information box. The Data Quality information and the number of Satellites determine the quality and strength of the GPS signal, and can be used to fine tune the mounting location of the GPS antenna. When the data quality is good, the Latitude, Longitude, and Altitude information can be used to configure site information, e.g., configuring the radar site file. The accuracy of these data can vary from 5 – 15 meters depending on whether the signal was received in a differential or non-differential state.

IMPORTANT NOTE: Significant inaccuracies can exist in the Station Information within the first five minutes of powering the GPS unit, and during times when a limited number of satellites are detected. The Altitude information can be particularly susceptible to error during the latter situation.

The second method synchronizes the computer clock using the time on another network computer. This method requires that the two computers be connected to the same Local Area Network (LAN), and that the host computer is synchronized with a GPS using the first method described above. If the computer is specified by name, include two back slashes before the name (e.g., a computer named ETLRAD would be specified as \\ETLRAD). A computer may also be specified by IP address (e.g., 192.168.1.1).

The Update Frequency defines how often the computer clock will be updated using the specified synchronization method. Upon enabling Auto Updating, the clock is immediately synchronized, and the current computer time is used as a reference time for the Update Frequency.

The Auto Update Status displays the results of the latest clock-synchronization attempt. Status information is generated every time a synchronization method is executed, and is automatically updated in the Auto Update Status box. In addition, because this information is stored in and accessed from the computer registry, the latest status information can be accessed by any instance at any time by the Clock Synchronization software (i.e., the status information will not be lost when closing and restarting the software). To view archived status information, click on the View Logs button and select the appropriate log file in the YYJJJ.log format (where YY = year and JJJ = Julian day).

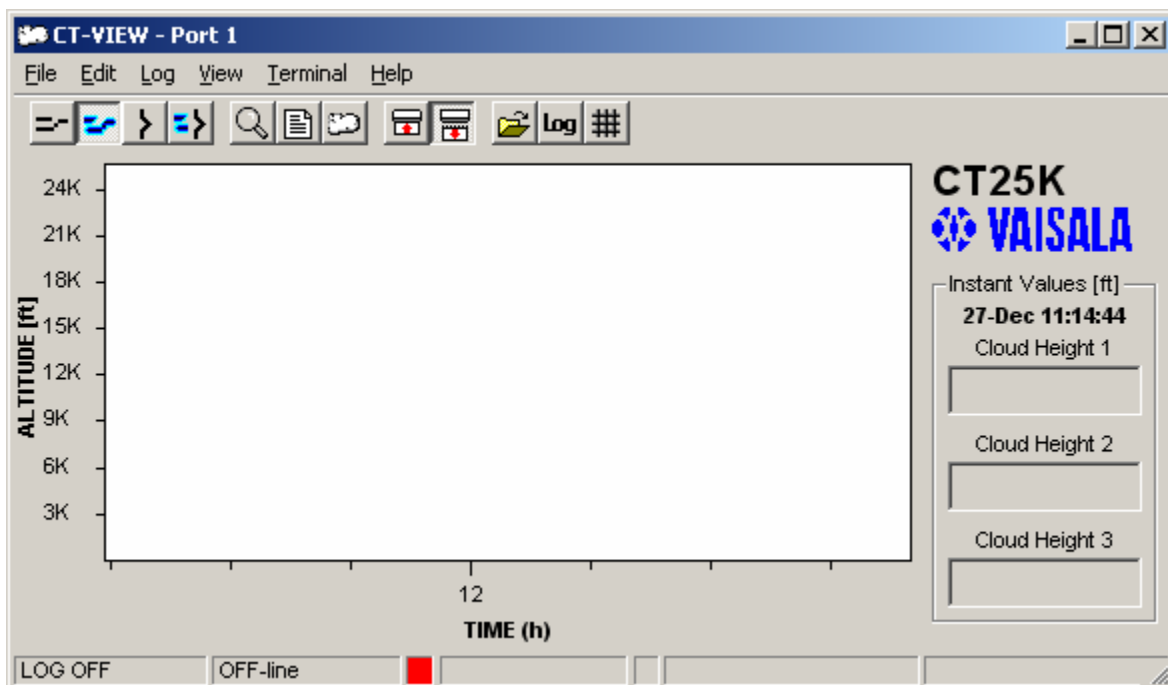
IMPORTANT NOTE: Since Notepad makes a snapshot copy of the file contents at the time the file is opened, new log entries that are written to the file after it is opened will not automatically appear in the Notepad window. To view new entries, the log file of interest must be reopened. Alternatively, the log file contents will be automatically updated if the log file is manually loaded into V Fileviewer from the ClockSynchronization folder in [EtlLogs](#).

CT-View

The [CT-View](#) software is used to visualize real-time ceilometer data. It is used strictly as a diagnostic tool, and is not used for data archival.

IMPORTANT NOTE: The [Ceilometer Data Acquisition](#) software must be disabled before CT-View can be used to visualize the ceilometer data. During this time, no data will be archived to disk. When finished with CT-View, enable the [Ceilometer Data Acquisition](#) software to resume data archiving.

The main display is as follows:



To begin ingesting the ceilometer data stream, first configure the serial communications settings by selecting Port Settings from the File menu item. Next, select the OpenPort option from the File menu item to begin ingesting the ceilometer data stream on the selected port. Using the View menu option, backscatter, cloud intensity, and cloud detection graphs can be created. To help diagnose problems with the instrument, investigate the instrument status message from the Status option under the View menu option. A translation of these messages can be obtained from the [ceilometer instrument manual](#). For a more detailed description of the other features associated with CT-View, select the Contents option from the Help menu.

Data Backup

The [Data Backup](#) software is used to manually back up data files from the field computers to removable media (e.g., LaCie hard disks that interface using USB or Firewire) that are delivered back to the laboratory. There are two backup models that are used, depending on the space requirements of the real-time data sets:

1) Docking

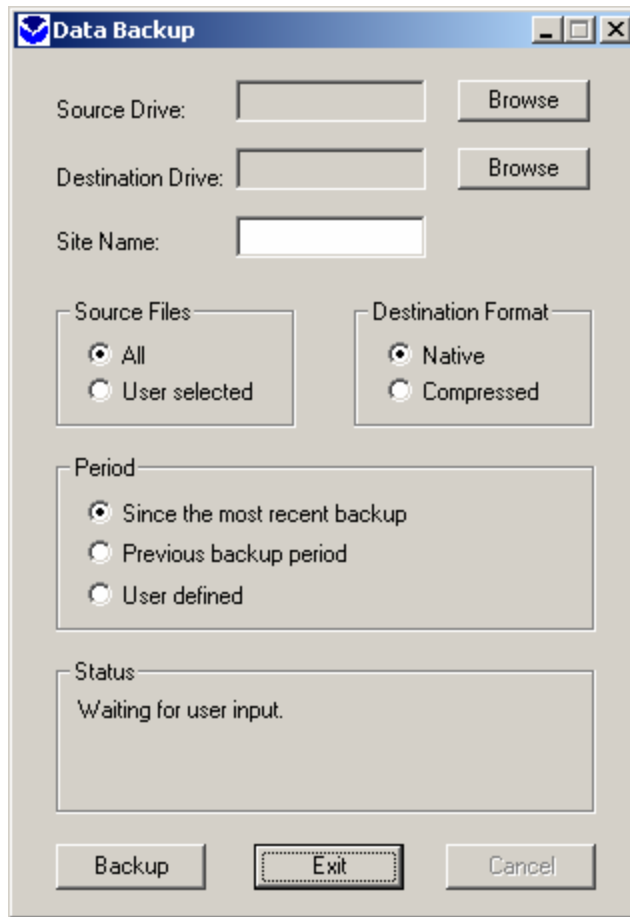
The docking method is used to back up small to moderately sized data systems. Connect the new removable disk to either a removable disk that is already connected to the computer (via a Firewire daisy chain), or connect the new removable disk directly to the computer using a USB or Firewire interface connector. Once the physical connection is made, a data backup is performed. When the backup is complete, the newly docked disk is disconnected and delivered to the laboratory. The docking backup disk can be used to backup data sets from multiple sites.

2) Swapping

The swapping method is used to back up large data systems. A data backup (actually data verification) is performed on the existing removable disk that contains the automated backups performed by the [File Manager](#) software. When the backup is complete, the existing removable disk is replaced with a new empty disk, and the verified disk is delivered to the laboratory. The swapping backup disk can only be used to backup one site.

IMPORTANT NOTES: If uncertainty exists when determining which backup method to use, consult the data manager using the [ETL Staff List](#). Also, any newly connected removable disk needs to be powered externally if it is connected to the USB interface, or if it is connected to a Firewire interface with two or more existing devices (regardless of whether it's a direct connection or daisy connection). Lastly, when disconnecting a removable disk, it is imperative that the disk be stopped before it is physically disconnected. Failure to do so may result in the loss of data. To stop a device, first close all applications that may be accessing the drive. Next, left click on the green-arrow icon on the system tray (near the clock), and select the appropriate hard drive that you want to remove. A message on the system tray will appear when the disk is successfully stopped. At this point, the disk can be physically removed.

When the backup software is started, the following interface will be displayed:



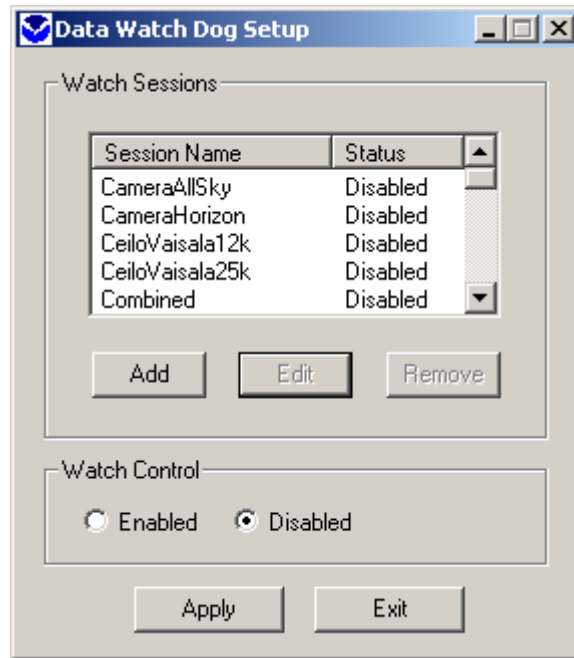
To begin configuring the backup, first choose the Source and Destination drives using the Browse buttons. The source drive will correspond to the logical drive that contains the directories that the data acquisition systems are archiving to (typically D:\ , and it should have the volume label “Data”). The destination drive will correspond to the logical letter and volume label of the removable disk that the source data will be backed up to. With removable drives, it is often easiest to match the physical label on the drive with the volume label that is displayed under the Type description in the Drive Browser window.

IMPORTANT NOTE: The Site Name entry is specified as the three-letter site ID for docking backups, and is left empty for swapping backups. The Destination Format is specified as Native for docking backups and Compressed for swapping backups.

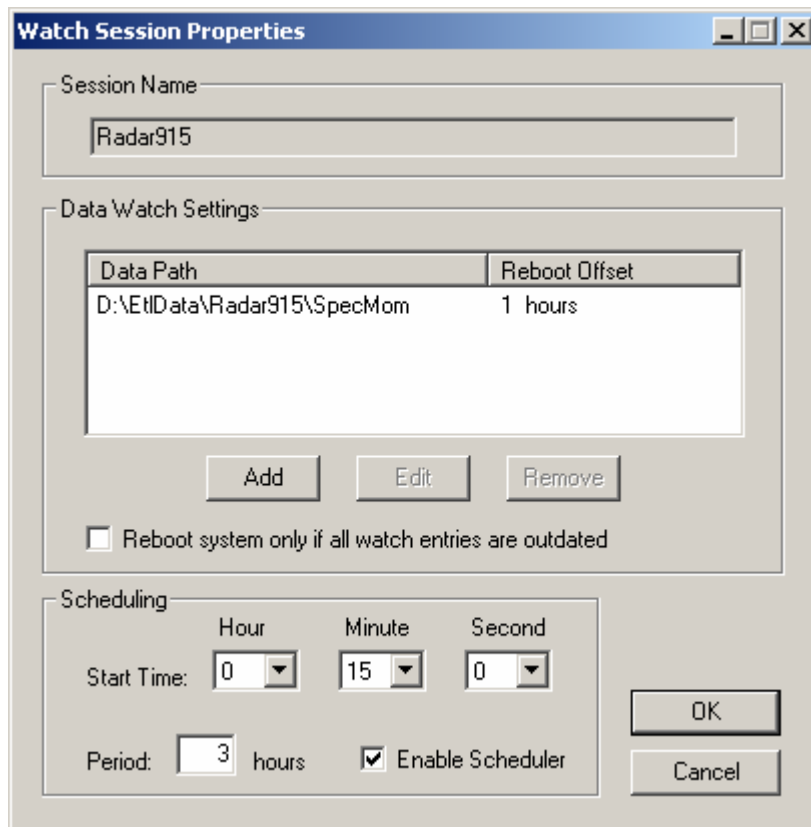
For standard backups, the Source Files setting should be set to “All”, and the Period should be set to “Since the most recent backup” (both are the default settings). If no previous backups have been performed on the computer, the user will be prompted to specify a backup period (this is a one time occurrence). The functionality also exists to back up a subset of files for a previously-defined or a user-defined backup period. Lastly, a detailed backup log will be created in the EtlBackupLog folder on the destination drive. This log can be used diagnose problems or to review the backup operations.

Data Watch Dog

The [Data Watch Dog](#) software automatically restarts the computer when data acquisition files are outdated. The main interface is as follows:



From the scrollable list, edit and enable the sessions that need to be watched. By default, all entries are disabled except for the Radar915 session. When editing a session, the following dialog will appear:



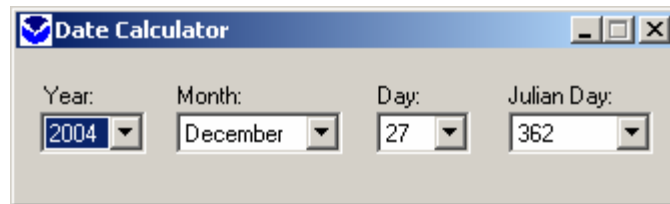
In the Data Watch settings box, specify the data directories that need to be watched for the current session by using the Add button. For each directory, a Reboot Offset Time must be specified. This

offset is subtracted from the scheduled time, and is used to determine if the watched files are outdated. In the Radar915 example shown above, when the scheduler runs at 03:15, the modification time of the most recently modified file in the D:\EtlData\Radar915\SpecMom directory is compared to the cutoff time of 02:15 (offset equals one hour). If the file time stamp is older than 02:15, the computer is rebooted. If multiple directories are watched, the computer can be rebooted if any one of the directories is outdated, or the computer can be rebooted only if all of the directories are outdated. If the latter case is desired, enable the “Reboot system only if all watch entries are outdated” box. Lastly, the scheduler start time and the scheduler period are set in the Scheduling box. The period determines how often a watch dog test should be performed, and the start time is used as a reference time for the scheduling period.

Status and error messages are written to log files, which are stored in the DataWatchDog folder in [EtlLogs](#).

Date Calculator

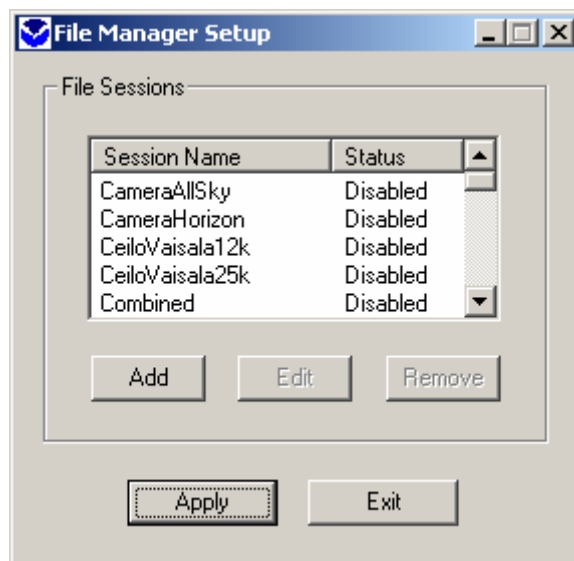
The [Date Calculator](#) software is used to convert between calendar dates to Julian dates. The interface is as follows:



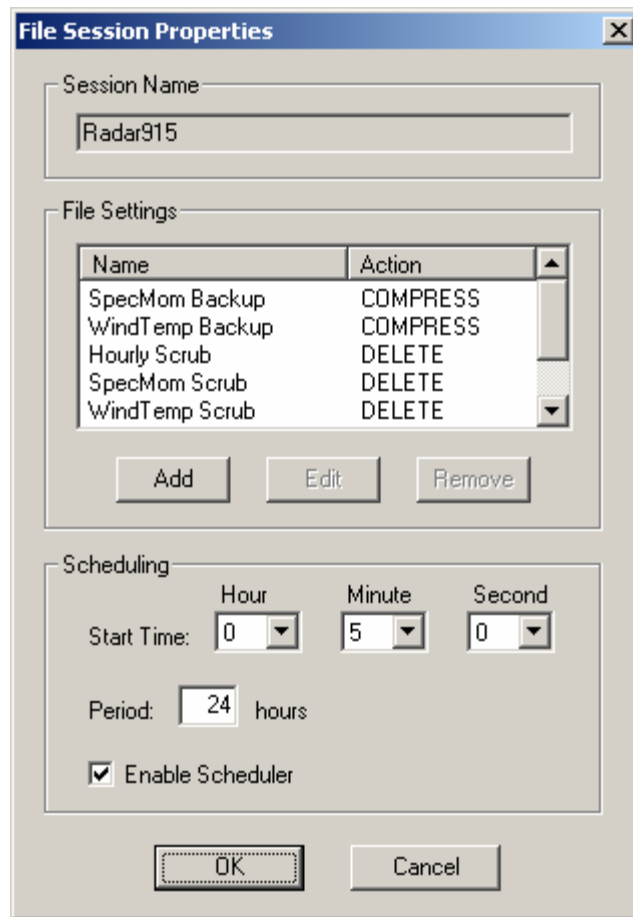
When a value is changed in any of the drop-down lists, the values in the other applicable drop-down lists will automatically adjust to the appropriate date.

File Manager

The [File Manager](#) software is used to configure automated file management tasks. The main interface is as follows:



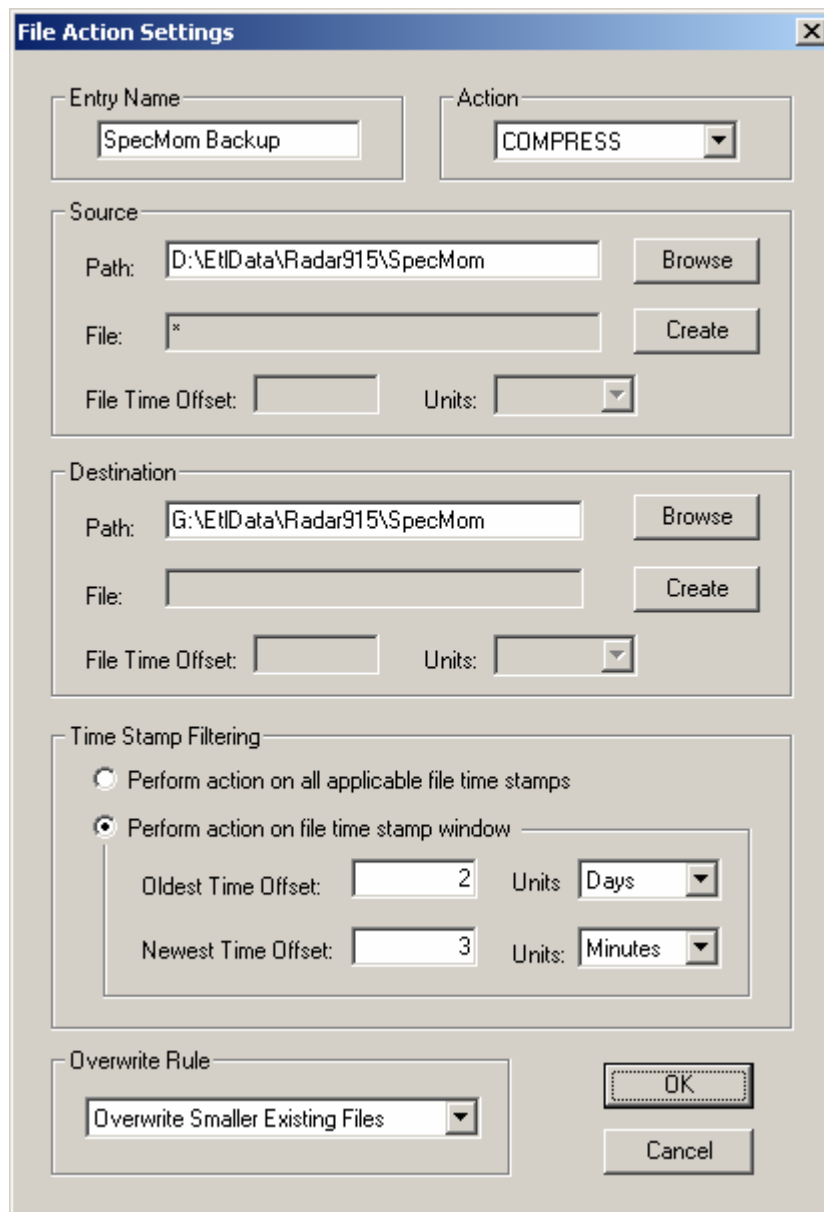
From the scrollable list, edit and/or enable the sessions that need to be configured. By default, all entries are disabled except for the CsiSurfaceMet, Log Files, Radar915, TemporaryData sessions. The Log Files and TemporaryData sessions should always be enabled. When editing a session, the following dialog will appear:



Each session has a single execution schedule. File management tasks are created using the Add button. When multiple tasks are created, each task is executed in sequential order when the scheduled execution time occurs. The scheduler start time and the scheduler period are set in the Scheduling box. The period determines how often all of the task entries in the File Settings list will be performed, and the start time is used as a reference time for the scheduling period.

The following are a few notes regarding scheduling strategies. Because the File Manager software is multithreaded, multiple scheduled file sessions can execute at the same time. The existing file sessions have staggered schedules to help distribute the I/O and processing loads more evenly. In particular, file compression tasks demand a fair amount of processing resources. Also, since each file session runs as a single thread, efforts to group multiple file management tasks in a file session and efforts to limit the number of enabled file sessions will help reduce unnecessary resource overhead. While it is preferred that similar file management tasks be grouped in the file session that they are best associated with, scheduling constraints may require that similar file management tasks be executed in separate file sessions at different times. Lastly, the schedule start time and schedule period of the file session should be chosen such that file access violations are avoided. This can occur with some data acquisition systems, such as LAP-XM, which exclusively access files when outputting data. As will be described below, file-time offsets and time-stamp filtering can be used in conjunction with the schedule start time and schedule period to precisely access files of interest.

Each file management task (in the File Settings box) is configured by double clicking on the associated entry name or by using the Edit button. When doing so, the following window is displayed:



The Action drop-down list contains all of the file management tasks that can be performed, which include the delete, copy, move, compress, and uncompress actions. The Source and Destination boxes contain settings that define the source and destination files for the file action. Specifically, these settings include the path, file expression, and file-time offset. The path can be explicitly specified or located using the Browse button. The destination path will automatically be created, if the path does not previously exist. The Create button is used to create the file expression. Here, the file name can consist of ASCII strings and/or dynamic time objects (use the Append buttons to add components to the file name). If dynamic time objects are use in the file expression, a file-time offset must be specified. This offset is subtracted from the time that the file action executes, and is then used to generate filenames that contain dynamic time objects. The file-time-object feature should be used when explicit files, with a known file-naming convention based on time, need to be acted upon. If the file naming convention is variable or doesn't include time objects, the Time Stamp Filtering feature can be used to identify files based on their modification time stamp. In the SpecMom Backup example above, all files of type '*' that have a modification time stamp that is newer than two days ago and older than three minutes ago will be compressed. Lastly, if a file action involves overwriting an existing destination file with the same name, the Overwrite Rule will be applied. The options for the overwrite rule are "Overwrite No Existing Files", "Overwrite All Existing Files", "Overwrite Smaller Existing Files", "Overwrite Larger Existing Files", "Overwrite Older Existing Files", and "Overwrite Newer Existing Files". The default

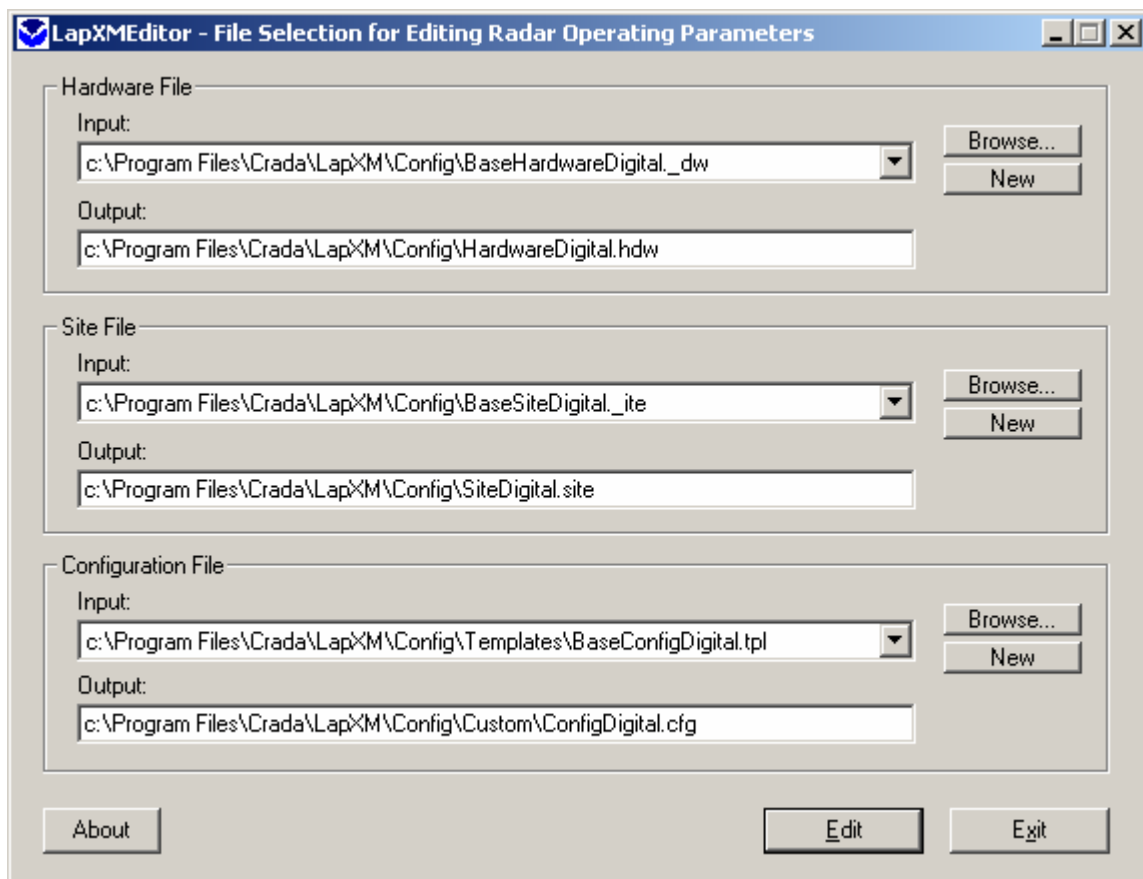
overwrite rule is “Overwrite Smaller Existing Files” for source files that are created and updated in appended mode.

File-time offsets and time-stamp filtering can be used in conjunction with the schedule start time and schedule period to precisely access files of interest. The following are examples of how to copy a file, with the file-naming convention of YYJJJ.txt (where YY = two-digit year and JJJ = three-digit Julian day), once per day at 00:30 UTC (schedule start time of 0 hours, 30 minutes, and 0 seconds, and a scheduling period of 24 hours) for the previous day of data. Using file-time offsets, create a source and destination file expression of <YYJJJ>.txt, and set the source and destination File Time Offset to 31 minutes. In this case, if the current year and Julian day are 2004 and 330, and the scheduler executes at 00:30 UTC, the file 04329.txt will be copied. The time-stamp filtering feature could also be used to accomplish the same task. In this case, specify the source and destination file expressions as *.txt, and set the Oldest Time Offset and the Newest Time Offset in the Time Stamp Filtering window to 1470 minutes and 30 minutes respectively. This will copy all files of type *.txt with modification time stamps that are newer than 00:00 UTC on 04329 and older than 00:00 UTC on 04330.

Status and error messages are written to log files, which are stored in the FileManager folder in [EtlLogs](#).

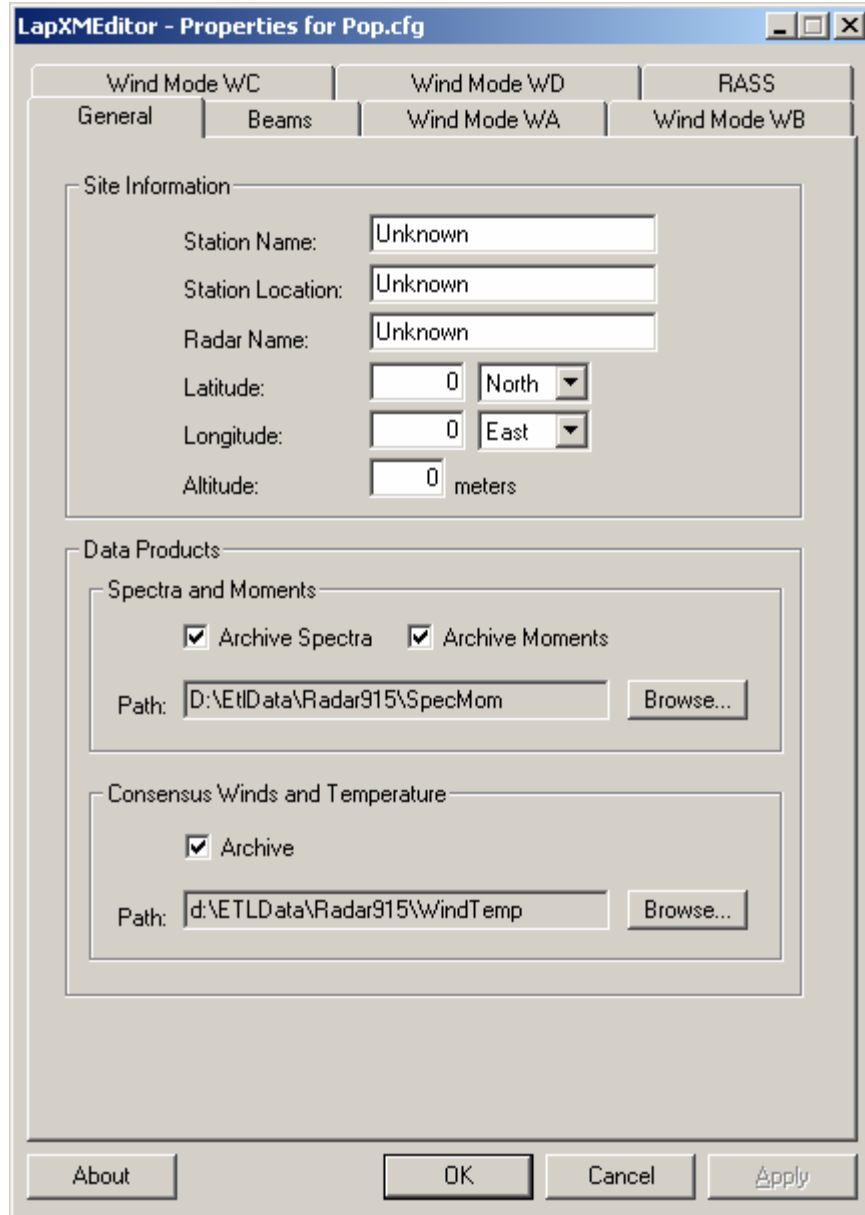
LapXMEEditor

The [LapXMEEditor](#) software is used to edit [LAP-XM](#) configuration files for radar operations. The opening file selection interface is as follows:



The drop-down list boxes for the Hardware File, Site File, and Configuration File are populated with all of the files, for the particular type, that exist in the input directories. The input directories include the LAP-XM installation directory (c:\Program Files\Crada\LapXM in this example) and the output directory from the last saved edit (if different from the installation directory). The input files that exist

in the above example are editor template files that are created using the New buttons. This feature provides a starting point when no other hardware, site and/or configuration files exist on disk, and can be used to access the default configuration settings. The input files in the drop-down list are read only (i.e., the path and filename can not be changed), but the output paths and files can be modified by the user. If new output files are created, the newly created output filenames will be added to the Input drop-down lists. Once all of the input and output paths and files have been specified, clicking on the Edit button will display the interface that is used to edit the file contents:



Each property page and associated contents are accessed by clicking on the appropriate title tab. On the Beams property page, the Assign beam configuration box is password protected, which can be accessed by entering the password LapXMEEditor. When the changes are complete, click on the Apply or OK buttons to save the changes (pressing OK will return back the file-selection dialog box, and pressing Apply will keep the property pages displayed). Before the settings are saved, a message will display the names of the output files that will be modified, and user confirmation is required to proceed.

IMPORTANT NOTE: When started, the LAP-XM software system automatically loads a single .site and .hdw file. Before the LapXMEEditor saves changes to new .site and/or .hdw files, it will delete

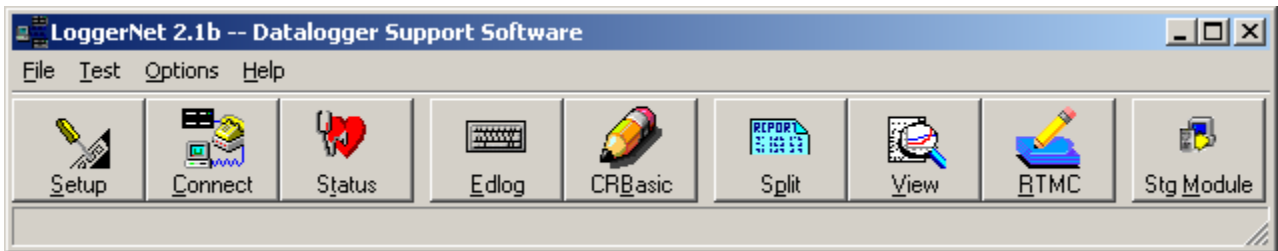
all other files of these types in the specified output directories. The user will be prompted before the deletion occurs. If the preexisting .site and/or .hdw files are needed, backup copies of these files should be made to a directory that is different from the output directory.

LoggerNet

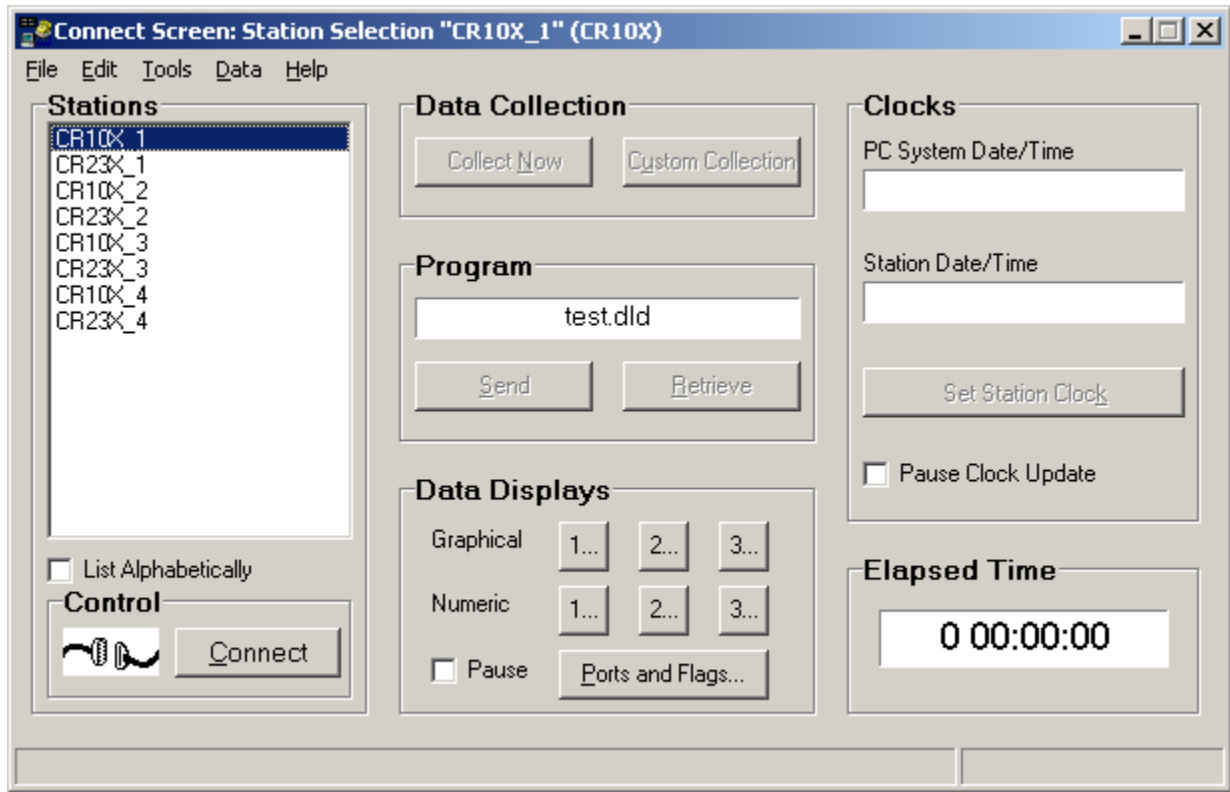
The [LoggerNet](#) software is used to download an upload data acquisition programs to and from Campbell Scientific dataloggers. The software can also be used to monitor real-time data on the datalogger for diagnostic and troubleshooting purposes. Automated data acquisition and data archiving are performed by the [Datalogger Acquisition](#) software.

IMPORTANT NOTE: The [Datalogger Acquisition](#) software must be disabled before LoggerNet can be used. During this time, no data will be archived to disk. When finished with LoggerNet, enable the [Datalogger Acquisition](#) software to resume data archiving.

The main interface for LoggerNet is as follows:



To perform datalogger program management and/or to monitor data, click on the Connect button. The Connect will appear as follows:



To connect to a datalogger, select the appropriate station name, and click on the connect button. The Station names follow the naming convention MMMMM_P, where MMMMM = the datalogger model (CR10X or CR23X) and P = serial communication port number. Once a connection is established

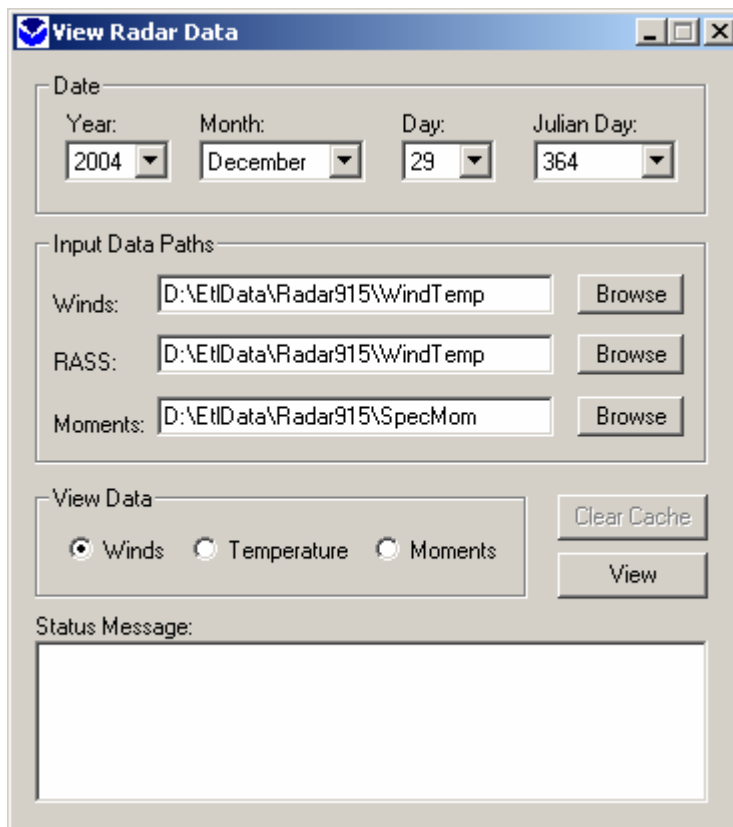
datalogger programs can be sent or received to and from the datalogger using the buttons in the Program section. Also, data can be monitored using the functions in the Data Displays section. Lastly, the Clock section is used to manually synchronize the datalogger clock with the computer clock. Once enabled, the [Datalogger Acquisition](#) software performs clock synchronization automatically on a periodic basis.

System Administrator

The System Administrator software automatically performs various system administration tasks, such as log file management. The System Administrator software runs as a Windows service. It does not have any user-configurable parameters, and thus, does not have a user-interface configuration tool. To start and stop the service, use the Windows Service Manager Console by running services.msc from the Start-Run dialog box. The System Administrator service should be running at all times.

View Radar Data

The [View Radar Data](#) software graphically displays radar measurements and radar-derived meteorological products. The interface is as follows:



The screenshot shows the 'View Radar Data' application window. It features a 'Date' section with dropdown menus for Year (2004), Month (December), Day (29), and Julian Day (364). Below this is the 'Input Data Paths' section, which includes three rows: 'Winds' with path 'D:\EtIData\Radar915\WindTemp', 'RASS' with path 'D:\EtIData\Radar915\WindTemp', and 'Moments' with path 'D:\EtIData\Radar915\SpecMom'. Each row has a 'Browse' button. The 'View Data' section contains three radio buttons: 'Winds' (selected), 'Temperature', and 'Moments'. To the right of these are 'Clear Cache' and 'View' buttons. At the bottom is a 'Status Message' area with a large empty text box.

There are three different radar data products that can be displayed, namely winds, temperature, and spectral moments. The spectral moments consists of radial velocity, signal-to-noise ratio, and spectral width. All data types are plotted in time-height cross sections for a 24 hour period. Specify the date, the input data paths, and the data type before clicking on the View button to display the data. For the wind and temperature data types, data format conversions are performed. These converted data are cached to disk for the life of the application instance, which provides faster viewing of other data from the same time period. However, if new real-time wind or temperature data are written to a file that has already been converted and cached, the cache must be cleared for these data can be viewed. In this case, click on the Clear Cache button. For wind and temperature files, real-time data are typically written once per hour.

Measurements

Cloud

ETL 3GHz S-Band Radar

Communications: ISA and PCI interface boards

Data Acquisition: [LAP-XM](#)

Vaisala CT12K and CT25K Ceilometers

Communications: Passive RS-232 data stream. The factory default communication settings are 2400 baud rate, 7 data bits, 1 stop bit, even parity, and no flow control. The baud rate can be changed (see hardware manual).

Data Acquisition: [Ceilometer Acquisition Setup](#)

Instrument Manual: [Vaisala CT25K Ceilometer](#)

GPS

Garmin 36 TracPak GPS Antenna

Communications: Passive RS-232 data stream. The factory default communication settings are 4800 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Clock Synchronization Setup](#)

Instrument Manual: [Garmin 36 TracPak GPS Antenna](#)

Trimble 4000sse GPS Receiver

Communications: Interactive RS-232 data stream. The default communication settings are 57600 baud rate, no parity, and no flow control.

Data Acquisition: [Water Vapor Setup](#)

Instrument Manual: [Trimble 4000sse GPS Receiver Setup](#)

Trimble R7 GPS Receiver

Communications: Interactive RS-232 data stream. The default communication settings are 38400 baud rate, no parity, and no flow control.

Data Acquisition: [Water Vapor Setup](#)

Instrument Manual: [Trimble R7 GPS Receiver Setup](#)

Humidity

Licor 7500 Gas Analyzer

Communications: Passive RS-232 data stream. The factory default communication settings are 38400 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Serial Acquisition Setup](#)

Instrument Manual: [Licor 7500 Gas Analyzer](#)

Campbell HMP45C Temperature and Relative Humidity Probe

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell HMP45C Temperature and Relative Humidity Probe](#)

Ophir IR-2000 Optical Hygrometer

Communications: Passive RS-232 data stream. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Serial Acquisition Setup](#)

Instrument Manual: [Ophir IR-2000 Optical Hygrometer](#)

Motion

Crossbow AHRS500 Motion and Attitude Sensing Unit

Communications: Passive RS-232 data stream. The factory default communication settings are 38400 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Serial Acquisition Setup](#)

Instrument Manual: [Crossbow DMU-AHRS Motion and Attitude Sensing Unit](#)

Pressure

Campbell CS105/CS105MD Barometric Pressure Sensor

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell CS105/CS105MD Barometric Pressure Sensor](#)

Rain

Campbell Met One Rain Gage

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell Met One Rain Gage](#)

Campbell TE525 Tipping Bucket Rain Gage

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell TE525 Tipping Bucket Rain Gage](#)

Distromet RD-80 Disdrometer

Communications: Passive RS-232 data stream. The factory default communication settings are 9600 baud rate, 7 data bits, 1 stop bit, even parity, and no flow control.

Data Acquisition: [Disdrometer Acquisition Setup](#)

Instrument Manual: [Distromet RD-80 Disdrometer](#)

Radiation

Campbell CM3 Pyranometer

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell CM3 Pyranometer](#)

Campbell Q-7.1 Radiometer

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell Q-7.1 Radiometer](#)

Kipp & Zonen 2AP Sun Tracker

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: None. The [Win2AP](#) software is used to configure the hardware platform.

Instrument Manual: [Kipp & Zonen 2AP Sun Tracker](#)

Soil

Campbell CS615 Water Content Reflectometer

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell CS615 Water Content Reflectometer](#)

Campbell CS616 and CS625 Water Content Reflectometers

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell CS616 and CS625 Water Content Reflectometers](#)

Campbell HFT3 Heat Flux Plate

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell HFT3 Heat Flux Plate](#)

Campbell 107 Temperature Probe

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell 107 Temperature Probe](#)

Snow

Campbell SR50 Sonic Ranging Sensor

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell SR50 Sonic Ranging Sensor](#)

Temperature

Applied Technologies Inc. Sonic Anemometer

Communications: Passive RS-232 data stream. The factory default communication settings are 9600 baud rate, 7 data bits, 1 stop bit, even parity, and no flow control.

Data Acquisition: [Serial Acquisition Setup](#)

Instrument Manual: [Applied Technologies Inc. Sonic Anemometer](#)

Campbell 107 Temperature Probe

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell 107 Temperature Probe](#)

Campbell HMP45C Temperature and Relative Humidity Probe

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [Campbell HMP45C Temperature and Relative Humidity Probe](#)

ETL Radio Acoustic Sounding System

Communications: ISA and PCI interface boards

Data Acquisition: [LAP-XM](#)

Wind

R.M. Young 05103, 05106, and 05305 Wind Monitors

Communications: Analog wiring to a datalogger. Interactive RS-232 data stream with datalogger. The factory default communication settings are 9600 baud rate, 8 data bits, 1 stop bit, no parity, and no flow control.

Data Acquisition: [Datalogger Setup](#)

Instrument Manual: [R.M. Young 05103, 05106, and 05305 Wind Monitors](#)

Applied Technologies Inc. Sonic Anemometer

Communications: Passive RS-232 data stream. The factory default communication settings are 9600 baud rate, 7 data bits, 1 stop bit, even parity, and no flow control. Communication setting can be changed using software commands in the instrument manual.

Data Acquisition: [Serial Acquisition Setup](#)

Instrument Manual: [Applied Technologies Inc. Sonic Anemometer](#)

ETL 915MHz and 449 MHz Wind Profilers

Communications: ISA and PCI interface boards

Data Acquisition: [LAP-XM](#)

Hardware

Datalogger

[Campbell CR10X](#)

[Campbell CR23X](#)

Data Packer

[Applied Technologies Inc. Data Packer](#)

Modems

[Campbell COM210 Telephone Modem](#)

U.S. Robotics Courier V.Everything

[Installation Guide](#)

[Modem Command Reference](#)

Router

Cisco 831

[ETL Field Setup Instructions](#)

[Quick Startup Guide](#)

[Installation Guide](#)

[Software Configuration Guide](#)

[Backup and Restore Configuration File](#)

Satellite

Hughes DirectWay

[DW4020 Installation Guide](#)

[DW4020 UserGuide](#)

[Antenna Installation Guide](#)

[Antenna System Series 1892/1982](#)

Serial Boards

[SeaLevel 7202 2-Port RS232 PCI Board](#)

[SeaLevel 7801 8-Port RS232 PCI Board](#)

Serial Interfaces

[Campbell SC932A 9-Pin to RS-232-DCE Interface](#)

Solar Panels

[Campbell MSX10, MSX10R, MSX20R, MSX64R, and MSX128R Solar Panels](#)

Switches

[Cybex SwitchView KVM](#)

Phone Line Switch

[Black Box Line Share Pro 102](#)

[Black Box Line Share Pro 104](#)

Updated: 02/17/05