User Manual
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OpenBSI Harvester Manual

EMERSON.
Process Management

IMPORTANT! READ INSTRUCTIONS BEFORE STARTING!

Be sure that these instructions are carefully read and understood before any operation is attempted. Improper use of this device in some applications may result in damage or injury. The user is urged to keep this book filed in a convenient location for future reference.

These instructions may not cover all details or variations in equipment or cover every possible situation to be met in connection with installation, operation or maintenance. Should problems arise that are not covered sufficiently in the text, the purchaser is advised to contact Emerson Process Management, Remote Automation Solutions for further information.

EQUIPMENT APPLICATION WARNING

The customer should note that a failure of this instrument or system, for whatever reason, may leave an operating process without protection. Depending upon the application, this could result in possible damage to property or injury to persons. It is suggested that the purchaser review the need for additional backup equipment or provide alternate means of protection such as alarm devices, output limiting, fail-safe valves, relief valves, emergency shutoffs, emergency switches, etc. If additional information is required, the purchaser is advised to contact Remote Automation Solutions.

RETURNED EQUIPMENT WARNING

When returning any equipment to Remote Automation Solutions for repairs or evaluation, please note the following: The party sending such materials is responsible to ensure that the materials returned to Remote Automation Solutions are clean to safe levels, as such levels are defined and/or determined by applicable federal, state and/or local law regulations or codes. Such party agrees to indemnify Remote Automation Solutions and save Remote Automation Solutions harmless from any liability or damage which Remote Automation Solutions may incur or suffer due to such party's failure to so act.

ELECTRICAL GROUNDING

Metal enclosures and exposed metal parts of electrical instruments must be grounded in accordance with OSHA rules and regulations pertaining to "Design Safety Standards for Electrical Systems," 29 CFR, Part 1910, Subpart S, dated: April 16, 1981 (OSHA rulings are in agreement with the National Electrical Code).

The grounding requirement is also applicable to mechanical or pneumatic instruments that include electrically operated devices such as lights, switches, relays, alarms, or chart drives.

EQUIPMENT DAMAGE FROM ELECTROSTATIC DISCHARGE VOLTAGE

This product contains sensitive electronic components that can be damaged by exposure to an electrostatic discharge (ESD) voltage. Depending on the magnitude and duration of the ESD, this can result in erratic operation or complete failure of the equipment. Read supplemental document S14006 for proper care and handling of ESD-sensitive components.

Contents

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Introduction – What is the Harvester?

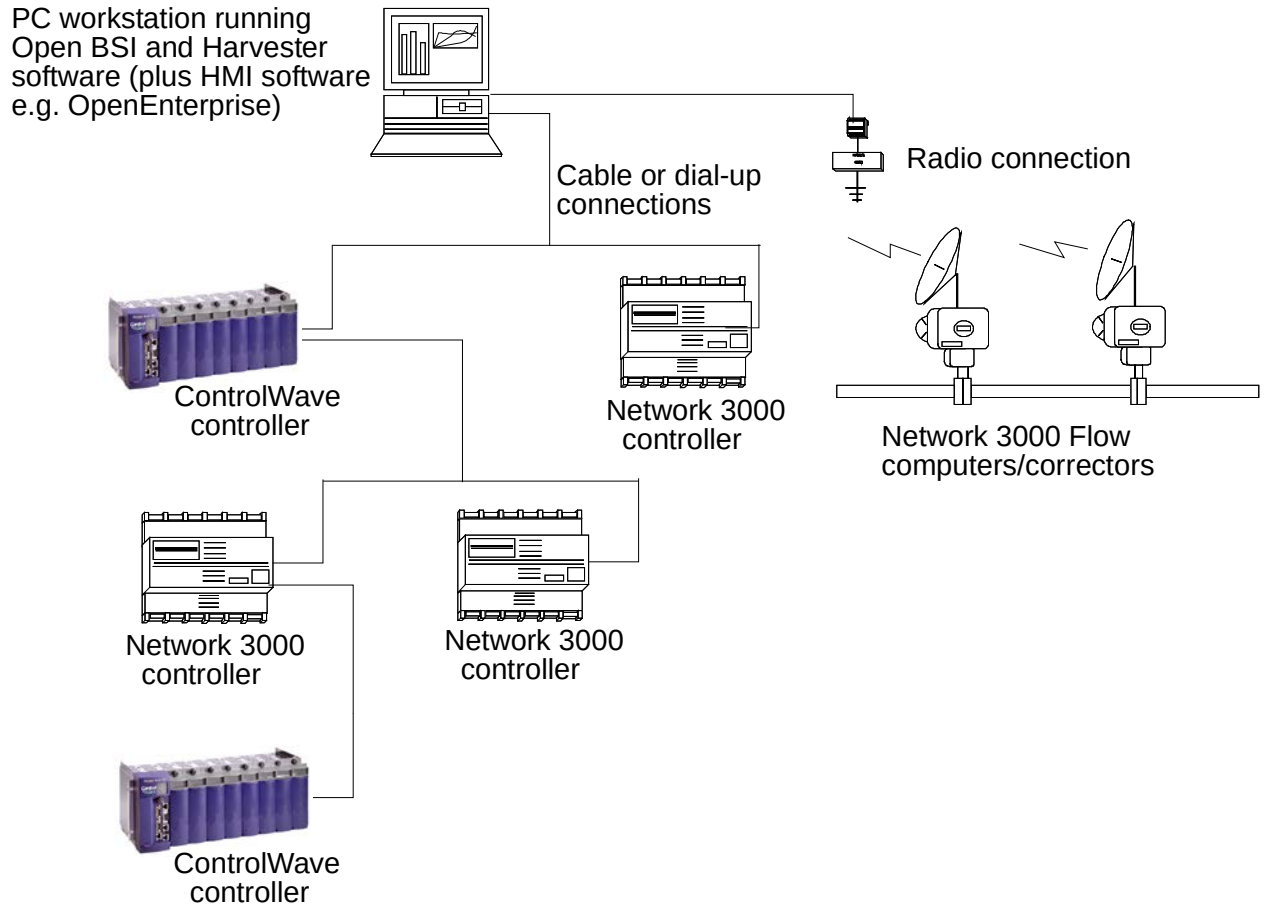
The Harvester is a utility which allows collection of historical data from a network of ControlWave and Network 3000 controllers. It combines many of the features of the OpenBSI Scheduler and OpenBSI Data Collector programs, available in earlier releases of OpenBSI.

What types of data can be collected?

This historical data which can be collected by the Harvester includes:

- Data array values
- Archives
- Audit data (alarms and/or events)
- Lists (typically containing configuration data)

The Harvester can be used with Network 3000 series controllers (DPC 3330, TeleFlow, etc.) as well as the ControlWave series of controllers.



Introduction - What is the Harvester?

What determines how often data is collected?

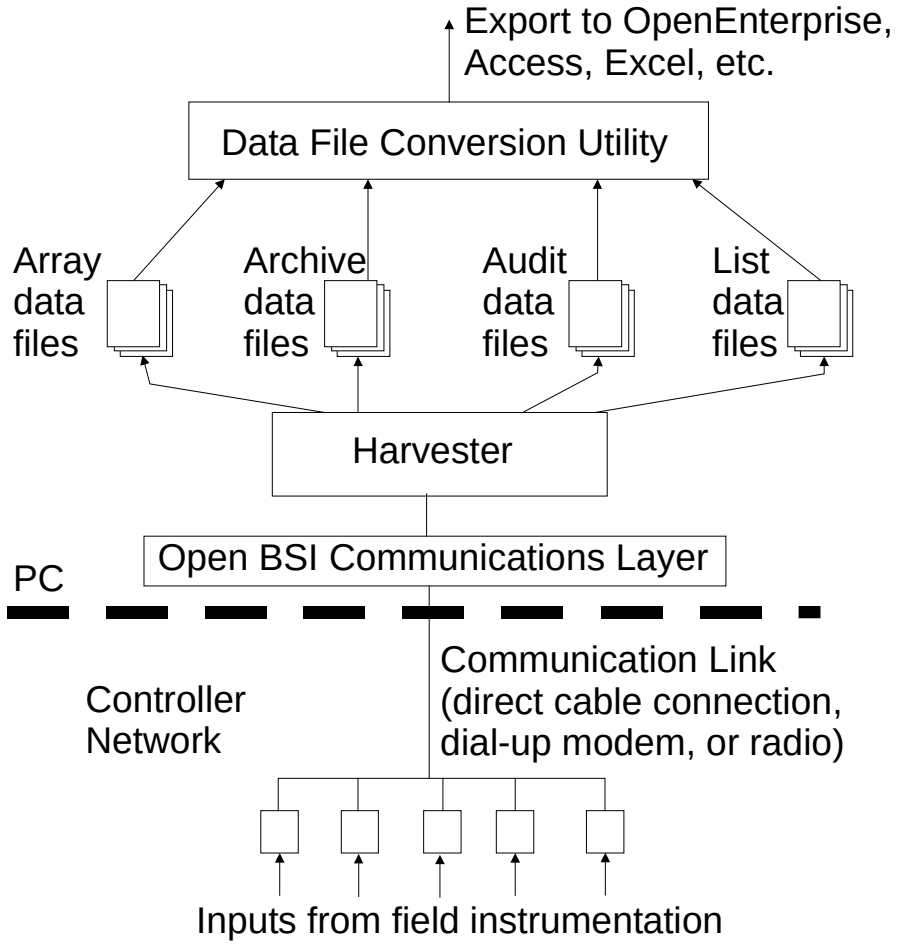
Data can be collected at scheduled intervals e.g. hourly, or at a specified set of up to ten times during the day, or based on a pre-defined collection scheme which takes into account various factors affecting communications.

OpenBSI communications must be active for collections to occur.

What happens to the data once it is collected?

The data collected by the Harvester is stored in files at the PC workstation. These files can be converted to a variety of formats using the OpenBSI Data File Conversion Utility, making them accessible to other programs:

- OpenEnterprise database
- Comma Separated Variable format (CSV) - for use in Microsoft® Excel
- Coastal Flow Measurement's Flow-Cal™ package
- ODBC - for use in Microsoft® Access



Overview of Steps Which Must be Completed to Successfully Use the Harvester

1. The OpenBSI Network Edition, and the Harvester kit must be installed on your PC workstation. In addition, if this is a new system, you will need the ControlWave Designer kit, and/or the ACCOL Workbench kit, to create a control strategy which will execute in the controller.

2. Create structures in your control strategy which will hold the data you want to collect with the Harvester. These structures can include lists, arrays, archives, or audit trail. You may find it advantageous to use the same signal names, list numbers, array numbers, and archive numbers in each controller you configure, since this can simplify your configuration activities later on.

> NOTE:
>
> We strongly recommend you consider using Archives instead of Arrays, because Archives are more versatile. Archives include sequence numbers and timestamps which simplify data management, and make data collection more efficient.

3. Create necessary configuration signals in each control strategy. These are used for modem control, and to set various modes of operation for the controller, when it is used with the Harvester. Again, you may find it advantageous to use the same configuration signal names in each controller.

4. Download the completed and compiled control strategy files (ACCOL or ControlWave) into each controller.

5. Configure your controller network. Before attempting to use the Harvester, you must have an existing network of controllers to communicate with. These controllers must exist in your NETDEF database. Verify that communications between the PC and the controller network are functioning properly before trying to configure and use the Harvester.

6. Start the Harvester software, and sign on.

7. If you used lists with the same list numbers and signal names, you can configure common lists at this point, otherwise, skip this step.

8. Add new node(s), and configure the node(s) using the Node Configuration pages, and the Collection Configuration dialog box.

9. Edit the system information to specify the locations where Harvester files should be output, and if you are using the scan interval for your on-time method, specify its associated parameters.

10. Examine the status of your collections in the monitor window.

11. Configure the OpenBSI Data File Conversion Utility to set up export of the Harvester data files to formats which may be exported to OpenEnterprise or various third-party packages.

Installing the Software

The Harvester software is included on the OpenBSI CD-ROM.

To install it, choose **“Install OpenBSI”** from the choices provided in the CD browser, and then select **“Harvester”**. If it isn’t already installed, you should also select **“Network Edition”**. Continue with the installation by following the directions onscreen. For more information on the installation process, and on other software packages, see Chapter 2 of the *OpenBSI Utilities Manual* (document# D5081).

Configuring Your Controller to Work with the Harvester

Before attempting to use the OpenBSI Harvester, your controller network must already be 'up and running', and collecting data from field instrumentation. Instructions for setting up each controller are included in the hardware manual accompanying the device.

The node name for each and every controller must exist in the Network Definition (NETDEF) files. During later stages of configuration, you will need to know the node name, local address, and expanded node addressing group number (if applicable) for each controller.

EGM 3530-10A, EGM 3530-50A TeleFlow™ Users

If you are using an EGM 3530-10A or -50A TeleFlow™ electronic gas measuring computer, it is already pre-configured with the required signals, signal lists, Audit Trail, and archive structures; if you need to alter the configuration, please contact our Technical Support Group for assistance.

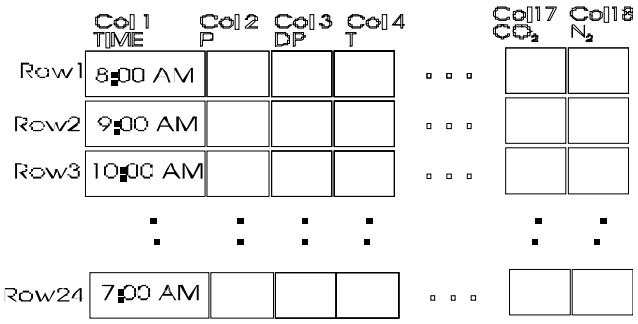
DPC 3330, DPC 3335, RTU 3305, RTU 3310, 3530B-series, GFC 3308, ControlWave Users

If you are using Network 3000-series DPC 3330, DPC 3335, RTU 3305, RTU 3310, 'B' or newer 3530-series units supporting ACCOL, or a GFC 3308 unit, the ACCOL load running in the unit must be configured with certain structures. Similar structures must also be created if you are using a ControlWave controller running one of the IEC 61131 languages.

These structures (data arrays, the EAudit Module (or AUDIT function block for ControlWave), signal lists, and signals) are discussed, briefly, below:

Data Arrays

The Harvester collects data from an analog read-write data array, or from multiple such arrays which share the same row/column dimensions. These arrays are used to hold **historical data**.



In most cases, the first column of each analog read-write array must contain a timestamp in the Julian format of the ACCOL system signal #TIME.000 or the ControlWave _TIME_000 variable.

The remaining columns of each array row contain the actual data collected at the time designated by the timestamp in column 1. An example array is shown, above, which contains hourly flow data from a natural gas pipeline. The type of data in the array will vary depending upon your particular application.

There are four basic methods of array storage, each of which is discussed, below:

Storage without Wrapping (Push Down Array)

Storage without wrapping means that the most recent data is always stored in row 2 of the data array; and as new data is entered, the previous data in row *n* is moved to row *n+1*, with the data in the last row of the array discarded. (Note: Row 1 is reserved for temporary storage of running totals.)

The pictures at right illustrate this concept by showing two snapshots of a 5 row by 4 column data array.

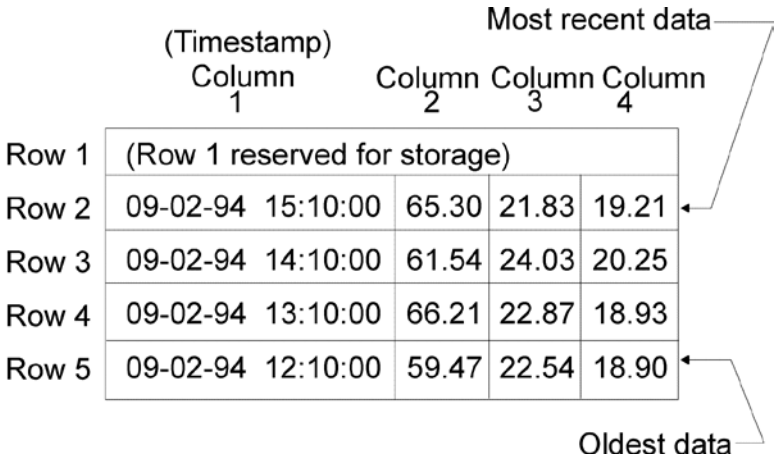
In the first picture, the most recent data has a time stamp of September 2, 1994 at 2:10 PM and is in row 2.

Most recent data

	(Timestamp) Column 1	Column 2	Column 3	Column 4
Row 1	(Row 1 reserved for storage)			
Row 2	09-02-94 14:10:00	61.54	24.03	20.25
Row 3	09-02-94 13:10:00	66.21	22.87	18.93
Row 4	09-02-94 12:10:00	59.47	22.54	18.90
Row 5	09-02-94 11:10:00	60.11	23.78	19.33

Oldest data

In the second picture, new data has been collected, at 3:10 PM, pushing the 2:10 PM data down into row 3, the row 3 data into row 4, and the row 4 data into row 5. The previous data that had been in row 5 is discarded.



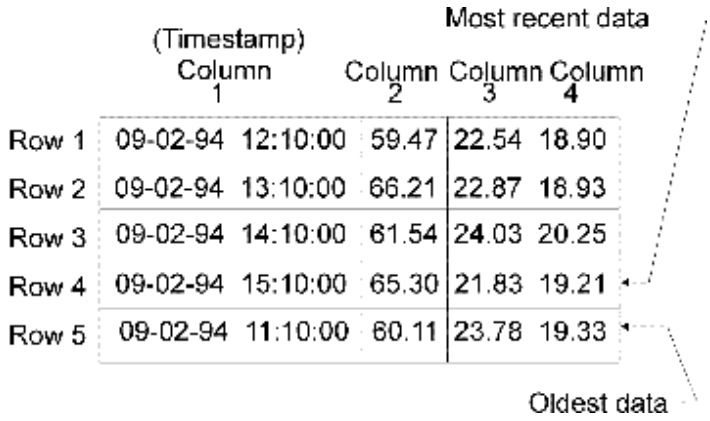
Storage *with* Wrapping (Wrap Array)

Storage with wrapping means that if the most recent data is currently in row *n* of the data array, the next data will be stored in row *n+1*, unless row *n* is the last row of the array, in which case, the next data will go to row 1. This wrap-around method is also referred to as a 'circular' array.

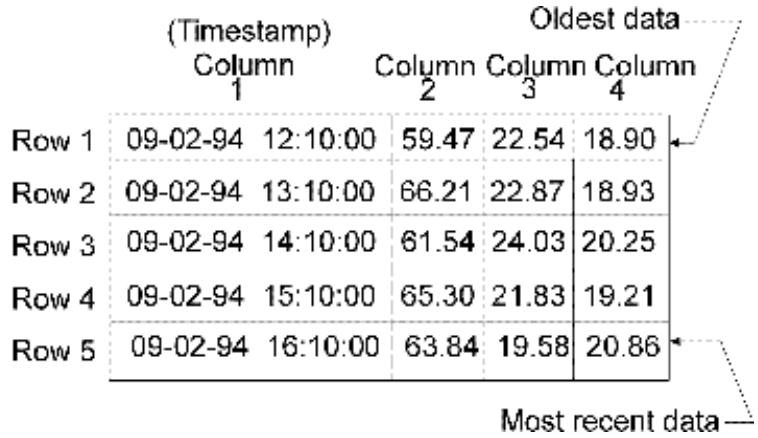
In this way, the oldest data is always overwritten with the newest data. When configuring this array, data should always be stored beginning with Row 1. In addition, data must be stored in the array at regular intervals, which are less than or equal to the specified scan interval. (Scan intervals are discussed later in this manual.)

The pictures, below, illustrate the wrap array concept by showing three snapshots of a 5 row by 4 column data array.

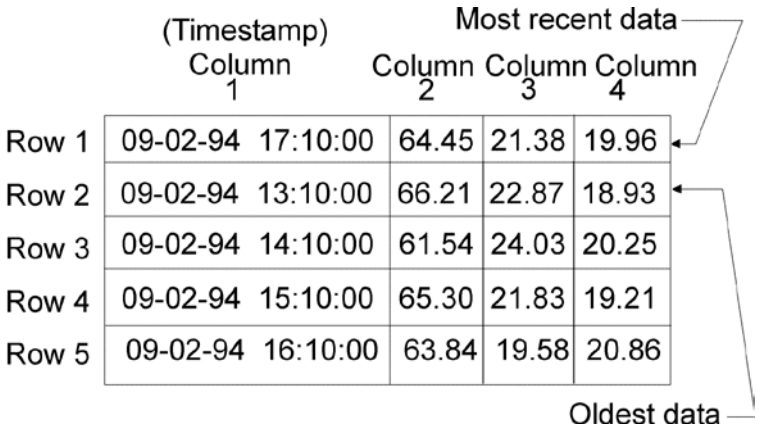
In the first snapshot, the most recent data has a time stamp of September 2, 1994 at 3:10 PM and is in the fourth row.



In the second picture, new data has been collected, at 4:10 PM, overwriting the oldest data (i.e. 11:10 AM data which had been in row 5). The 12:10 PM data in row 1 is now the oldest.

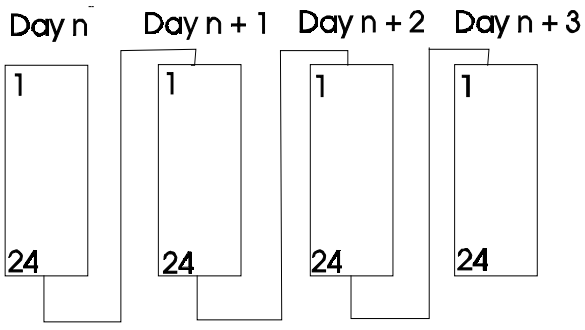


In the third picture, new data is collected again. It would be stored in Row 6, except there isn't one, so the array *wraps-around* and it is stored in Row 1. Now the oldest data, which was the 12:10 PM data in row 1, has been over-written with the most recent data, from 5:10 PM. The next collection will overwrite Row 2, and so on.



Storage in Wrap Multiple Arrays

The final method of data array storage is typically used in applications involving large amounts of data, such as gas flow metering, using the GFC 3308 AccuRate Gas Flow Computer with its standard ACCOL load. In this type of application, arrays in the GFC 3308 unit's ACCOL load are configured to store data on an hourly basis, and each array has 24 rows, one for each hour in the 24 hour period corresponding to a 'gas day.' When the gas day ends, i.e. the first array is full, new data is stored in *another* array, until that array is full, and then still another array is used. (See the figure, below.)



This process continues until some pre-defined number of arrays has been filled, at which time, the process will start over again. (This is similar to the wrapping discussed earlier, except instead of wrapping around within a single array, wrapping occurs to another array.) When configuring these arrays in ACCOL, data should always be stored beginning with Row 1 of the first array. When wrapping to another array, storage should also always begin with Row 1. Data must be stored at regular intervals, which are less than or equal to the specified scan interval.

IMPORTANT

If you decide to modify the standard ACCOL load for the GFC 3308, or you create a load of your own, remember that multiple array collection can only be performed if each and every array to be collected has the exact same row / column dimensions. Any attempt to collect arrays of different sizes through multiple collection will cause the Harvester to terminate its collection. In addition, when multiple arrays are to be collected, they must be numbered consecutively.

Raw Array

A Raw Array collection involves an array where the Harvester simply collects the entire array, without regard to timestamps, or rows.

No matter which of the methods are used, the Harvester will collect the historical data from the data arrays, at a pre-defined scan interval, and store the data in files on the PC hard disk.

Archive Files

As an alternative to using data arrays, some controllers support the use of historical archive files. Archive files reside within the controller, and are similar to data arrays, except that each column is directly associated with a particular signal, and each column also has a descriptive title. See the 'ARC_STORE' section of the *ACCOL II Reference Manual* (document# D4044) for details. ControlWave users should see the ControlWave Designer on-line help for the 'ARCHIVE' function block.

Wherever possible, we strongly recommend you use Archive Files for your historical storage.

NOTE: When using the Harvester to collect Archive Files in a BSAP network, the archive records to be displayed must be 220 bytes or less. This is explained in more detail later in this manual.

EAudit Module, Audit Function Block

ACCOL users must configure the Extended Audit Trail Module (EAudit).[1] This module is used to record alarm and event conditions, and is discussed in detail in the *'Audit Trail /EAudit'* section of the *ACCOL II Reference Manual* (document# D4044.) Similarly, ControlWave users must configure the AUDIT function block. See the ControlWave Designer on-line help in ControlWave Designer for details.

The alarm/event data is collected by the Harvester, and stored in files on the PC hard disk.

Signal Lists, Configuration Signal List

The Harvester can collect signal lists. One of these lists may be the Configuration Signal List which contains any configuration parameters related to your particular application. The configuration list generally contains information which does not change often, because it is normally collected only on system startup, if a change occurs, or if the operator explicitly requests that it be collected. In a natural gas pipeline application, for example, this list might contain signals whose values represent pipe diameters, or orifice types.

NOTE: Signal lists collected via the Harvester cannot have more than 1000 signals.

Radio Turn ON Time Logic

If you are using radios as your communication link, your program must include user-defined logic to turn ON its radio, at a pre-determined time, so as to be ready for data collection from the Harvester. This pre-determined time is calculated based on the node's local address, its expanded node addressing group number, and various parameters defined in the Harvester. *Appendix C* of this manual includes a sample ACCOL task which may be used to turn on a Network 3000 controller's radio at a scheduled time. For information on the turn on logic for the Harvester program, see the box, below:

[1] *Protected mode firmware (PLS00/PLX00 or newer) currently only supports use of the EAudit Module. 186-based units (except for the 3308) with AL (or newer firmware) or 386EX Real Mode units with RMS02 (or newer firmware) can be used with either the Audit Module, or the EAudit Module.*

Calculation of Node Turn ON Time, Actual Collection Time

Turn ON Time = Start Time Offset + ([Local Address - 1]* Poll Time Per Node)+ (Expanded Node Addressing Group No.)* (Poll Time Per Group)

Actual Start of Collection = Turn ON Time + Turn on Delay

So, for example, if:

Start Time Offset = 1 second
Poll Time Per Node = 20 seconds
Poll Time Per Group = 5 seconds
Turn on Delay = 5 seconds

Then, the controller with the group # and local address # shown, will turn ON at the time within the scan interval shown:

Group #	Local Address #	Turn ON time	Actual Start of Collection
0	1	1 second	6 seconds
0	2	21 seconds	26 seconds
0	3	41 seconds	46 seconds
1	1	6 seconds	11 seconds
1	2	26 seconds	31 seconds
1	3	46 seconds	51 seconds
2	1	11 seconds	16 seconds
2	2	31 seconds	36 seconds
2	3	51 seconds	56 seconds

Logical Signals to Regulate Data Collection & Modem Control

In addition to the signals collected via the signal lists, and turn ON time logic, each program requires certain logical signals which are either used to notify the Harvester to perform a certain function, or are used by the Harvester, to indicate it has performed a certain function. These signals are as follows:

Communications Off Signal

This signal is turned ON by the Harvester to notify the controller that it has finished collecting data for this scan interval. This can trigger user-defined logic which turns OFF the radio.

Maintenance Mode Signal

This signal is set ON by the Harvester monitor as a notification that the radio should not be turned OFF, even if no collections are currently occurring. (This might be done so maintenance or testing can be performed.)

Force List Collection Signal

This signal is set ON by user-defined logic in the program as a notification to the Harvester that the configuration list has changed, somehow, and so it should be re-collected by the Harvester. This signal MUST be designated for audit trail collection via the EAudit Module or AUDIT function block.

Modem Control Signals

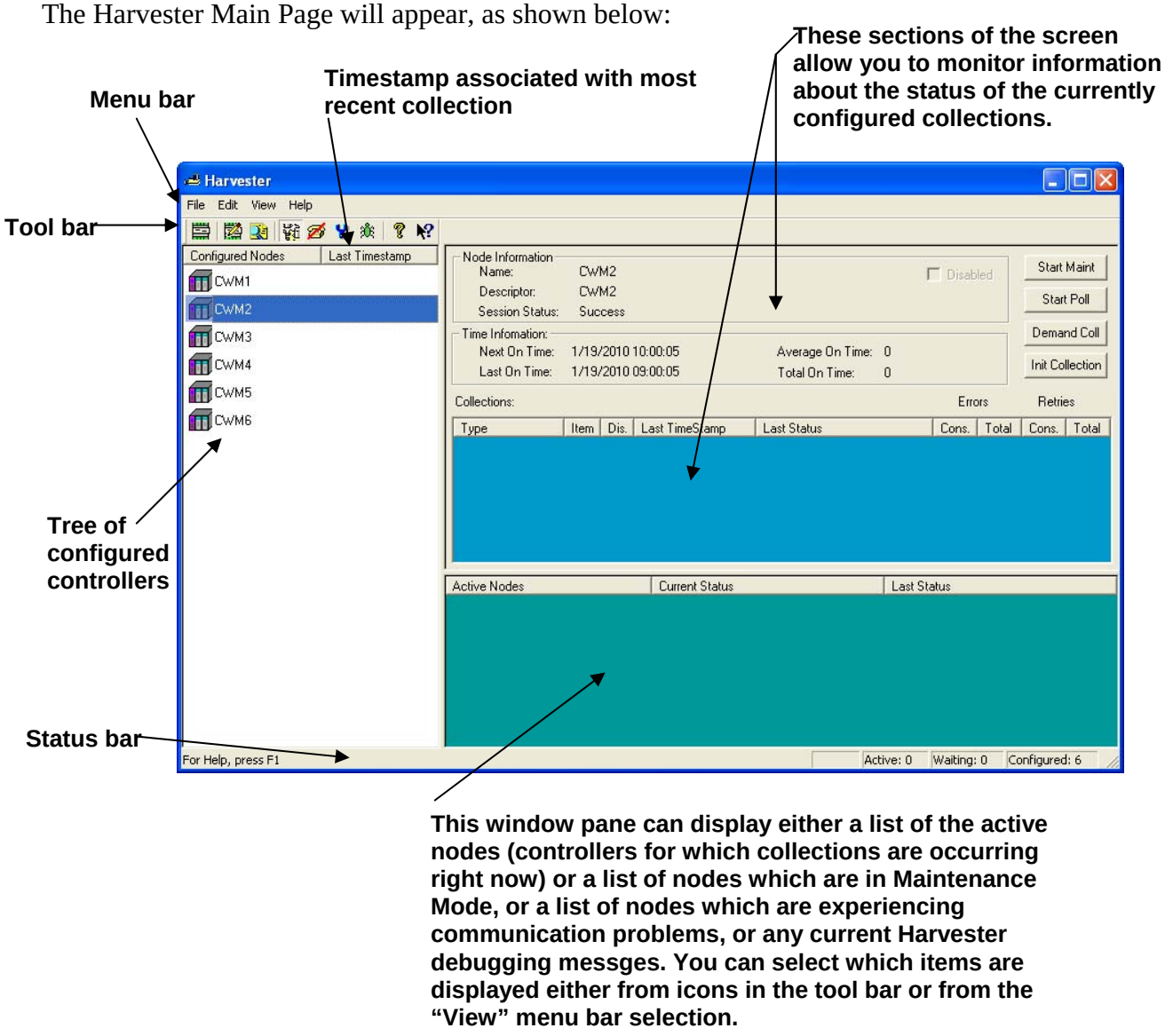
If the Harvester is collecting data from a slave controller which communicates to its master controller in the network via a dial-up modem, the master must have a pair of logical (boolean) signals for modem control. One signal is turned on by the Harvester (Request signal) to signify that the master controller should dial-up its slave controller. The second signal (Confirm signal) is turned on by the master controller to indicate that the dial-up connection with the slave node has been established, thereby signifying to the Harvester, that collections can begin.

Starting the Harvester

In order to start the Harvester, communications with the controller network must already be active, via NetView. To start the Harvester, click as follows: **Start→Programs→OpenBSI Tools → Collection Programs→Harvester**

IMPORTANT: If this is the very first time the Harvester has been started on this particular computer, you will be prompted to register the software. Otherwise, the software can only be used for a maximum of 60 days. For more information on the registration process, see Chapter 2 of the *OpenBSI Utilities Manual* **(document# D5081).**

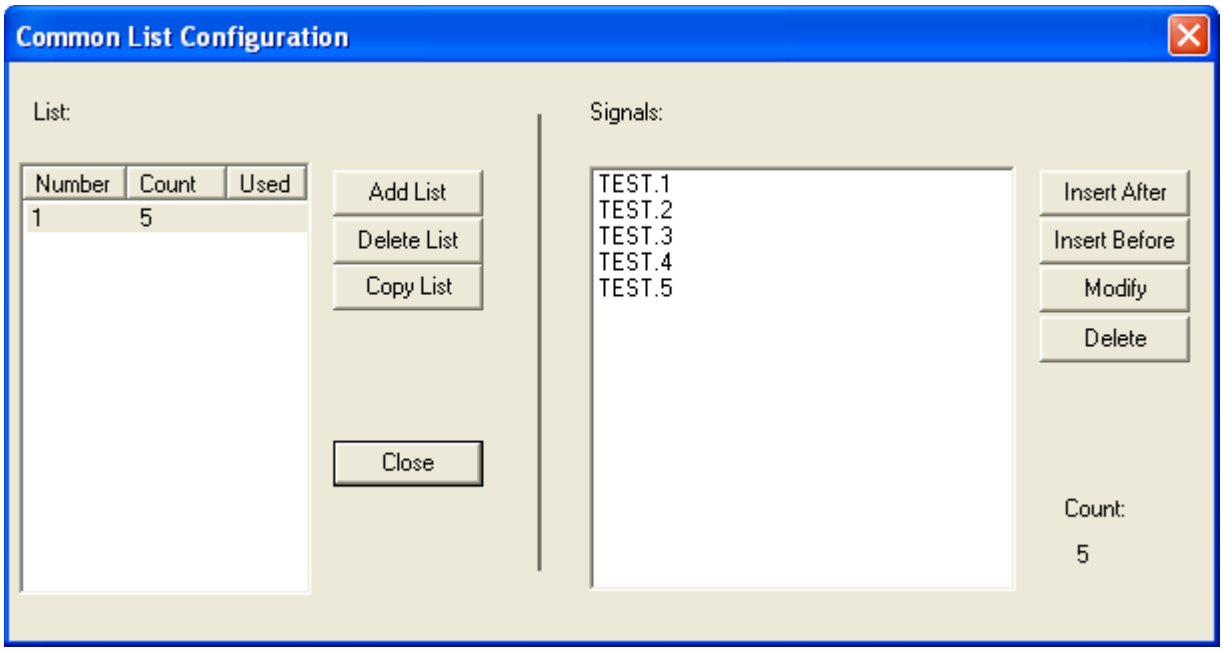
The Harvester Main Page will appear, as shown below:



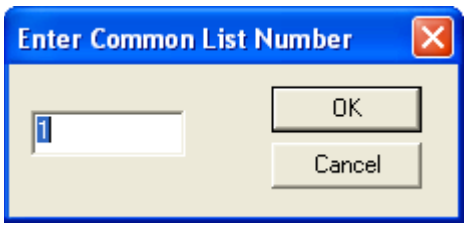
Defining Common Lists

If you are running an identical application load/project in more than one controller, that contains signals you want to collect, you can use Common Lists to simplify your collections. A common list is just a group of signals you want to collect, in which the signals share the same name in more than one controller. For example, if you have ten controllers, and each one has signals named CURRENT.FLOW, CURRENT.TEMP, and CURRENT.PRESUR that you want to collect, you could define a Common List containing these three signals. The advantage is that the Common List is defined in only one place (the Harvester program itself); so as long as those individual signals already exist in the your running application, you don't need to modify your application to add or change the Common List. Another advantage of using common lists is that you save on certain communications overhead, because signal names do not need to be collected, just the signal values.

To access the Common List Configuration dialog box, click on **Edit→ Common Lists**.



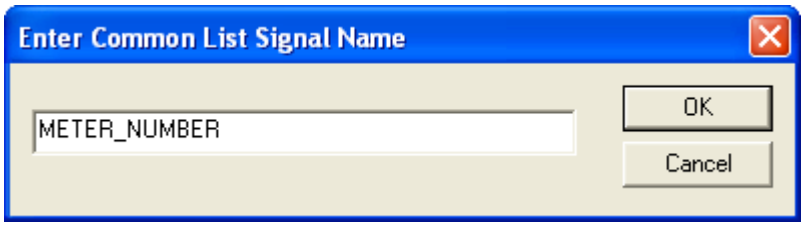
To create a common list, click on the **[Add List]** button. The Enter Common List Number dialog box will appear. Enter a number which will identify the common list, then click on **[OK]**.



Defining Common Lists

That list number will now appear in the **"List"** window on the left side of the Common List Configuration dialog box. Click on it, and then click on either the **[Insert After]** or **[Insert Before]** buttons to begin inserting signal names in the list.

The Enter Common List Signal Name dialog box will appear. Enter the name of the first signal of the list, and click on **[OK]**.



That signal name will now appear in the **"Signals"** window on the right side of the Common List Configuration dialog box. Repeat this process, using the **[Insert After]** button to insert additional signals in the list. NOTE: The signal names and ordering of signals must match exactly the corresponding signals in the controller's signal list.

The common list you define can be used, later, when you are defining a Signal List collection in the Collection Configuration dialog box.

Changing a signal Name already in a Common List

To change the signal name of a signal already in the list, click on the signal, then click on the **[Modify]** button. The Enter Common List Signal Name dialog box will re-appear, and you can edit the signal name.

Deleting a signal Name already in a Common List

To delete the signal name of a signal already in the list, click on the signal, then click on the **[Delete]** button. The signal name will be removed from the list.

Deleting an entire Common List

To delete an entire common list, click on the number of the list, in the **"List"** window of the Common List Configuration dialog box, then click on the **[Delete List]** button.

Exiting the Common List Configuration dialog box

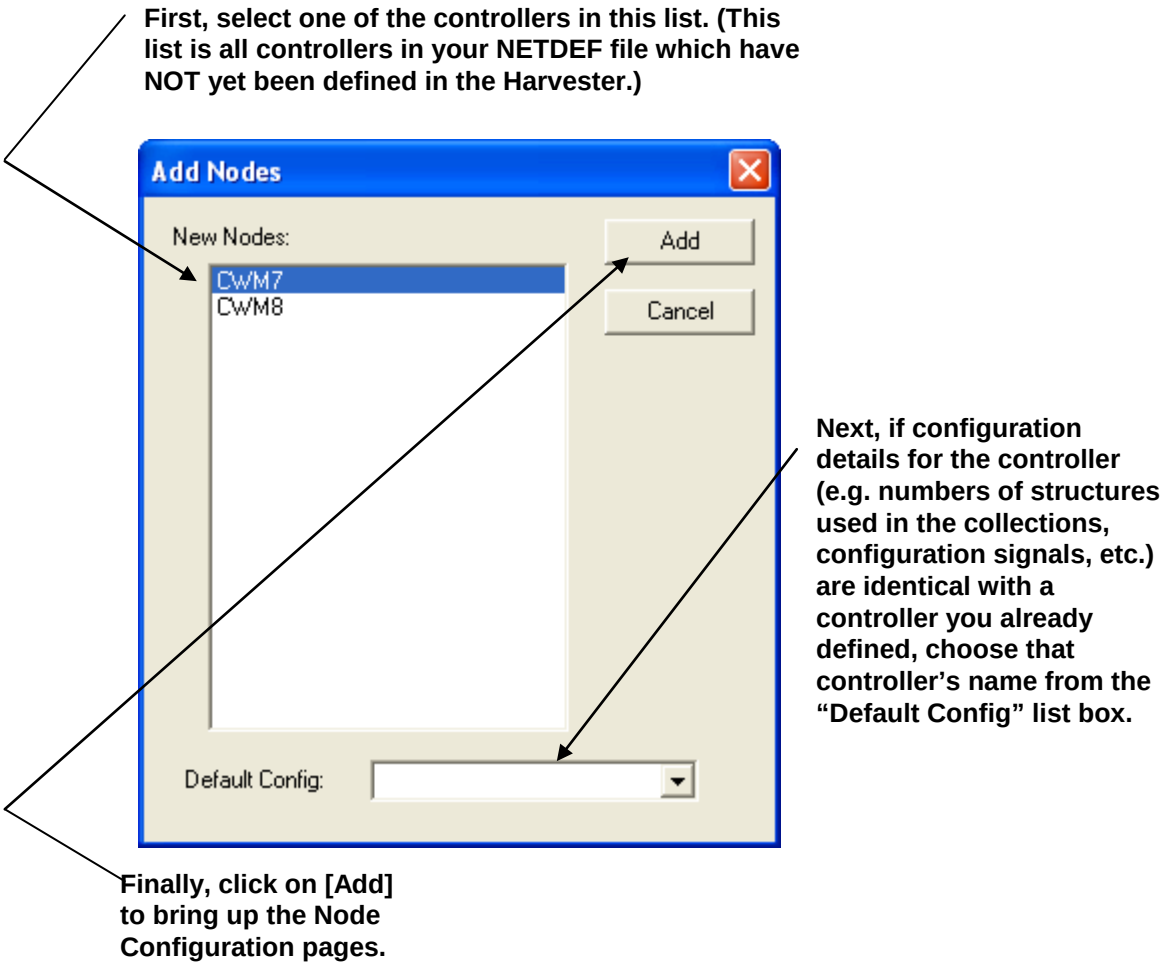
To exit the Common List Configuration dialog box, click on the **[Close]** button.

Adding a Controller and Configuring Collections

Before data can be collected from a controller, it must be added into the list of nodes accessible by the Harvester, and certain configuration entries must be made.

Adding the Controller

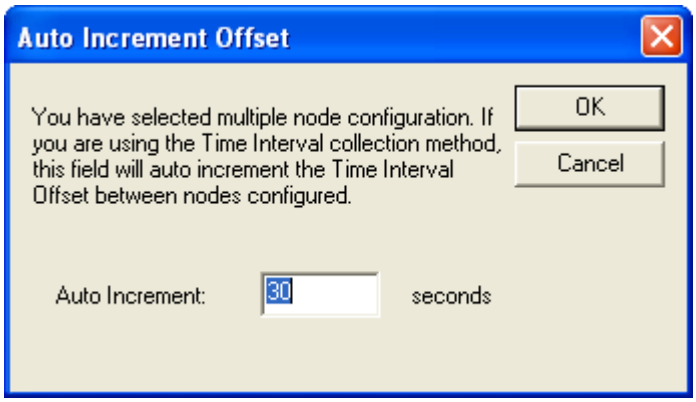
To add a controller, click on the 'New Node' icon, shown above, or click on **File→ New Node** from the menu bar. The Add Nodes dialog box will appear.



- The **"New Nodes"** list box, displays a list of all controllers in your NETDEF database which have NOT yet been configured for use with the Harvester. Select any one of these controllers by clicking on it.

- Optionally, you can add multiple controllers at the same time by holding down the **[Ctrl]** key as you select. This will cause all of the controllers you add to have the same collection configuration parameters (you can alter them individually, after the initial configuration is complete.) When you add multiple controllers via this method, you will prompted to enter an **"Auto Increment"** value (in seconds).

  If your collection method is 'Time Interval', the **"Auto Increment"** is used to space out collections if collections from multiple controllers are scheduled to occur within the same interval. (Otherwise the Harvester would attempt to collect all the collections at the same time, which could cause communication problems.)



  You can adjust the offset for individual nodes, later using the **"Offset in seconds"** parameter described on page 23.

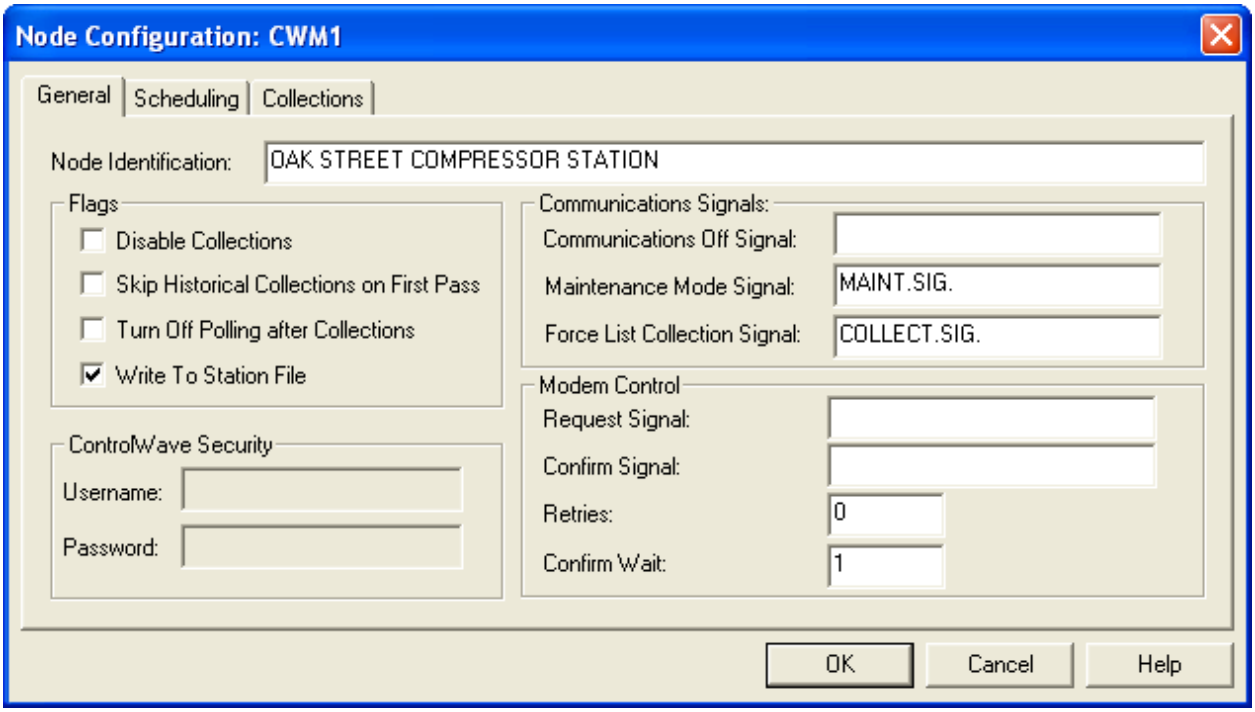
- Optionally, if you have already configured another controller with a similar configuration (for example, it shares the same configuration signal names, and will use the same list, array numbers, etc.) you can select its name from the **"Default Config"** list box. Once you have selected a default configuration, common configuration details will be used for the new controller you are adding.

- Finally, click on the **[Add]** button.

The Node Configuration pages will now appear. These pages allow you to enter various configuration details, to choose how often your Harvester collections will be performed, and to specify the type(s) of data to be collected by the Harvester from this particular controller.

Node Configuration - General Page

The Node Configuration pages appear immediately after you add a new controller.



Node Identification — Enter a textual description of the node. For example, 'OAK STREET COMPRESSOR STATION'. This will appear in the Harvester **"Node Information"** window. Only the first 64 characters you enter will be displayed as the description.

Flags

Disable Collections — When checked, the Harvester will NOT attempt to make any collections from this controller. This would typically be checked if a controller has been temporarily taken out of service for repairs, or if there are communication problems which must be fixed prior to attempting collections.

Skip Historical Collections on First Pass — When checked, the Harvester will NOT attempt to perform an initial array / archive collection on startup. Instead, it will wait for the next calculated interval.

Turn Off Polling after Collections — Normally, if communications with a particular controller are via a dial-up modem or radio, as soon as the Harvester completes its collections, polling would be turned off, and the modem would be

	hung up, because there is no reason to continue requesting data. If this box is NOT checked, however, polling will continue, even after a collection has been completed. This can be useful if the controller has a direct cable connection (i.e. it is always connected.)
Write to Station File	When checked, will automatically update the station file used by the OpenBSI Data File Conversion Utility. If no station file exists, one will be created. NOTE: If there are multiple list, arrays, etc. being collected from this controller, only the first one will be used to update the station file.

Communications Signals

Communications Off Signal	This signal is turned ON by the Harvester to notify the controller that it has finished collecting data for this scan interval. This can trigger user-defined logic which turns OFF the radio.
Maintenance Mode Signal	This signal is set ON by the Harvester as a notification that the radio should not be turned OFF, even if no collections are currently occurring. (This might be done while maintenance or testing is being performed.)
Force List Collection Signal	This signal is set ON by user-defined logic in the program as a notification to the Harvester that the configuration list has changed, somehow, and so it should be recollected by the Harvester. This signal MUST be designated for audit trail collection via the EAudit Module or AUDIT function block.

ControlWave Security

Username	RESERVED FOR FUTURE USE.
Password	RESERVED FOR FUTURE USE.

Modem Control

If the Harvester is collecting data from a slave controller which communicates to its master controller in the network via a dial-up modem, the master must have a pair of logical (boolean) signals for modem control.
The Harvester will turn on the request signal, which should be used as a notification to execute user-defined logic in the master for dialing up the slave node. When this is successfully done, the user-defined logic should set the confirm signal to ON, as a notification to the Harvester that collections from the slave node can proceed. The Harvester will check the confirm signal at a

user-specified interval (see **"Confirm Wait"** and **"Retries"**, below).

Request Signal The Harvester turns on the **"Request Signal"** in the Master node, to activate user-defined logic in the control strategy file, that will initiate a dial-up operation to the Slave node.

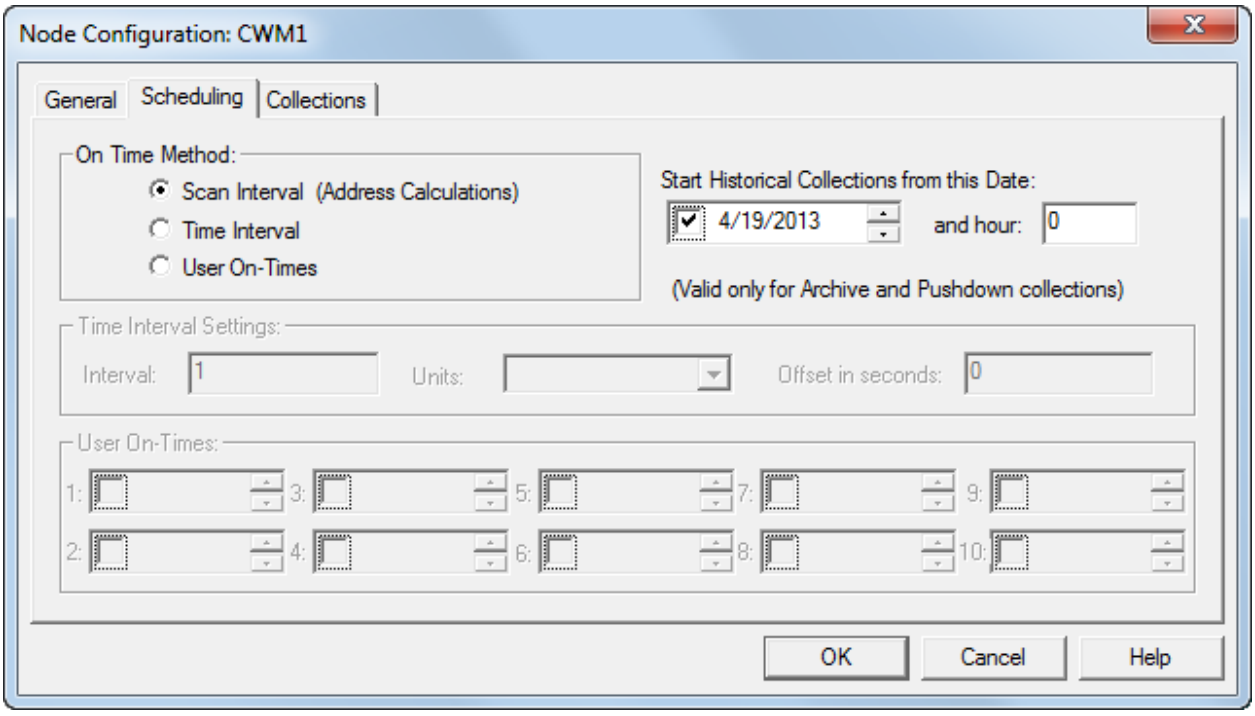
Confirm Signal User-defined logic in the control strategy file must turn this signal on to notify the Harvester that the Slave node has been successfully dialed, and collections can commence.

Retries After setting the **"Request Signal"**, this is the number of times the Harvester will check to see that the **"Confirm Signal"** has been turned ON.

Confirm Wait After setting the **"Request Signal"**, this is the length of time (in seconds) the Harvester will wait before checking to see that the **"Confirm Signal"** has been turned ON. This same period applies to all **"Retries"** as well.

Node Configuration - Scheduling Page

NOTE: If you are using Distributed User On-Times (different from 'User On-Times' shown below) skip the 'Scheduling' page. Distributed User On-Times is discussed later in this manual in the *'Specifying Distributed User On-Times'* section.



On Time Method

Only one On Time Method per controller may be used. There are three possible choices:

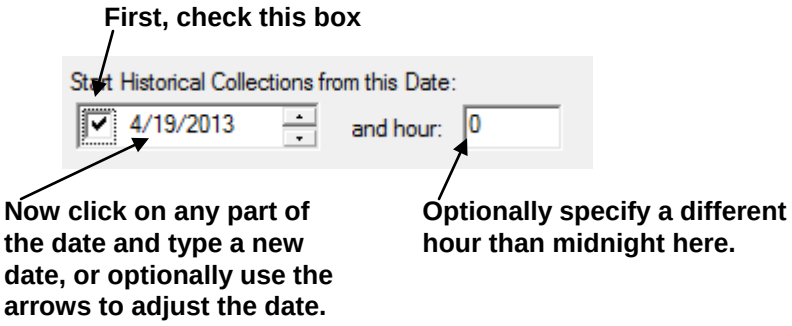
Scan Interval (Address Calculations) — When this is chosen, the Harvester attempts to communicate with a particular node based on its location in the network, as determined by an address calculation.

Time Interval — When this is chosen, the Harvester attempts to communicate with a particular node every time a particular period of time has expired, for example, every hour. See **"Timer Interval Settings"** below.

User On-Times — When this is chosen, the Harvester attempts to communicate with a particular node at up to ten specified times during the day. See the "User On-Times" section, below.

Start Historical Collections from this Date:

If you have several days of pushdown array or archive data stored in the controller, this allows you to specify the first date from this historical data from which you want the collections to begin. Any stored data for dates earlier than this will not be collected. (This applies only to Archive and pushdown arrays.)



To set the date, check the box next to the date, then select one of the date fields, and either enter new numbers for the date, or use the up-down controls on the right to adjust the date as desired.

and hour

If you want to specify that this historical data that you collect doesn't start at the default of midnight (0) you can specify a different hour here (in 24 hour format 0-23). (Requires OpenBSI 5.9 or newer)

Time Interval Settings

Interval

Together with the **"Units"** this defines the period of time between collections. For example, if the **"Interval"** is set to 1, and **"Units"** is set to 'hours', then collections will occur every hour.

Units

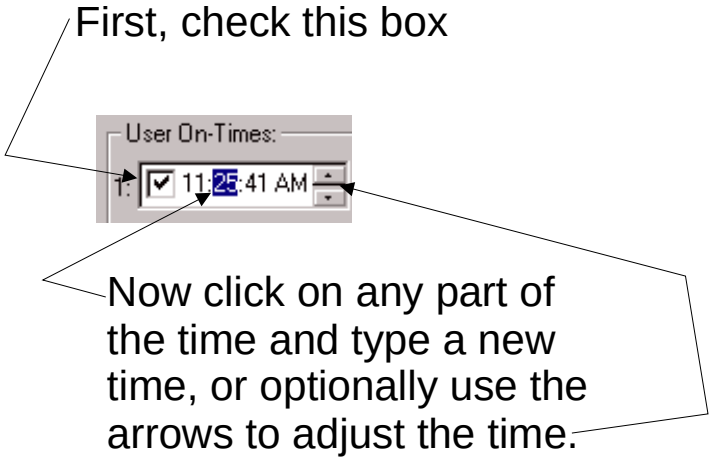
This defines the units of the interval. The possible choices are 'minutes', 'hours' or 'days'.

Offset in seconds

This specifies a period of time in seconds (measured from the beginning of the interval) that the Harvester will wait before beginning its collection. This is often necessary if arrays or archives are being updated in the controller every hour, and it is necessary to wait this number of seconds for the array / archive manipulation to be completed. If left at 0, the collection will begin at the very start of the interval. The offset can also be used to space out collections, if several collections from multiple controllers are scheduled to occur within the same interval.

User On-Times

If User On-Times is selected as the On-Time Method, up to 10 different times during the day can be specified as times at which the Harvester should collect data from this controller. Use the **"User On-Times"** boxes, shown, to specify a time for collection.



NOTE: If you have a large number of controllers, and do not want to manually enter on times for each one, you can use an alternate method called Distributed User On-Times. This is discussed later in this manual in the *'Specifying Distributed User On-Times'* section.

Reducing Communication Message Traffic (OpenBSI 5.8 Service Pack 1 and newer only):

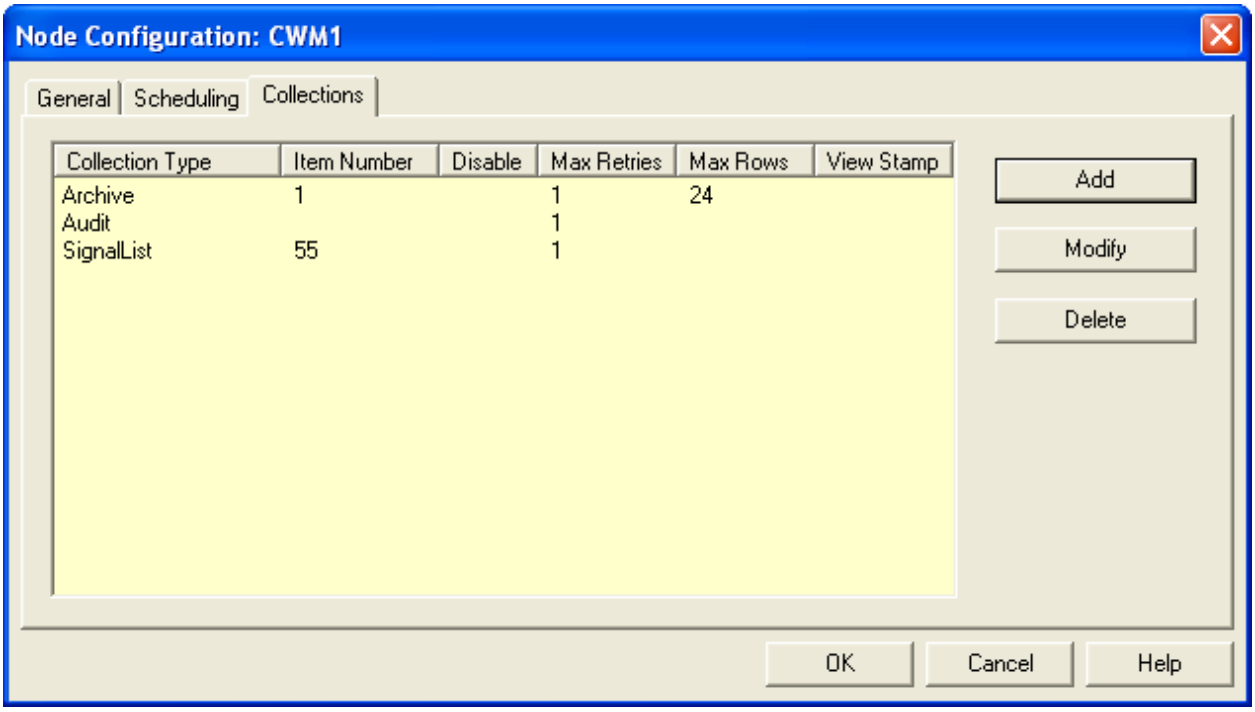
By default, Harvester collects column header information each collection pass. To prevent this re-collection of column header data and thereby reduce the number of communication messages per collection, you can use the Advanced Configuration tool to turn off re-collection of column header information. This option can reduce communication costs if your communication link is expensive, for example a satellite link.

To do this:

1. First start the Advanced Configuration tool by clicking **OpenBSI Tools > Common Tools > Advanced Configuration**.
2. Then on the Harvester tab of the OpenBSI INI Configuration Settings dialog box, check the **"Do Not collect Column Header Information on Archive Collections"** and click **"OK".** Harvester will not collect column header information on subsequent collections.

Node Configuration - Collections Page

The Collections page lists all currently configured collections for this controller, and also allows you to configure additional collections



Adding a new Collection for this Controller

To add a collection, click on the **[Add]** button, then configure the collection in the Collection Configuration dialog box. (See *'Using the Collection Configuration Dialog Box'*).

Modifying an existing Collection

To modify an existing collection, click on the line for that collection in the list of collections window, then click on the **[Modify]** button to call up the Collection Configuration dialog box. (See *'Using the Collection Configuration Dialog Box'*).

Deleting an existing collection

To delete an existing collection, click on the line for that collection in the list of collections window, then click on the **[Delete]** button.

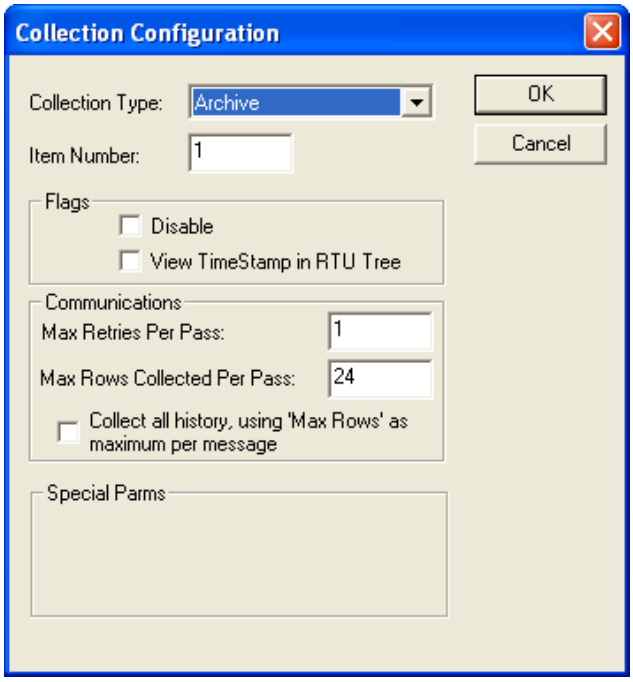
Using the Collection Configuration Dialog Box

The Collection Configuration dialog box is accessible by clicking on the **[Add]** button from the Node Configuration - Collections page. If you select an existing collection on that page, you can call it up by clicking on the **[Modify]** button.

The fields visible in the Collection Configuration dialog box vary depending upon your choice of **"Collection Type"**. The available choices are: Archive, Audit, Pushdown Array, Raw Array, Signal List, Wrap Array, Wrap Multiple Array. Each choice will be explained in a separate section, below.

Defining / Modifying an Archive Collection:

Complete the fields as described, below, then click on **[OK]**:



Collection Type — This must be set to 'Archive'.

Item Number — Enter the Archive File Number here.

Network 3000 users: The Archive File must have been defined in ACCOL Workbench. The Archive File Number must match the value on the ARCHIVE terminal of the ARC_STORE module.

ControlWave users: The Archive File must have been

defined using either the Flash Configuration Utility or the Archive web page. The Archive File Number must match the value on the iiArchiveNumber parameter in the ARCHIVE function block.

Flags

Disable — When checked, will stop this collection from occurring.

View TimeStamp in RTU Tree — When checked, will display the most recently collected timestamp (**"Last Timestamp"**) from this controller, in the tree of nodes on the left hand side of the main Harvester window. NOTE: Even if there are multiple collections for a controller, only one collection timestamp will be displayed.

Communications

Max Retries Per Pass — This specifies the total number of attempts the Harvester will make to collect data from this controller on a given collection pass. A retry occurs if there is a communication timeout.

Max Rows Collected Per Pass — This specifies the maximum number of Archive Records (rows) which the Harvester will attempt to collect from the controller on a given collection pass.

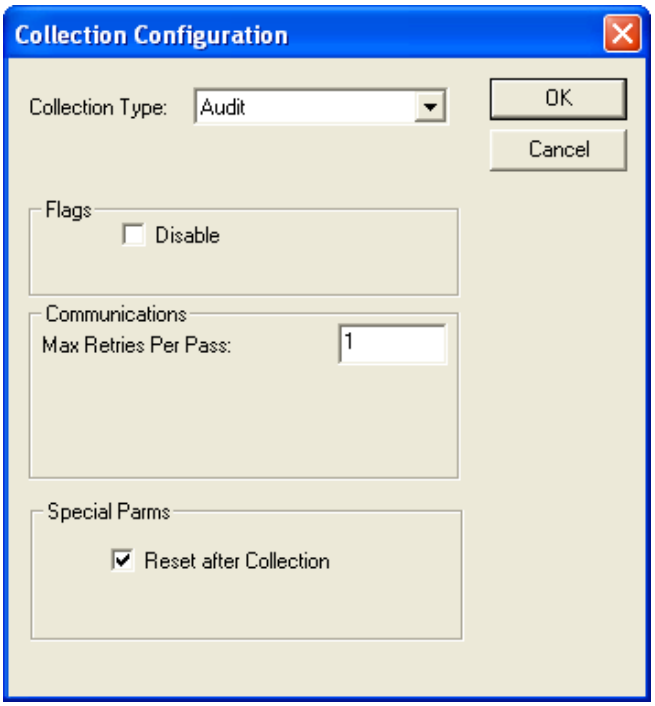
Collect all history using 'Max Rows' as maximum per message — If your system is having communication problems, outside of OpenBSI, you may want to use this option. This specifies that the Harvester should attempt to collect the maximum number of Archive Records (as specified by the parameter above) but it will do it using shorter messages. (OpenBSI 5.4 and newer.)

NOTE: When using the Harvester to collect Archive Files in a BSAP network, the archive records to be displayed must be 220 bytes or less. A total of 4 bytes of the 220 are already used to display the timestamp, plus 2 bytes are used for the local sequence number, and 2 bytes are used for the global sequence number. This leaves 212 bytes for other columns of data. This could include up to 53 columns of floating point data.

Type of Data	Number of bytes required
Timestamp	4
Local Sequence Number	2
Global Sequence Number	2
Analog Floating Point value	4
Logical / BOOL value	1

Defining / Modifying an Audit Collection:

Complete the fields as described, below, then click on **[OK]**:



Usage Notes:

If Harvester users select a **[Demand Coll]** collection, all audit records which the Harvester has not already collected, will be brought back. If audit records have already been collected and still exist at the RTU, they will not be collected again.

If the **[Init Collection]** button has been pressed, prior to a **[Demand Coll]** collection, all audit records available at the RTU will be brought back, whether or not they have been collected previously.[1]

Collection Type — This must be set to 'Audit'.

Flags

Disable — When checked, will stop this collection from occurring.

Communications

Max Retries Per Pass — This specifies the total number of attempts the Harvester will make to collect data from this controller on a given collection pass. A retry occurs if there is a communication timeout.

Special Parms

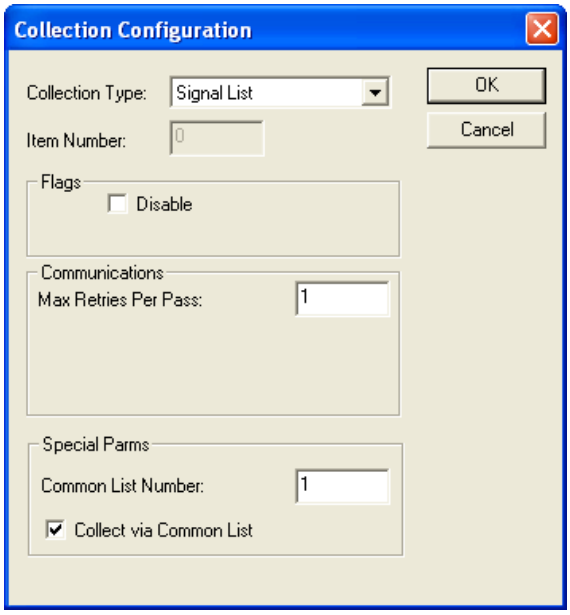
Reset after Collection — If checked, once audit records have been collected by the Harvester, they will be deleted from the controller.

[1] *Prior to OpenBSI 5.6 Service Pack 1, Harvester would collect all available audit records, whether or not they had been collected earlier, unless the audit buffer had been reset, using the* ***"Reset after Collection"*** *option, to delete records already collected.*

Defining / Modifying a Signal List Collection:

Complete the fields as described, below, then click on **[OK]**:

NOTE: Signal lists collected via the Harvester cannot have more than 1000 signals.



Collection Type This must be set to 'Signal List'.

Item Number This is the number of the signal list.

Flags

Disable When checked, will stop this collection from occurring.

Communications

Max Retries Per Pass This specifies the total number of attempts the Harvester will make to collect data from this controller on a given collection pass. A retry occurs if there is a communication timeout.

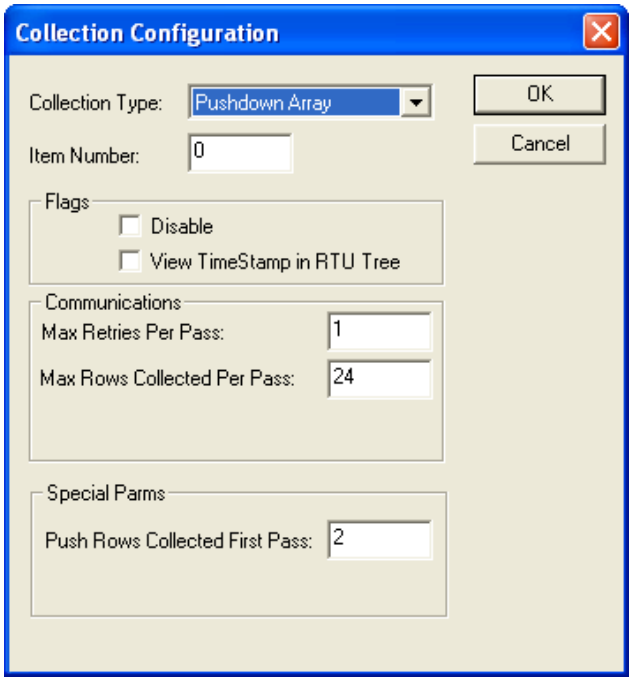
Special Parms
Common List Number If you have more than one controller which uses the same set of signal names, and you want to be able to collect those signals via the Harvester, you can optionally define a common list. This allows you to define the list of signals in one place (the Harvester) and then enter that list number here. This avoids the need of having a dedicated list of those signals in each controller, and also allows on-line changes to the common list without editing the control strategy in the controller. See *'Defining Common Lists'* earlier in this manual.

Collect via Common List When selected, specifies that the common list, specified above, will be collected, using signal names specified in the common list.

Defining / Modifying a Pushdown Array Collection:

For an explanation of what a Pushdown Array is, please see the *'Configuring Your Controller'* section.

Complete the fields as described, below, then click on **[OK]**:



Collection Type — This must be set to 'Pushdown Array'.

Item Number — This is the number of the array.

Flags

Disable — When checked, will stop this collection from occurring.

View TimeStamp in RTU Tree — When checked, will display the most recently collected timestamp (**"Last Timestamp"**) from this controller, in the tree of nodes on the left hand side of the main Harvester window. NOTE: Even if there are multiple collections for a controller, only one collection timestamp will be displayed.

Communications

Max Retries Per Pass — This specifies the total number of attempts the Harvester will make to collect data from this controller on a given collection pass. A retry occurs if there is a communication timeout.

Max Rows Collected Per Pass — This specifies the maximum number of array rows which the Harvester will attempt to collect from the controller on a given collection pass.

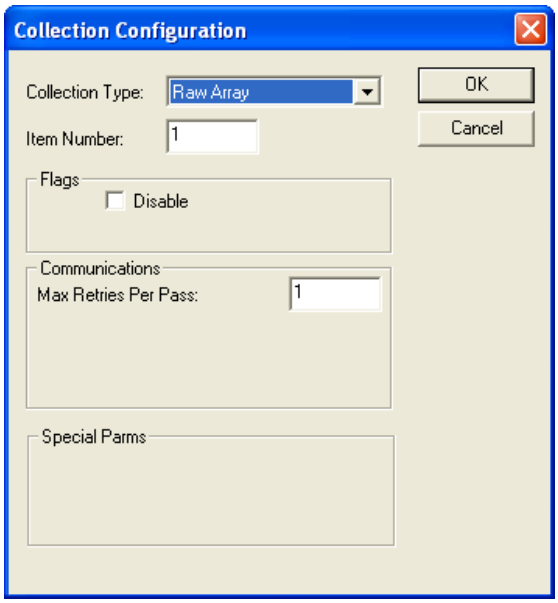
Special Parms

Push Rows Collected First Pass — This is the number of array rows to collect during the first collection pass. This should be set to match the number of rows of data generated within the controller, that need to be collected on a given collection pass.

Defining / Modifying a Raw Array Collection:

For an explanation of what a Raw Array is, please see the *'Configuring Your Controller'* section.

Complete the fields as described, below, then click on **[OK]**:



Collection Type — This must be set to 'Raw Array'.

Item Number — This is the number of the array.

Flags

Disable — When checked, will stop this collection from occurring.

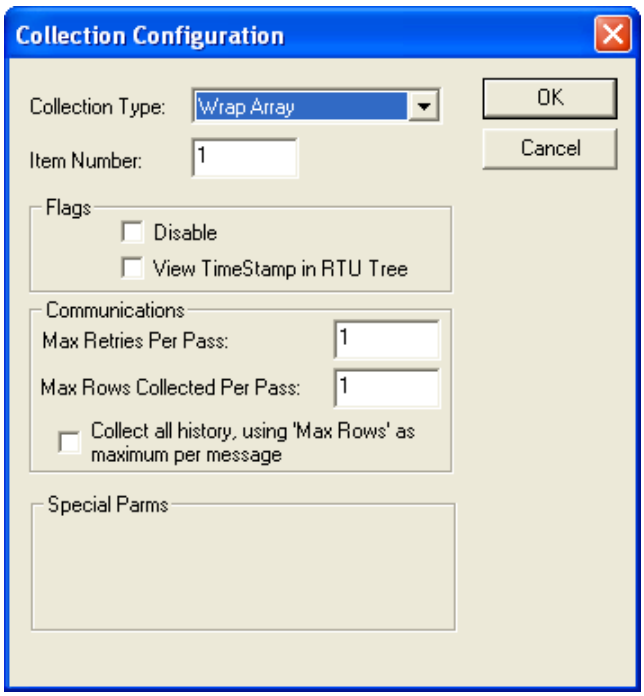
Communications

Max Retries Per Pass — This specifies the total number of attempts the Harvester will make to collect data from this controller on a given collection pass. A retry occurs if there is a communication timeout.

Defining / Modifying a Wrap Array Collection:

For an explanation of what a Wrap Array is, please see the *'Configuring Your Controller'* section.

Complete the fields as described, below, then click on **[OK]**:



Collection Type — This must be set to 'Wrap Array'.

Item Number — This is the number of the array.

Flags

Disable — When checked, will stop this collection from occurring.

View TimeStamp in RTU Tree — When checked, will display the most recently collected timestamp (**"Last Timestamp"**) from this controller, in the tree of nodes on the left hand side of the main Harvester window. NOTE: Even if there are multiple collections for a controller, only one collection timestamp will be displayed.

Communications

Max Retries Per Pass — This specifies the total number of attempts the Harvester will make to collect data from this controller on a given collection pass. A retry occurs if there is a communication timeout.

Max Rows Collected Per Pass — This specifies the maximum number of array rows which the Harvester will attempt to collect from the controller on a given collection pass.

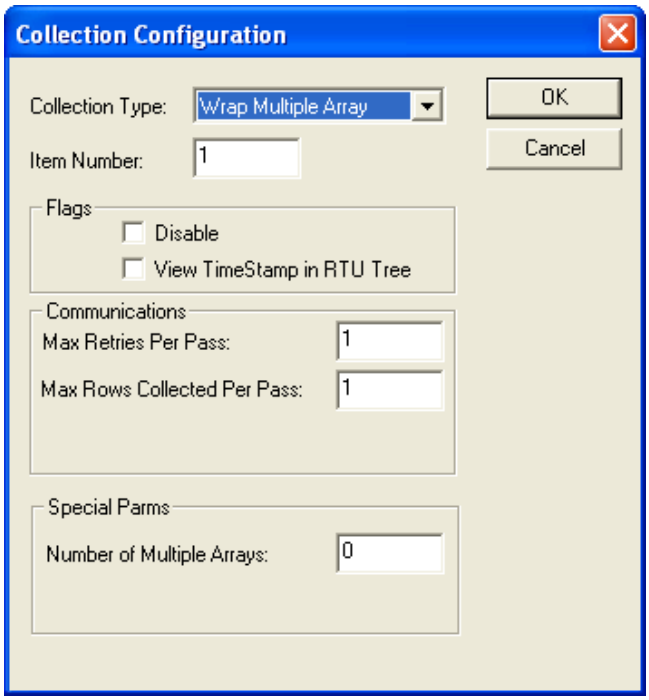
Collect all history using 'Max Rows' as maximum per message

If your system is having communication problems, outside of OpenBSI, you may want to use this option. This specifies that the Harvester should attempt to collect the maximum number of Archive Records (as specified by the parameter above) but it will do it using shorter messages. (OpenBSI 5.4 and newer.)

Defining / Modifying a Wrap Multiple Array Collection:

For an explanation of what a Wrap Multiple Array is, please see the *'Configuring Your Controller'* section.

Complete the fields as described, below, then click on **[OK]**:



Collection Type

This must be set to 'Wrap Multiple Array'.

Item Number

This is the number of the first array in the group of multiple arrays to be collected. All arrays in the group must be consecutively numbered from this first array number.

Flags

Disable

When checked, will stop this collection from occurring.

View TimeStamp in RTU Tree

When checked, will display the most recently collected timestamp (**"Last Timestamp"**) from this controller, in the tree of nodes on the left hand side of the main Harvester window. NOTE: Even if there are multiple collections for a controller, only one collection timestamp will be displayed.

Communications

Max Retries Per Pass This specifies the total number of attempts the Harvester will make to collect data from this controller on a given collection pass. A retry occurs if there is a communication timeout.

Max Rows Collected Per Pass This specifies the maximum number of array rows which the Harvester will attempt to collect from the controller on a given collection pass.

Special Parms

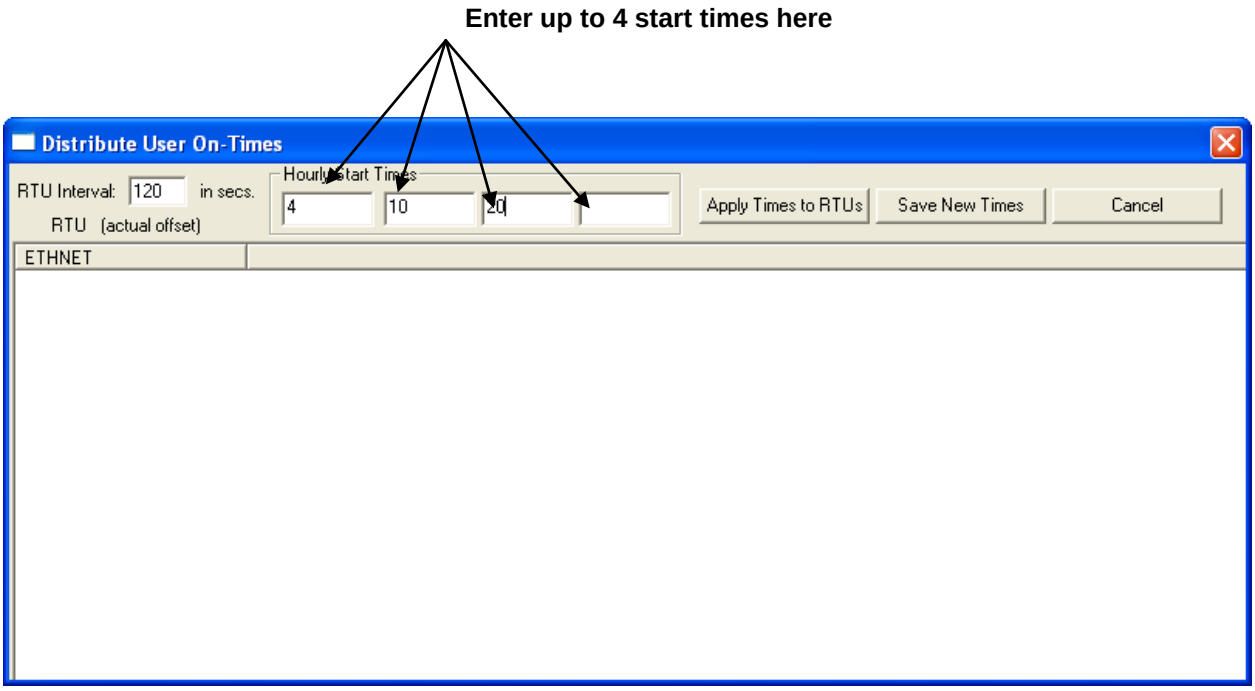
Number of Multiple Arrays This is the total number of arrays to be collected.

Specifying Distributed User On-Times (OpenBSI 5.0 and newer)

The Harvester can be configured to collect data from an RTU at a pre-defined set of times during the day. In systems with a very large number of RTUs, however, it may be tedious for the user to specify on-times for each RTU. In this case, the user can opt to use distributed user on-times.

The user specifies a base set of up to four on-times, and an interval (in seconds) between RTU collections on the same communication port. The Harvester will automatically calculate, from the base time, and the interval, offsets at which collections should occur for each RTU on a given communication port.

To specify user configured on-times, choose **Edit → Distribute User On-Times**



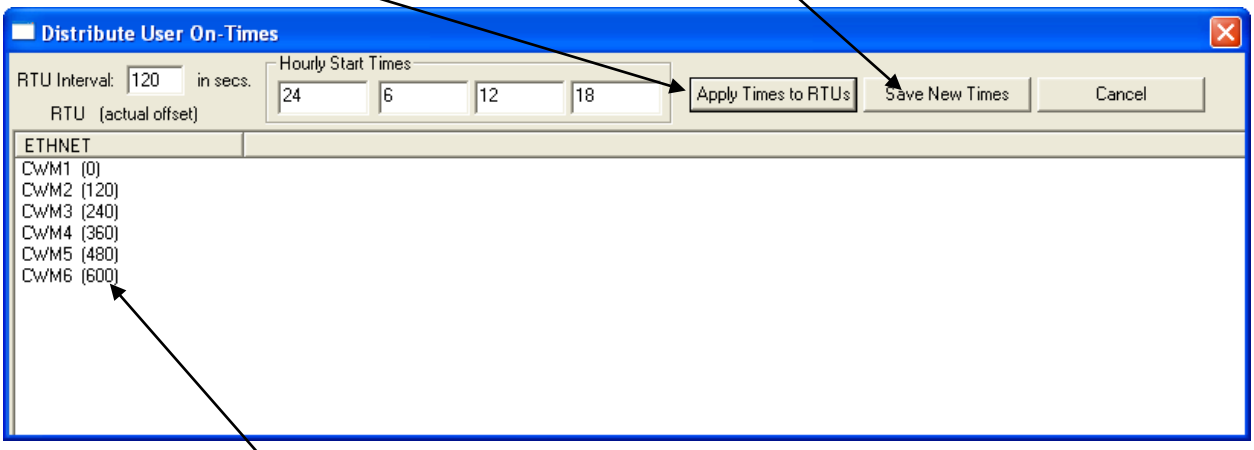
RTU Interval — This is the period of time (in seconds) to wait, after starting collection from one RTU, before beginning a collection from the next RTU on this same communication port. For example, if you want collections to RTUs on a port one minute apart, enter 60 here.

Hourly Start Times — These are the hours in which collections should be started, entered in 24 hour format (1=1AM, 24=12 midnight) For example, to start collections at midnight, 6AM, 12 noon, and 6PM, enter 24, 6, 12, and 18. Up to four hourly start times can be specified. NOTE: Actual collections for a given RTU occur at offsets from these start times, as calculated by the **"RTU Interval"**. Entering 0 for an hour disables that particular user on-time.

[Apply Times to RTUs] This loads the Harvester Database collection schedule, and calculates, for each RTU on a given PC communication port, at which offsets from the start times, collections should occur.

Click on [Apply Times to RTUs] to bring in the existing Harvester database and calculate collection times, which the Harvester displays on the screen.

Finally, click on [Save New Times] to store the newly defined times for collection in the database.



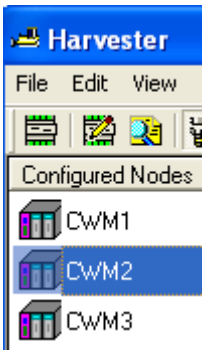
Each column displays collections the Harvester makes through a particular communication port on the PC. Each RTU name is displayed, followed by a calculated offset from the beginning of the start time hour, at which a collection should occur. The offsets are based on the "RTU Interval" value.

*NOTE: The new collection offsets are only displayed on the screen. They must be stored in the Harvester database, using the **[Save New Times]** button.*

[Save New Times] This stores the newly defined collection schedule in the database. You must do this before exiting, or the new schedule will not be used.

[Cancel] Exits the dialog box.

 Modifying the Configuration for a Controller



Once you have added a controller, and configured collections for it in the Node Configuration pages, you can recall those pages to modify the configuration by three different methods:

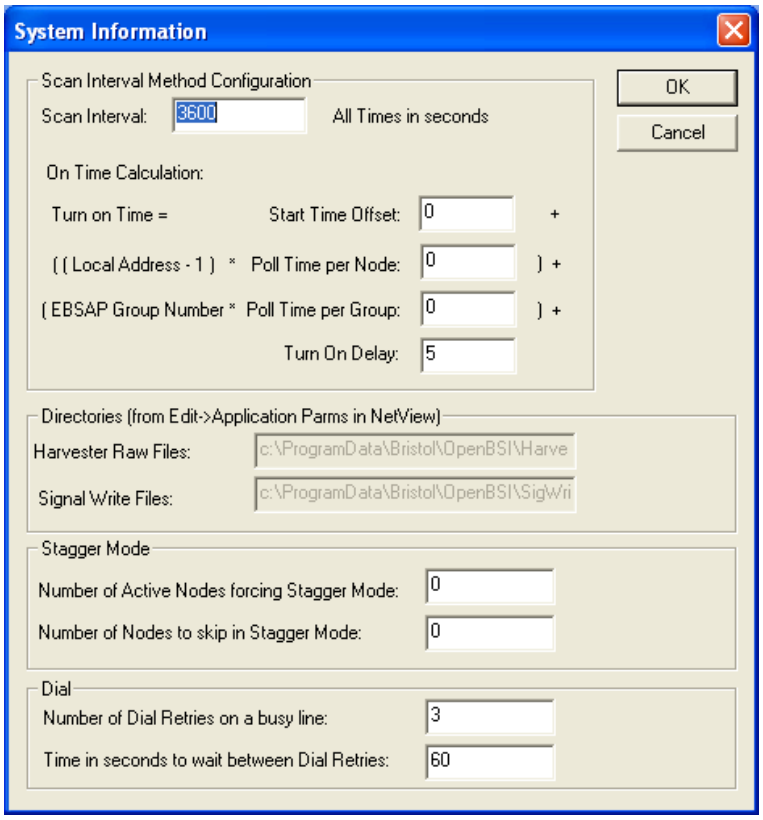
- Double-click on the controller's icon in the tree on the left hand side of the Harvester main page *or*
- Click once on the controller's icon (to highlight it) then click on the Edit Node icon, shown above *or*
- Click once on the controller's icon (to highlight it) then click on **Edit → Node Configuration** from the menu bar.

Deleting a Controller

To delete a controller from the list of configured nodes, click on the controller's icon, then click on **File→ Delete Node**. You will be prompted to confirm the deletion.

Defining System Information

To call up the System Information dialog box, either click on the icon, shown above, or click on **Edit→ System Information** from the menu bar.



The System Information dialog box allows you to specify several things:

- Where the Harvester will store the data files generated from its data collections.
- Where the Harvester will look for Write List Files and Write Signal Files.
- What the configuration parameters are if you choose the scan interval as the On Time Method. (See **"Scan Interval (Address Calculations)"** choice on the Node Configuration - Scheduling page.)

Scan Interval Method Configuration:

Scan Interval

This value defines the period of time (in seconds) over which the Harvester will attempt to collect data from each and every node in the network. Typically, this would be set to 3,600 seconds to indicate that collections occur hourly, however the value can range from 600 to 172,800 seconds, and should be set large enough to accommodate collection of data from all of the nodes under normal operating conditions. The initial scan interval is measured from 00:00:00 (midnight) of the current day, therefore it is recommended that the scan interval be chosen so as to divide a 24 hour period into equal parts (without remaining time left over).

Start Time Offset

This value defines the offset into the scan interval, at which the polling should start. If, for example, the scan interval is 3,600 seconds (1 hour), and the start time offset is 60 seconds, no polling will start until after the first minute of the hour has expired. The Start time offset can range from 0 to 3600 seconds.

Poll Time per Node

This value defines the amount of time required to poll a single node for data, under normal operating conditions.

Poll Time per Group

This value defines the amount of time from the start time for polling nodes from one expanded addressing group, before the Harvester will attempt to start polling nodes from the next expanded node addressing group. See the ACCOL II Reference Manual (document# D4044) for details on expanded node addressing. This value can range from 0 to 3600 seconds.

Turn On Delay

This is a delay (in seconds) which is added to the calculated 'ON' time, which must expire before the actual collection begins. This value can range from 0 to 3600 seconds. See the calculation on page 13 for details.

Harvester Directories:

Raw File Storage Directory

This entry defines the DOS drive and directory (file path) where array, archive, audit trail, and list files will be stored. You can type the path in directly, or use the **[Browse]** button to locate it.

Write File Directory

This entry defines the DOS drive and directory (file path) where the Harvester will look for Write List (*.WLS) files and Write Signal (*.WSG) files. (These files are discussed, in detail, in Appendix A.) You can type the path in directly, or use the **[Browse]** button to locate it.

Stagger Mode:

Number of Active Nodes forcing Stagger Mode

The OpenBSI Harvester will automatically enter stagger mode if the number of nodes, which the Harvester is currently attempting to communicate with, is greater than or equal to **"Number of Active Nodes forcing Stagger Mode"**.

Number of Nodes to skip in Stagger Mode

If, the number of nodes the Harvester is actively trying to collect data from exceeds a user-defined number, it is said to be in an 'over-run' condition, and so will enter stagger mode. In stagger mode, the Harvester will only attempt to collect the full amount of new data from a portion of all of the nodes during any scan interval. For each node which the Harvester collects from it will skip a full collection from **"Number of Nodes to skip in Stagger Mode"** nodes. For example, if **"Number of Nodes to skip in Stagger Mode"** is set to 5, the Harvester will collect the full amount of data from one node, skip full collections from the next 5 nodes, then collect the full amount of data from another node, then skip another 5 nodes, etc. In other words, the full amount of data is only collected from every 6^{th} node. On the next

scan interval, the Harvester will collect the full amount of data from a different set of nodes (again, skipping 5 nodes for each node collected) and so on. This effectively staggers collections over **"Number of Nodes to skip in Stagger Mode"** + 1 scan intervals. When, and if, the Harvester'catches up' and has collected all data not collected on previous passes, it will return to its normal collection method, as defined by the scan interval. Setting **"Number of Nodes to skip in Stagger Mode"** to 0 effectively prevents the use of stagger mode.

Dial:

Number of Dial Retries on a busy line — If when attempting to dial, a busy signal is encountered, this is the number of dial retry attempts which will be made.

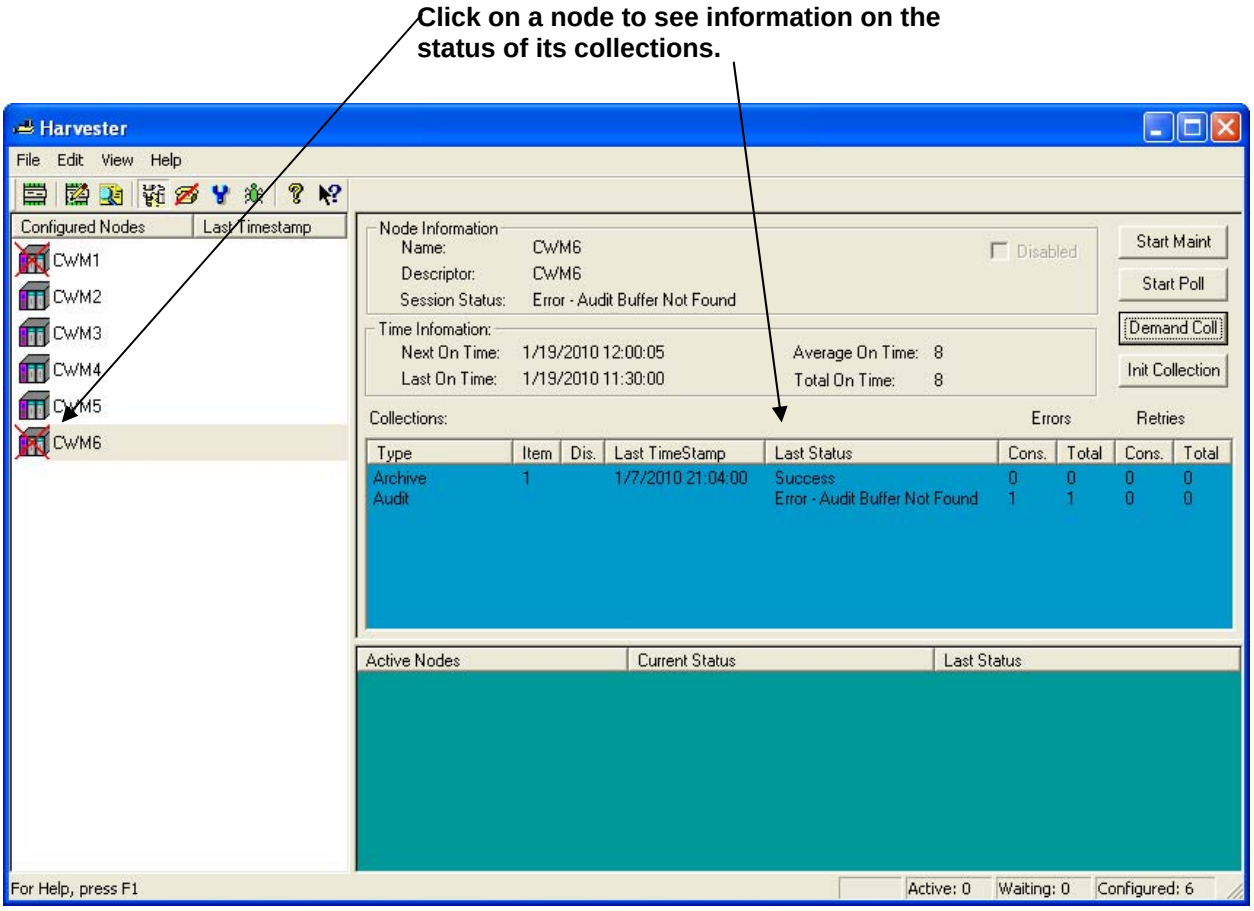
Time in seconds to wait between Dial Retries — This is the length of time (in seconds) between dial retry attempts.

DIALING APPLICATION NOTE

If you have multiple controllers multi-dropped on the same dial-up line, once OpenBSI has successfully connected to the first node, you can configure it to also continue to poll, in sequence, all other nodes on that same dial-up line. To do this, you must set the SpecialDial parameter in the BSBSAP.INI initialization file to 1.

Monitoring the Status of Your Collections

The right hand side of the Harvester main window displays information about the status of collections. Simply click on a node's icon (in the tree on the left) and its corresponding collection status information will appear in the right window pane.



Node Information

Name The controller's node name, as defined in the NETDEF files.

Descriptor A textual description of the controller. (This comes from the **"Node Identification"** field on the Node Configuration - General page.)

Session Status 'Success' indicates collections are occuring without errors. If an error message appears, it usually indicates some sort of communication or

	configuration problem. NOTE: This status is only for the current Harvester session, it does NOT report the status of the previous Harvester session.
Disabled	Will appear checked, if collections have been disabled.

Time Information

Next On Time	This is the *next* time that the Harvester will attempt to collect any data from this controller.
Last On Time	This is the *last* time that the Harvester attempted to collect any data from this controller.
Average On Time	This is the average time (in seconds) that the Harvester requires to collect all necessary data from this controller.
Total On Time	This is a running total of the amount of time (in seconds) that the Harvester has been in communication with this node during all collection passes since the last time the **[Init Collection]** button was pressed.

Collections

Type	This indicates the kind of data being collected. There are seven collection types: 'Archive', 'Audit', 'List', 'Raw', 'Wrap' 'Push' and 'MWrap'. The last four refer to different types of array collection.
Item	This is the number of the structure being collected, i.e. the array number, the archive number, or the signal list number. If multiple arrays are collected, this would be the number of the first array in the group of consecutively numbered arrays. This field does not apply to Audit.
Dis.	Indicates whether or not this collection has been disabled.
Last Timestamp	During the last collection, of this type of data, this was the timestamp collected.
Last Status	During the last collection, of this type of data, this was the status of the collection. 'Success' indicates the collection occurred without errors. Any other message indicates an error.
Errors - Cons.	The total number of *consecutive* errors received during this type of collection.
Errors - Total	The total number of errors received during this type of collection.

Retries - Cons. The total number of *consecutive* communication retries made during this type of collection.

Retries - Total The total number of communication retries made during this type of collection.

Controllers with Collection Errors

If, as the Harvester attempts to collect data from a particular controller, an error occurs, the icon for that controller will be surrounded by an red box, indicating that there are errors with the most recent collection. Typically, collection errors relate to communication problems, or invalid configuration of the structures (arrays, archive, etc.) in the controller.

NOTE:

If the Harvester is currently collecting data from a particular controller, and a communication failure occurs prior to the collection being completed, Harvester will store whatever partial valid data it was able to collect.

Viewing / Hiding the Tool Bar

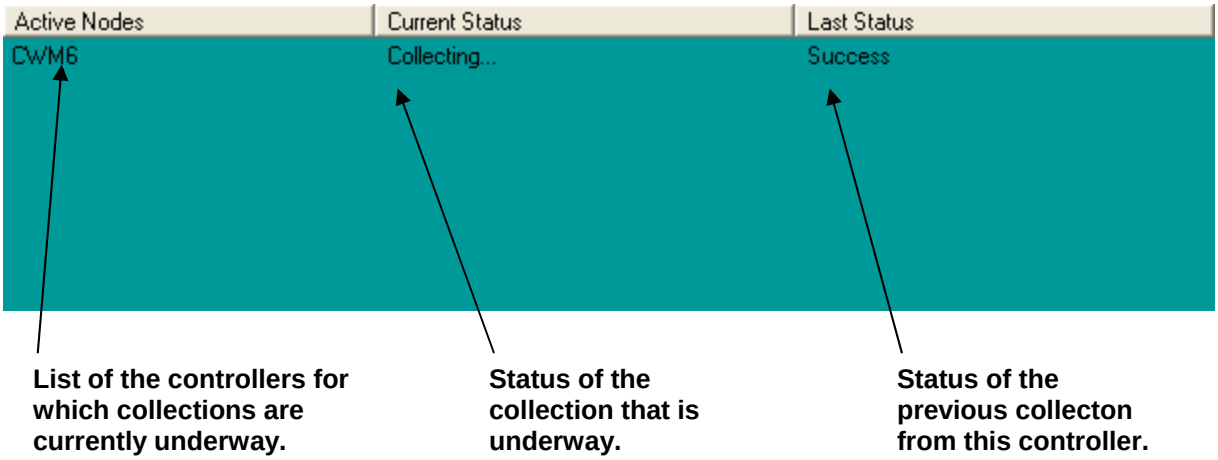
If desired, you can remove the Tool Bar from the screen by clicking on **View→Toolbar**. To restore the Tool Bar, repeat the same command.

Viewing / Hiding the Status Bar

If desired, you can remove the Status Bar from the screen by clicking on **View→Status bar**. To restore the Status Bar, repeat the same command.

Viewing a List of the Controllers in which a Collection is Occurring Right Now

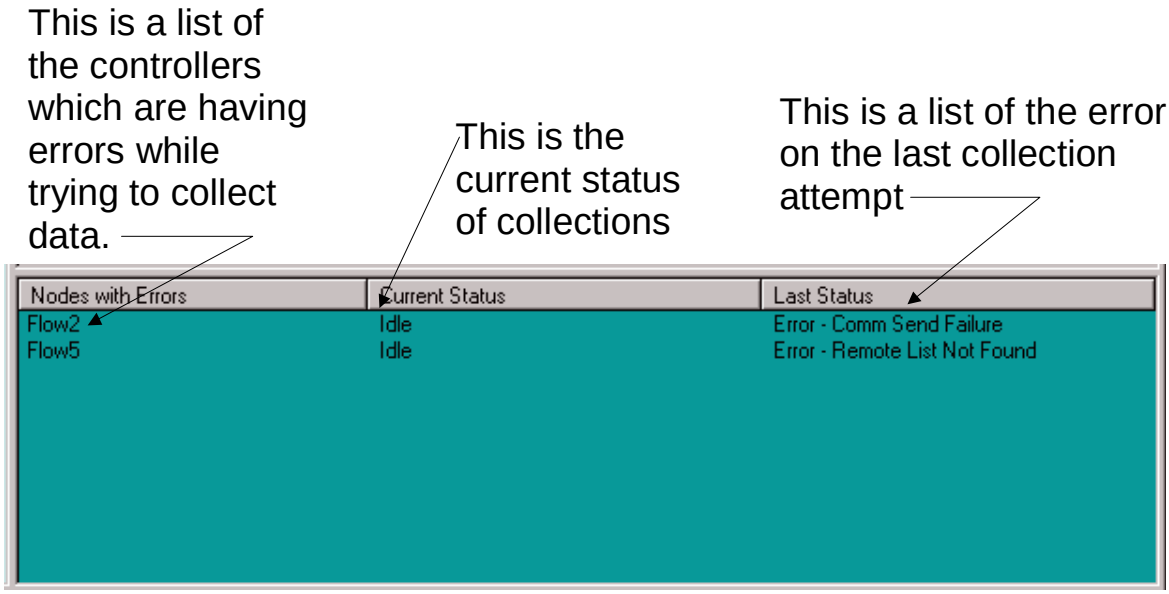
To view a list of the controllers to which a collection is underway, at this moment, click on the 'Active Nodes' icon, shown above, or click on **View→Active Collections**.



If desired, you can stop the collection underway, by right clicking on the node name, and choosing **"Stop Collections"** from the pop-up menu.

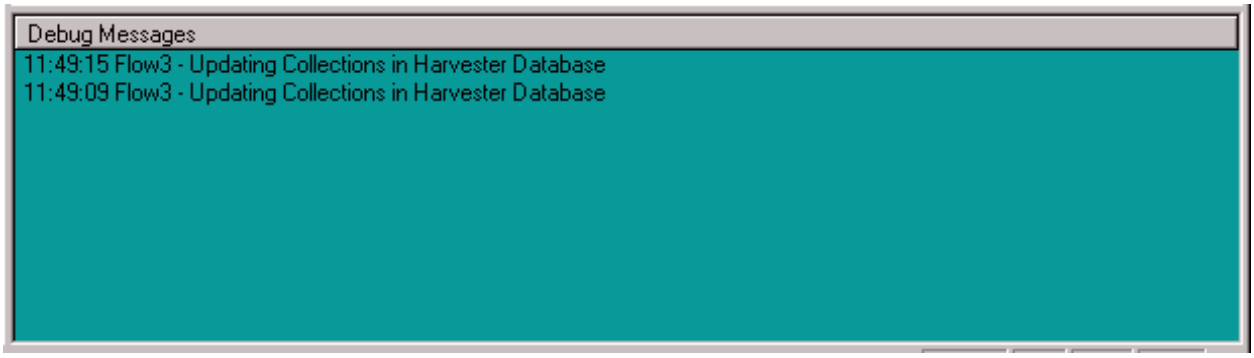
Viewing a List of Controllers which are experiencing Communication Errors or other Failures

To view a list of the controllers which are experiencing communication errors or other errors on one or more of their last scheduled collections, click on the 'Node Errors' icon, or click on **View → Collection Errors**.



Viewing a list of Debugging Messages

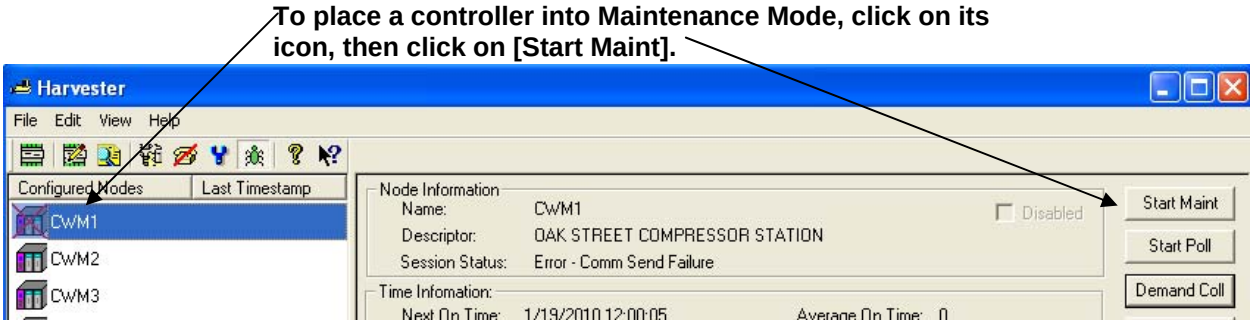
The Harvester reports various debugging messages which relate to how collections are occurring, and what errors are encountered. These messages are primarily for use by Bristol development and support personnel, however, they may be viewed by clicking on the 'Debug Msgs' icon, shown above, or by clicking on **View→ Debug Messages**. NOTE: Only debugging errors related to the currently selected controller will be displayed.



Placing a controller into Maintenance Mode

Maintenance Mode is a mode of operation in which communications with a controller (via radio, etc.) are kept running, even when no collections are occurring. This may be useful during maintenance or testing, or if other programs need access to the controller (e.g. DataView or an HMI package) even though the Harvester is between collections.

To place a controller into Maintenance Mode, click on the icon for it, then click on the **[Start Maint]** button.

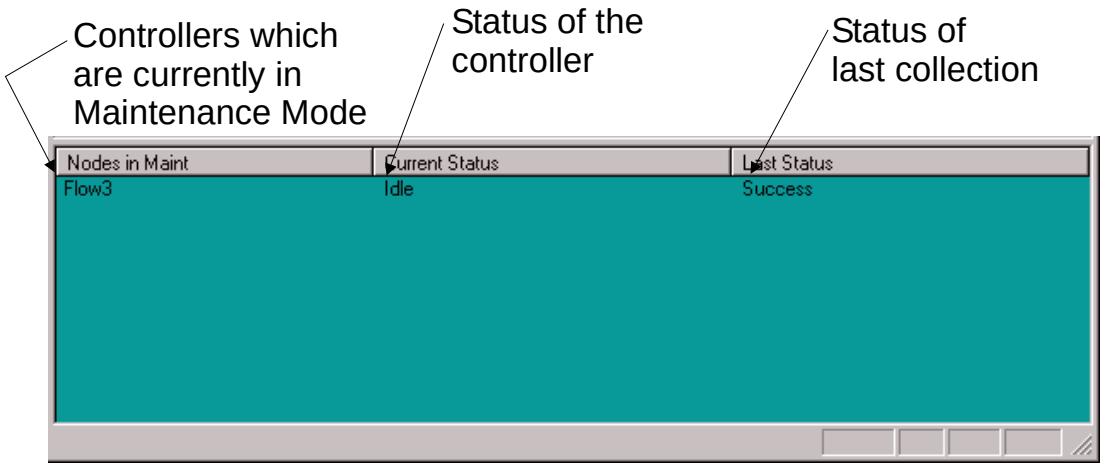


The Harvester will then send a message to turn ON the Maintenance Mode signal inside the controller. (This signal triggers user defined logic in the control strategy which leaves communications active.)

Once Maintenance Mode has been successfully activated, the icon for the controller placed into maintenance will be displayed with a yellow “M” over it, and the controller will be added to the list of controllers in Maintenance Mode.

Viewing the List of Controllers Currently in Maintenance Mode

To view a list of the controllers currently in Maintenance Mode, click on the 'Maint. Mode' icon, shown above, or click on **View→Maintenance Mode**.



Taking a Controller Out of Maintenance Mode

To remove a controller from Maintenance Mode, click on the icon for it, then click on the **[Stop Maint.]** button.

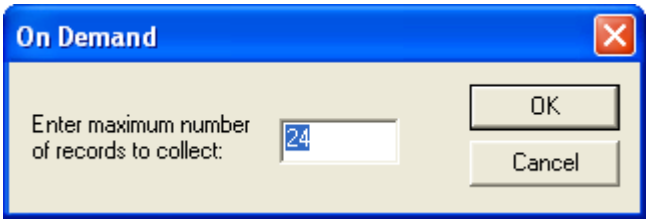
Turning on Polling for a Particular Controller

Polling is a term referring to a request for data sent by the OpenBSI communications system to the controller network. Normally, polling from a particular controller would only be activated when the Harvester is ready to perform a collection, according to a predefined schedule. For example, in a radio system, polling of a particular controller would only occur when radio communication is scheduled to be active with that controller; at all other times, polling of that controller would be shut off.

The **[Start Poll]** button allows the user to force polling at other non-scheduled times (for example, if communications with the controller need to be tested.) To do this, click on the icon for the controller you want to poll, and click on the **[Start Poll]** button. Polling will begin. You can shut off polling by clicking on the **[Stop Poll]** button.

Performing an 'On Demand' Collection

If you want the Harvester to collect data from a controller at some time *other* than when it is normally scheduled to perform a collection, you can force an 'on demand' collection.



To do this, click on the icon for the controller from which you want to collect data, and click on the **[Demand Coll]** button. The On Demand dialog box will appear.

In the **"Enter maximum number of records to collect"** field, enter the maximum number of records (i.e. array rows, archive rows, signals from a list) that you want to collect, then click on **[OK]**. The Harvester will immediately attempt to perform collections from that controller.

Clearing Error, Status, and Timestamp Information using ‘Init Collection’

To clear (erase) the Error, Last Collection, and Timestamp information showing in the window for a particular controller, click on the icon for that controller, then click on the **[Init Collection]** button.

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Appendix A - Writing File Data to Signals

The Harvester's can optionally read ASCII text files containing signal values, and write those signal values to corresponding signals in the node. This is useful for changing the value of configuration signals in the node.

There are two different file formats supported - Write List Files (*.WLS) and Write Signal Files (*.WSG).

During the collection of data for a particular node, the Harvester will check to see if a WLS or WSG file exists for that node; if it does, the values in the file will be written to the node, during the collection pass.

Write List File Format

The Write List File must be in an ASCII text format, and must be located in the Write Files directory, as specified in the **"Write File Directory"** in the Harvester's System Information dialog box. The file base name must be the node name, as defined in the NETDEF files, and the file extension must be "WLS".

The format of the Write List File is presented below:

n number of list definitions in this Write List File
list definition 1
list definition 2
.
.
.
list definition *n*

where a list definition consists of:

the number of the signal list
the starting index into the list
x number of signals being written to
value 1
value 2
.
.
value *x*

Values in the definition must be consecutive. They can be analog values; or for logical signals, either ON/OFF or TRUE/FALSE.

Appendix A - Writing File Data to Signals

In the example shown, below, a Write List file has been created for the node called RTU3. Its Write List File must therefore be named RTU3.WLS.

The first line of the RTU3.WLS file indicates that it contains 2 list definitions.

The first list definition applies to signal list 1 in RTU3, and will write to 2 consecutive list entries, starting with the fifth entry in the list. It will write a value of 1.9 to the fifth entry in the list 1, and a value of TRUE to the sixth entry in list 1.

The second list definition applies to signal list 27 in RTU3. It will write to 3 consecutive list entries, starting with the eighth entry in the list. It will write a value of ON to the eighth entry of list 27, a value of 1001 to the ninth entry of list 27, and a value of 45 to the tenth entry of list 27.

File Entry in RTU3.WLS	Explanation
2	number of list definitions
1	list definition for signal list 1
5	start with 5th signal in signal list 1
2	write values to 2 consecutive signals, i.e. signal 5 and 6 in list1
1.9	signal 5 value
TRUE	signal 6 value
27	list definition for signal list 27
8	start with 8th signal in signal list 27
3	write values to 3 consecutive signals, i.e. signals 8, 9, and 10
ON	signal 8 value
1001	signal 9 value
45	signal 10 value

Write Signal File

A Write Signal File must be in an ASCII text format, and must be located in the Write Files directory, as specified in the **"Write File Directory"** in the Harvester's System Information dialog box. A Write Signal file must be named

node.**WSG**

where the file base name of *node* is the node name of the controller which will be written to, and WSG is the file extension. This node name must exist in the NETDEF files. The first line of the WSG file must be an integer specifying the number of signals in the file. Each of the remaining lines of the file must consist of a signal name, and a signal value, separated by a space. Either analog or logical signals may be used; string signals are not supported. If a logical signal is used, its value must be either ON/OFF or TRUE/FALSE.

In the example shown, below, a Write Signal file has been created for the node called DPU5. Its Write Signal file must therefore be named DPU5.WSG.

```
3
VALVE01.OPEN.NOW  TRUE
PUMP01.POWER.ON  ON
SETPOINT.WATER.TEMP  32
```

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Appendix B - File Naming Conventions

The data collected from controllers by the Harvester is saved in data files at the OpenBSI Workstation.

The directory where these files are saved is specified in the **"Raw File Storage Directory"** field in the Harvester's System Information dialog box.

Once the files are saved, they are typically exported to OpenEnterprise, Microsoft® Excel, or some other third-party package, using the OpenBSI Data File Conversion Utility, described in an addendum to this manual.

A maximum of 999 files can be saved of a given type in the Raw File Storage Directory. Once this number is exhausted, older files will be overwritten, as new data must be saved.

The table, below, details the file naming conventions:

File Type	File Format	File Naming Convention	Example File Name
Archive	Binary	*nnnnnnnn*_C*xxx.yyy*	RPC5_C001.000
Array	Binary	*nnnnnnnn*_A*xxx.yyy*	NORTHWD_A001.000
Audit	ASCII	*nnnnnnnn*_E*xxx.yyy*	FLOW3_E001.000
List	ASCII	*nnnnnnnn*_L*xxx.yyy*	PARKROAD_L001.000

Where:

nnnnnnnn = the controller's node name (as defined in the NETDEF files)
xxx = the structure number beginning with 001 (e.g. array number)
yyy = the file number ranging from 000 to 999

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Appendix C - Sample ACCOL Task for Radio Control

When using radios as the communication link between the Harvester and a Network 3000 controller, power consumption by the radio is normally an important consideration. Power may be conserved by ensuring that under normal operating conditions, a controller's radio is ONLY turned ON when it is scheduled to send/receive data from the Harvester. This is also important in preventing interference between multiple controllers which share the same radio frequency.

The radio turn ON logic is based on a calculation involving a controller's local address, its expanded node addressing group number, and other parameters defined both in the ACCOL load, and in the Harvester.

The sample ACCOL task in this appendix represents one approach to creating such logic, and should only be used as a guide. This sample task only shows the part of the ACCOL load related to radio control; it does NOT cover other communication details such as buffers, port definitions, etc. Questions regarding this task should be directed to Bristol's Application Support Group.

Task Description

Turn-ON Logic Highlights

This task assumes the Harvester has a scan interval of 1 hour (3,600 seconds).[1] The time within each hour that the controller will turn ON its radio is stored in the signals HOUR.MIN and HOUR.SEC, and is calculated by the lines:

```
60 *   CALCULATOR
     10 :IF(#NODEADR!=127)
     20   NODE.TIME=((#NODEADR-1)*26)+(GROUP.ADDR*5)+60
     30   HOUR.MIN=:INT(NODE.TIME/60)
     40   HOUR.SEC=NODE.TIME-(60*HOUR.MIN)
```

where in line 20, #NODEADR is a system signal representing the local address of this controller, and GROUP.ADDR is a signal which holds the Expanded Node Addressing group number (as defined during system configuration). The values "26", "5", and "60" are the poll time per node, poll time per group, and start time offset, respectively, which must be identical to the values for those parameters defined in the Harvester. Lines 30 and 40 of the Calculator convert the turn ON time (in seconds) to minutes and seconds. The HOUR.MIN and HOUR.SEC values are checked against #TIME system signals, later in the task, to determine when it is time to turn on the radio:[2]

```
160   :IF((#TIME.007==HOUR.SEC)&(#TIME.006==HOUR.MIN))
170     :IF(RADIO.HOUR.ENBL)
180       RADIO.HOUR.REQ=#ON
```

[1] *The start time of a scan interval is measured from midnight (00:00) of the current day.*

[2] *As part of its communication activities, the Harvester regularly sends a Node Routing Table (NRT) to each controller. This prevents a loss of time synchronization between the PC and controllers.*

```
   190     :ENDIF
```

Later, after various checking is performed, the radio is actually activated using the Turn DTR ON feature of the Portstatus module.

```
    30 :C     CHECK TO SEE IF REQUIRED TO BE ON
    40 :IF(RADIO.ACTIVE)
    50   MASTER.RADIO.MODE=5
    60 :ENDIF
   330 * PORTSTATUS
PORT               MASTER.PORT.
MODE               MASTER.RADIO.MODE
STATUS             MASTER.RADIO.STAT
```

Modes of Operation

This ACCOL task supports 5 different modes of operation. Most of the modes also include user-defined setpoints which are fed into Timer Module logic to determine how long the radio stays ON. Each mode is summarized, briefly, in the table below:

Local Turn ON Mode	This mode is enabled by turning ON the signal RADIO.LOCAL.ENBL. This mode allows the radio to be activated manually by an operator using a keypad device. The signals LOCAL.TIME.SP and LOCAL.TIMOUT.SP are used to define the length of the ON time, and timeout periods for this mode.
Daily Turn ON Mode	This mode supports turning on the radio daily, and is enabled by setting valid values on the DAY.HOUR, DAY.MIN and DAY.SEC signals. These turn ON time values are checked against the #TIME.005 (hours) #TIME.006 (minutes) and #TIME.007 (seconds) system signals, respectively. The signals DAY.TIME.SP and DAY.TIMOUT.SP are used to define the length of the ON time, and timeout periods for this mode.
Hourly Turn ON Mode	This mode is the normal method of communication with the Harvester, as discussed, above, under *Turn ON Logic Highlights*. This mode is enabled by turning ON the signal RADIO.HOUR.ENBL. The actual turn ON time is defined in the signals HOUR.MIN and HOUR.SEC. The signals HOUR.TIME.SP and HOUR.TIMOUT.SP define the length of the ON time, and timeout periods for this mode. A daylight hours mode option is also provided. This option is enabled by turning ON the signal RADIO.DLIGHT.ENBL. When ON this mode limits the Hourly Turn ON Mode to hours between the value of RADIO.DLIGHT.STRT and RADIO.DLIGHT.END. If the time of day in hours, as indicated on the system signal #TIME.005 is not between those two values, Hourly Turn ON Mode will be disabled.

Maintenance Mode	Maintenance Mode allows a radio to be left ON for longer than the normally scheduled time period. This may be useful during radio maintenance or system debugging. This mode is enabled by the operator, by turning ON the signal RADIO.MAINT.REQ. (This signal must also be defined in the Harvester as the Maintenance Mode Signal.) The signals MAINT.TIME.SP and MAINT.TIMOUT.SP define the length of the ON time, and timeout periods for this mode.
Radio Turn OFF Mode	This mode allows the Harvester to notify the controller that it has finished collecting data, and that the radio may be turned OFF. This is part of normal Harvester communications, and is handled by the signal RADIO.RESET.REQ. (This signal must also be defined in the Harvester as the Communications OFF Signal.)

ACCOL Task Code

```
*TASK 6
  10 * C@
            THIS TASK IS TO CONTROL THE RADIO VIA THE DTR SIGNAL ON THE@
             NETWORK PORT (PORT C).@
            THE SIGNAL "RADIO.ACTIVE." CONTROLS THE PORT STATUS MODULE.@
            THE SIGNAL "RADIO.TIMER.RSET" IS USED TO TURN OFF RADIO@

  20 * C@
            THE PORT IS CONTROLLED VIA A TIMER SO THAT IF THERE IS@
            NO COMMUNICATION TO THE UNIT THE RADIO IS THEN TURNED OFF@

  30 * C     CHECK TO SEE IF TIME TO CALCULATE HOURLY AND DAILY ENABLE TIMES
  40 * IF (NODE.CALC)
  50 * C@
                DETERMINE NODE OFFSET COLLECTION TIME:@
       @
            SECONDS PAST HOUR= ((NODE ADDR-1)*26)+(GROUP#*5)+OFFSET@
       @
                **** NOTE:  GROUP.ADDR  (GROUP#) MUST BE MANUALY CONFIGURED !!!@
  60 *   CALCULATOR
    10 :IF(#NODEADR!=127)
    20   NODE.TIME=((#NODEADR-1)*26)+(GROUP.ADDR*5)+60
    30   HOUR.MIN=:INT(NODE.TIME/60)
    40   HOUR.SEC=NODE.TIME-(60*HOUR.MIN)
    50   DAY.MIN=HOUR.MIN
    60   DAY.SEC=HOUR.SEC
    70   NODE.CALC=#OFF
    80 :ENDIF
  70 * ENDIF
  80 * C   CHECK FOR TIMER TRIGGER SIGNAL IF ON THEN SKIP HOUR TESTS AND@
             TURN OFF TRIGGER TO ALLOW FOR RE-TRIGGER OF TIMER
  90 * IF (RADIO.TIMER.TRIG)
 100 *   CALCULATOR RADIO.TIMER.TRIG=#OFF
 110 * ELSE
 120 * C@
             CHECK FOR TIME OF HOUR TURNON (WITH DAYLIGHT OPTION) SIGNALS:@
                 RADIO.DLIGHT.ENBL   ON IF ACTIVE ONLY DURING DAYLIGHT HOURS@
                 HOUR.MIN            MINUTE FOR HOURLY TURN ON@
                 HOUR.SEC            SEC OF MIN FOR HOURLY TURNON@
                 RADIO.DLIGHT.STRT   START HOUR OF DAY LIGHT@
                 RADIO.DLIGHT.END    END HOUR OF DAY LIGHT@
```

```
                RADIO.HOUR.ENBL     ENABLE SIGNAL FOR HOURLY TURN ON
130 *   CALCULATOR
   10 :C   CHECK TO SEE IF TIME OF DAY ENABLE
   20 :IF(RADIO.DLIGHT.ENBL)
   30 :C    IF DAYLIGHT,  THEN CHECK TIME OF DAY FOR ENABLE OF HOURLY COMM.
   40   :IF((#TIME.005>RADIO.DLIGHT.STRT)&(#TIME.005<RADIO.DLIGHT.END))
   50     RADIO.DLIGHT.OK=#ON
   60   :ELSE
   70     RADIO.DLIGHT.OK=#OFF
   80   :ENDIF
   90 :ELSE
  100 :C   DAY LIGHT NOT ENABLED,  THEREFORE ALWAYS OK!
  110   RADIO.DLIGHT.OK=#ON
  120 :ENDIF
  130 :C   DAYLIGHT TEST DONE,  CHECK FOR HOURLY TURN ON
  140 :IF(RADIO.DLIGHT.OK)
  150 :C   CHECK IF MIN AND SECOND = START RADIO
  160   :IF((#TIME.007==HOUR.SEC)&(#TIME.006==HOUR.MIN))
  170     :IF(RADIO.HOUR.ENBL)
  180       RADIO.HOUR.REQ=#ON
  190     :ENDIF
  200   :ELSE
  210     RADIO.HOUR.REQ=#OFF
  220   :ENDIF
  230 :ENDIF
140 * C    CHECK TO SEE IF TIME FOR DAY  (ONCE PER DAY) AS DEFINED BY:@
                DAY.HOUR@
                DAY.MIN@
                DAY.SEC
150 *   CALCULATOR
   10 :C  CHECK TO SEE IF TIME TO TURN ON ONCE PER DAY COMMAND
   20 :C   TO ELIMINATE DAILY POLL ..  MAKE DAY.HOUR > 24
   30 :IF((#TIME.007==DAY.SEC)&(#TIME.006==DAY.MIN)&(#TIME.005==DAY.HOUR))
   40   RADIO.DAY.REQ=#ON
   50 :ELSE
   60   RADIO.DAY.REQ=#OFF
   70 :ENDIF
160 * C    CHECK TO SEE IF LOCAL USER@
      @
         RADIO.LOCAL.ENBL  MUST BE ON FOR LOCAL SELECTION@
170 *   CALCULATOR
   10 :C   CHECK FOR KEYPAD SENSE OF OPERATOR
   20 :IF(RADIO.LOCAL.ENBL)
   30   :IF(KEYPAD.STATE)
   40 :C   KEYPAD SENSOR ON,   TURN ON LOCAL REQUEST,  TURN OFF KEYPAD
   50     RADIO.LOCAL.REQ=#ON
   60     KEYPAD.STATE=#OFF
   70   :ENDIF
   80 :ENDIF
180 * C   RADIO COMMANDED ON  CHECK TIMEOUT
190 * C      CHECK # OF DATA REQUESTS
200 *   PORTSTATUS
   PORT               MASTER.PORT.
   MODE               STATUS.MODE.
   LIST               COMMSTAT.LIST.
210 * C   DETERMINE WHAT SETPOINT TO USE
220 *   CALCULATOR
   10 :C    CHECK FOR POLLS FROM THE MASTER ( IS COMM. ESTABLISHED)
   20 COMMSTAT.TRIG=(COMMSTAT.POLL!=COMMSTAT.POLL.LAST)|(COMMSTAT.RX!=@
       COMMSTAT.RX.LAST)|(RADIO.LOCAL.REQ|RADIO.MAINT.REQ|RADIO.DAY.REQ|@
       RADIO.HOUR.REQ)
   30 COMMSTAT.POLL.LAST=COMMSTAT.POLL
   40 COMMSTAT.RX.LAST=COMMSTAT.RX
```

```
    50 :C    CHECK FOR TURN ON REQUEST BY PRIORITY
    60 :IF(RADIO.LOCAL.REQ)
    70   RADIO.TIME.SP=LOCAL.TIME.SP
    80   RADIO.TIMOUT.SP=LOCAL.TIMOUT.SP
    90   RADIO.TIMER.TRIG=#ON
   100   RADIO.TIMER.RSET=#ON
   110   RADIO.LOCAL.REQ=#OFF
   120 :ELSEIF(RADIO.MAINT.REQ)
   130   RADIO.TIME.SP=MAINT.TIME.SP
   140   RADIO.TIMOUT.SP=MAINT.TIMOUT.SP
   150   RADIO.TIMER.TRIG=#ON
   160   RADIO.TIMER.RSET=#ON
   170   RADIO.MAINT.REQ=#OFF
   180 :ELSEIF(RADIO.DAY.REQ)
   190   RADIO.TIME.SP=DAY.TIME.SP
   200   RADIO.TIMOUT.SP=DAY.TIMOUT.SP
   210   RADIO.TIMER.TRIG=#ON
   220   RADIO.TIMER.RSET=#ON
   230   RADIO.DAY.REQ=#OFF
   240 :ELSEIF(RADIO.HOUR.REQ)
   250   RADIO.TIME.SP=HOUR.TIME.SP
   260   RADIO.TIMOUT.SP=HOUR.TIMOUT.SP
   270   RADIO.TIMER.TRIG=#ON
   280   RADIO.TIMER.RSET=#ON
   290   RADIO.HOUR.REQ=#OFF
   300 :ENDIF
 230 * ENDIF
 240 * C   END OF "RADIO.TIMER.TRIG" TEST
 250 * C@
          CHECK RADIO RESET REQUEST FROM HOST@
           IF REQUESTED,  THEN WAIT FOR ~ 1.5 SECONDS TO ALLOW@
           COMMUNICATIONS TO COMPLETE BETWEEN MASTER AND REMOTE
 260 * CALCULATOR
    10 :C     CHECK FOR RESET REQUEST
    20 :IF(RADIO.RESET.REQ)
    30 :C      IF RESET REQUEST THEN INCREMENT LOOP COUNTER
    40   RADIO.RESET.CNT=RADIO.RESET.CNT+1
    50 :C      IF COUNTER =3  (1.5 SECONDS AFTER SHUTOFF)  THEN RESET TIMERS
@
                 THIS IS NEEDED TO ALLOW THE REMOTE TO RESPOND TO THE TURN
OFF@
                 COMMAND.
    60   :IF(RADIO.RESET.CNT>=3)
    70     RADIO.RESET.CNT=0
    80     RADIO.RESET.REQ=#OFF
    90     RADIO.TIMER.RSET=#OFF
   100   :ENDIF
   110 :ELSE
   120   RADIO.RESET.CNT=0
   130 :ENDIF
 270 * C   RETRIGGER COMM TIMER
 280 * TIMER
    INPUT              COMMSTAT.TRIG.
    SETPOINT           RADIO.TIMOUT.SP
    RESET              RADIO.TIMER.RSET
    TIME               COMMSTAT.TIME.
    OUTPUT_1           RADIO.TIMER.RSET
 290 * C    IF NO POLLS IN TIME OUT PERIOD THEN RESET BOTH TIMERS AND@
            TURN OFF PORT
 300 * TIMER
    INPUT              RADIO.TIMER.TRIG
    SETPOINT           RADIO.TIME.SP
    RESET              RADIO.TIMER.RSET
```

```
   TIME                RADIO.TIME.REM
   OUTPUT_1            RADIO.ACTIVE.
310 * C   UPDATE STATUS OF RADIO CONTROL OUTPUT
320 * CALCULATOR
   10 :C    SET MODE COMMAND STATE FOR RADIO OFF
   20 MASTER.RADIO.MODE=6
   30 :C     CHECK TO SEE IF REQUIRED TO BE ON
   40 :IF(RADIO.ACTIVE)
   50   MASTER.RADIO.MODE=5
   60 :ENDIF
330 * PORTSTATUS
   PORT                MASTER.PORT.
   MODE                MASTER.RADIO.MODE
   STATUS              MASTER.RADIO.STAT
```

Appendix D - Harvester Database Tables

The Harvester uses several database tables for storing configuration information. These tables can optionally be read from / written to by third-party applications specifically written for this purpose.

System Information Table

The System Information Table contains information about the overall configuration of the Harvester, calculation parameters for the scan interval, and directory paths.

Field Name	Data Type	Description
Version	Number	Version of the Harvester Database. This controls updates to tables on new releases.
Scan Interval	Number	User configured scan interval, in seconds.
Stagger Nodes	Number	When in stagger mode, the number of nodes to skip.
Stagger Force	Number	When this number of nodes is active, Stagger Mode is activated.
Turn on Delay	Number	The number of seconds to delay after the calculated ON time.
Start Time Offset	Number	Offset (in seconds) into the Scan Interval when polling should start.
Node Poll Time	Number	The time required (in seconds) to collect data from a node.
Group Poll Time	Number	The Offset (in seconds) to separate EBSAP groups throughout the interval.
File Storage	Text	The directory path in which the Harvester will store data files collected from the nodes.
Write Path	Text	The directory path where the Harvester will look for WLS and WSG files.
Dial Retries	Number	The number of times the Harvester will retry dial nodes when the line is busy.
Dial Wait	Number	The number of seconds between dial retries..
Add RTU	Yes/No	When this field is set to YES by an external program, the Harvester will look for new RTUs to add in the HARV_ADD.INI file. This field is checked every 5 seconds.

Appendix D - Harvester Database Tables

Field Table

The field table contains information on the configuration of a controller.

Field Name	Data Type	Description
Node Identifier	Text	User defined text to describe this node.
Disable	Yes/No	If set, no collection is performed.
On Demand	Yes/No	If set, data from the node is collected immediately. NOTE: Harvester regularly monitors this table entry for changes. Therefore, if you want to have an external program trigger an on-demand collection, you can do that simply by setting this database field to Yes.
On Demand List	Yes/No	If set, lists from the node are collected immediately. NOTE: Harvester regularly monitors this table entry for changes. Therefore, if you want to have an external program trigger an on-demand collection of list data, you can do that simply by setting this database field to Yes.
OnUserTimeChange	Yes/No	If set, the User Times have been changed externally. NOTE: Harvester regularly monitors this table entry for changes. Therefore, you could have an external program change the user on times (User Time 1 through User Time 10, later in this table) and activate the new on times simply by setting OnUserTimeChange to Yes.
Turn Off Polling	Yes/No	If set, polling to this unit is stopped, and the modem will be hung up after the collections have been completed.
Scan Type	Number	The method of collection: 0 = Scan Interval 1 = User entered Interval 2 = User entered ON times
Interval	Number	If User entered interval, this field contains the interval value.
Interval Units	Text	If User entered interval, this field contains the user selected units.
Interval Offset	Number	Number of seconds to offset collections from the inerval
Comm Off Sig	Text	This signal is set in the node to turn off communications at the node end.
Maint Sig	Text	This signal is set in the node to start Maint. Mode.
Collect Audit Sig	Text	If the signal is within an Audit record, all lists for the node are collected.

Appendix D - Harvester Database Tables

Field Name	Data Type	Description
Skip History	Yes/No	If set Archive, Array, and Audit collections are skipped on the first collection pass.
Username	Text	ControlWave nodes require a username and password be supplied for collections to occur. Encrypted.
Password	Text	Password must be correct for the Username entered above. Encrypted.
Start Collection Date	Date/Time	If set, indicates from what Date/Time to start collecting Archive and/or Array data.
Avg On Time	Number	Average time in seconds the node is online and collecting.
Num On Times	Number	The number of times data has been collected from this node.
Last On Time	Date/Time	The last time data was collected from the node.
Total On Time	Number	The total time in seconds the node has been on line.
Modem Request Sig	Text	Signal in node's master that turns on modem to target node.
Modem Confirm Sig	Text	Signal in node's master that confirms node is online.
Modem Retries	Number	The number of times the modem connection will be attempted.
Modem Wait	Number	The number of seconds to wait before checking the Modem Confirm signal.
User Time 1	Date/Time	User Configured On Time 1
User Time 2	Date/Time	User Configured On Time 2
User Time 3	Date/Time	User Configured On Time 3
User Time 4	Date/Time	User Configured On Time 4
User Time 5	Date/Time	User Configured On Time 5
User Time 6	Date/Time	User Configured On Time 6
User Time 7	Date/Time	User Configured On Time 7
User Time 8	Date/Time	User Configured On Time 8
User Time 9	Date/Time	User Configured On Time 9
User Time 10	Date/Time	User Configured On Time 10

Appendix D - Harvester Database Tables

Crop Table

The crop table contains information about what type of data will be collected from the controller.

Field Name	Data Type	Description
Node	Text	Target Node Name
Type	Text	Type of Collection
Item	Number	Node structure number (e.g. list 10)
Disable	Yes/No	If set, this collection is disabled.
Last Timestamp	Date/Time	Last valid timestamp collected (for Archives and Arrays) or last time structure was collected (for Lists, Audits, and Raw Arrays)
Last Error	Text	Error encountered on the last collection pass.
Max Retries	Number	Maximum number of Retries before marking a collection as 'failed'.
Common List	Number	Number of the Common Signal Name List to associate with this list (if zero signal names are collected from the node)
Reset Audit	Yes/No	If set, the Audit records collected are removed in the Audit buffer in the node.
Max Rows	Number	Max number of archive rows to collect per pass.
Push Rows	Number	Number of array rows to collect in the first message, in the Pushdown Array scheme.
Mult Arrays	Number	Number of Arrays in the Wrap Multiple Array scheme.
Last Row	Number	The last sequence number or array row collected.
Last Array	Number	For Multiple wrap collections, this is the last array collected.

Appendix D - Harvester Database Tables

Common List Tables

The Common List Tables contain signal names for signal lists in the controllers. The user can configure these to eliminate the communications overhead of collecting the signal names. The first table (common lists table) shows the number of the list, then the number of entries in the list. The second table (common list signals table) contains all of the signal names for all of the common lists.

Common Lists Table

Field Name	Data Type	Description
List	Number	Common List Number 1
Entries	Number	Number of signals in List 1
List	Number	Common List Number 2
Entries	Number	Number of signals in List 2
:	:	:
List	Number	Common List Number *n*
Entries	Number	Number of signals in list *n*

For example, if there are three common lists numbered 10, 20, and 42, and they have 8, 2, and 7 signals in them, respectively, then the Common Lists Table would appear as follows:

List	Entries
10	8
20	2
43	7

Common List Signals Table

For the Common List Signals Table, the table must include a list number (identifying which Common List a signal belongs to) and the signal name of each signal.

Field Name	Data Type	Description
List Number	Number	Common List Number
Signal	Text	Signal Name

For example, if you have two common lists (numbered 1 and 2) each with four and three signals in them, respectively, the Common List Signals Table would appear similar to that shown below:

List Number	Signal
1	STATION.FLOW.
1	STATION.PRES.
1	STATION.TEMP.

Appendix D - Harvester Database Tables

List Number	Signal
1	STATION.ACTIVE.
2	DAILY.FLOW.AVG
2	DAILY.TEMP.AVG
2	DAILY.PRES.AVG

Appendix E – HARVESTER Initialization Files

HARVESTER.INI

The HARVESTER.INI file, which is located in the \WINDOWS folder, sets certain defaults for how the Harvester operates. The format of the HARVESTER.INI file is as follows:

[TIMERS]
CONFIGVIEW_TIMER=*config_time*
MONVIEW_TIMER=*monitor_time*
RTUVIEW_TIMER=*rtu_time*
ONDEMAND_TIMER=*demand_time*
STATION=*station*
BROADCAST=*broadcast*
CRITICAL=*critical*
SILENTEXIT=*silent*

[DEBUG]
ENABLE=*enable*

[DISTRIBUTE]
INTERVAL=*interval*
STARTTIME1=*time1*
STARTTIME2=*time2*
STARTTIME3=*time3*
STARTTIME4=*time4*

where:	*config_time*	is the rate (in milliseconds) at which the configuration pane on the right hand top of the window is updated.
	monitor_time	is the default rate (in milliseconds) at which the monitor pane of the window is updated.
	rtu_time	is the default rate (in milliseconds) at which the tree of RTUs pane of the window is updated.
	demand_time	is the default rate (in milliseconds) at which the Harvester will check for an on-demand request for data.
	station	when set to '1' will write RTU configuration data to the station file.

broadcast	if set to '1', broadcasts a message at the start and end of a collection.
critical	while the Harvester is normally considered to be a critical message exchange (mex), thereby preventing OpenBSI from being shut down. When this is set to '0', however, Harvester is not considered critical, and so OpenBSI can be shut down.
silent	when set to '1', will allow the Harvester to be closed without a confirmation prompt. In addition, when set to '1', Harvester startup will be in a minimized state.
enable	set to '1' to activate debug mode, or '0' to turn off debug mode. In Debug mode, the contents of the monitor window is written to the file harv_log.txt in the \ProgramData\Bristol\OPENBSI directory.
interval	is the default interval used with the distributed on times.
time1,time2, time3, time4	are a set of four base times during the day from which the interval will be added to calculate the collection times for RTUs. Times should be specified as hours and minutes in 24 hour format: **hh:mm**.

Appendix E – Harvester Initialization Files

HARV_ADD.INI

The HARV_ADD.INI file allows one or more RTU definitions to be added or removed from OpenBSI, and Harvester collections to be configured for RTUs.

OpenBSI periodically checks the \ProgramData\Bristol\OPENBSI installation directory to see whether a HARV_ADD.INI file has been added, and if it has, dynamically re-configures the system based on the entries in the file. Once this configuration is completed the HARV_ADD.INI file is automatically deleted so the configuration does not get repeated.

This allows a user, or some external program, to change the system configuration using a batch file, instead of using the dialog boxes of the standard graphical user interface.

If a failure occurs during the parsing of the HARV_ADD.INI file, it will be renamed to HARV_ADD.ERR, and the configuration changes will not be processed.

Multiple RTU definitions may exist in the same file.

[RTU_x]
Name=*rtu_name*
Delete=*delete*
Node_ID=*description*
Write_Station=*station_file*
Default_Config=*default_RTU_config*
Disable=*disable_collections*
Skip_Hist=*skip*
Turn_Off_Poll=*no_poll*
Comm_Off_Signal=*comm_off_sig*
Maint_Mode_Signal=*maint_mode_sig*
Force_List_Signal=*force_list_sig*
Modem_Req_Signal=*modem_req_sig*
Modem_Confirm_Signal=*modem_confirm_sig*
Modem_Retries=*retries*
Modem_Wait=*wait_time*
Scan_Type=*scantype*
Interval=*interval*
Interval_Units=*interval_units*
Interval_Offset=*interval_offset*
Start_Coll_Date=*start_date*
User_Time_1=*user_time1*

User_Time_2=*user_time2*
:
User_Time_10=*user_time10*
Collection1=*coll_1*
Collection2=*coll_2*
:
Collectionn=*coll_n*
Network=*network_name*
RTUType=*type*
Local_Addr=*local_address*
Prim_IP=*aaa.bbb.ccc.ddd*
Pred=*node*
Sec_IP=*eee.fff.ggg.hhh*
MsgTmo=*timeout*
Load=*filename*
Dial=*dial_string*
WebPage=*startup_page*
AlarmDest1=*aaa.bbb.ccc.ddd*
AlarmDest2=*eee.fff.ggg.hhh*
AlarmDest3=*iii.jjj.kkk.lll*
AlarmDest4=*mmm.nnn.ooo*
RBEDest1=*aaa.bbb.ccc.ddd*
RBEDest2=*eee.fff.ggg.hhh*
RBEDest3=*iii.jjj.kkk.lll*
RBEDest4=*mmm.nnn.ooo.ppp*
FailType=*ip_fail_choice*
TS_Disable=*toggle*
Comm_Direct=*proxydirect*

[Coll_n]
Type=*collection_type*
Item=*item_num*
Disable=*disable*
View_Timestamp=*show_timestamp*
Max_Retry=*num_attempts*
Max_Rows=*max_rows*
Collect_All=*max_coll*
Audit_Reset=*delete_records*
Push_First=*number*
Common_List=*list_number*
Wrap_Number=*num_arrays*

where:

[RTU_*x*]	*x* is an integer referring to which RTU definition is being added or deleted. For the first RTU definition in the file, x would be 1, for the second definition in the file, it would be 2, etc.
Name=*rtu_name*	*rtu_name* is the name of the RTU being added to or deleted from the system via this definition. *rtu_name* must either match the name of an RTU already configured in NetView, or the RTU must be added to NetView using the 'Network' keyword further on in this definition.
Delete=*delete*	if *delete* is set to '1', this RTU will be deleted from the Harvester.
Node_ID=*description*	Enter a textual *description* of the node that will appear in the Harvester "Node Information" window. Only the first 64 characters you enter will be displayed as the description.
Write_Station=*toggle*	if *toggle* is set to 0, information from the RTU definition will NOT be written to the station file. If set to 1 (default), it will be written to the station file. If set to 1 and no station file exists, it will be created. NOTE: If there are multiple list, arrays, etc. being collected from this controller, only the first one will be used to update the station file.
Default_Config = *default_RTU_config*	If specified, the Harvester will use the defaults for the RTU named in *default_RTU_config* for this RTU's configuration. NOTE: If a *default_RTU_config* is specified, the remaining entries for this RTU are not necessary, as they will assume the defaults of the RTU specified by *default_RTU_config*.
Disable=*disable_collections*	If *disable_collections* is set to 1, collections for this RTU are disabled. If set to 0 (default) collections remain active. This would typically be used only if a controller has been temporarily taken out of service for repairs, or if there are communication problems which must be fixed prior to attempting collections.
Skip_Hist=*skip*	If skip is set to 1, collection of array/archive data for this RTU is disabled during the first collection

	pass, and instead it will wait for the next calculated interval. If set to 0 (default) the Harvester will attempt to collect historical data during the first collection pass.
Turn_Off_Poll=*no_poll*	If communications with a particular controller are via a dial-up modem or radio, as soon as the Harvester completes its collections, it may be desirable to turn polling off, because there is no reason to continue requesting data. If the controller has a direct cable connection (i.e. it is always connected) it may make sense to continue polling. If *no_poll* is set to '1', polling will cease after a collection is completed. If set to '0' (default) polling continues after a collection is completed.
Comm_Off_Signal= *comm_off_sig*	*comm_off_sig* is a signal that the Harvester will turn ON in the RTU when collection is complete. This may be used to trigger user-defined logic in the RTU to turn off a radio.
Maint_Mode_Signal= *maint_mode_sig*	*maint_mode_sig* is a signal in the RTU. If set ON (True), by the Harvester, it is intended to trigger user-configured logic that keeps communications active with the RTU, even though no collections are occurring, so that maintenance / communications testing/ debugging can be performed.
Force_List_Signal= *force_list_sig*	This signal is set ON by user-defined logic in the program as a notification to the Harvester that the configuration list has changed, somehow, and so it should be re-collected by the Harvester. This signal MUST be designated for audit trail collection via the EAudit Module or AUDIT function block.
Modem_Req_Signal= *modem_req_sig*	If the Harvester is collecting data from a slave controller which communicates to its master controller in the network via a dial-up modem, the signal identified by *modem_req_sig* is turned ON by the Harvester as a trigger to execute user-defined logic in the Master controller that will cause it that will cause it to dial-up its slave controller.
Modem_Confirm_Signal=	If the Harvester is collecting data from a slave

modem_confirm_sig	controller which communicates to its master controller in the network via a dial-up modem, the signal identified by *modem_confirm_sig* must be turned ON by user-defined logic in the Master controller as a confirmation to the Harvester that the Slave node has been successfully dialed, and collections can commence.
Modem_Retries=*retries*	After setting the *modem_req_sig* to ON, this is the number of times the Harvester will check to see that the *modem_confirm_sig* has been turned ON. This number can range from 0 to 5. The default is 1,
Modem_Wait=*wait_time*	After setting the *modem_req_sig*, this is the length of time (in seconds) the Harvester will wait before checking to see that the *modem_confirm_sig* has been turned ON. This same period applies to all "Modem_Retries" as well. (This can range from 1 to 5.) The default is 1.
Scan_Type=*scantype*	Specifies how data scanning is performed. Choose from the following: 0=Scan Interval (default), 1=User Interval, 2=User On Times
Interval=*interval*	This applies when *scantype* is either 1 or 2 (scan interval) or (user interval). The *interval* is a period of time that may range from 1 to 3600. The units of time are specified by Interval_Units. The default is 1. When used as the scan interval, the Harvester attempts to communicate with a particular node based on its location in the network, as determined by an address calculation. When used as a user interval, the Harvester attempts to communicate with a particular node every time a particular period of time has expired, for example, every hour. For example, if the *interval* is set to 1, and *interval_units* is set to 'hours', then collections will occur every hour.
Interval_Units=*interval_units*	This defines the units of the interval. The possible choices are 'minutes','hours' or 'days'.
Interval_Offset=*interval_offset*	This specifies a period of time in seconds (0 to 86400) measured from the beginning of the interval, that the Harvester will wait before

	beginning its collection. This is often necessary if arrays or archives are being updated in the controller every hour, and it is necessary to wait this number of seconds for the array / archive manipulation to be completed. If left at the default of 0, the collection will begin at the very start of the interval. The offset can also be used to space out collections, if several collections from multiple controllers are scheduled to occur within the same interval.
Start_Coll_Date=*start_date*	*start_date* specifies from which date in the historical system, data collection should start. It should be expressed in the format *mm/dd/yyyy* where *mm*=months, *dd*=days, and *yyyy*=years.
User_Time_1= *user_time1* User_Time_2= *user_time2* : User_Time_10= *user_time10*	When this is chosen, the Harvester attempts to communicate with a particular node at up to ten user-specified times during the day. *user_time* must be specified as *hh:mm:ss* PM or *hh:mm:ss* AM, depending upon whether the time is before or after 12 noon.
Collection1=*coll_1* Collection2=*coll_2* : Collection*n*=*coll_n*	These identify the names of collections for this particular RTU. Parameters for the collections will be defined in a section of the file with this name.
Network=*network_name*	If this field is included in the [RTU_x] group, Harvester will add this RTU to OpenBSI before adding it to its own database. A check for RTUs being added to the system is performed every 5 seconds. The network must already exist in OpenBSI. Several additional fields (RTUType, LocalAddr, Prim_IP, Pred, Sec_IP, MsgTmo, Load, Dial, WebPage, AlarmDest, RBEDest, FailType, TS_Disable, Comm_Direct) are used to define the RTU (some are required, some are optional).
RTUType=*type*	*type* defines the type of RTU being defined. Possible types are as follows: Type: RTU: 1 RTU 3305 2 GFC 3308 3 RTU 3310

	4 DPC 3330 5 DPC 3335 6 3508 TeleTrans 7 3530-series TeleFlow / TeleRTU / TeleRecorder 9 ControlWave 10 ControlWave LP 12 ControlWave MICRO 13 ControlWave EFM 14 ControlWave GFC 15 ControlWave XFC 16 CW_10 17 CW_30 19 ControlWave Express
Local_Addr=*local_address*	This is the BSAP local address (1 to 127).
Prim_IP=*aaa.bbb.ccc.ddd*	Prim_IP=*aaa.bbb.ccc.ddd* - If this is an IP node, you must define a primary IP address.
Pred=*node*	Pred=*node* For BSAP networks, this would be the predecessor RTU. If this is the first level of the BSAP network, then specify the NHP name. (Required)
Sec_IP= *eee.fff.ggg.hhh*	Sec_IP=*eee.fff.ggg.hhh* - If this is an IP node, you may optionally define a secondary IP address. The default is 0.
MsgTmo=*timeout*	This is the message timeout in seconds. The default is 45.
Load=*filename*	*filename* is the name of the control strategy running in the RTU (either an ACCOL load, or a ControlWave project.)
Dial=*dial_string*	The phone number this RTU will dial if communication is via a dial-up modem.
WebPage=*startup_page*	The initial web page that will be displayed for this RTU. Default: blank
AlarmDest1=*aaa.bbb.ccc.ddd* AlarmDest2=*eee.fff.ggg.hhh* AlarmDest3=*iii.jjj.kkk.lll* AlarmDest4=*mmm.nnn.ooo*	Each RTU can send alarm messages to up to 4 different IP addresses. These are defined as alarm destinations. The default is 0.
RBEDest1=*aaa.bbb.ccc.ddd* RBEDest2=*eee.fff.ggg.hhh* RBEDest3=*iii.jjj.kkk.lll* RBEDest4=*mmm.nnn.ooo*	Each RTU can send RBE messages to up to 4 different IP addresses. These are defined as RBE destinations. The default for these is 0.
FailType=*ip_fail_choice*	Specifies what happens if IP communications fail. There are two choices.

	type='0' Always try to establish Primary link.' If you choose this option, OpenBSI will always attempt to communicate with this RTU using the Primary link (Primary IP Address), unless that link fails, in which case, it will try to communicate using the Secondary link (Secondary IP Address). *type*='1' 'Stay with link that is working. (Symmetric)' If you choose this option, OpenBSI will attempt to use the current working communication link (either Primary or Secondary) and then if that link fails, fail-over to the alternate link.
TS_Disable=*toggle*	Determines whether or not timestamps will be sent to this RTU. '0' TimeSync Enabled - If you choose this option, time synchronization messages will NOT be sent to this RTU. (Default) '1' TimeSync Enabled' If you choose this option, time synchronization messages will be sent to this RTU.
Comm_Direct=*proxydirect*	Determines whether proxy direct access is allowed to this IP RTU. 0 = Proxy direct access disabled (default). 1 = Proxy direct access enabled.
[*coll_n*]	The name of a collection section, as specified in the [RTU] section. The same collection section can be used by multiple RTUs if they share the same collection parameters.
Type=*collection_type*	This indicates the kind of data being collected. There are seven collection types: (Archive, Audit, PushdownArray, RawArray, SignalList, WrapArray, WrapMultipleArray)
Item=*item_num*	This is the number of the structure being collected, i.e. the array number, the archive number, or the signal list number. If multiple arrays are collected, this would be the number of the first array in the group of consecutively numbered arrays. This field does not apply to Audit.
Disable=*disable*	Specifies whether this collection is disabled: 0=collect (default), 1=disable collection
View_Timestamp=	Can be set to display the most recently collected

show_timestamp	timestamp ("Last Timestamp") from this controller, in the tree of nodes on the left hand side of the main Harvester window. NOTE: Even if there are multiple collections for a controller, only one collection timestamp will be displayed. Choices are: 0=timestamp not displayed (default) 1 =last timestamp displayed
Max_Retry=*num_attempts*	This specifies the total number of attempts the Harvester will make to collect data from this controller on a given collection pass. A retry occurs if there is a communication timeout. This can range from 0 to 10. The default is 1.
Max_Rows=*max_rows*	This specifies the maximum number of array rows which the Harvester will attempt to collect from the controller on a given collection pass. This can range from 1 to 99999. The default is 24.
Collect_All=*max_coll*	Determines whether the Harvester will try to collect only some rows, or the maximum number of rows. 0=Normal collection (default) 1=Collect all using Max_Rows as max per message
Audit_Reset=*delete_records*	Specifies whether audit records that have been collected by the Harvester, will be deleted from the controller. 0 = Don't delete audit records in the RTU. (default) 1 = Delete audit records in the RTU that have already been collected.
Push_First=*number*	This is the number of pushdown array rows to collect during the first collection pass. This should be set to match the number of rows of data generated within the controller, that need to be collected on a given collection pass. *number* can be either 0 or 1 (default).
Common_List=*list_number*	If using a Common List, *list_number* is the number of that signal list. This can range from 1 (default) to 99999. If 0, collection occurs via signal names.
Wrap_Number=*num_arrays*	If using Wrap Multiple arrays, this is the number of arrays used. This can range from 1 (default) to 99999.

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Appendix F - Harvester Error Messages

A list of common Harvester error messages, and their explanations, is included, below:

Error Message	Cause / Possible Remedy
Error - Archive File Not Found	The specified archive file could not be collected because it did not exist in the RTU. • Verify that you did configure an Archive file in the ACCOL load or ControlWave project with that number. • Check to see that you specified the correct archive file number in the **"Item Number"** field of the Collection Configuration dialog box. For ACCOL II users, this number must match the value on the ARCHIVE terminal of the ARC_STORE module; for ControlWave users; this number must match the value on the iiArchiveNumber parameter in the ARCHIVE function block.
Error - Array Not Found	The specified data array could not be collected because it did not exist in the RTU. • Verify that you did configure an array with that array number in the ACCOL load or ControlWave project. For ControlWave users, make sure you have registered the array using the REG_ARRAY function block. • Check to see that you specified the correct array number in the **"Item Number"** field of the Collection Configuration dialog box. • If using Wrap Multiple Array collection, verify that you did not specify too large a value for the **"Number of Multiple Arrays"** parameter in the Collection Configuration dialog box, as this could cause the Harvester to attempt to read a higher numbered array than actually exists.
Error - Audit Buffer Not Found	The Audit data could not be collected because it did not exist in the RTU. • Verify that you did in fact set up the Audit system properly in the RTU. In ACCOL II,

Appendix F - Harvester Error Messages

Error Message	Cause / Possible Remedy
	this would involve configuring the EAUDIT Module, and allocating sufficient memory for the Audit entries. In ControlWave, this would involve configuring the AUDIT function block.
Error - Collections Stopped	A collection has been stopped by the user by clicking on the **"Stop Collections"** pop-up menu selection, thereby aborting the current collection.
Error - Common List Read	A problem occurred while trying to read the Common List in the RTU. • Verify that a list with the number specified in the Common List Configuration dialog box actually exists in the RTU, and that the names of the signals in that list match the ones defined in the Common List Configuration dialog box, and that they are in the correct order. • Verify that all the signals in the list can be collected. For ControlWave users, this means that they must have been their PDD check box marked.
Error - Comm Send Failure	The Harvester could not communicate with the specified RTU. • Verify that the RTU is on-line and communicating.
Error - Comm Timeout	The RTU did not respond within the expected period of time. • Verify that the RTU is on-line and communicating, and that timeouts are not set too short.
Error - Crop Write Failure	Failure to update field with new timestamp.
Error - Dial Comm Line Busy	The phone line used for dial-up is already is use. • Check to see that another RTU is not using the line. If it is, check to see if hang-up parameters may be improperly configured.

Appendix F - Harvester Error Messages

Error Message	Cause / Possible Remedy
	• If using one of the 'On-Times' features to collect data at specified times during the day, check to see if there might be too many RTU's configured for collection at the same time.
Error - Failed to lookup node status	Node status could not be verified in OpenBSI. • Check to see that the RTU is configured properly in OpenBSI. This could also be caused by an internal error.
Error - Failed to Turn on Polling	Polling could not be turned on for this RTU. • Check to see that the RTU is configured properly in OpenBSI. • Check that the communication line is not already in use. • This could also be caused by an internal error.
Error - Invalid Maint Mode Signal	The **"Maintenance Mode Signal"** configured in the Node Configuration dialog box is not set up correctly. • Verify that the signal name entered in the dialog box is syntactically correct. • Verify that this signal exists in the RTU, and that it is a logical (or BOOL) signal. • Verify that the signal is accessible (Marked PDD for ControlWave). • Verify that the signal is NOT inhibited.
Error - Invalid Radio Off Signal	The **"Communications Off Signal"** configured in the Node Configuration dialog box is not set up correctly. • Verify that the signal name entered in the dialog box is syntactically correct. • Verify that this signal exists in the RTU, and that it is a logical (or BOOL) signal. • Verify that the signal is accessible (marked

Appendix F - Harvester Error Messages

Error Message	Cause / Possible Remedy
	PDD for ControlWave.) • Verify that the signal is NOT inhibited.
Error - Modem Confirm Configuration	The signal name entered for the **"Modem Control Confirm Signal"** in the Node Configuration dialog box is incorrect. • Verify that the signal name entered in the dialog box is syntactically correct.
Error - Modem Request Configuration	The signal name entered for the **"Modem Control Request Signal"** in the Node Configuration dialog box is incorrect. • The signal name entered in the dialog box is not syntactically correct.
Error - No Comm Line assigned in OpenBSI	No communication line has been configured in OpenBSI for this particular RTU's address. • Check that a communication line has been defined in NetView, and that it handles the address range encompassing the RTUs used by the Harvester.
Error - Node failed to turn on-line	The Harvester was unable to communicate with the RTU. • Verify that dialing is working properly and that the line is NOT busy. • Verify that timeouts are configured such that the RTU has enough time to come on line (proper delays allowed for modems, radios, etc.)
Error - Node not configured in OpenBSI	The Harvester cannot communicate with the specified node because it is undefined. • Verify that the node is configured in OpenBSI and is visible in the NetView tree.
Error - No Modem Confirm	The Modem Confirm signal in the RTU did NOT turn ON. • Verify that user-defined logic in the RTU correctly turns on this signal to notify the

Appendix F - Harvester Error Messages

Error Message	Cause / Possible Remedy
	Harvester that the slave could be dialed successfully. • Verify that dialing to the slave works correctly.
Error - Output File Open	An array, archive, audit or list file is currently open at the same time the Harvester is attempting to write to it. • Verify that the Data File Conversion Utility (Converter) is not scheduled to access the raw data files at the same time that they are to be written to by the Harvester. Change collection schedules accordingly.
Error - Read Modem Request	The Modem Control Request Signal does NOT exist in the RTU. • Verify that the Modem Control Request Signal actually exists in the RTU, and is of the proper signal type.
Error - Remote List Not Found	A requested signal list could not be found in the RTU. • Verify that a list of that specified number does exist in the RTU.
Error - Remote Signal Not Found	A required signal does NOT exist in the RTU. • Check for syntax errors. Verify that a signal with the particular signal name does in fact exist in the RTU. • Verify that the signal is accessible, i.e for ControlWave users, it must have its PDD box checked.
Error - Signal not found in Node	A signal could not be read from in the RTU. • Verify that all the signals defined in the Common List actually exist in the RTU.
Error - Unexpected %d	Bad data was received from the RTU. • Verify that there is not a problem with the communication line (noise, etc.) If this

Error Message	Cause / Possible Remedy
	problem persists, contact Bristol.
Error - Write Modem Request %l	The modem request signal in the RTU could not be written to. • Verify that the modem request signal exists in the RTU, that its name matches that defined in the Node Configuration dialog box, and that it is not inhibited. • Verify that the modem request signal is marked PDD.
Error - Write Signal / List Not Found	A signal could not be written to in the RTU. • Verify that all the signals defined in the Common List or Write List File actually exist in the RTU.

The following are error and status messages generated as the result of processing the HARV_ADD.INI file.

Error or Status Message	Cause / Possible Remedy
group name – RTU Keyword not found	The HARV_ADD.INI file does not have any sections named [RTU_*x*] where *x* is an integer, so no RTUs can be added or deleted.
RTU name – Audit Collection already present	Because an RTU only has one set of audit buffers, there can be only one collection defined for a particular RTU that collects audit data.
RTU name – Copy operation. RTU not found.	The RTU specified by the Default_Config keyword does not exist. Check for a misspelling.
RTU name – Delete operation, RTU not found.	The 'delete' keyword specifies that an RTU should be deleted, but the RTU name does not exist in the Harvester.
RTU name – Duplicate Collection Type	More than one collection has been defined with the same name.
RTU name – Failure to access OpenBSI API Error = *-nnn*	There was an error with the OpenBSI Application Programmer's Interface (API) while trying to add an RTU to the system. The error codes *nnn* are as follows: -142 RTU name already in use.

Appendix F - Harvester Error Messages

Error or Status Message	Cause / Possible Remedy
	-145 No Communications Line found for this address. -158 Network not in OpenBSI Definition. -159 Message Timeout not within 1-1800 range. -160 Bad RTU Type specified. -161 Illegal Predecessor specified. -162 Illegal Local or IP Address specified.
RTU name – Failed to write to the Harvester Database.	Parameters could not be written to the Harvester database tables.
RTU name – Illegal Collection Item Number	The numbered structure (array, archive, list) does not exist, or the number is out of range.
RTU name – Illegal Collection Type	An incorrect entry was made for the collection type. The collection type must be one of the following: 'Archive', 'Audit', 'PushDownArray', 'RawArray', 'SignalList', 'WrapArray', 'WrapMultipleArray'.
RTU name – Illegal Interval specified	An incorrect entry was made for the interval. The interval must be an integer from 1 to 3600.
RTU name – Illegal Interval Units specified	An incorrect entry was made for the interval units. Interval units must be one of the following: 'Hours', 'Minutes', or 'Days'.
RTU name – Illegal Scan Type specified	An incorrect entry was made for the Scan Type. This value must be either 0, 1, or 2.
RTU name – Illegal Start Collection Date	The start collection date was invalid. The date must be formatted as mm/dd/yyyy where mm is the two digit month, dd is the two digit day, and yyyy is the four digit year.
RTU name – Illegal User On Time	One of the user one times is invalid. These must be in the format: hh:mm:ss PM or hh:mm:ss AM where hh is the two digit hour, mm is the two digit minute, and ss is the two digit second.
RTU name – RTU already exists	You have attempted to add an RTU that already exists in the Harvester or OpenBSI.
RTU name – Successfully Added to Database	The RTU has been successfully added to the Harvester Database.
RTU name – Successfully Deleted from Database	The RTU has been successfully deleted from the Harvester Database.

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Addendum to: D5082, D5083, D5120
Using the OpenBSI Data File Conversion Utility

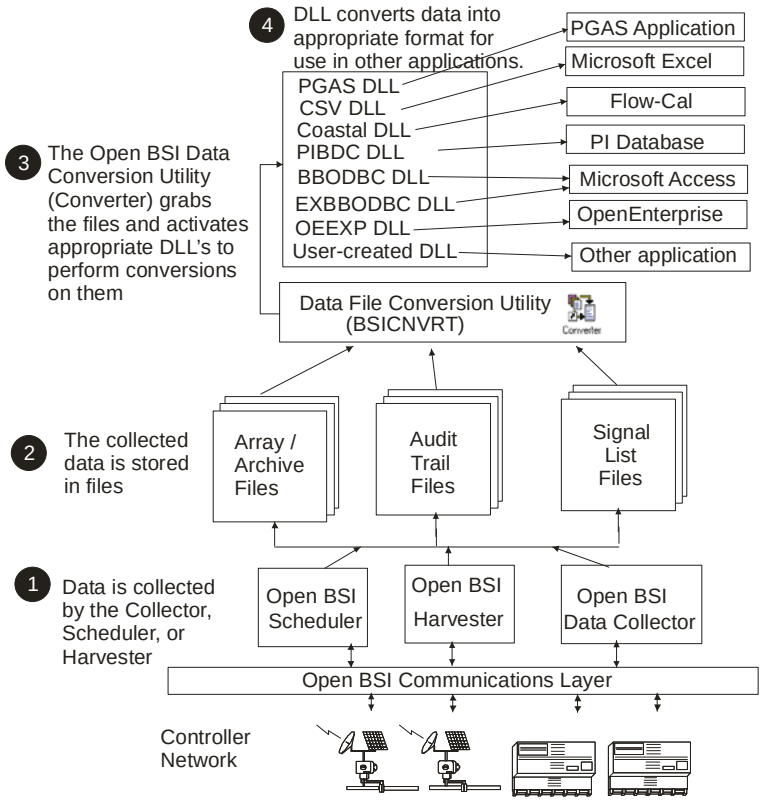
This addendum applies to the following manuals:

OpenBSI Scheduler Manual (document# D5082) - OBSOLETE
OpenBSI Collection/Export Utilities Manual (document# D5083) - OBSOLETE
OpenBSI Harvester Manual (document# D5120)

Introduction

The OpenBSI Harvester, OpenBSI Data Collector, and OpenBSI Scheduler store data array, signal list, archive, and audit trail data in multiple files on the PC hard disk.[1] Although it is possible to view the individual data files[2,] most users will, instead, find it easier to export the data to other packages, such as OpenEnterprise, Microsoft Access®, Microsoft® Excel, or Coastal Flow Measurement Inc.'s Flow-Cal™ software. In order to successfully export the data, however, it must be converted to a format compatible with the other software packages.

The Data File Conversion Utility provides this conversion capability.



IMPORTANT: If you are using the Harvester in addition to the Data Collector in the same OpenBSI system, you must ensure that the files stored by these utilities are NOT in the same directory, or there will be file conflicts.

[1] *These files are sometimes referred to as UOI files, because they follow the format used by the Universal Operator Interface software: signal list data and audit trail data are stored in ASCII format; data array entries and archive data are stored in binary format. For more information on the internal structure of the files, see Appendix C of the Universal Operator Interface Configuration Manual (document# D5074).*

[2] *ASCII files may be viewed with any ASCII text editor. For information on viewing binary array/archive files, see appendices in the OpenBSI Scheduler Manual (document# D5082) and OpenBSI Collection / Export Utilities Manual (document# D5083).*

How Does the Conversion Process Work?

At a pre-defined interval, the Data File Conversion Utility searches for Collector/ Scheduler/Harvester data files that should be converted. If it finds such files, the utility converts the files into one or more specified file formats by calling sets of special export filters called **dynamic link libraries (DLLs)**.[3] The utility comes with several DLLs to choose from.[4] If errors occur during the conversion process, error messages will appear in a window on the screen. Optionally, the data which caused the errors may be saved in an error recovery database, to allow for a later conversion attempt to be made.

How Is the Data File Conversion Utility Configured?

The configuration process varies, somewhat, depending upon whether you are using the Data Collector, Scheduler, or Harvester and which software package(s) you will be exporting data to. Changes to the configuration of the utility require all exporting to be stopped, and then re-started, for the changes to take effect.

Once the Data File Conversion Utility, DLL, and related configuration is complete, and the export process has been activated, data conversions occur automatically, and are essentially transparent to the user. There are six major steps involved in configuring this utility:

Step 1 - Start the Data File Conversion Utility - In order to configure the various parameters of this utility, it must be running. See *'Starting the Data File Conversion Utility'* for details.

Step 2 - Specify Initialization Parameters - In all cases, the user must specify initialization parameters, such as the interval at which conversions should occur. This is done from the **"Parameters"** page of the Data File Conversion Setup dialog box. See *'Specifying Initialization Parameters'* for details.

Step 3 - Specify Station Names and Collection Names - The collection names (file base names of data files collected by the Scheduler, Data Collector, or Harvester) and the station name (file base name which will be used for the exported files) must also be defined. This configuration is done using the Station File Configuration dialog box. See *'Specifying Station Names and Collection Names'* for details.

Step 4 - Configure Dynamic Link Libraries which will perform conversions - The user must decide which of the available dynamic link libraries should be used to perform conversions, and may also need to specify, in a text file named EXPDLL.INI, certain special parameters required by the selected DLLs. See the sub-section on configuring the particular DLL, for details. Depending upon the choice of DLL, special configuration of databases and field mapping may need to be performed using the Data Storage Configuration Utility and other utilities.

Step 5 - Select Appropriate DLLs - Once the desired DLLs have been configured, they must be selected from the **"Export Libraries"** page of the Data File Conversion Setup dialog box. See the sub-section *'Selecting DLLs Using the Data File Conversion Setup Dialog Box'* for details.

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[3]*Dynamic Link Libraries (DLLs) are simply a collection of software sub-routines or procedures which may be called on to perform a particular task. In this case, a customized DLL exists for each type of file conversion to be performed. The user specifies which type of conversions are needed by selecting the required DLLs.*

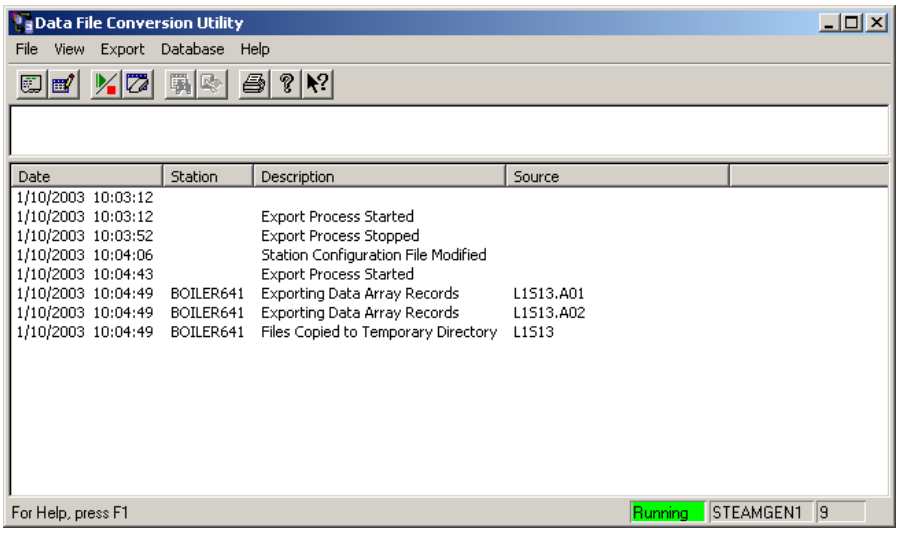
[4]*Facilities exist for adding new DLLs, when new ones become available.*

Step 6 - Start the Export Process - Once configuration is complete, the export process can be activated. The Data File Conversion Utility will then search for files to be converted, and conversions will begin. The operator can observe the progress of the conversions in the monitor area of the window. See *'Activating the Export Process'* for details.

NOTE: With the exception of the EXPDLL.INI file, users should not attempt to edit configuration files with a text editor. Always use the dialog boxes and utilities provided.

Starting the Data File Conversion Utility

To start the Data File Conversion Utility, OpenBSI communications must already be active.[5] Click on **Start→Programs→OpenBSI Tools→ Collection Programs→ Converter**. A message may appear concerning database files being loaded. The Data File Conversion Utility window will then appear. This window includes a monitor area which displays messages concerning the operation of the utility.



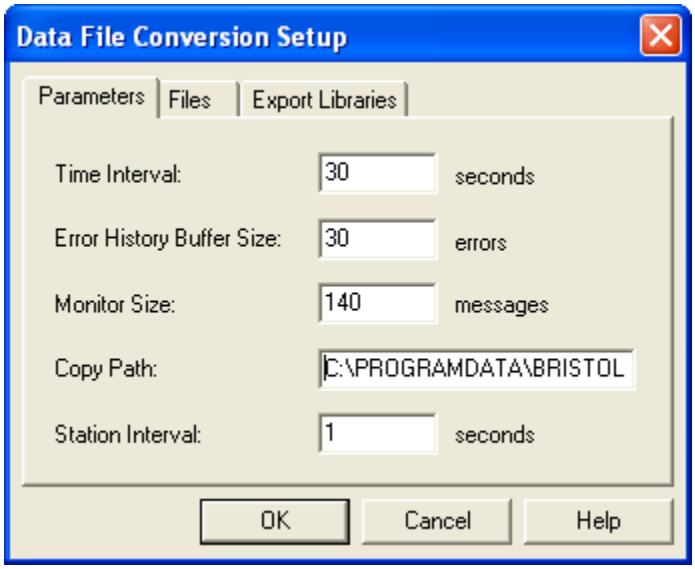
[5]*See the OpenBSI Utilities Manual (document# D5081) for information about configuring and starting OpenBSI communications.*

Specifying Initialization Parameters

For the Data File Conversion Utility to function correctly, certain information must be specified before exporting is started. This information is defined in the Data File Conversion Setup dialog box. To call up this dialog box, click on the icon, shown above, or click on **File→Initialization**.

Parameters Page:

The first page of the dialog box defines initialization parameters, and is accessible by clicking on the **"Parameters"** file tab. The fields on the page are described, below:



Time Interval specifies the interval (in seconds) at which the Data File Conversion utility will check to see whether Collector / Scheduler /Harvester data files exist which require conversion. This interval must be short (fast) enough to prevent files from being used up. See IMPORTANT note, below:

IMPORTANT

No more than 99 (999 for Harvester) data files of a given file type are saved for a given collection name/node name. Once they have been used, data will wrap-around and overwrite the existing files. IT IS THE RESPONSIBILITY OF THE USER TO RETRIEVE DATA (BY USING THE DATA FILE CONVERSION UTILITY) *BEFORE* THESE FILES ARE OVERWRITTEN; OTHERWISE IMPORTANT DATA MAY BE LOST.

Error History Buffer Size specifies the number of errors which may be saved in each station's dedicated error history buffer. Any change to this parameter will cause the Error History to be cleared, losing all previous error messages.

Monitor Size defines the number of status messages which may exist in the monitor area at any one time.

Copy Path specifies the file path where the *original, unconverted* data files should be copied after conversion/exporting has been completed. This is to prevent them from being re-used during the next file conversion. If this parameter is left blank, the individual date files will be automatically deleted following conversion. NOTE: Do NOT specify the copy path to be the same as the path where the OpenBSI Data Collector, Scheduler, or Harvester generate their data files, or problems may occur.

Station Interval specifies the length of time (in seconds) that the Data File Conversion utility will wait before attempting to process the next station. This value can range from 0 to 3600.

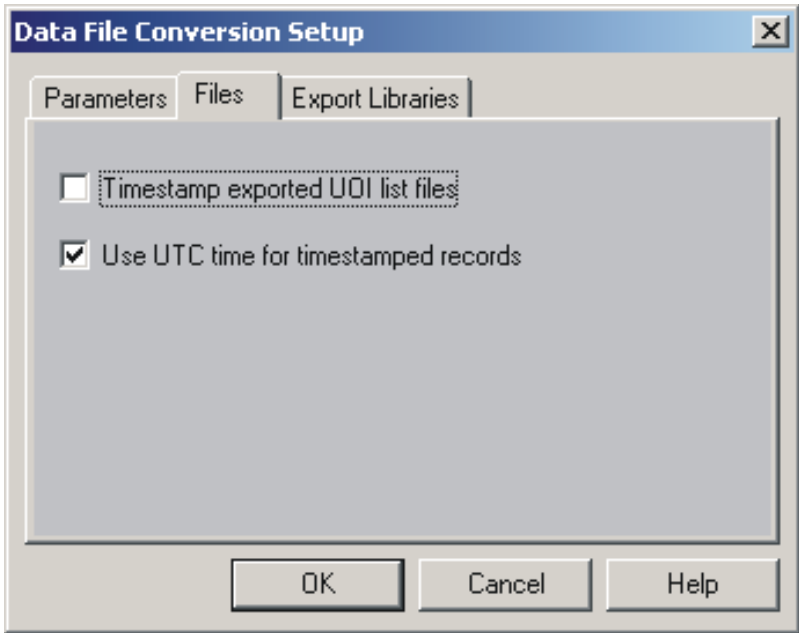
Click on the **[OK]** push button to save the parameters, and exit the dialog box.

NOTE: Initialization parameters are stored in the system directory under the name DFCU.INI. A description of this file is included at the end of this addendum.

Files Page:

The second page of the dialog box is accessible by clicking on the **"Files"** tab. This page allows you to specify that you would like timestamps included in the first row of all list files you export. If you select **"Timestamp exported UOI list files"**, an entry LIST.CREATE.TIME with an accompanying timestamp will be the first record exported. The format of the time / date in the timestamp of this record is governed by **"Regional Settings"** in the Windows™ Control Panel. The timestamp corresponds to the time the data was exported, *not* the time it was collected; however these are usually within a few moments of each other, depending upon your configuration settings.

If you check the **"Use UTC time for timestamped records"** box, all timestamps in array/archive or audit files will be converted to Universal Time (UTC) when exported via the Data File Conversion Utility.



Export Libraries Page:

The third page of the dialog box defines which dynamic link libraries (DLLs) should be used to convert and export the data files. It is accessible by clicking on the **"Export Libraries"** file tab. Instructions for using this page of the dialog box are included later in this addendum, in the section *'Configuring and Selecting Export DLLs'*.

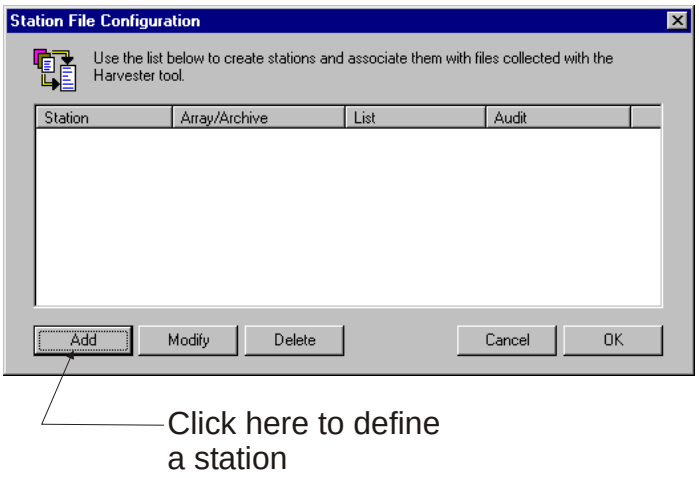
Specifying Station Names and Collection Names

When the Data File Conversion Utility performs its conversion of data files, a new set of files, which may be exported to other software packages, is created. Most of the export DLLs use **Station names** as the file base names for these new files.

Although not required, typically, the station name corresponds to the name of the 'meter'. A meter is either the controller, or one of the 'meter runs' associated with the controller. For example, if a controller is named 'DPU4', the station name for its exported data could be 'DPU4'. If, on the other hand, a controller named 'RPU2' controls three separate meter runs, then three separate station names (one for each run) should be defined, such as 'RPU21', RPU22', and 'RPU23'. The '1' '2' or '3' on the end of RPU2 indicates the run number.

Collection names are the file base names of the data files originally generated by the Harvester, Collector, or Scheduler. In general, for each and every 'meter run' within the controller, there is a collection name for the Audit Trail collection data files, the Array/Archive collection files, and the signal List collection files.[6]

Station names, and collection names are specified in the Station File Configuration dialog box. To access this dialog box, click on the icon, shown above, or click on **File→Station**. The Station File Configuration dialog box will appear:



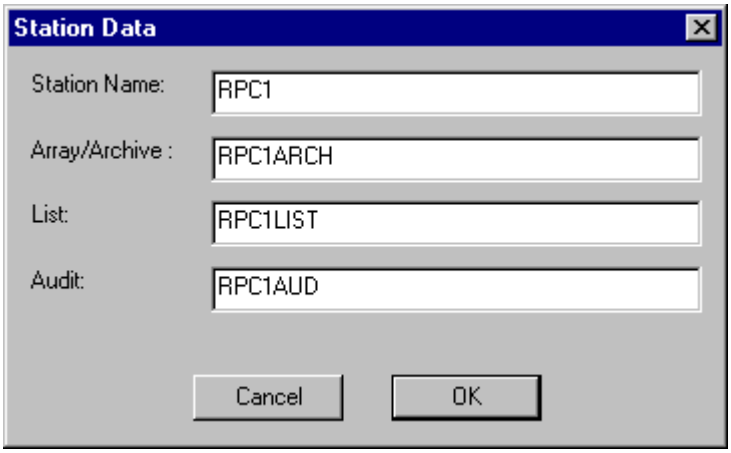
Click on the **[Add]** button to begin defining the station.

NOTE: Harvester users can have the station file created automatically, by selecting the **"Write to Station File"** option in the Harvester's Node Configuration dialog box.

[6]*Information on file naming conventions is included in appendices of the OpenBSI Scheduler Manual (document# D5082), OpenBSI Collection/Export Utilities Manual (document# D5083), and OpenBSI Harvester Manual (document# D5120).*

To Define A New Station Name and Specify its Associated Collection Names:

Click on the **[Add]** push button in the Station File Configuration dialog box (see previous page). The Station Data dialog box will appear. Complete the fields, as described, below:



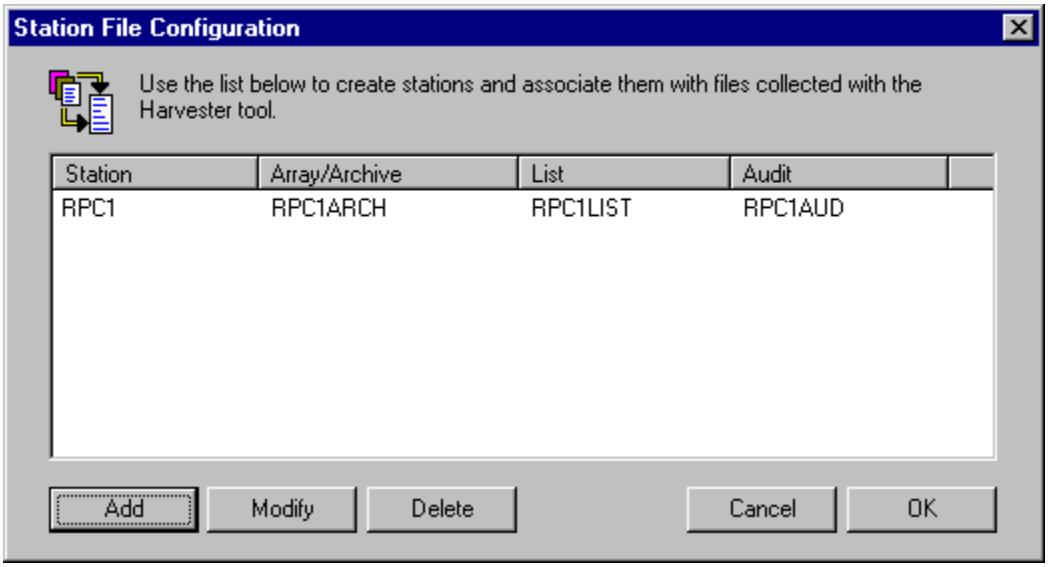
Station Name is the file base name that will be used for the converted/exported data file(s). In OpenBSI 5.1 (or newer) the station name can be up to 126 characters. Previous versions were limited to 8 characters.

Array/ Archive is the collection name for array/archive data for this station. *The name entered must be the file base name of this station's array/archive files, as created by the Harvester, Collector, or Scheduler.*

List is the name of the signal list collection file (either Real Time List or Configuration List) for this station. *The name entered must be the file base name of this station's list files as created by the Harvester, Collector, or Scheduler.*

Audit is the name of the audit trail collection for this station. The name entered must be the file base name of this station's audit trail files as created by the Harvester, Collector, or Scheduler. Note: If this is a multi-run unit, and you intend to export to Flow-Cal™ (using the COASTAL DLL) the audit_collection_name should be entered for only one of the stations for that unit. All stations representing other runs for the same unit should leave the "Audit" field blank.

Click on the **[OK]** push button to save changes, and exit the Station Data dialog box. The station data will appear in the Station File Configuration dialog box.



Exiting the Station File Configuration Dialog Box

Click on **[OK]** to save changes and exit**,** or click on **[Cancel]** to discard the changes and exit.

To View / Modify A Station Configuration

In the Station File Configuration dialog box, select the name of the station you want to modify, then click on the **[Modify]** button, or just double-click on the selected station name. The Station Data dialog box will re-appear and you can edit the station's associated collection file names. Make any changes, and click on the **[OK]** push button to save changes, and exit the Station Data dialog box, or click on **[Cancel]** to discard the changes. Note: Once defined, the station name cannot be modified.

To Delete A Station Configuration

In the Station File Configuration dialog box, select the name of the station you want to delete. Click on the **[Delete]** push button; you will be prompted to confirm that you want to proceed with deletion of this station configuration. Click on **[OK]** to proceed, or **[Cancel]** to cancel the deletion request. Then click on **[OK]** to exit the Station File Configuration dialog box, and save changes. The station configuration, as well as all entries for that station in the Error Recovery Database (if used) will be deleted. Note: If you click on **[Cancel]** to exit the Station File Configuration dialog box, the deletion request will be canceled.

Configuring and Selecting Export DLLs

In order to convert Collector or Scheduler data to a format suitable for export, the Data File Conversion Utility uses a series of Export Dynamic Link Libraries (DLL). Each of these DLLs consist of the software procedures and sub-routines necessary to convert data to another format. Currently, the Data File Conversion Utility supports the following DLLs:

Comma-separated variable (CSV.DLL) - This DLL exports data as a set of values, separated by commas. This format is suitable for import by Microsoft® Excel. For information on configuring this DLL, see the sub-section *'Exporting Data Using the Comma-separated Variable (CSV) DLL'*.

Flow-Cal™(COASTAL.DLL) - This DLL exports data in a format compatible with Coastal Flow Measurement Inc.'s Flow-Cal™ gas flow calculation package. For information on configuring this DLL, see the sub-section *'Exporting Data Using the Flow-Cal™ (Coastal) DLL'*.

Access Database (BBODBC.DLL) - This DLL exports signal list data in a format compatible with ODBC-compliant[7] applications, such as Microsoft Access®. For information on this DLL, see the sub-section *'Exporting Data Using the Access (BBODBC) DLL'*.

Extended Access Database (EXBBODBC.DLL) - This DLL exports signal list, array, archive, and audit trail data in a format compatible with ODBC-compliant applications, such as Microsoft Access®. For information on this DLL, see the sub-section *'Exporting Data Using the Extended Access (EXBBODBC) DLL'*.

OpenEnterprise Export (OEEXP.DLL) - This DLL exports data in a format compatible with the historical portion of the database in the OpenEnterprise supervisory software package. For information on configuring this DLL, see the sub-section *'Exporting Data Using OpenEnterprise Export(OEEXP) DLL'*.

PI Batch Database Conversion (PIBDC.DLL) - This DLL exports data in a format compatible with PI Database. For information on configuring this DLL, see the sub-section *'Exporting Data Using the PI Batch Database Conversion (PIBDC) DLL'*.

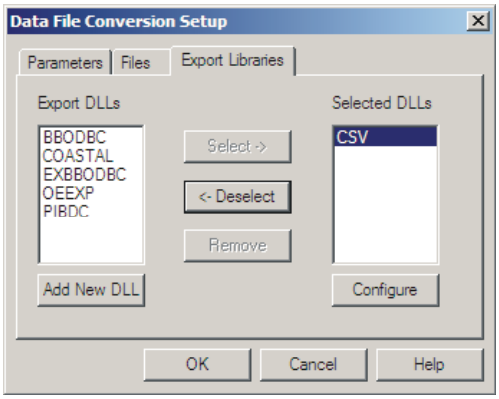
PGAS Conversion (PGAS.DLL) - This DLL exports data in a format compatible with the PGAS application. For information on configuring this DLL, see the sub-section *'Exporting Data Using the PGAS DLL'*.

Once the required DLLs have been configured, they must be selected.

[7] *ODBC stands for Open Database Connectivity.*

Selecting DLLs using the Data File Conversion Setup Dialog Box

In order to specify what types of conversions should be performed, the appropriate DLLs must be configured *first* and then selected for use from the Export Libraries page of the Data File Conversion Setup dialog box. To call up this dialog box, click on the icon, shown above, or click on **File→Initialization**. Next, click on the **"Export Libraries"** file tab.



To select a DLL, click on its name in the **"Export DLLs"** list box, then click on the **[Select->]** push button. The name will now appear in the **"Selected DLLs"** list box.

If a particular DLL does not appear in the dialog box, you can add it via the **[Add New DLL]** push button. (The name of the DLL must be eight characters or less, and must not be the same name as any other DLL). No more than 32 export DLLs can be configured.

NOTE: A DLL must appear in the **"Selected DLLs"** list box in order for conversions to take place using that DLL.

If the configuration of a particular DLL has changed *since* the time the DLL was initially selected, you MUST click on it in the **"Selected DLLs"** list box to highlight its name, and then click on the **[Configure]** push button. For some DLLs, this will activate a dialog box from which you must enter certain configuration changes. For other DLLs, the **[Configure]** push button loads the DLL into the system but does not require configuration changes to be entered.

To de-select one or more DLLs, and thereby disable conversions by them, click on the name in the **"Selected"** list box, then click on the **[<-Deselect]** push button, and the DLL will be moved to the **"Export DLLs"** list box, disabling any conversions using that DLL.

The DLLs will not be enabled until after exiting the Data File Conversion Setup dialog box, by clicking on the **[OK]** push button.

IMPORTANT
Configuration cannot be performed while the export process is underway; you must stop any exporting in order to perform configuration. When all configuration has been completed, you MUST explicitly activate the export process to begin exporting data. See *'Activating the Export Process'* later in this addendum.

Exporting Data Using the Comma-Separated Variable (CSV) DLL

The Comma-Separated Variable (CSV) DLL converts Collector/Scheduler/Harvester historical data files into a format suitable for import into Microsoft® Excel. It requires that these files have a timestamp in Column 1. If there are multiple files for a collection name of a given type during a conversion pass, they will be compacted into a single file.

The table, below, shows the file extensions which will be used for the newly created files, in the directory specified by *path*:

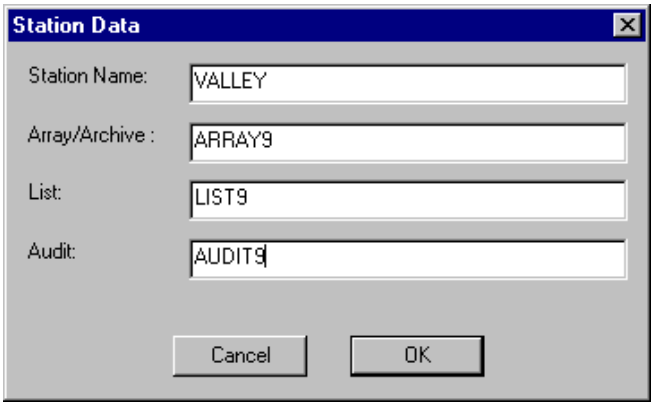
Converted Files of THIS Type:	Will Have THIS file extension:
Array/Archive	.ARR
Audit Trail	.AUD
Configuration List	.LST
Real Time List[8]	.RST

After defining the station data, go to the 'Export Libraries' page of the Data File Conversion Setup dialog box, then highlight 'CSV' in the **"Export DLLs"** list box, and then click on **[Select->]**. 'CSV' will now appear in the **"Selected DLLs"** list box. Click on 'CSV', then click on the **[Configure]** push button.

The CSV Export DLL Configuration dialog box will appear. Complete the fields as described in the example, below, then click on **[OK]** to exit the dialog box, then exit the Data File Conversion Setup dialog box. You can now re-start the export process.

Example -

There is a Network 3000 controller with the node name of DPU9 located on a natural gas pipeline at the Valley Road Compressor Station. The OpenBSI Data Collector collects array, audit trail, and configuration list data from DPU9. The collection names, as defined in the Define New Collection dialog box of the Collector are array9, audit9, and list9, respectively.[9]



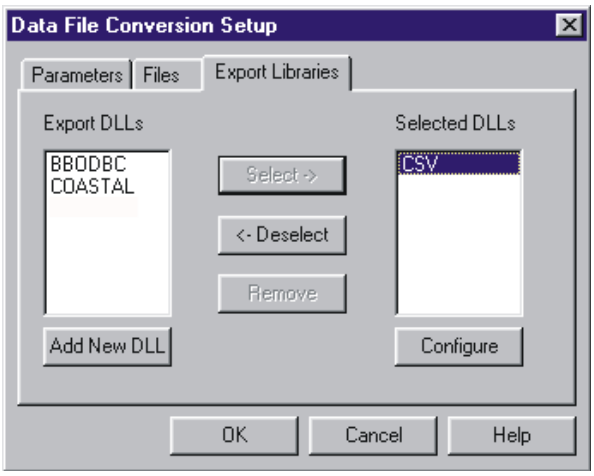
A station name of 'VALLEY' is chosen for the converted files, as shown in the Station Data dialog box[10] and array, audit, and list file collection names are entered.

[8] *Real Time List data files are ONLY used by the OpenBSI Scheduler and OpenBSI Harvester; the Data Collector does not generate these files.*

[9] *Information on naming conventions of files created by the Scheduler, Data Collector or Harvester, as well as information on the directories used to store these files are included, respectively, in the OpenBSI Scheduler Manual (document# D5082), the OpenBSI Collection/Export Utilities Manual (document# D5083). and the OpenBSI Harvester Manual (document# D5120).*

[10] *If exporting is currently in process, edits cannot be made in this dialog box.*

Next, with all exporting stopped, the CSV (comma-separated variable) DLL must be highlighted by clicking on it in the **"Export DLLs"** list box of the Data File Conversion Setup dialog box. It is then moved to the **"Selected DLLs"** list box by clicking on the **[Select->]** push button.

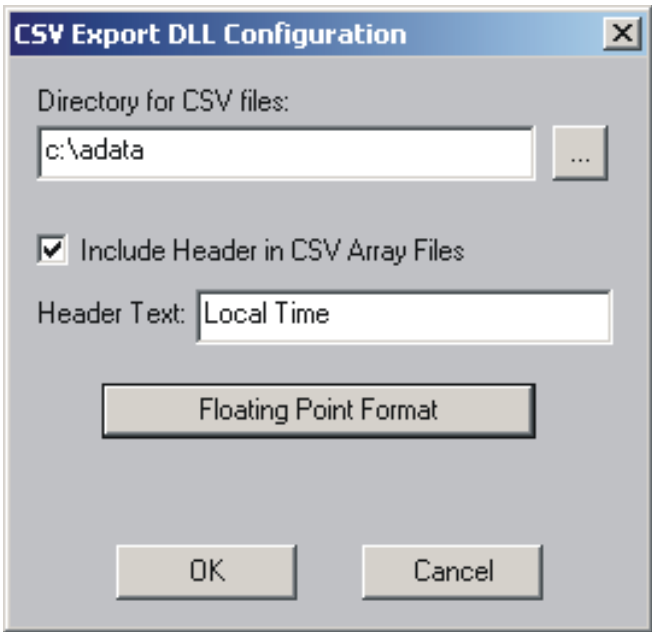


Now, click on the **[Configure]** push button to call up the CSV Export DLL Configuration dialog box.

In the CSV Export DLL Configuration dialog box, complete the fields, described, below, then click on the **[OK]** push button. This causes the changes to be read by the Data File Conversion Utility.

Then click on **[OK]** to exit the Data File Conversion Setup dialog box.

Finally, re-start the export process.



Directory for CSV files is the drive and directory where the converted files should be stored. The default entry is the \ProgramData\Bristol\OpenBSI\Harvester installation directory.

Include Header in CSV Array Files If checked, then **"Header Text"** (see below) will be inserted as the top line of the exported CSV file, enclosed in brackets. NOTE: This only applies for Array/Archive files.

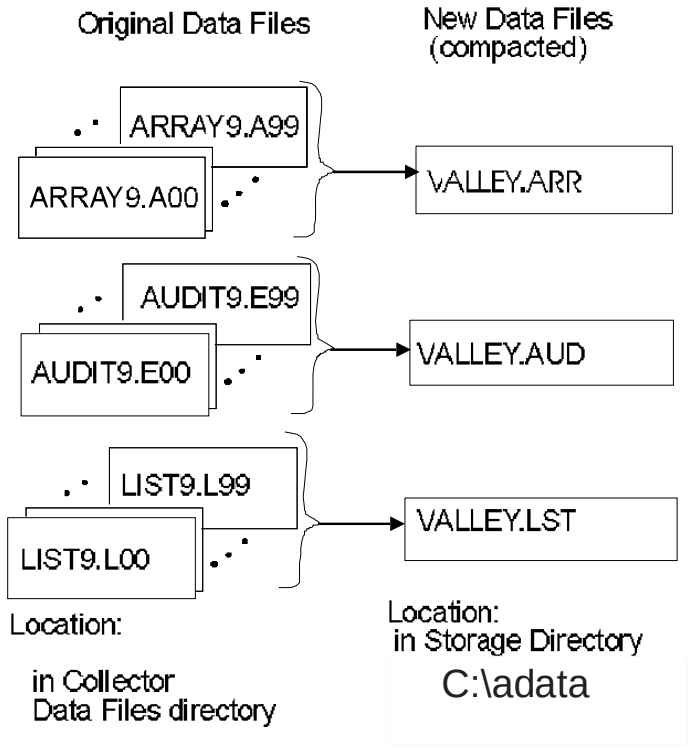
Header Text

is text (up to 255 characters) which is inserted within brackets [ ] as the first line of the exported file, whenever **"Include Header in CSV Array Files"** is checked. If that option is checked, but no text is provided, the text '[DATA]' will be used. NOTE: The header option only applies for Array/Archive files.

[Floating Point Format]

Calls up the Change Floating Point Format dialog box, to allow you to specify the floating point precision used to display array/archive exported data. See *Using the Floating Point Format dialog box,* later in this section.

When exporting is started, the Data File Conversion utility will generate compacted versions of the array / archive, audit trail, and list files in the C:\adata directory, as shown in the figure, at right.



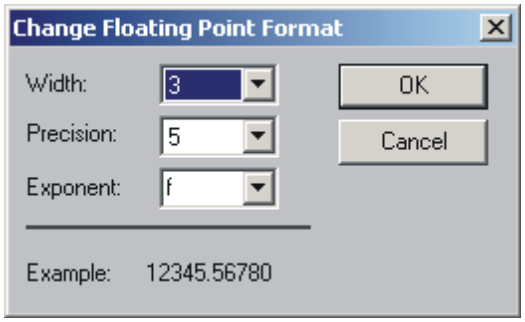
If a valid directory was specified in the **"Copy Path"** field of the Data File Conversion Setup dialog box, the original unconverted files will then be copied to the specified path, where they will remain until they are either overwritten by additional files (when file numbers wrap-around) or are deleted by the user.

If no **"Copy Path"** is specified, the original files will be deleted after conversion occurs, to prevent the same files from being converted on subsequent conversion passes.

If, during installation of the OpenBSI software, the Error Recovery Database files were installed, then any data which is unable to be converted because of errors will be stored in this database. During the next conversion pass, the Data File Conversion Utility will automatically make additional attempts to convert this data.

Using the Change Floating Point Format dialog box

Exported analog data from arrays/archives is displayed according to a default floating point format. To alter this default format, click on the Floating Point Format button. The Change Floating Point Format dialog box will appear. Use the **"Width"** list box to specify the total number of characters in the field (including the decimal point) when displaying a floating point number.



Use the **"Precision"** list box to choose the number of places to the right of the decimal point which should be displayed.

Use the **"Exponent"** list box to choose floating point format 'f', exponential notation 'e' or choose 'g' to have the Data File Conversion Utility choose the 'best fit' format.

Click on **[OK]** when finished.

Exporting Data Using the Flow-Cal™ (Coastal) DLL

The Flow-Cal™ (Coastal) DLL converts Harvester data files into a format suitable for import into Coastal Flow Measurement Inc.'s Flow-Cal™ software.

[COASTAL]
store_path = *storepath*
map_path = *mappath*
cfx_path = *cfxpath*
unique_map = *yes/no*
map_file = *filename*
period = *hour/day*

where:	*storepath*	is the drive and directory where the compacted files (.HLY, AUD, and .CFG) should be stored, for export to Flow-Cal.™ These files are used to create a Flow-Cal™ import file. The default *storepath* is C:\ProgramData\Bristol\OpenBSI\ACCOL.
	mappath	is the drive and directory where the mapping file(s) will reside. The default drive and directory is C:\ProgramData\Bristol\OpenBSI\ACCOL. Mapping files have the file extension of (.FCS) and are used to map structures such as signals and data arrays to corresponding Flow-Cal™ variables. See the Flow-Cal™ documentation for information on creating the mapping files.
	cfxpath	is the drive and directory where the Flow-Cal™ import file (*.CFX) will be created. The default drive and directory is C:\ProgramData\Bristol\OpenBSI\ACCOL.
	yes/no	is either YES, to indicate that a single common map file name will be used for all meters (stations) in the system. If the entry is NO, then each meter (station) must have its own individual map file. The default is NO.
	filename	specifies the name of the common map file shared by all stations (meters). If unique_map = NO this name is ignored, since there is no common map file.
	period	specifies how often the compacted data files will be exported to Flow-Cal™. Valid selections are either DAY (for daily export) or HOUR (for hourly export). The default is DAY.

The DLL combines up to 99 files for a particular collection name, of the same type, into a single larger file which is suitable for use by Flow-Cal™. Audit Trail files in the same collection are combined into a single file with the extension AUD. Hourly data array files or hourly archive files in the same collection are combined into a single file with the extension HLY. Because Flow-Cal™ only requires the most recent configuration data, the most recent signal list file is

given the file extension CFG; the older signal list files are not used.

To configure this DLL, use any text editor to edit the file C:\WINDOWS\EXPDLL.INI.

The table, below shows the file extensions which will be used for the newly created files, in the directory specified by *storepath*.

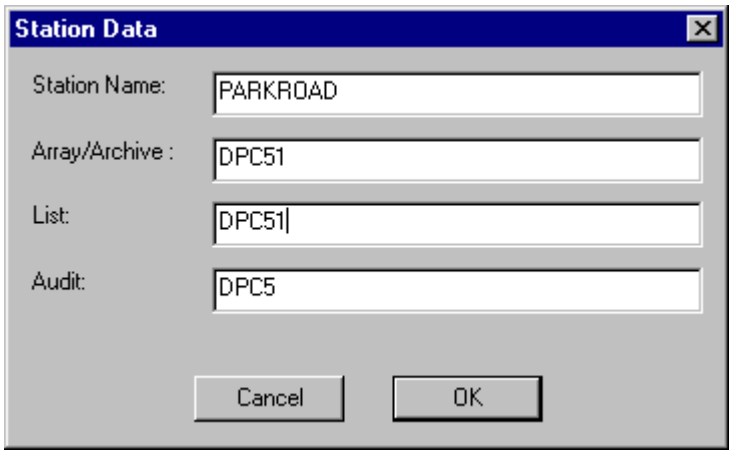
Converted Files of THIS Type:	Will Have THIS file extension:
Array/Archive	.HLY
Audit Trail	.AUD
Configuration List	.CFG

NOTE: Beginning with OpenBSI 5.8 Service Pack 1, you can optionally change the configuration list extension to something other than the default of CFG. If you want to do this, include the line LIST_EXT=*ext* where *ext* is the three-letter extension in the [COASTAL] section of your EXPDLL.INI file.

Once you have configured the COASTAL DLL, call it up in the **"Selected DLLs"** list box of the Data File Conversion Setup dialog box, and click on the **[Configure]** push button, then click on **[OK]** to exit the dialog box. You can now re-start the export process.

Example -

At the Park Road compressor station, there is a single-run Network 3000 controller with a node name of DPC5. DPC5 collects hourly gas flow data into a set of data arrays. The OpenBSI Harvester is configured to collect data from this controller. At a scheduled interval, it will collect hourly array data, Audit Trail data, and configuration list data, and store the data in files.



A station name of 'PARKROAD' has been chosen for the converted files, as shown in the Station Data dialog box.[11,12] Its associated collection names, which are DPC51 for the hourly arrays, DPC5 for the audit trail data, and DPC51 for the configuration list data are also entered.[13]

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[11] *If exporting is currently in process, edits cannot be made in this dialog box.*

[12] *Information on naming conventions of files created by the Scheduler or Collector, as well as information on directories used to store these files are included in appendices of the OpenBSI Scheduler Manual (document# D5082), the OpenBSI Collection/Export Utilities Manual (document# D5083), and the OpenBSI Harvester Manual (document# D5120).*

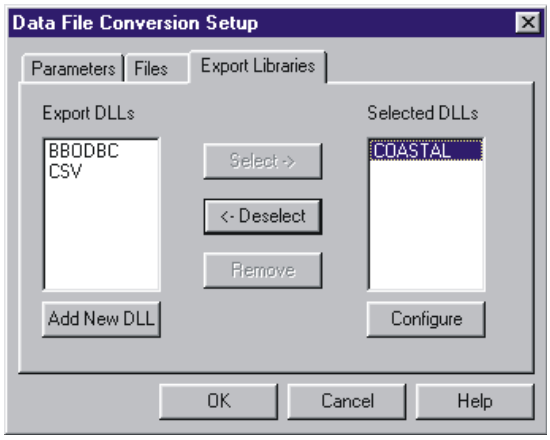
[13] *In the Scheduler, collection names are defined based on entries in the RTUDEF.TXT file. Array/Archive and List collection names consist of the node name, followed by the run number. Audit Trail collection names consist of the node name only, since the same Audit Trail buffer is shared by all runs in the node.*

The C:\WINDOWS\EXPDLL.INI file is modified so that the converted files will be stored in the \COASTAL directory. A mapping file (.FCS) which is specific to this controller must also be created in that directory.

```
[COASTAL]
store_path = C:\COASTAL
map_path = C:\COASTAL
cfx_path = C:\COASTAL
unique_map = NO
map_file =
period = DAY
```

Next, with all exporting stopped, the COASTAL DLL must be highlighted by clicking on it in the **"Export DLLs"** list box of the Data File Conversion Setup dialog box. Next, click on the **[Select->]** push button and the name will be moved to the **"Selected DLLs"** list box. Finally, click on the **[Configure]** push button, and then on the **[OK]** push button. This causes the changes in the EXPDLL.INI file to be read by the Data File Conversion Utility.

When exporting is started, the Data File Conversion utility will generate compacted versions of the array / archive, audit trail, and list files in the \COASTAL directory, as shown in the figure on the next page.

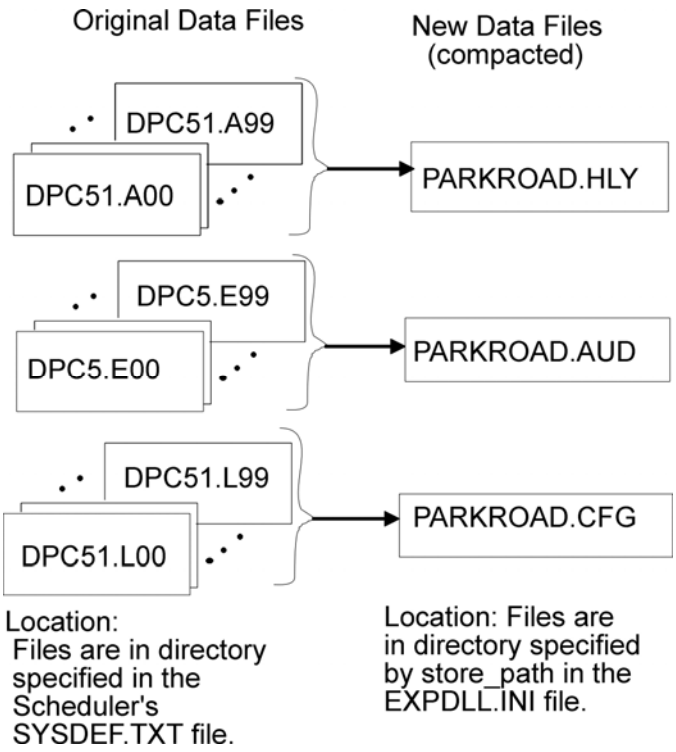


If a valid directory was specified in the **"Copy Path"** field of the Data File Conversion Setup dialog box, the original unconverted files: (*array_collection_name*.A*nn*, *audit_collection_name*.E*nn*, and *list_collection_name*.L*nn)* will be copied to the specified path, where they will remain until they are either overwritten by additional files, or are deleted by the user.

If no **"Copy Path"** is specified, the original files will be deleted after conversion occurs, to prevent the same files from being converted on subsequent conversion passes.

If during installation of the OpenBSI software, the Error Recovery Database files were installed, then any data which is unable to be converted because of errors will be stored in this database.

During the next conversion pass, the Data File Conversion Utility will automatically make additional attempts to convert this data.



Exporting Data Using the Access (BBODBC) DLL

The Access (BBODBC) DLL reads Scheduler/Collector/Harvester signal list data files, and inserts the data directly into a Microsoft Access® Database.[14] *NOTE: If you need to export data other than signal lists (arrays, archives, audit trail), you must use the Extended BBDOBC DLL (EXBBODBC) discussed later in this addendum.*

The name of the database file is BBODBC.MDB and the name of the data source (DSN) is BBI ODBC.[15] The list data in the Access database is stored in four columns of a table called 'REAL_TIME': The columns are defined as follows:

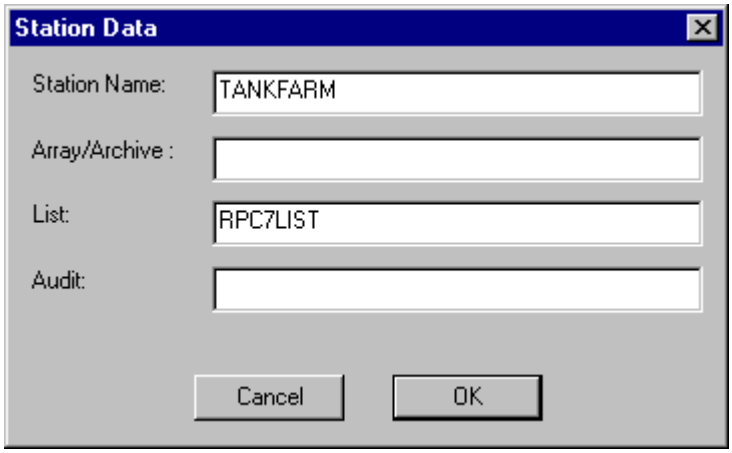
Column Heading:	Description:
STATION	Station name
SIGNAL	Signal name in the load. This signal must be associated with the STATION named above.
SIGVAL	Value of the signal named by SIGNAL.
TYPE	Signal type (0 = Analog or Logical, 1 = String signal)

The EXPDLL.INI file does not have to be configured for the Access (BBODBC) DLL. Configuration of station names, and selection of the DLL in the Data File Conversion Setup dialog box, however, is required.

Example -

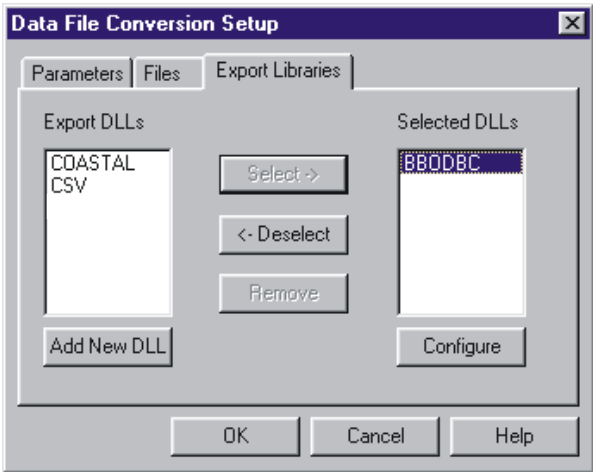
There is a controller with the node name of RPC7 which collects real time level information about oil tanks in a tank farm. The OpenBSI Data Collector collects this list data from RPC7, and uses a collection name of RPC7LIST.[16]

A station name of 'TANKFARM' has been chosen in the Station Data dialog box.[17]



[14] *ODBC stands for Open Database Connectivity.*
[15] *Any errors occurring during the data transfer are logged in the file BBODBC.LOG.*
[16] *Information on naming conventions of files created by the Scheduler, Data Collector, or Harvester, as well as information on the directories used to store these files are included, respectively, in the OpenBSI Scheduler Manual (document# D5082), the OpenBSI Collection/Export Utilities Manual (document# D5083), and the OpenBSI Harvester Manual (document# D5120).*
[17] *If exporting is in process, edits cannot be made in this dialog box.*

Next, with all exporting stopped, the BBODBC (Access) DLL must be highlighted (by clicking on it) in the **"Export DLLs"** list box of the Data File Conversion Setup dialog box. Next, click on the **[Select->]** push button and the DLL name will be moved to **the "Selected DLLs"** list box.



Finally, click on the **[Configure]** push button, and then on the **[OK]** push button.

When exporting is started, the Data File Conversion utility will insert the list data directly into the Access database, in the 'REAL_TIME' table, as discussed previously.

If a valid directory was specified in the **"Copy Path"** field of the Data File Conversion Setup dialog box, the original unconverted files will be copied to the specified path, where they will remain until they are either overwritten by additional files (when file numbers wrap-around) or they are deleted by the user. If no **"Copy Path"** is specified, the original files will be deleted after conversion occurs, to prevent the same files from being converted on subsequent conversion passes.

Exporting Data Using the Extended Access (EXBBODBC) DLL

Like the BBODBC.DLL, the EXBBODBC.DLL can take signal list data (collected via the OpenBSI Scheduler/Data Collector/Harvester) and insert that data into an ODBC-compliant[18] database, such as Microsoft Access®. In addition, however, it can also insert array, archive, and audit trail data into an ODBC-compliant database.

IMPORTANT

If you previously used the EXBBODBC DLL in OpenBSI Version 3.1, and you are upgrading to OpenBSI Version 3.2 or newer, you will need to *modify* the schema of the database created under 3.1 to be compatible with OpenBSI 3.2. To do so, you must use the Table Definition dialog box in the Data Storage Configuration utility to explicitly create a column to hold the STATION name; this column must be mapped to field 0. (In OpenBSI 3.1 this was unnecessary because a station name column was created automatically.) Also, if you previously used the STATION as part of the primary key, you must select **"Designate Column As Part of Primary Key"** in the Table Definition dialog box.

The EXPDLL.INI file does not have to be configured for the Extended Access (EXBBODBC) DLL. Configuration of station names, and the steps described, below, must be performed.

There are three major steps which must be accomplished in order to use the Extended Access (EXBBODBC) DLL:

1) Select the EXBBODBC DLL from the **"Export DLLs"** list box of the Data File Conversion Setup dialog box.

2) Configure the DLL via the EXBBODBC DLL Setup dialog box (accessible via the **[Configure]** push button.

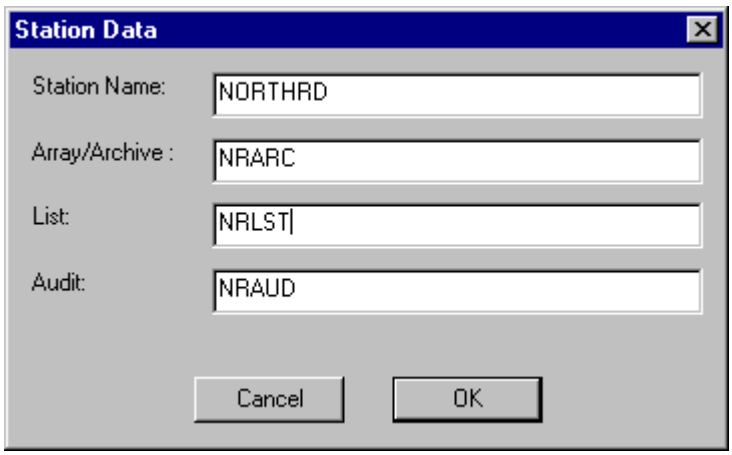
3) Use the Data Storage Configuration utility to create a database schema which maps data record fields from the collected data files to specific columns in tables of your database. The Data Storage Configuration utility is accessed from the **[Configure Schema]** push button of the EXBBODBC DLL Setup dialog box. (See the *'Using the Data Storage Configuration Utility'* later in this addendum for details.)

NOTE: If for some reason, you want to use the EXBBODBC DLL to export to *more* than one database, you can accomplish this by configuring the DLL for the *first* database, and then going into Windows™ Explorer, and making a copy of the EXBBODBC.DLL file, and assigning a new name to the copy. The first three characters of the new name MUST be unique among all the other export DLLs. Then load the new DLL and configure it independently to export to the *second* database.

[18] *ODBC stands for Open Database Connectivity*

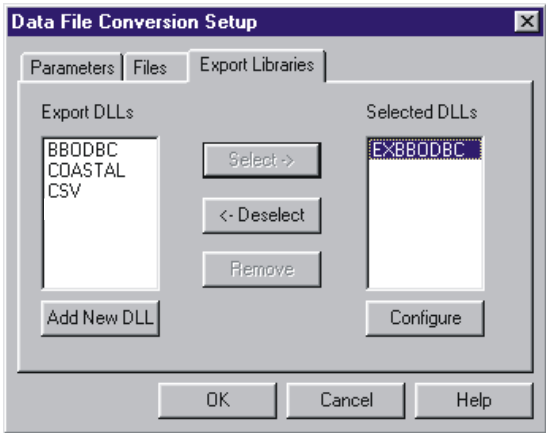
Example -

A compressor station on North Road includes a EGM 3530 Electronic Gas Measurement Computer which collects archive data, audit trail data, and signal list data. The OpenBSI Data Collector retrieves this information from the EGM 3530. The collection names configured in the Data Collector are NRARC for archive data, NRAUD for audit trail data, and NRLST for signal list data.[19]



The configured collection names, as well as a station name we have chosen, called 'NORTHRD' are entered in the Station Data dialog box.

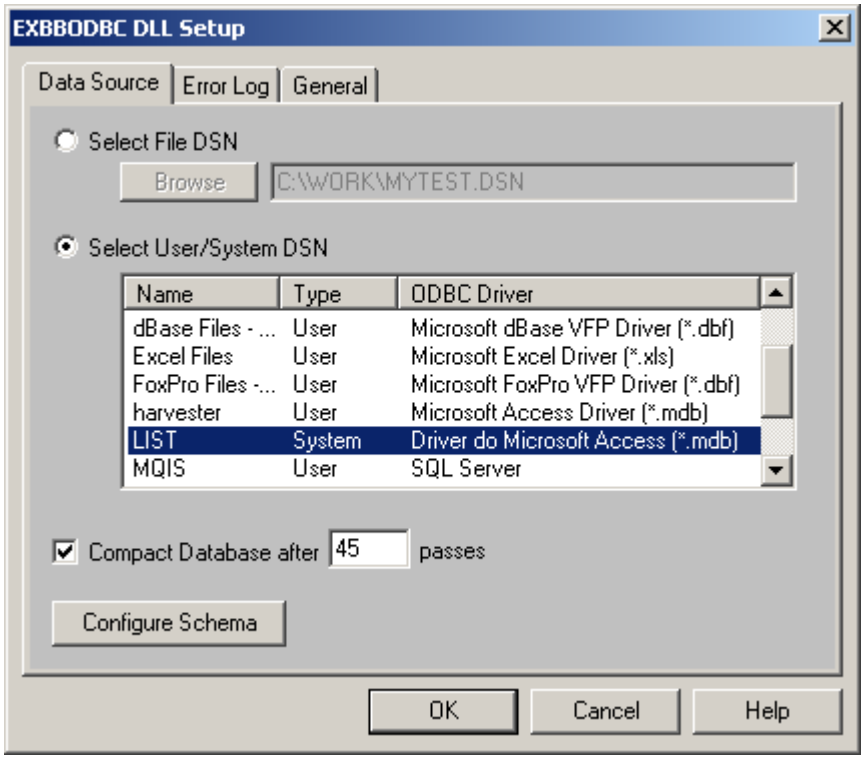
Next, with all exporting stopped, the EXBBODBC (Extended Access) DLL must be highlighted (by clicking on it) in the **"Export DLLs"** list box of the Data File Conversion Setup dialog box. Next, click on the **[Select->]** push button and the DLL name will be moved to the **"Selected DLLs"** list box.



Next, click on the **[Configure]** push button to call up the EXBBODBC DLL Setup dialog box. This dialog box has three pages, each of which is accessible by clicking on its associated tab.

[19] *Information on naming conventions of files created by the Scheduler, Data Collector, or Harvester, as well as information on the directories used to store these files are included, respectively, in the OpenBSI Scheduler Manual (document# D5082), the OpenBSI Collection/Export Utilities Manual (document# D5083), or the OpenBSI Harvester Manual (document# D5120).*

EXBBODBC DLL Setup Dialog Box - Data Source Page



Select File DSN

The Data Source Name (DSN) contains details about how data collected from Harvester data files should be exported to an external database.

If you have already configured a DSN file, click on this button, and specify the path and filename of the DSN file associated with your database, or use the **[Browse]** button to locate the file. If the DSN filename you specify does NOT exist, the DLL will create a Microsoft Access® database, and display an MDB filename (with the same basename as the DSN) in this field.

Select User/System DSN

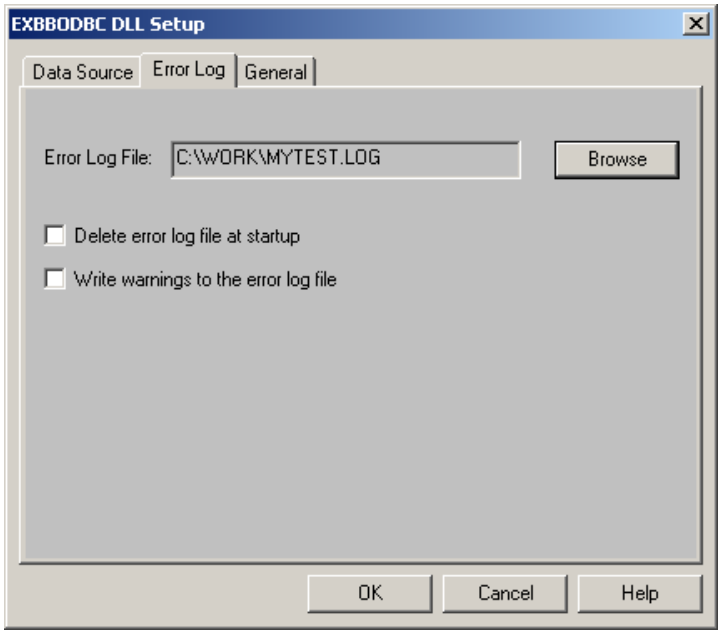
If you have an existing ODBC-compliant database created with some external application, and you would like to use it with the EXBBODBC DLL you must *first* use the Windows™ ODBC Administrator software to generate a Data Source Name (DSN) user/system entry for it. Then click on the **"Select User/System DSN"** button and select that entry from the list box.

Compact Database After *n* passes

Over time, the database can become fragmented. To de-fragment the database, and thereby save on disk space, select the **"Compact Database"** check box, and enter the number of passes between compactions. (See the **"Time Interval"** field on the 'Parameters' page of the Data File Conversion Setup dialog box to see how often a conversion pass occurs.)

[Configure Schema] The **[Configure Schema]** push button calls up the Data Storage Configuration utility to allow you to configure a schema which maps fields in your Collector / Scheduler / Harvester data files to columns in tables of your ODBC-compliant database. (See the *'Using the Data Storage Configuration Utility'* later in this addendum for details.)

EXBBODBC DLL Setup Dialog Box – Error Log Page

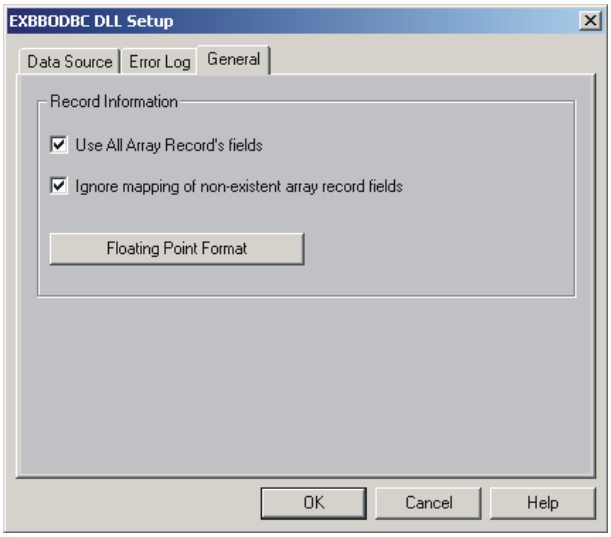


Error Log File Specifies the name of a file which will be used to store error messages generated during the file conversion process. Use the **[Browse]** push button to search for an existing error log file, or enter the name of a new one while browsing. If conversions are unsuccessful, check the error log file for errors. (A list of error messages, and their meanings, is included later in this addendum.)

Delete error log file at startup When this option is checked, the contents of the error log file will be deleted whenever the Data File Conversion Utility is re-started. When it is not checked, the contents of the error log file will be appended.

Write warnings to the error log file When this option is checked, warnings (such as messages about duplicate records) are written to the error log file. When not checked, warnings are not written to the error log file, thereby reducing the size of the error log file.

Fields in the EXBBODBC DLL Setup Dialog Box – General Page



Use All Array Record's fields — When checked, this field enforces a requirement that there must be an exact match between the number of fields in the array record, and number of columns in the database. When unchecked, the number of array columns need NOT match the number of fields in the database.

Ignore mapping of non-existent array record fields — When this button is checked, any mapping between non-existent array record fields and table columns that was set up by the Data Storage Configuration Utility will be ignored. This button should be checked if you want to use the same table definition for arrays whose records are different sizes and are exported to the same table in the database.

Floating Point Format — Calls up the Change Floating Point Format dialog box, to allow you to specify the floating point precision used to display array/archive exported data. See *Using the Floating Point Format dialog box*, earlier in this section.

When you have finished defining your database name, configured its schema via the Data Storage Configuration utility, etc., click on the **[OK]** push button to save changes, or the **[Cancel]** push button to abandon the changes. In either case, you will return to the EXBBODBC DLL Setup dialog box. From there, click on either **[OK]** or **[Cancel]** to return to the "Export Libraries" page of the Data File Conversion Setup dialog box. Click **[OK]** again and configuration is complete. After you have activated the export process, the Data File Conversion utility will insert the Collector/Scheduler/Harvester data directly into the database.

If a valid directory was specified in the **"Copy Path"** field of the Data File Conversion Setup dialog box, the original unconverted files will be copied to the specified path, where they will remain until they are either overwritten by additional files (when file numbers wrap-around) or they are deleted by the user. If no **"Copy Path"** is specified, the original files will be deleted after conversion occurs, to prevent the same files from being converted on subsequent conversion passes.

Exporting Data Using the OpenEnterprise Export (OEEXP) DLL

The OEEXP.DLL can take signal list data, array/archive data, and audit trail data (collected via the OpenBSI Scheduler, OpenBSI Data Collector, or OpenBSI Harvester) and insert that data into a pre-defined OpenEnterprise Database. The signal list data is exported to the Real Time portion of the database; the array/archive and audit trail data is also exported to the Real Time portion of the database, but it is then logged into the Historical portion of the database.

The EXPDLL.INI file does not have to be configured for the OpenEnterprise Export (OEEXP) DLL. Configuration of station names, and the steps described, below, must be performed.

There are six major steps which must be accomplished in order to use the OpenEnterprise Export (OEEXP) DLL:

1) If you are exporting signal list data, and you have not done so already, you must configure the real time portion of the OpenEnterprise database by creating a table. To do this, enter the following statements in a text file named *mytable*.SQL, (where *mytable* is a name of your choice)

   CREATE TABLE *mytable* **(PERSISTENT, PRIMARY KEY (STATION,** *signal_name***), STATION CHAR,** *signal_name* **CHAR,** *signal_value* **CHAR);**

   The *signal_name,* and *signal_value* can be replaced with names of your own choosing. Now enter the following command at the SQL prompt.[20]

   include *'mytable';*

2) If you are exporting array/archive and/or audit trail data to the historical portion of the OpenEnterprise Database, you must *first* configure the real time portion of the database, and then configure the historical portion of the database. See *'Examples for Configuring the OpenEnterprise Historical System'* later in this addendum.

3) Start the OpenEnterprise Database as described in the user documentation accompanying OpenEnterprise.

4) Select the OEEXP DLL from the **"Export DLLs"** list box of the Data File Conversion Setup dialog box.

5) Configure the DLL via the OEEXP DLL Setup dialog box (accessible via the **[Configure]** push button of the Data File Conversion Setup dialog box.

6) Use the Data Storage Configuration utility to make any allowed changes required in the database schema which maps fields from the collected data files to specific columns in tables of your database. NOTE: You can only change **"UOI Field Number"** mappings; column names, and data types CANNOT be changed via the Data Storage Configuration utility. The Data Storage Configuration utility is accessed from the **[Configure Schema]** push button of the OEEXP DLL Setup dialog box. (See the *'Using the Data Storage Configuration Utility'* later in this addendum for details.)

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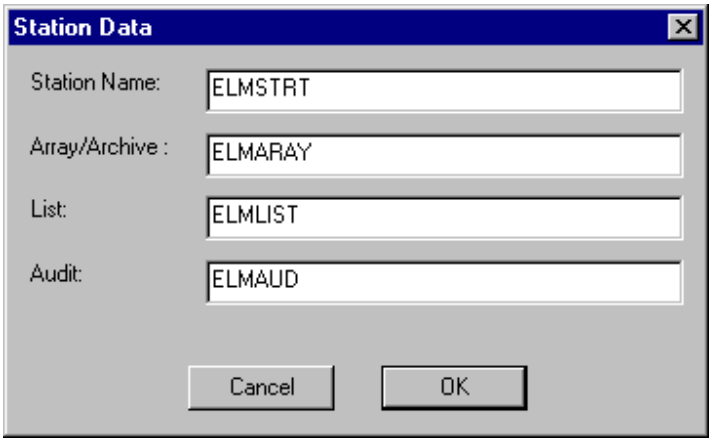
[20] *Any SQL configuration done for OpenEnterprise should be done by entering statements in text files. This allows proper debugging to be performed, and prevents the loss of SQL commands in the event of a system re-start.*

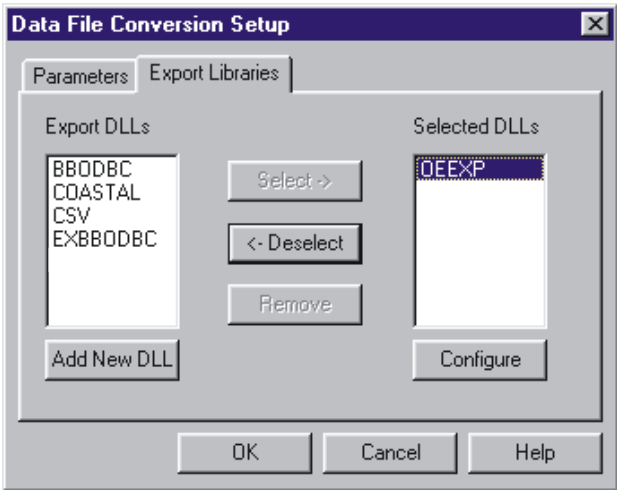
Example -

The Elm Street pumping station is monitored and controlled by a DPC 3330 controller. The controller array data, audit trail data, and signal list data are retrieved via the OpenBSI Data Collector. The collection names configured in the Data Collector are ELMARAY for array data, ELMAUD for audit trail data, and ELMLIST for signal list data.[21]



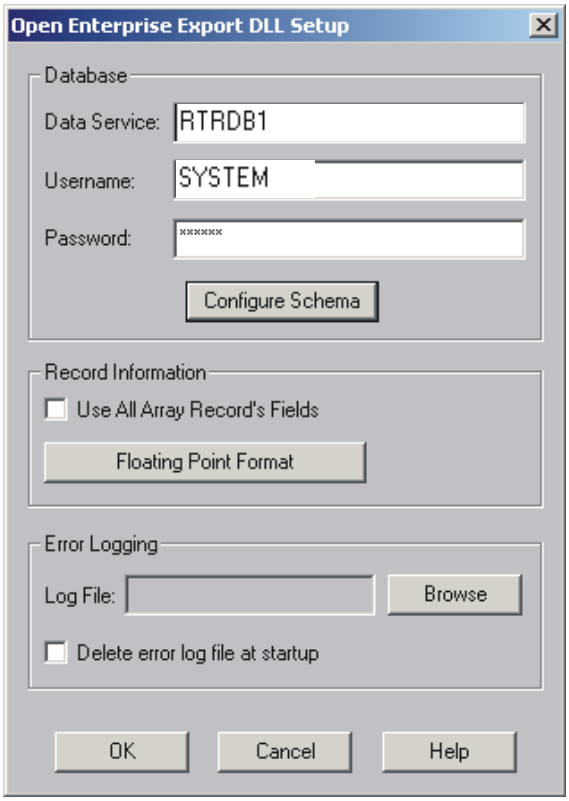
These names, together with a station name of ELMSTRT have been entered in the Station Data dialog box.

Next, with all exporting stopped, the OEEXP (OpenEnterprise Export) DLL must be highlighted (by clicking on it) in the **"Export DLLs"** list box of the Data File Conversion Setup dialog box. Next, click on the **[Select->]** push button and the DLL name will be moved to the **"Selected DLLs"** list box.



[21] *Information on naming conventions of files created by the Scheduler, Data Collector, or Harvester, as well as information on the directories used to store these files are included, respectively, in the OpenBSI Scheduler Manual (document# D5082), the OpenBSI Collection/Export Utilities Manual (document# D5083), and the OpenBSI Harvester Manual (document# D5120).*

Next, click on the **[Configure]** push button to call up the OEEXP DLL Setup dialog box.



Fields in the OEEXP DLL Setup Dialog Box

Data Service Enter the data service name of your OpenEnterprise database. This is entered in the form *hostname:service*. If the database resides on this workstation, it is NOT necessary to include the *'hostname:'* portion.

Username, Password These fields require you to enter the proper username and password required for access to the specified **"Data Service"**. You will NOT be able to export data to the OpenEnterprise Database without entering this information.

[Configure Schema] The **[Configure Schema]** push button calls up the Data Storage Configuration utility to allow you to configure a schema which maps fields in your Collector / Scheduler / Harvester data files to columns in tables of your OpenEnterprise Database. (See the *'Using the Data Storage Configuration Utility'* later in this addendum for details.)

Log File Specifies the name of a file which will be used to store error messages generated during the file conversion process. Use the **[Browse]** push button to search for an existing error log file, or enter the name of a new one while browsing. (In the figure above, we have created an error log file named OEERROR.LOG.) If conversions are unsuccessful, check the error log file for errors. (A list of error messages, and their meanings, is included later in this addendum.)

Delete error log file at startup — When this option is checked, the contents of the error log file will be deleted whenever the Data File Conversion Utility is re-started. When it is not checked, the contents of the error log file will be appended.

Floating Point Format — Calls up the Change Floating Point Format dialog box, to allow you to specify the floating point precision used to display array/archive exported data. See *Using the Floating Point Format dialog box*, earlier in this section.

When you have finished defining your data service, configured its schema via the Data Storage Configuration utility, etc., click on the **[OK]** push button to save changes, or the **[Cancel]** push button to abandon the changes. In either case, you will return to the OEEXP DLL Setup dialog box. From there, click on either **[OK]** or **[Cancel]** to return to the **"Export Libraries"** page of the Data File Conversion Setup dialog box. Click **[OK]** again and configuration is complete.

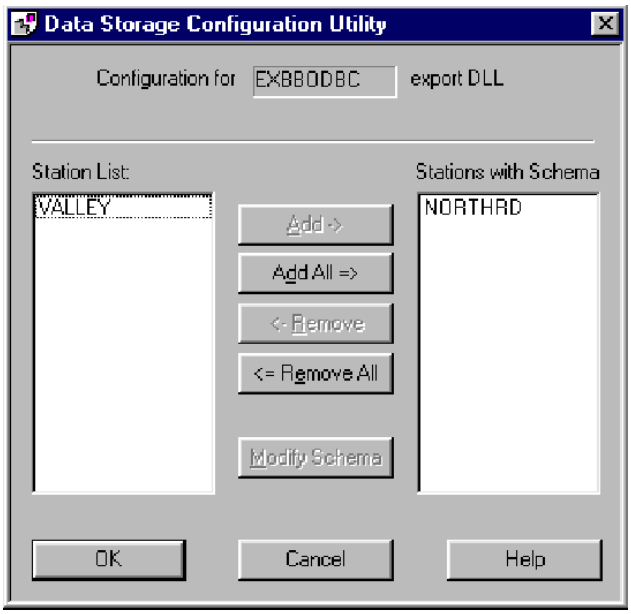
After you have activated the export process, the Data File Conversion utility will insert the Collector/Scheduler/Harvester data directly into the OpenEnterprise database.

If a valid directory was specified in the **"Copy Path"** field of the Data File Conversion Setup dialog box, the original unconverted files will be copied to the specified path, where they will remain until they are either overwritten by additional files (when file numbers wrap-around) or they are deleted by the user. If no **"Copy Path"** is specified, the original files will be deleted after conversion occurs, to prevent the same files from being converted on subsequent conversion passes.

Using the Data Storage Configuration Utility (For Use With EXBBODBC.DLL or OEEXP.DLL only)

The Data Storage Configuration utility is accessed via the [Configure Schema] push button in either the EXBBODBC DLL Setup dialog box or the OpenEnterprise Export DLL Setup dialog box. It is currently used only with those two DLLs.

The purpose of the Data Storage Configuration utility is to define a schema for the ODBC-compliant database into which data will be exported. The schema defines a mapping between the fields in the original OpenBSI Data Collector / Scheduler / Harvester files and the columns in tables of the database.



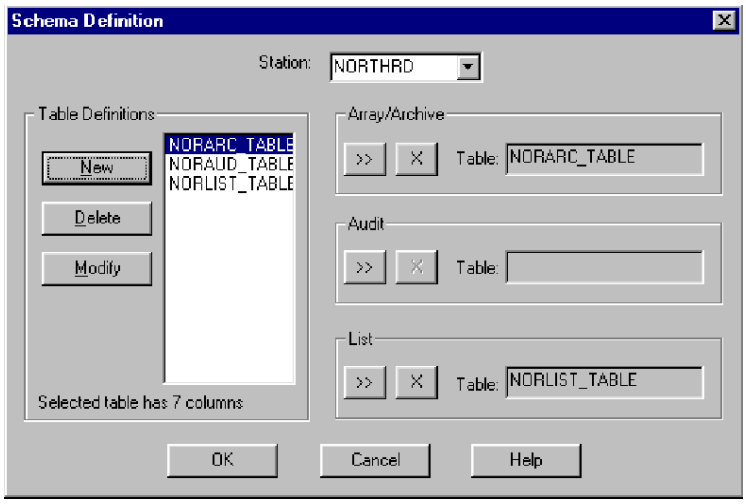
The **"Station List"** list box displays the stations previously defined using the Station File Configuration dialog box. To define a schema for a station, it must first be moved from the **"Station List"** list box to the **"Stations with Schema"** list box by clicking on the station name in the **"Station List"** list box, then click on the **[Add->]** push button. You can move all stations in this way using the **[Add All->]** push button. Similarly, you can remove stations from the **"Stations with Schema"** list box by using the **[<-Remove]** or **[<-Remove All]** push buttons.

Once a station name appears in the **"Stations with Schema"** list box, and is highlighted, you can configure it using the Schema Definition and Table Definition dialog boxes by clicking on the **[Modify Schema]** push button.

Schema Definition Dialog Box

The Schema Definition dialog box is accessed from within the Data Storage Configuration Utility dialog box by clicking on the desired station name in the

"Stations with Schema" list box, and then clicking on the **[Modify Schema]** push button.



Station

The station name, as selected in the Data Storage Configuration Utility dialog box.

Table Definitions

Tables are a critical part of the schema for every database. This list box displays a list of all tables in your database schema which have been defined via the Data Storage Utility. To create a new table, click on the **[New]** push button. To modify an existing table, click on the table name, then click on the **[Modify]** push button. In either case, the Table Definition dialog box will appear, from which you can create or modify a table. See *'Table Definition Dialog Box'* later in this addendum for details. To delete a table, click on the table name, then click on the **[Delete]** push button.

Array/Archive

This section of the dialog box lets you specify which of the tables (previously defined via the Table Definition dialog box) will hold array/archive data for this station. To specify the table, click on the table's name in the **"Table Definitions"** list box, then click on the **[>>]** push button. To remove the table currently shown in the Array/Archive section, click on the **[X]** push button.

Audit

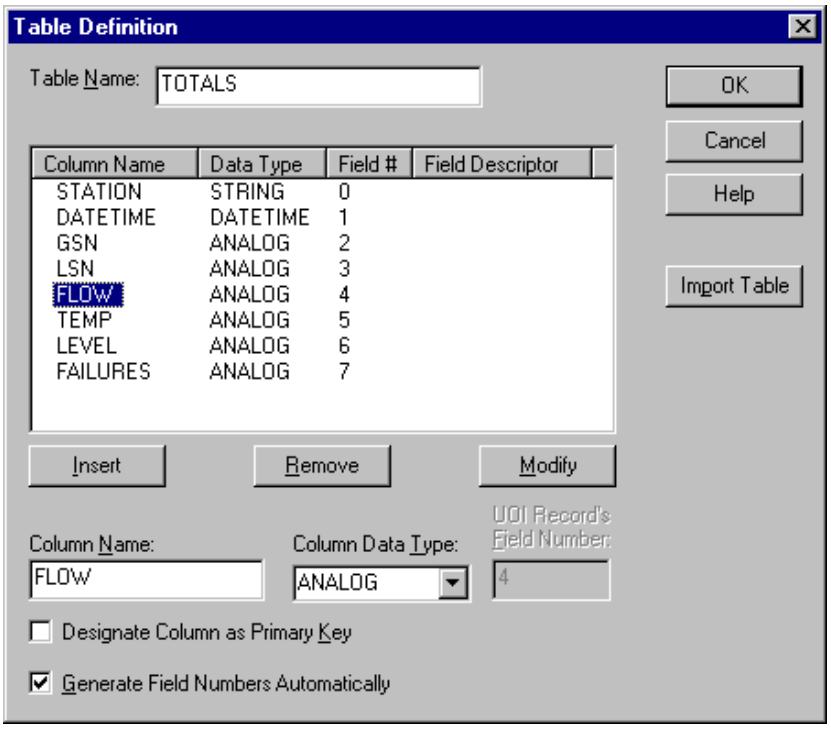
This section of the dialog box lets you specify which of the tables (previously defined via the Table Definition dialog box) will hold audit trail data for this station. To specify the table, click on the table's name in the **"Table Definitions"** list box, then click on the **[>>]** push button. To remove the table currently shown in the Audit section, click on the **[X]** push button.

List

This section of the dialog box lets you specify which of the tables (previously defined via the Table Definition dialog box) will hold signal list data for this station. To specify the table, click on the table's name in the **"Table Definitions"** list box, then click on the **[>>]** push button. To remove the table currently shown in the List section, click on the **[X]** push button.

Table Definition Dialog Box

The Table Definition dialog box is accessed by clicking on a table name in the **"Table Definitions"** list box of the Schema Definition dialog box, and then clicking on either the **[New]** or **[Modify]** push buttons.



There are two basic methods to define a table: One way is to create an all new table and define its individual columns. This is the recommended method if you are using the Extended Access DLL (EXBBODBC DLL).

The other method (required when using the OEEXP DLL) is to import an existing table from a database, and use its pre-defined columns. If you are using the OpenEnterprise Export DLL (OEEXP DLL), you MUST import the table definitions from your historical portion of your OpenEnterprise Database. Because of this, you must have already configured *both* the real time and the historical portion of your database, before you attempt to configure station schema.

Method 1: To Define Column(s) of the Table:

1. Enter a name for the column in the **"Column Name"** field. Although the choice of names is at the discretion of the user, we strongly recommend that '_TABLE' be added to the end of whichever name you choose.[22]

2. Select, ANALOG, DATETIME, LOGICAL, or STRING from the **"Column Data Type"** list box. The choice you make depends upon what type of Collector / Scheduler / Harvester data you are storing in this column. IMPORTANT: Do NOT assume, for example, that numbers should always be stored as ANALOG. Please review the notes, below, for directions as to which data type to choose for a given type of file.

NOTES ABOUT STORING **SIGNAL LIST** DATA:

- You must create at least a two-column table.

- Column 1 should be used to hold signal names. Choose a **"column name"** for it. Choose 'STRING' for the **"Column Data Type"**. Enter 1 for the **"UOI Record Field Number"**. Select **"Designate Column as Primary Key"**; the signal name, together with the station name will be used to form a unique primary key for each record in this table of the database.

- Column 2 should be used to hold signal values. Choose a **"column name"** for it. Choose 'STRING' for the **"Column Data Type"** (we choose STRING because the signal's value could be analog, logical, or string, depending upon the signal type, and STRING can store all three). Enter 2 for the **"UOI Record Field Number"**.

- If you want to use STATION names, Column 3 should be used to hold the STATION name; choose a name for this column (i.e. column can be named something other than 'STATION'). The STATION column must be made part of the primary key by selecting **"Designate Column as Primary Key"**; the signal name, together with the station name will be used to form a unique primary key for each record in this table of the database. Enter 0 for the **"UOI Record Field Number"** since there is no station field in the UOI record, only in the database.

[22] Early versions of the DLL required that there be no spaces or dashes in the column name, just an uninterrupted string of alphanumeric characters. Later versions allow underscores and/or spaces in the column name.

NOTES ABOUT STORING AUDIT TRAIL DATA:

- **IMPORTANT: IF YOU ARE USING THE OEEXP DLL (OpenEnterprise Export) you CANNOT define tables for audit trail data via this method. You must configure both the real time and historical parts of the OpenEnterprise Database *first,* and then import tables from it.**

If you are using the EXBBODBC DLL follow these instructions:

- You must define a table with six columns.

- Column 1 should be used to hold date and time information for the audit event. Choose a **"column name"** for it. Choose 'DATETIME' for the **"Column Data Type"**. Enter 1 for the **"UOI Record Field Number"**.

- Column 2 should be used to hold signal names. Choose a **"column name"** for it. Choose 'STRING' for the **"Column Data Type"**. Enter 2 for the **"UOI Record Field Number**

- Column 3 should be used to hold the audit event information. Choose a **"column name"** for it. Choose 'STRING' for the **"Column Data Type".** Enter 3 for the **"UOI Record Field Number"**.

- Beginning with OpenBSI 4.0, column 4 should be used to hold the local sequence number. Choose a **"column name"** for it. Choose 'STRING' for the **"Column Data Type".** Enter 4 for the **"UOI Record Field Number"**.

- Beginning with OpenBSI 4.0, column 5 should be used to hold the global sequence number. Choose a **"column name"** for it. Choose 'STRING' for the **"Column Data Type".** Enter 5 for the **"UOI Record Field Number"**.

- If you want to use STATION names, Column 6 should be used to hold the STATION name; choose a name for this column (i.e. column can be named something other than 'STATION'). Do NOT designate the STATION (or any other column) to be part of the primary key. Audit Trail data does NOT use a primary key. Enter 0 for the **"UOI Record Field Number"** since there is no station field in the UOI record, only in the database.

NOTES ABOUT STORING ARRAY/ARCHIVE DATA:

- **IMPORTANT: IF YOU ARE USING THE OEEXP DLL (OpenEnterprise Export) you CANNOT define tables for array/archive data via this method. You must configure both the real time and historical portions of your OpenEnterprise Database *first,* and then import tables from it.**

If you are using the EXBBODBC DLL follow these instructions:

- If **"Use All Array Record's Fields"** is checked in the EXBBOCBC DLL Setup dialog box, the number of columns you define must match exactly the number of columns in your array/archive file(s).

- If a timestamp is included in your array/archive file(s), it should be mapped to column 1 of the table. Choose a **"column name"** for it. Choose 'DATETIME' for the **"Column Data Type"**. Enter 1 for the **"UOI Record Field Number"**. Select **"Designate Column as Primary Key"**; the date and time value, together with the station name, will be used to form a unique primary key for each record in this table of the database.

- The other columns you define will be used to hold array/archive values. For each, choose a **"column name"** and choose 'ANALOG' for the **"Column Data Type"**. You can use the **"Generate Field Numbers Automatically"** method for these columns.

- If you want to use STATION names, you must define an extra column which will be used to hold the STATION name; choose a name for this column (i.e. column can be named something other than 'STATION'). The STATION column must be made part of the primary key by selecting **"Designate Column as Primary Key".** Enter 0 for the **"UOI Record Field Number"** since there is no station field in the UOI record, only in the database.

3. Enter a **"UOI Record Field Number"** to map the column of the table to the appropriate field from the Data Collector / Scheduler / Harvester array/archive, audit trail or list file(s), or check the **"Generate Field Numbers Automatically"** to have field numbers assigned automatically.[23] NOTE: In most cases, you will want to explicitly define field numbers, rather than let them be generated automatically, to ensure proper mapping. This is especially true in the case of the STATION, which must be field 0 because there is no station field in the UOI record, but a STATION must be part of the database record. Please review the notes, above, for directions as to which field numbers to use for a given type of file.

4. If this column should be part of the primary key of the table, check the **"Designate**

[23] *Data files collected by the OpenBSI Data Collector, OpenBSI Scheduler or OpenBSI Harvester are sometimes generically referred to as UOI files because they follow the same format as files generated by the Universal Operator Interface (UOI) software. When we say UOI files, we are referring to data array/archive files, audit trail files, or signal list files collected by the Scheduler, Data Collector, or Harvester.*

Column as Primary Key" selection. (See the notes, on the previous pages to determine which columns should be part of the primary key.)

5. Click on the **[Insert]** push button to add the column to the table.

NOTE: If you make a mistake, you can change the column definition by clicking on the column name in the list box, then making changes in various fields (the same fields used to create the column), and then clicking on the **[Modify]** push button. You can also delete a column definition by clicking on the column name in the list box, and then clicking on the **[Remove]** push button.

Method 2: Importing the Table: (Required Method When Using the OEEXP DLL to export array/archive or audit trail data.)

IMPORTANT
If you are using OpenEnterprise Export (OEEXP DLL) you must have created *both* the real time and historical portions of your OpenEnterprise Database. For help on the historical portion, see *'Examples For Configuring the OpenEnterprise Historical System'* later in this addendum.

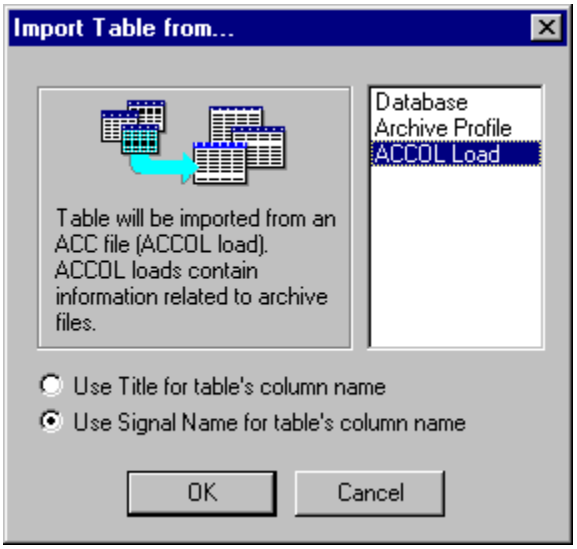
To import a pre-existing table (rather than defining one as described in Method 1), click on the **[Import Table]** push button in the Table Definition dialog box.

You have three different choices as to the source from which you want to import the table:

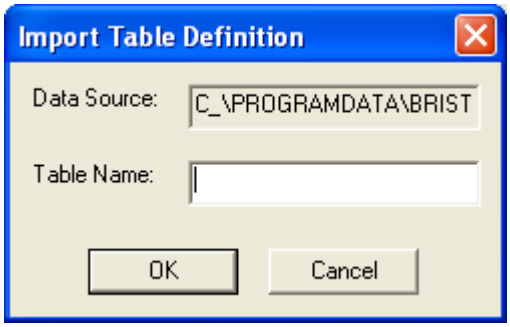
Database

Archive Profile

ACCOL Load



Import Table From Database



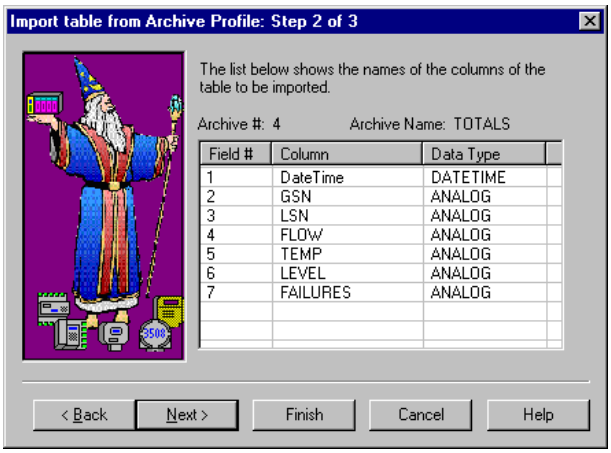
Before attempting to import tables from a database, you must have already created them in your database, and they must include a STATION column.

When 'Database' is selected from the list, and you click on **[OK]** the Import Table Definition dialog box will appear. This allows you to import a table from an existing relational database that is involved in the export process, such as Microsoft Access or SQL Server. Enter the **"Table Name"** you want to import and click on **[OK]**, to import the table. The first column of the database table will be mapped to field 1 of the UOI record's field.

Import from Archive Profile (ControlWave-series ONLY)

When 'Archive Profile' is selected from the Import Table from list, and you click on **[OK]**, you will be prompted to locate a Flash Configuration Profile (*.FCP) file. (FCP files are created using the Flash Configuration Utility). Selection of the requested FCP file will activate the Import from Archive Profile Wizard.

In the first page of the wizard, simply choose one of the listed Archive Files from which you want to import the table columns. Then click on **[Next]**.



The second page of the wizard lists the names of the columns which will be imported into the database. If any modifications are required they can be made through the Table Definition dialog box after the table has been imported.

(NOTE: If you realize, at this point, that you've chosen the wrong Archive file, click on **[Back]** to choose a different one.)

If you don't want to rename the table, you can click on **[Finish]**, and the table will be imported. If you want to rename the table, click on **[Next]** to bring up the third page.

In the third page of the wizard, you have the option of renaming the table, prior to importing it. If you want to rename it, enter a new name in the **"Import to table"** field; otherwise, just leave it at the default name, which is the Archive file name. Finally, click on **[Finish]** to actually import the table

Import from ACCOL Load (Network 3000-series ONLY)

When 'ACCOL Load' is selected from the Import Table from list, a table schema will be built for archive files whose definitions were specified during construction of your ACCOL load.

Since the ACC file associates an ACCOL signal with each column of the archive record, the user has the choice of how to name the column in the new table. If **"Use Signal Name for table's column name"** is chosen, each column of the imported table will be named after its associated ACCOL signal. If **"Use Signal Name for table's column name"** is chosen, each column of the imported table will be named after the archive record column's title.

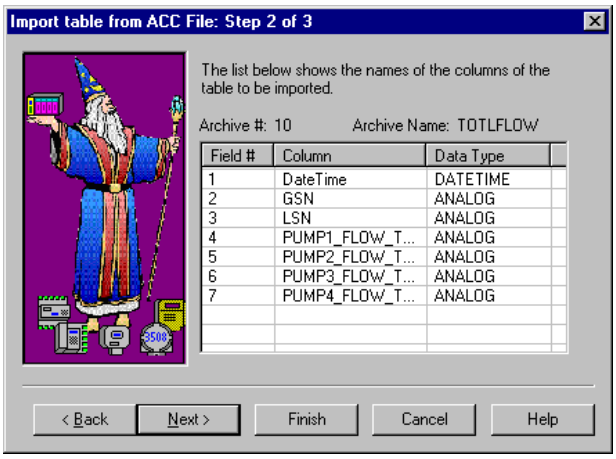
After you have done so, the Import from ACC File Wizard will be started.

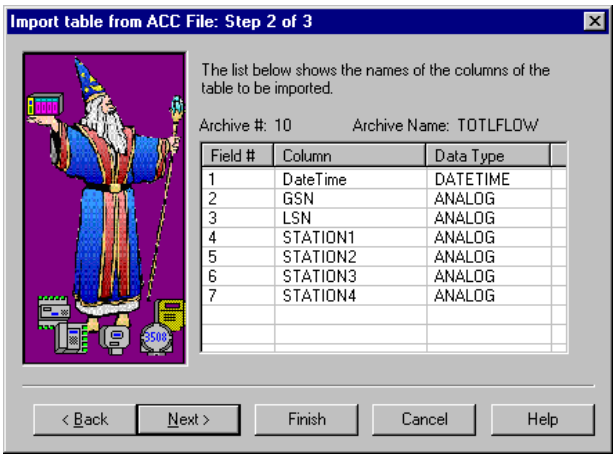
> NOTE
>
> Column names are limited to 16 characters. If you choose signal names for the column names, the signal names will be truncated to the first 16 characters. If, because of the truncation, duplicate column names result (because the first 16 characters of more than one signal are the same), an error message will result.

In the first page of the wizard, simply choose one of the listed Archive Files from which you want to import the table columns. Then click on **[Next]**.

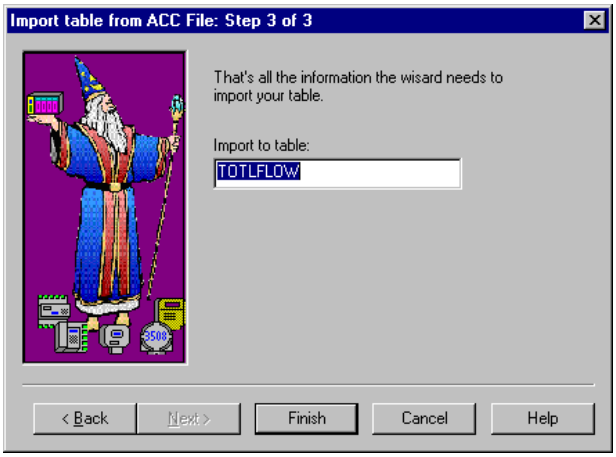
The second page of the wizard lists the names of the columns which will be imported into the database. If you chose signal names for the column names, they will appear; if you chose column

titles for the column names, they will appear. If you don't want to rename the table, you can click on **[Finish]**, and the table will be imported. If you want to rename the table, click on **[Next]** to bring up the third page.





In the third page of the wizard, you have the option of renaming the table, prior to importing it. If you want to rename it, enter a new name in the **"Import to table"** field; otherwise, just leave it at the default name, which is the Archive file name. Finally, click on **[Finish]** to actually import the table



The column names of the imported table will be entered in the list box of the Table Definition dialog box (overwriting any columns you defined yourself). Since in this case the mapping between the column names and the fields in the Collector / Scheduler / Harvester data files is not known, the first table's column will be mapped to field 1 the second column to field 2 and so on. You can adjust this mapping by entering new values in the **"UOI Record Field Number"** and clicking on the **[Modify]** push button.

Examples for Configuring the OpenEnterprise Historical System

Array/archive and audit records are exported to the historical subsystem of the Open Enterprise Database. The historical system provides a set of tables, which define what data should be stored for retrieval at a later time. These tables should be configured by inserting specific records into them. This configuration can be performed by using the OpenEnterprise SQL Client, as follows:

1. Create the source tables

The schema of a source table is a close image of the format of the array/archive or audit record. A source table should be created with as many columns as fields in the record, plus a column named STATION, which will store the name of the station from which the records were collected. The STATION column must be the primary key in the table, and must have a data type of char. (For array/archive data records, the source tables must have an extra column named TRIGGER_UPDATE of data type integer. See Example 1 and Example 3).

2. Set up the OELogControl Table

Entries in the OELogControl table should be inserted to prompt monitoring of data in the Source Tables. These entries are known as Stream Instances.

3. Set up the OELogColumn Table

Entries should be inserted into the OELogColumn table in order to determine which columns of the source table should be monitored, and to define the names of the columns of the destination table where data records will be logged.

4. Set up the OELogData Table

Entries should be made to the OELogData table to determine how often data should be retrieved from a stream. These entries are known as data sets.

5. Create Access Tables

Once one or more data sets have been established for a stream, the stream may specify access tables. These are tables that an operator using the SQL Client could use to view historically logged data using standard SQL queries. They are created by updating the OELogControl table's raw column.

OpenEnterprise Historical Example 1

The following SQL, DDL and DML statements provide an example of the steps that have to be performed in order to configure the historical component of the OpenEnterprise database, for storing array/archive records into the historical tables (Statements appearing in *italics* are comments. This example assumes that array/archive records collected from station dpu1_station have 3 fields (one datetime field and two analog value fields).

Create the source table; OEEXP DLL will insert/update array records in this table for logging them into historical database.

```
create table dpu1_station
(
        PERSISTENT,
        PRIMARY KEY (station),
        station             char,
        trigger_update      integer,
        rectimestamp        datetime,
        signal_01           real,
        signal_02           real
);
```

Create a stream for monitoring of data in the source table.

```
insert into oelogcontrol (id, source, namecolumn, enable, triggercolumn) values
(1, 'dpu1_station', 'station', true, 'trigger_update');
commit;
```

Set up the columns of the source table to be monitored.

```
insert into oelogcolumn (control, name, type, sourcecolumn) values
(1, 'rectimestamp', 0, 'rectimestamp');
insert into oelogcolumn (control, name, type, sourcecolumn) values
(1, 'signal_01', 0, 'signal_01');

insert into oelogcolumn (control, name, type, sourcecolumn) values
(1, 'signal_02', 0, 'signal_02');
commit;
```

Determine how often array data should be retrieved from the stream.

```
insert into oelogdata (rate, control, buffercount, buffersize, archdirectory,
archbuffercount) values ('0s', 1, 10, 10240, 'c:\histfiles', 9);
commit;
```

Create the Access table.

```
update OELogControl set raw='dest_table' where id=1;

commit;
```

OpenEnterprise Historical Example 2:

The following SQL, DDL and DML statements provide an example of the steps that have to be performed in order to configure the historical component of the OpenEnterprise Database, for storing audit records into the historical tables (Statements appearing in *italics* are comments.)

Create the source table. OEEXP DLL will insert/update audit records in this table for logging them in the historical database.

```
create table audit_event_source
(
        PERSISTENT,
        PRIMARY KEY (station),
        station                 char,
        eventtimestamp          datetime,
        signal_name             char,
        remote_event            char
);
```

Create a stream for monitoring of data in the source table.

```
insert into oelogcontrol (id, source, namecolumn, enable) values
(2, 'audit_event_source', 'station', true);

commit;
```

Set up the columns of the source table to be monitored.

```
insert into oelogcolumn (control, name, type, sourcecolumn) values
(2, 'eventtimestamp', 0, 'eventtimestamp');
insert into oelogcolumn (control, name, type, sourcecolumn) values
(2, 'signal_name', 0, 'signal_name');
insert into oelogcolumn (control, name, type, sourcecolumn) values
(2, 'remote_event', 0, 'remote_event');
commit;
```

Determine how often audit events should be retrieved from the stream.

```
insert into oelogdata (rate, control, buffercount, buffersize, archdirectory,
archbuffercount) values ('0s', 2, 10, 1024, 'c:\histfiles', 9);
commit;
```

Create the Access table.

```
update OELogControl set raw='dest_table' where id=2;
commit;
```

Example 3:

The following SQL, DDL and DML statements provide an example of the steps that have to be performed in order to configure the historical component of the OpenEnterprise Database, for storing array/archive records. (Statements appearing in *italics* are comments. This example assumes that array/archive records are collected from two stations dpu1 and dpu2. Records from dpu1 have 4 fields (one datetime field and three analog value fields), while records from dpu2 have 3 analog value fields.

Create the source tables. OEEXP DLL will insert/update array records in these tables for logging into historical database.

```
create table dpu1
(
        PERSISTENT,
        PRIMARY KEY (station),
        station             char,
        trigger_update      integer,
        rectimestamp                datetime,
        flow                real,
        temperature         real,
        pump_status                 real
);

create table dpu2

(
        PERSISTENT,
        PRIMARY KEY (station),
        station             char,
        trigger_update      integer,
        pressure_1          real,
        pressure_2          real,
        pressure_3          real
);
```

Create the streams for monitoring of data in the source tables.

```
insert into oelogcontrol (id, source, namecolumn, enable, triggercolumn) values
(3, 'dpu1', 'station', true, 'trigger_update');
insert into oelogcontrol (id, source, namecolumn, enable, triggercolumn) values

(4, 'dpu2', 'station', true, 'trigger_upate');
commit;
```

Set up the columns of the source tables to be monitored.

```
insert into oelogcolumn (control, name, type, sourcecolumn) values
(3, 'rectimestamp', 0, 'rectimestamp');
insert into oelogcolumn (control, name, type, sourcecolumn) values
(3, 'flow', 0, 'flow');
insert into oelogcolumn (control, name, type, sourcecolumn) values
(3, 'temperature', 0, 'temperature');

insert into oelogcolumn (control, name, type, sourcecolumn) values
(3, 'pump_status', 0, 'pump_status');
insert into oelogcolumn (control, name, type, sourcecolumn) values
(4, 'pressure_1', 0, 'pressure_1');
insert into oelogcolumn (control, name, type, sourcecolumn) values
(4, 'pressure_2', 0, 'pressure_2');
insert into oelogcolumn (control, name, type, sourcecolumn) values
(4, 'pressure_3', 0, 'pressure_3');

commit;
```

Determine how often array data should be retrieved from the streams.

```
insert into oelogdata (rate, control, buffercount, buffersize, archdirectory,
archbuffercount) values ('0s', 3, 10, 1024, 'c:\histfiles', 9);
insert into oelogdata (rate, control, buffercount, buffersize, archdirectory,
archbuffercount) values ('0s', 4, 10, 1024, 'c:\histfiles', 9);
commit;
```

Create the Access tables.

```
update OELogControl set raw='dpu1_dest_table' where id=3;
commit;
```

or

Create the Access table.

```
update OELogControl set raw='dpu2_dest_table' where id=4;
commit;
```

Exporting Data Using the PI Batch Database Conversion (PIBDC) DLL

The PI Batch Database DLL converts data from arrays, archive files, audit files, and signal lists to a file that can be imported into the PI Database.

The user must create a text file that defines the mapping between the source data file and the tag names that will be used in the PI Database. The PI Batch Database DLL can then automatically generate a file containing the tag names, timestamps, and the actual data values for import into the PI Database.

The PI Tag Mapping file is a text (*.TXT) file. Entries in the file must follow the format shown below:

rtu_name, *structure_type, structure_number*, *element_number*, *tag_name*

where *rtu_name* is the name of the controller from which the data is collected.

structure_type is the UOI file type of data being collected. The supported choices are:

1 = data array
2 = audit file
3 = signal list
4 = archive file

structure_number is the number assigned to the array, archive file, or signal list from which you are collecting data.

element_number is the position in the structure from which the data will come. This would correspond to the Archive File column number, array column number, or signal list entry number.

tag_name is the tag name used to represent this data in the PI Database. Spaces are not allowed in the tag name.

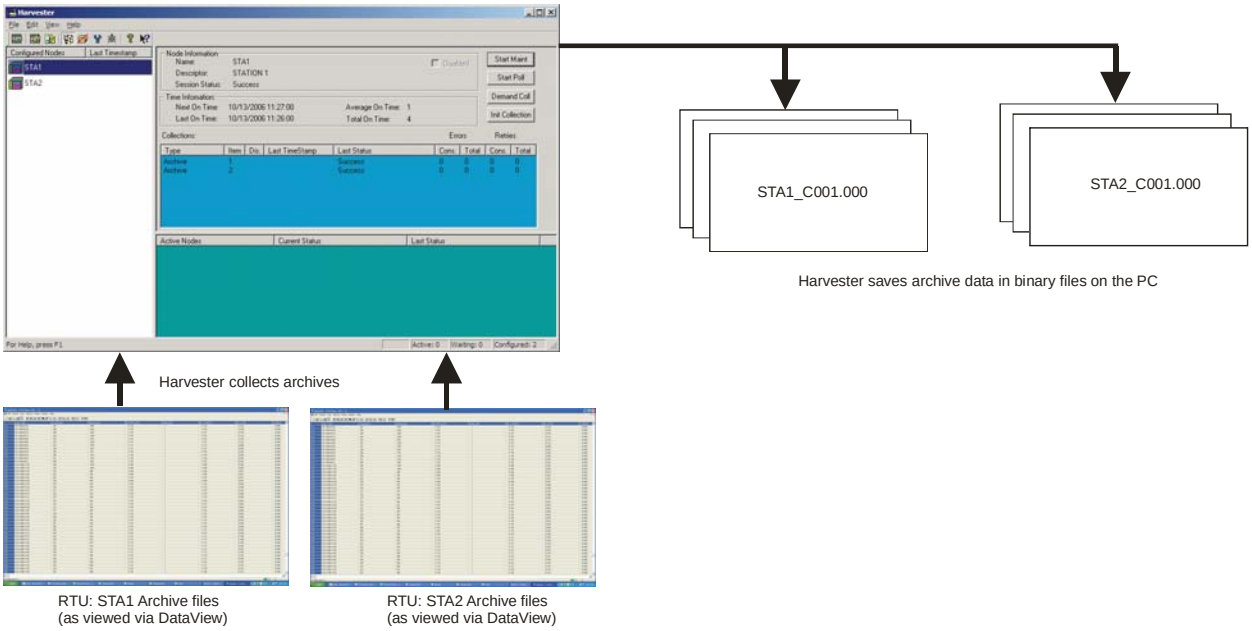
See the example, below, for more on creating the Tag Mapping file.

Example:

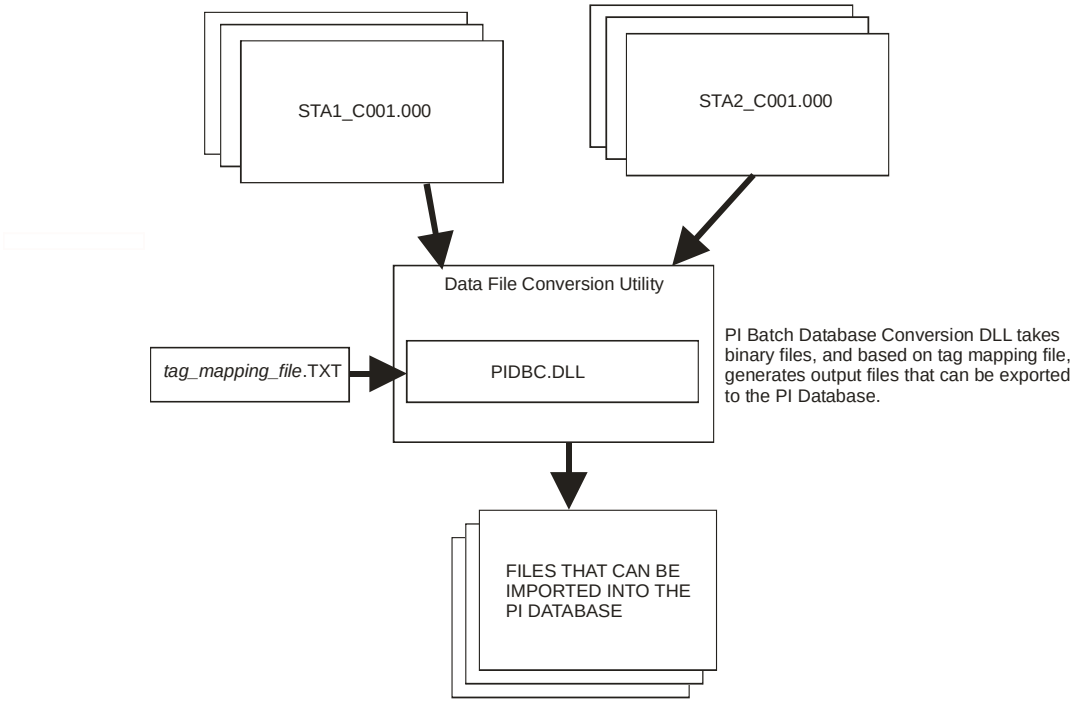
Two ControlWave controllers, named STA1 and STA2 are used to monitor electrical data and pressure at two different sites, though they are running identical application programs.

Each controller has two archives. Archive 1 collects battery voltage, communication request status, input voltage, a resistance temperature device (RTD) reading, and current. Archive 2 collects the outlet pressure.

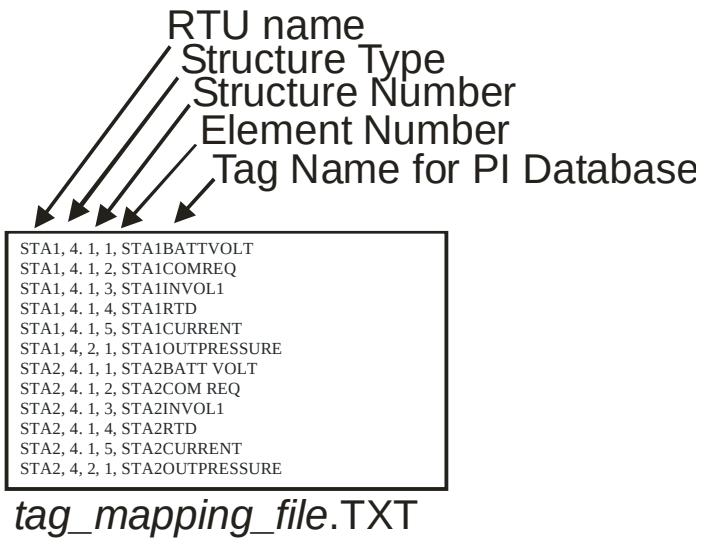
The Harvester collects these archives, and stores the archive data in binary files at the PC.



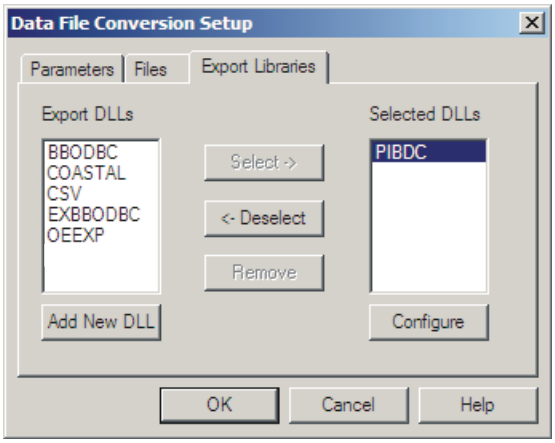
The PI Batch Database Conversion DLL (PIDBC) needs to know which columns of archive file data will be assigned to which tag names in the PI Database. To specify this, you must create a Tag Mapping file.



Tag Mapping files have a file extension of *.TXT. A Tag Mapping file for this example is shown below:



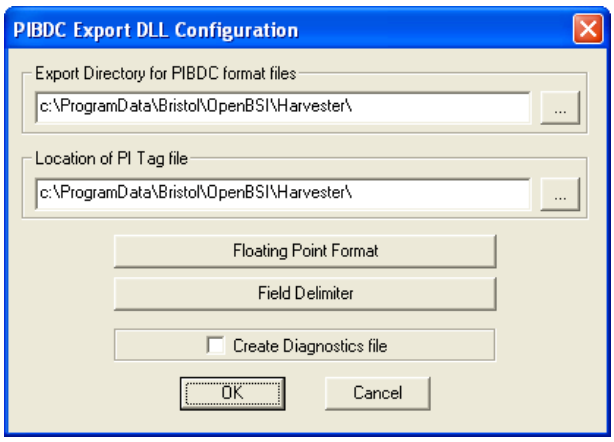
Once the Tag Mapping file has been created, you can proceed to set up the DLL.



With all exporting stopped, the PIBDC DLL must be highlighted by clicking on it in the **"Export DLLs"** list box of the 'Export Libraries' page of the Data File Conversion Setup dialog box. It is then moved to the **"Selected DLLs"** list box by clicking on the **[Select->]** push button.

Now click on the **[Configure]** button to call up the PIBDC Export DLL Configuration dialog box.

In the PIBDC Export DLL Configuration dialog box, complete the fields as described, below, and then click on the **[OK]** push button. This causes the changes to be read by the Data File Conversion Utility.



Then click on **[OK]** to exit the Data File Conversion Setup dialog box.

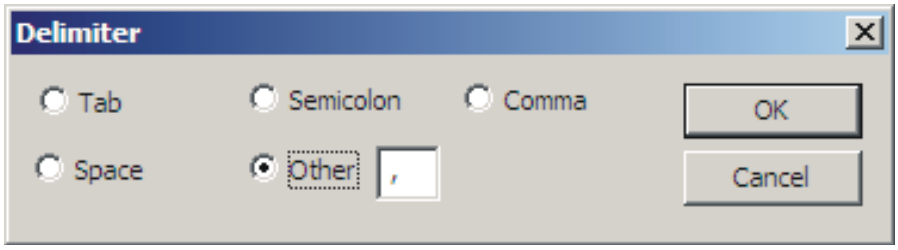
Finally, re-start the export process.

Directory for PIBDC files — The directory / folder where the converted files that will be imported into the PI Database are stored. Click on the **[…]** button to specify the directory.

Location of PI Tag file — The path and filename of the tag mapping file. The Tag Mapping file specifies the tag names that will be used in the PI Database for the data to be exported. Click on the **[…]** button to specify the path and tag mapping filename.

Floating Point Format Click here to call up the Change Floating Point Format dialog box, to allow you to specify the floating point precision used to display the exported data. See *Using the Floating Point Format dialog box* earlier in this document.

Field Delimiter Click here to call up the Delimiter dialog box. This dialog box allows you to specify what character (tab, comma, etc.) will be used in the converted file to separate one data field from the next data field. The choice of a delimiting character depends upon the application/database which will be using the converted file. Choose whichever delimiting character is required by your application/database, and click on **[OK].**



Create Diagnostics file When this is checked, a log will be maintained concerning the PI Batch Database DLL's operation.

Format of Files Generated for the PI Database

Each file generated for export to the PI Database is named according to a convention that indicates the timestamp when the file was created:

PIBDC*YYYYMMDDhhmmssxxx*.**TXT**

where:

YYYY	is the four digit year
MM	is the two digit month
DD	is the two digit day
hh	is the two digit hour in 24-hour format
mm	is the two digit second
ss	is the two digit second
xxx	is the three digit milliseconds

Example:

PIBDC20061025075103967.TXT

is the PI Database file created on October 25, 2006 at 07:51:03:967

The contents of the files generated for the PI Database vary depending upon the original type of data being converted.

Array and Archive Files

Typical contents of an array or archive PI Database file are shown, below:

```
Tag Name          Date/Time Stamp        Value
|                 |                      |
DIFF_PRESSURE,09-OCT-2006 09:00:56,0
STATIC_PRESSURE,09-OCT-2006 09:00:56,0
TEMPERATURE,09-OCT-2006 09:00:56,0
FREQUENCY,09-OCT-2006 09:00:56,0
DIFF_PRESSURE,09-OCT-2006 09:15:00,0
STATIC_PRESSURE,09-OCT-2006 09:15:00,0
TEMPERATURE,09-OCT-2006 09:15:00,0
FREQUENCY,09-OCT-2006 09:15:00,0
DIFF_PRESSURE,09-OCT-2006 09:30:00,0
STATIC_PRESSURE,09-OCT-2006 09:30:00,0
TEMPERATURE,09-OCT-2006 09:30:00,0
FREQUENCY,09-OCT-2006 09:30:00,0
DIFF_PRESSURE,09-OCT-2006 09:45:00,0
STATIC_PRESSURE,09-OCT-2006 09:45:00,0
TEMPERATURE,09-OCT-2006 09:45:00,0
FREQUENCY,09-OCT-2006 09:45:00,0
```

Audit Files:

Typical contents of an audit PI Database file are shown, below:

```
AudTag.01,1,12-OCT-2006 14:01:31   ←Date/Timestamp for first record
AudTag.02,1,SYSTEM TIME            ←Signal or Event Name for first record
AudTag.03,1,                       ← Descriptor for first record
AudTag.04,1,333                    ← Global Sequence number for first record
AudTag.05,1,1014                   ← Local Sequence number for first record
AudTag.01,2,12-OCT-2006 14:51:37   ←Date/Timestamp for second record
AudTag.02,2,SYSTEM TIME            ←Signal or Event Name for second record
AudTag.03,2,                       ←Descriptor for second record
AudTag.04,2,334                    ←Global Sequence Number for second record
AudTag.05,2,1037                   ←Local Sequence Number for second record
AudTag.01,3,12-OCT-2006 15:41:45   ←Date/Timestamp for third record
AudTag.02,3,SYSTEM TIME            ←Signal or Event Name for third record
AudTag.03,3,                       ←Descriptor for third record
AudTag.04,3,335                    ←Global Sequence Number for third record
AudTag.05,3,1063                   ←Local Sequence Number for third record
  :
  :
```

Format of List File:

The format of a typical list PI Database file is shown, below:

LIST_0.00,1,@GV.R1_VOLUME_ACCUM ← Variable/sig name for list element 1
LIST_0.01,1,0 ← Value of list element 1

LIST_0.00,2,@GV.R1_ENERGY_ACCUM ← Variable/sig name for list element 2
LIST_0.01,2,0 ← Value of list element 2

LIST_0.00,3,@GV.R1_VOLUME_MONTH ← Variable/sig name for list element 3
LIST_0.01,3,0 ← Value of list element 3

LIST_0.00,4,@GV.R1_VOLUME_LMONTH ← Variable/sig name for list element 4
LIST_0.01,4,0 ← Value of list element 4

LIST_0.00,5,@GV.R1_ENERGY_MONTH ← Variable/sig name for list element 5
LIST_0.01,5,0 ← Value of list element 5

LIST_0.00,6,@GV.R1_ENERGY_LMONTH ← Variable/sig name for list element 6
LIST_0.01,6,0 ← Value of list element 6

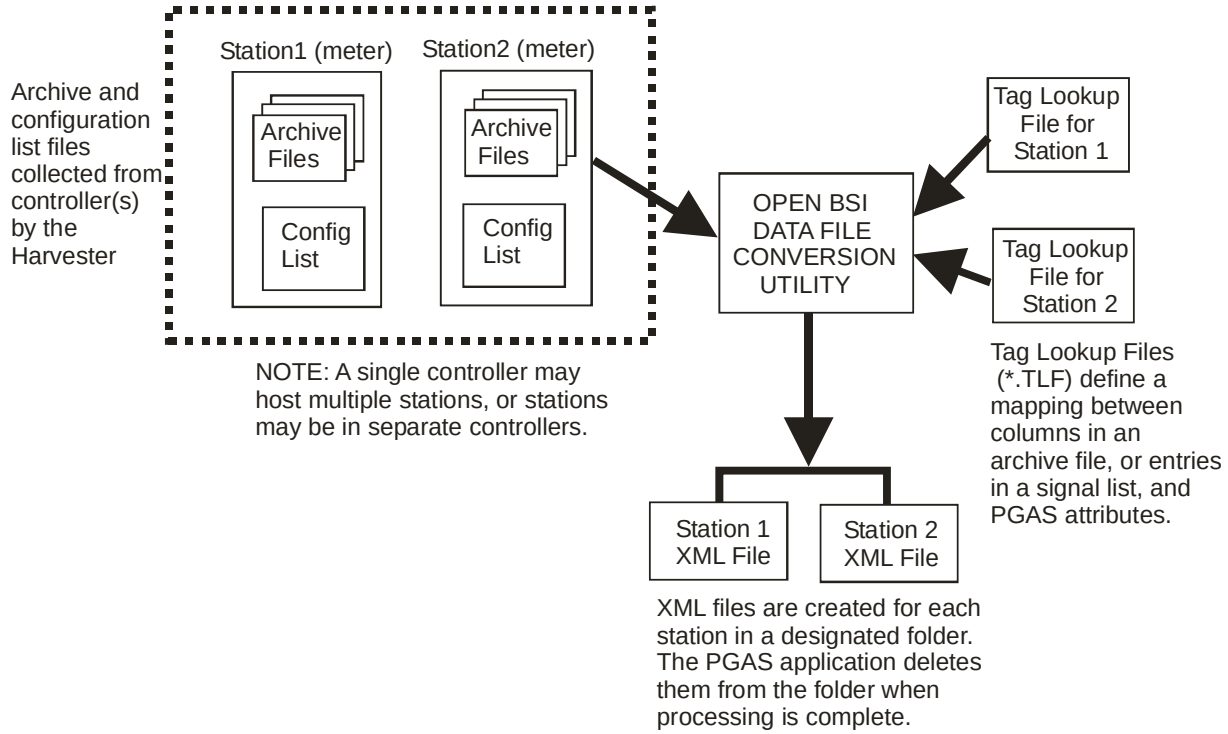
LIST_0.00,7,@GV.R1_FLOWTIME_TODAY ← Variable/sig name for list element 7
LIST_0.01,7,0 ← Value of list element 7

LIST_0.00,8,@GV.R1_FLOWTIME_CURR ← Variable/sig name for list element 8
LIST_0.01,8,0 ← Value of list element 8

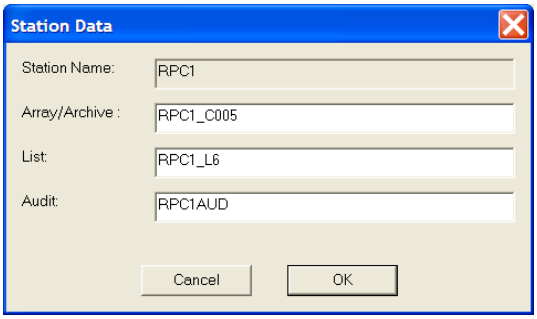
Exporting Data Using the PGAS DLL

The PGAS DLL converts data from archive files, audit files, and signal lists to XML files that can be imported into the PGAS application.

A PGAS XML file can contain either meter data from an Electronic Flow Meter (EFM) such as gas volumes, events and alarms, or it can contain gas quality data from a chromatograph.



Before using the PGAS Export DLL, you must have identified the structures that make up a given station. Normally, this is done as part of configuring the Harvester To view/change the names used, all exporting must be stopped, then, click **File → Station**. The Station File Configuration dialog box will appear.



Now, select the station name, and click on the **[Add]** or **[Modify]** button to specify the file basenames for the archive, list, and audit files associated with this station (meter) in the Station Data dialog box.

Archive file basenames should follow the format:

rtuname_Carchive_number

where	*rtuname*	is the controller name
	archive_number	is the archive file number

Example: Archive file 005 in an RTU named 'RPC1' would be RPC1_C005

List file basenames should follow the format: *rtuname*_L*listnumber*

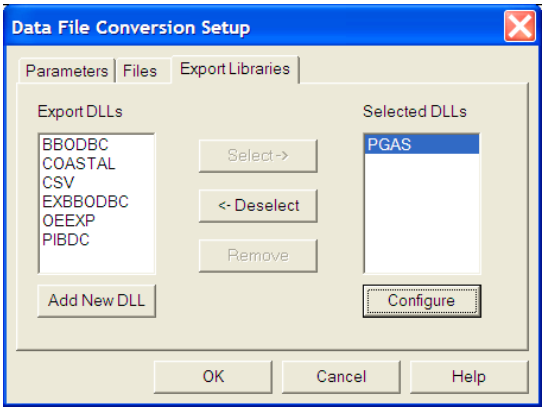
where	*rtuname*	is the controller name
	listnumber	is the number of the signal list

Example: List 6 in an RTU named 'RPC1' would be RPC1_L6

Click on **[OK]** when finished.

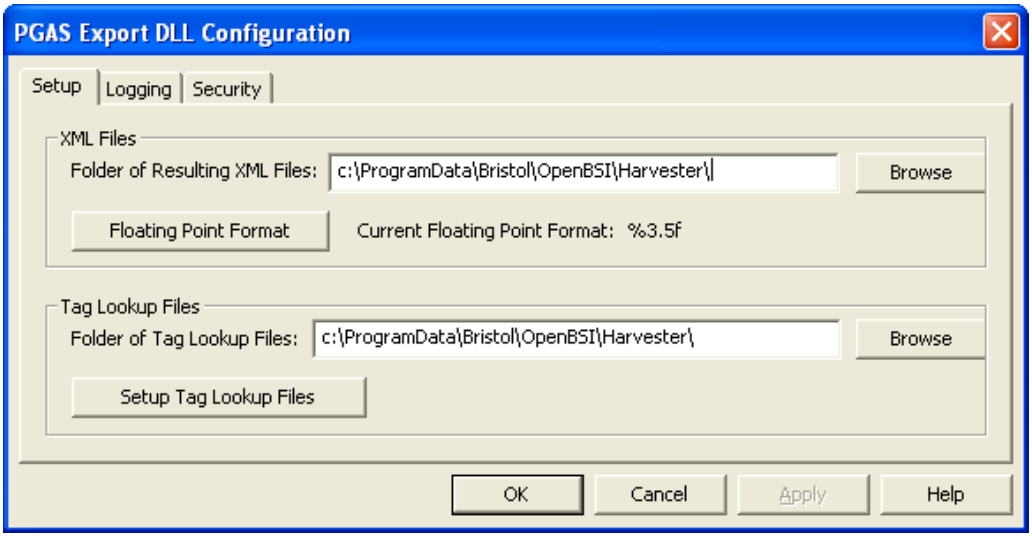
NOTE: The **"Station Name"** is used as the file basename for the XML file.

Click on **File → Initialization**, and go to the 'Export Libraries' tab of the Data File Conversion Setup dialog box. Click on 'PGAS' in the **"Export DLLs"** box, then click on the **[Select->]** button. 'PGAS' now appears in the **"Selected DLLs"** list box.



Now, click on the **[Configure]** button, and the PGAS Export DLL Configuration dialog box will appear.

Setup Page:



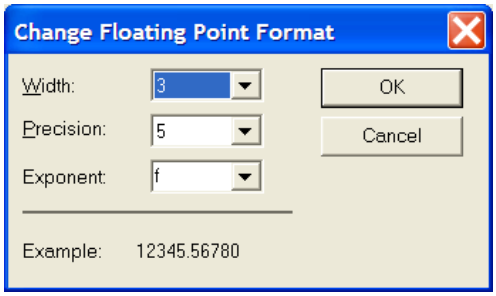
XML Files:

Folder of Resulting XML — The XML file, generated as a result of the conversion, is stored in this folder. The PGAS application looks in this folder to access each XML file, and deletes the XML file,

after processing. Use the **[Browse]** button to specify the location of the folder.

Current Floating Point Format — Displays the defined width, precision, and format of data as it will appear in the XML file.

[Floating Point Format] — Click on this button to alter the floating point format.



Use the **"Width"** list box to specify the total number of characters in the field (including the decimal point) when displaying a floating point number.

Use the **"Precision"** list box to choose the number of places to the right of the decimal point which should be displayed.

Use the **"Exponent"** list box to choose floating point format 'f', exponential notation 'e' or choose 'g' for the 'best fit' format, based on available space.

Tag Lookup Files:

Folder of Tag Lookup — The Tag Lookup File specifies a mapping between archive file columns or signal list entries and attributes used in the PGAS application. The Data File Conversion Utility looks in this folder to access each Tag Lookup File. Use the **[Browse]** button to specify the location of the folder.

[Setup Tag Lookup Files] — Click on this button to call up the Tag Lookup File Configuration dialog box. The Tag Lookup File Configuration dialog box allows you to define the mapping of signals and archive columns to PGAS attributes.

Tag Lookup File Configuration dialog box:

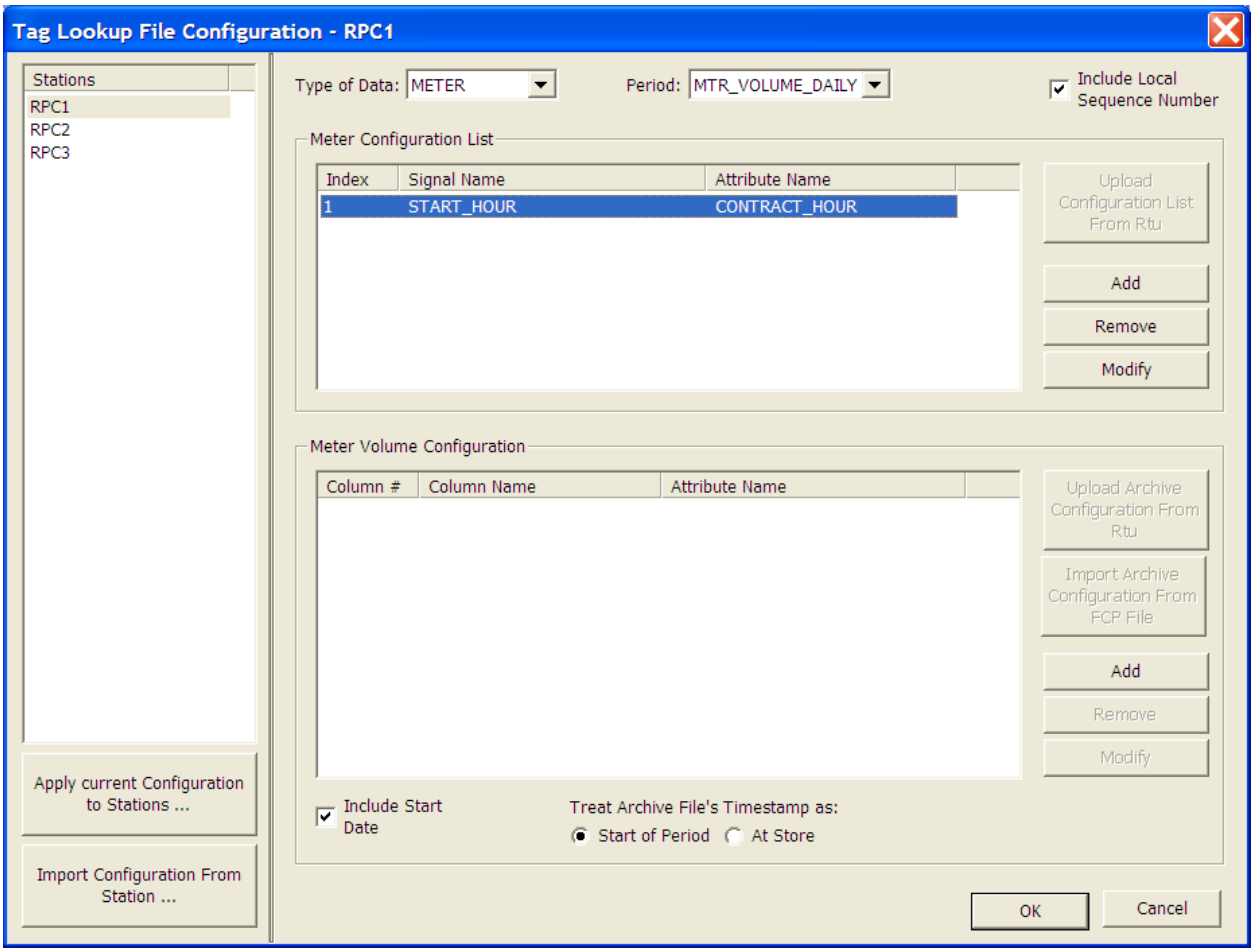
Each station has its own Tag Lookup File, with the station name used as the file basename, and an extension of *.TLF. If you have an existing station configuration that you want to re-use for this station, click on the **[Import Configuration from Station]** button to load the station data, then modify it as necessary.

If you do NOT have an existing station configuration to re-use, first select the **"Type of Data"** and the **"Period"**, then configure the Meter Configuration List mapping or Meter Volume Configuration mapping.

Meter Configuration List:

If you choose 'METER' as the type, and you are currently communicating with the controller, click on the **[Upload Configuration List From Rtu]** button to select the list, and bring it into the **"Meter Configuration List"** window. Then use the **[Modify]** button for each signal to call up the Map Signal to Archive Attribute Name dialog box, and assign the corresponding attribute to the signal.

If you are not currently communicating with the controller, use the **[Add]** button to call up the Map Signal to Archive Attribute Name dialog box, to identify each signal in the configuration list, via its position in the list, and its name, and then assign the corresponding attribute to the signal.



Stations — This lists all stations. Stations identify, for the utility, the file basenames of the archive, audit, and list files used in the conversion.

Type of Data — Type of data may be either 'METER' or

‘GAS_QUALITY’.

Period

If this is a ‘METER’-type file, **“Period”** can be either:

‘MTR_VOLUME’ (hourly data)
or ‘MTR_VOLUME_DAILY’ (daily data)

Meter data can come from both signal lists, and archive files.

If this is a ‘GAS_QUALITY’-type file, **“Period”** can be ‘GQ_PERIODIC’. Gas quality data only comes from archive files.

Include Local Sequence Number

If checked, the local sequence number of the archive is included in the XML file.

Meter Configuration List

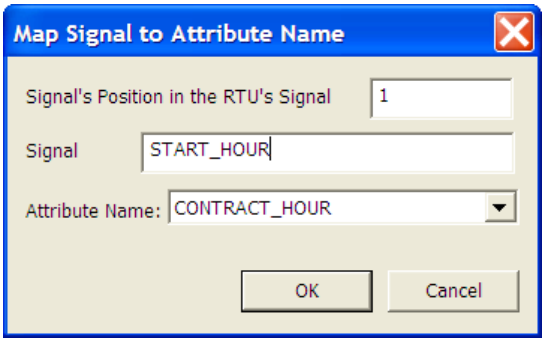
This is a list of signals that will be mapped to PGAS meter attributes.

[Upload Configuration List From Rtu]

If you are currently communicating with the controller, you can click on this button to upload an existing configuration list into the “Meter Configuration List window”, thereby simplifying the configuration for this station file, since you only need to define the attribute name for each signal, via the **[Modify]** button.

NOTE: For this to work correctly, the station file’s list name, must follow the format described, earlier, in this section.

[Add]



To map signals to PGAS attributes, identify a signal’s position in the Configuration List, then enter the signal’s name. Finally, use the **“Attribute Name”** selection box to choose the corresponding PGAS attribute. Click on **[OK]** when finished.

[Remove]

To delete an entry from the Meter Configuration List, click on it, then click on **[Remove]**.

[Modify]

To change an entry from the Meter Configuration List, click on it, then click on **[Modify]**. The Map Signal to Attribute Name dialog box will appear and allow you to change the entry.

Meter Volume Configuration

This is a list of archive columns to be mapped to PGAS attributes.

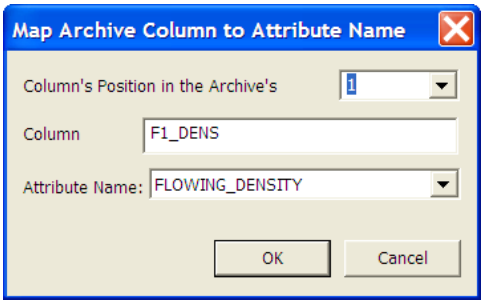
[Upload Archive Configuration From Rtu]

If you are currently communicating with the controller, you can click on this button to upload the archive file's column data into the Meter Volume Configuration window, thereby simplifying the mapping process since you only need to define the attribute name for each column, via the **[Modify]** button. NOTE: For this to work correctly, the station file's archive name must follow the format described, earlier, in this section.

Import Archive Configuration From FCP File

If you have a Flash Configuration Profile (FCP) file, you can click on this button to load the archive file's column data into the Meter Volume Configuration window, thereby simplifying the mapping process since you only need to define the attribute name for each column, via the **[Modify]** button. NOTE: For this to work correctly, the station file's archive name must follow the format described, earlier, in this section.

[Add]



To map columns of the archive to PGAS attributes, identify the column, then enter the column name. Finally, use the **"Attribute**

Name” selection box to choose the corresponding PGAS attribute. Click on **[OK]** when finished.

[Remove]

To delete an entry from the Meter Volume Configuration window, click on it, then click on **[Remove]**.

[Modify]

To change an entry from the Meter Volume Configuration window, click on it, then click on **[Modify]**. The Map Archive Column to Attribute Name dialog box will appear, allowing you to change the entry.

Include Start Date

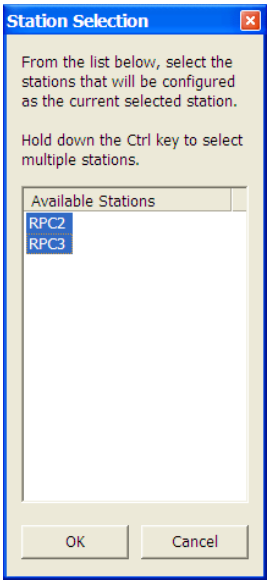
If checked, the start date will be included in the XML file.

Treat Archive File’s Timestamp As ‘Start of Period’ *-or-* **‘At Store’**

The timestamp for archive records in a file can represent the moment the record was stored in the file, i.e. **“At Store”** or they can represent the start of the interval over which the data was collected, i.e. **“Start of Period”**. Choose one of these, based on your system requirements.

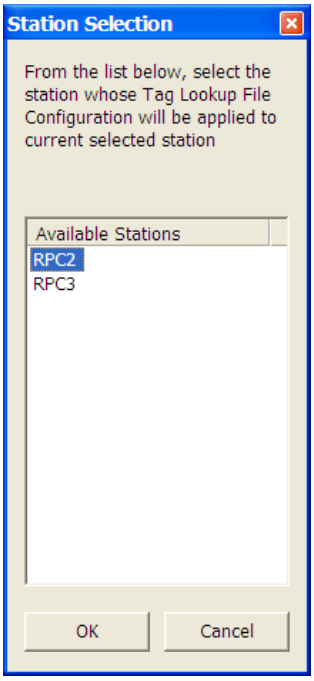
[Apply Current Configuration to Stations]

If you have multiple stations for which you want to have similar configurations, click on this button. In the Station Selection dialog box, hold down the **[Ctrl]** key and select all the stations for which you want to set up a common configuration, then click on **[OK]** and the configuration of the station will be applied to all of the selected stations, which you can then modify, as needed.



[Import Configuration From Station]

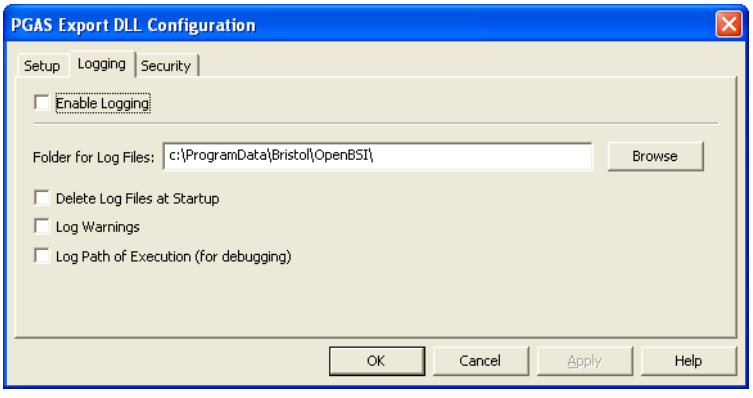
If you have already configured a station, which has a configuration similar to the one you are creating, you can apply that station's configuration for the current station. You can then modify the station, as needed.



To do this, click on this button, and select the station configuration you want to apply to the current station; you will be prompted to confirm this, since it will overwrite any entries already made for the current station.

Logging Page

The 'Logging' page allows you to specify whether logs should be kept of PGAS Export operations. Log files are useful primarily for debugging purposes.

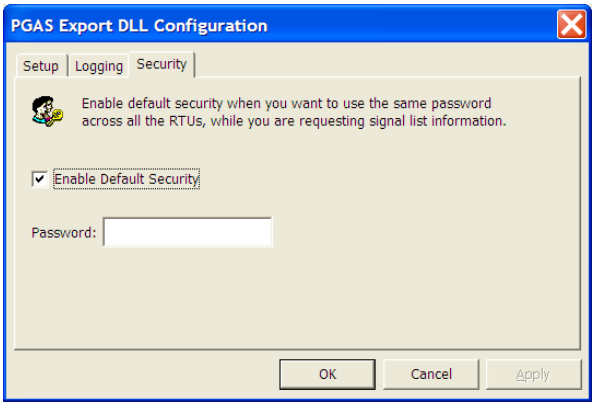


To set up logging, check the **"Enable Logging"** box, then use the **[Browse]** button to identify the folder on the PC, where log files should be stored. You can then specify various options for the logging.

The fields are discussed in more detail, below:

Enable Logging	Check this box to activate the logging feature.
Folder for Log	Use the **[Browse]** button to specify the location on the PC where PGAS log files should be stored. Log files have the base name of the station name, with the extension of *.log.
Delete Log Files at Startup	If checked, any existing log files are deleted whenever the Data File Conversion Utility is started.
Log warnings	If checked, any warning messages generated by the PGAS Export DLL, in the course of its execution, will be included in the log file.
Log Path of Execution (for debugging)	If checked, debugging information about the PGAS Export DLL's operation will be included in the log file.

Security Page



The 'Security' page allows you to specify that default security should be used. Default security allows you to specify a single common password, used by all controllers in your network that is sent automatically to an RTU when requesting signal list information, thereby avoiding the user having to log in to each controller individually.

NOTE: Beginning with OpenBSI 5.8 Service Pack 1, default passwords can be up to 16 characters. Earlier versions limited passwords to six characters.

To activate default security, check the **"Enable Default Security"** box, then provide a common **"Password"** that is valid for all controllers on your network.

Format of Tag Lookup Files (*.TLF)

IMPORTANT

We strongly recommend you only modify the Tag Lookup Files (*.TLF) using the Tag Lookup File Configuration dialog box, described earlier in this section. Advanced users may choose to make some edits directly in the TLF file, therefore the syntax is presented here, but most users should avoid this approach.

A TLF is an INI-type file consisting of three sections:

- The [PARAMETERS] section which includes parameters that help the PGAS Export DLL to interpret the type of data in the UOI-type files.
- The [MTR_CONFIG_TAGS] section which holds the tags that will be used to name the attributes in a MTR_CONFIG_REC element in the resulting XML file.
- The [DATA_TAGS] section which holds the tags that will be used to name the attributes in MTR_VOLUME_REC, MTR_VOLUME_DAILY_REC, and GQ_PERIODIC_REC elements in the resulting XML file.

[PARAMETERS] Section

TYPE = *type_attribute, period_attribute*	**Where *type_attribute* is either METER or GAS_QUALITY. For *type_attribute* METER the *period_attribute* is either MTR_VOLUME_DAILY (for daily data) or MTR_VOLUME (for hourly data). For *type_attribute* GAS_QUALITY the *period_attribute* is GQ_PERIODIC. If the TYPE keyword is not in the file METER, MTR_VOLUME_DAILY is assumed.**
STARTDATE=*value*	A *value* of 1 indicates that the START_DATE attribute will be included in the XML resulting record (This is the default if the STARTDATE keyword is not in the file).
LOCSEQ=*value*	A *value* of 1 indicates that the SEQUENCE attribute will be included in the XML resulting record indicating the local sequence number of the archive record (This is the default if the LOCSEQ keyword is not in the file).
TSSTORE=value	This keyword indicates how the timestamp was assigned to the archive record. A value of 1 indicates “At Store” (the timestamp assigned to this archive record is the time at which the record was stored), while a value of 0 indicates “Start of Period” (the timestamp assigned to this archive record is the time at the beginning of the interval). This value is used by the PGAS Export DLL to calculate the values of the START_DATE and END_DATE attributes of the resulting XML record. If the TSSTORE keyword is not in the file, ”Start of Period” is assumed.

Example:
[PARAMETERS]
TYPE = METER, MTR_VOLUME_DAILY
LOCSEQ=1
STARTDATE=0
TSSTORE=1

[MTR_CONFIG_TAGS] Section

[MTR_CONFIG_TAGS]
TAG1= *index, attribute_name, signal_name*
TAG2= *index, attribute_name, signal_name*
:
TAGn= *index, attribute_name, signal_name*

Where *attribute_name* is the name of the attribute (25 chars max), and *index* is the position (base 1) of the signal in the Station's Configuration Signal List. The *signal_name* is optional.

Example:
[MTR_CONFIG_TAGS]
TAG1=1, METER_NAME, @GV.METER_ID
TAG2=2, METER_MAKE, @GV.METER_MAKE
TAG3=3, MODEL
TAG4=4, METER_TYPE
TAG5=5, PLATE_MATERIAL
TAG6=6, TUBE_DIAMETER
TAG7=7, TUBE_REF_TEMP

NOTE: If a tag with a position and a signal name have been defined but is not associated with any attribute, the attribute name should be 'NONE'. For example: TAG8=8, NONE, @GV.FLOW_MAX

The PGAS export DLL will ignore the entries with 'NONE', but it will issue a warning message.

[DATA_TAGS] Section

[DATA_TAGS]
TAG1= *field_number, attribute_name, field_name*
TAG2= *field_number, attribute_name, field_name*
:
TAGn= *field_number, attribute_name, field_name*

Where *attribute_name* is the name of the attribute (25 chars max), and *field_number* is the number (base 1) of the user field in the archive record. The *field_name* is the name of the field in the archive record (optional).

Example:
[DATA_TAGS]
TAG1=1, DIFF_PRESS, DPRESS
TAG2=2, STATIC_PRESS, SPRESS
TAG3=8, TEMPERATURE

NOTE: If a tag with a position and a signal name have been defined but is not associated with any attribute, the attribute name should be 'NONE'. For example: TAG4=4, NONE, @GV.FLOW_MAX

The PGAS export DLL will ignore the entries with 'NONE', but it will issue a warning message.

Resulting XML Files

An XML file created by the PGAS Export DLL contains data from a single station. For example, if the station represents a Meter that reports daily data, the resulting XML file will have the following format:

```
 <?xml version="1.0"?>
<PGAS_XML>
  <TRANSACTION>
   <METER METER_ID="20-0236-00">
    <METER_CONFIG>
     <MTR_CONFIG_REC  attributes />
    </METER_CONFIG>
    <MTR_VOLUME_DAILY>
     <MTR_VOLUME_DAILY_REC attributes />
    </MTR_VOLUME_DAILY>
   </METER>
  </TRANSACTION>
</PGAS_XML>
```

If the station represents a Meter that reports hourly data, the resulting XML file will have the following format:

```
 <?xml version="1.0"?>
<PGAS_XML>
```

```
 <TRANSACTION>
  <METER METER_ID="20-0236-00">
   <METER_CONFIG>
    <MTR_CONFIG_REC  attributes />
   </METER_CONFIG>
   <MTR_VOLUME>
    <MTR_VOLUME_REC attributes />
   </MTR_VOLUME_DAILY>
  </METER>
 </TRANSACTION>
</PGAS_XML>
```

The attributes in the MTR_CONFIG_REC element correspond to signal values from a configuration list for the meter, where the attributes in the MTR_VOLUME_DAILY_REC (or MTR_VOLUME_REC) element correspond to values coming from the archive file that holds daily (or hourly) records for the meter.

If the station reports Gas Quality Data (with varying data log intervals), the resulting XML File will have the following format:

```
 <?xml version="1.0"?>
<PGAS_XML>
 <TRANSACTION>
  <GAS_QUALITY GAS_QUALITY_ID="20-0236-00">
   <GQ_PERIODIC>
    <GQ_PERIODIC_REC  attributes />
   </GQ_PERIODIC>
  </GAS_QUALITY>
 </TRANSACTION>
</PGAS_XML>
```

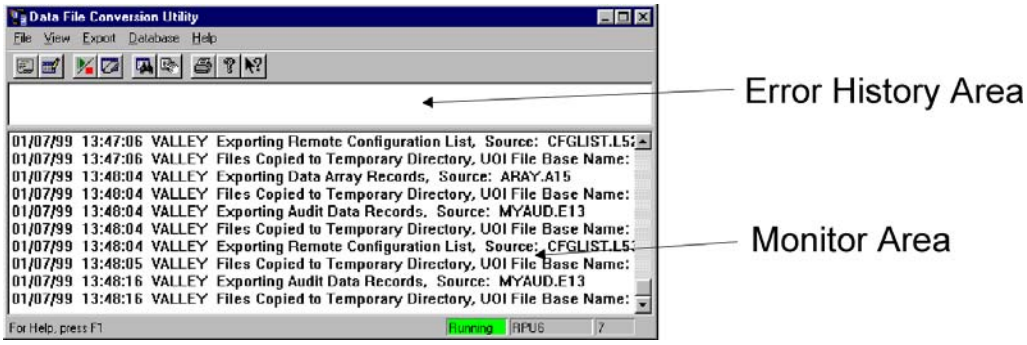
Activating the Export Process[24]

To activate the export process, click on **Export→Start**.

Once the export process has been started, it may be shut down by clicking on **Export→Stop**. There may be some delay time in order to allow export of the current file to be completed.

Monitoring the Progress of Conversions, Viewing Error Histories

The Data File Conversion Utility window is divided into two areas - the Error History Area and the Monitor Area. A slide bar between the two areas lets you adjust the relative size of the two areas.



Error History Buffer Area

Associated with each station name is an **error history buffer** which contains any error messages generated during the file conversions for that particular station name. The contents of the error history buffers may be viewed in the upper area of the Data File Conversion Utility window. Errors are displayed in the order in which the stations appear in the Station File Configuration dialog box. The size of the error history buffers is determined based on the **"Error History Buffer Size"** value in the Data File Conversion Setup dialog box.[25]

[24] *Before attempting to start the export process, one or more Export DLLs must have already been selected from the "Export Libraries" page of the Data File Conversion Setup dialog box.*

[25] *Any changes to this value will clear the Error History entries from the screen and delete all messages from the Error History buffers. Therefore, this value should only be changed after you have viewed all of the current errors.*

Error messages appear as follows:

date time station_name error_text export_dll

where:

date	is the date the error occurred
time	is the time the error occurred
station_name	is the station which had the error.
error_text	is a description of the error
export_dll	is the first 3 letters of the name of the DLL which had the error. It is one of the following: BBO (BBODBC), COA (Coastal), CSV, EXB (EXBBODBC), PIB (PIBDC), OEX (OEEXP), or PGA (PGAS).

If the error history buffer entries are not visible in the window, click on the icon, shown above, or click on **View→Error History**. If no errors are displayed, then the error history buffers for all stations are empty.

If the error history area is full of errors, no new incoming messages can be displayed. To DELETE all errors in the buffers, and clear the error history window, click on the icon shown at left**,** or click on **View→Reset Errors**.

Monitor Area

The lower part of the Data File Conversion Utility window includes a **monitor area** which displays messages concerning the status of the utility, and the progress of conversions. Oldest messages appear at the top of the monitor area, and newest messages appear at the bottom. The number of messages which can be displayed in the monitor area is configured by the **"Monitor Size"** parameter in the Data File Conversion Setup dialog box. If more messages are received than the number specified by **"Monitor Size"** older messages will automatically be deleted.

Refresh of the monitor area may be toggled on/off by clicking on the icon, shown above, or by clicking on **View→Restart Monitor** or **View→Stop Monitor.**

The scroll bar may be used to display messages which are not currently in view. It is recommended, however, that refreshing be turned off when attempting to view the oldest messages, since they will be the first to be overwritten when new messages are received, and the screen is refreshed.

To clear the monitor area, thereby deleting all the messages, click on the icon, shown at left, or click on **View→Clear Monitor**.

Printing Error History and Monitor Entries

To print textual entries from the Error History area or the Monitor Area, click on the icon, shown above. Text will be printed on the default printer.

Logging Errors Appearing in the Error Log File (OEEXP and EXBBODBC)

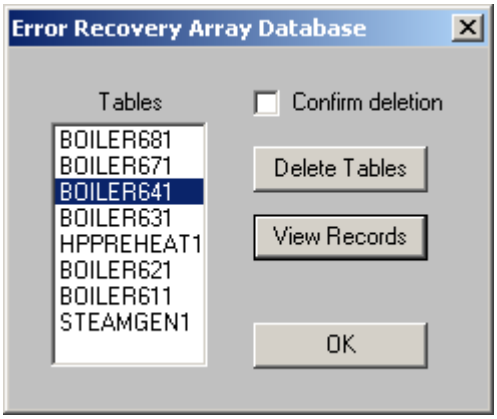
The following tables list possible errors which may appear in user-specified log files, when attempting to export data using the OEEXP or EBBODBC DLLs.

Error	Description
Failed to load the Database Schema Map file (DSM).	The file that keeps information about the station schema does not exist. Use the Data Storage Configuration utility to create it.
No Data Source File (DSN File) specified.	No DSN file has been specified. Use the EXBBODBC DLL Setup dialog box to specify one.
Failed to create Database Interface Object.	OEEXP Users ONLY: This is an internal DLL error and usually occurs if the OpenEnterprise Database had not been started, or the specified service name does not exist. In either case, there is no established connection to the OpenEnterprise Database.
Cannot map UOI field number to table column - Field number is invalid for this data record.	An invalid field number was configured in the station schema. Check the entries made in the Data Storage Configuration Utility for improper mapping.
Table definition does not exist. Cannot insert/update record.	An error occurred while trying to create a table, based on an incorrect table definition. A previous error may indicate the source of the problem.
Number of values in the UOI record exceeds number of table's columns. Record will not be inserted.	The UOI record (array/archive/audit/list) data has more fields than the number of columns in the table. Edit the database table to include the correct number of columns.

Viewing and/or Deleting Entries From the Error Recovery Database

If the Error Recovery Database files were loaded during system installation, then data which cannot be converted is saved in the database, and the utility will automatically attempt to convert it during another conversion/export cycle.

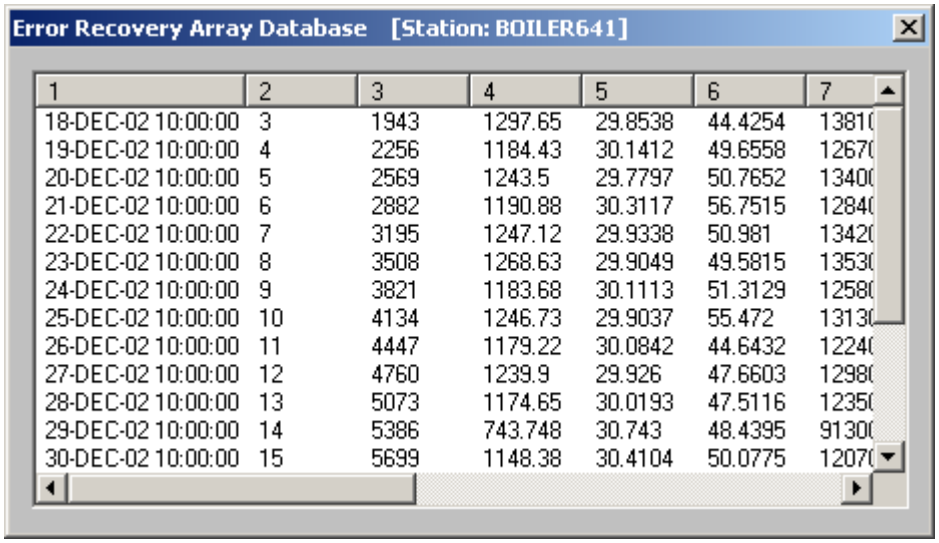
Occasionally, users may want to view entries in the database, to see what entries weren't converted, or they may want to purge some data entries from the database, so further attempts at converting them will be abandoned. To do this click on **"Database"** in the menu bar, and choose either **"Array"**, **"Audit"**, or **"List"** from the pull down menu. The Error Recovery Database dialog box for that type of data will appear.



Viewing Entries

The Error Recovery Database is organized into tables. Use the **"Tables"** list box to select which table you want to view. Tables are named after their associated **station name**. For List data, the **station name** is preceded by either an 'L' to indicate configuration list data, or an 'R' to indicate Real Time List data.

When the table has been selected, click on the **[View Records]** push button to view the entries in that table.



Deleting Entries

Use the **"Tables"** list box to select which tables will be deleted from the database. Tables are named after their associated **station name**. For List data, the **station name** is preceded by either an 'L' to indicate configuration list data, or an 'R' to indicate Real Time List data.

When the tables to be deleted have been selected, click on the **[Delete Tables]** push button to delete them. If the **"Confirm Deletion"** box has been checked, you will be prompted to confirm that you want to delete the selected tables.

To exit the dialog box, click on the **[OK]** push button.

Data File Conversion Utility Initialization File (DFCU.INI)

Initialization information for the Data File Conversion Utility is stored in the file DFCU.INI located in the system directory for NT users.

> IMPORTANT
>
> Users should avoid editing this file, and should use dialog boxes to change initialization parameters, instead. The only entries which may need to be edited directly in the INI file are the 'keep_files' and 'minimize' entry.

This file appears similar to the format shown below (comments appear in *italicized type* and do not actually appear in the DFCU.INI file):

[PARAMETER_SECTION]

time_interval=30 *Time Interval (see page 4)*

error_buffer=30 *Error Buffer History Size (see page 5)*

monitor=140 *Monitor Size (see page 5)*

copy_path=C:\ProgramData\Bristol\OpenBSI\ACCOL *Copy path (see page 5)*

station_interval=1 *Station Interval (see page 5)*

keep_files=0 *when keep_files=1, the Error Recovery Database will NOT be loaded or used by the utility. If there is an error while exporting data, the processing for that station will stop, and the unexported station files will NOT be deleted from the directory, or copied elsewhere. When this method is used, there is a chance that duplicate data might be exported to the configured DLLs because data which could not be exported will still be present from previous attempts.*

Minimize=1 *When 1, the Data File Conversion Utility will start with its window minimized. When 0, the window will not be minimized.*

SilentExit=1 *When 1, allows the Data File Conversion Utility to be closed down without confirmation prompts. When 0, prompts will be made to confirm that the utility should be shut down. (OpenBSI 5.6 and newer.)*

[DLL_SECTION] *This section lists the DLLs available to perform export duties*

DLL0=CSV

DLL1=COASTAL

DLL2=BBODBC

DLL3=EXBBODBC

DLL4=OEEXP

DLL5=PIBDC

DLL6=PGAS

[EXPORT_SECTION]

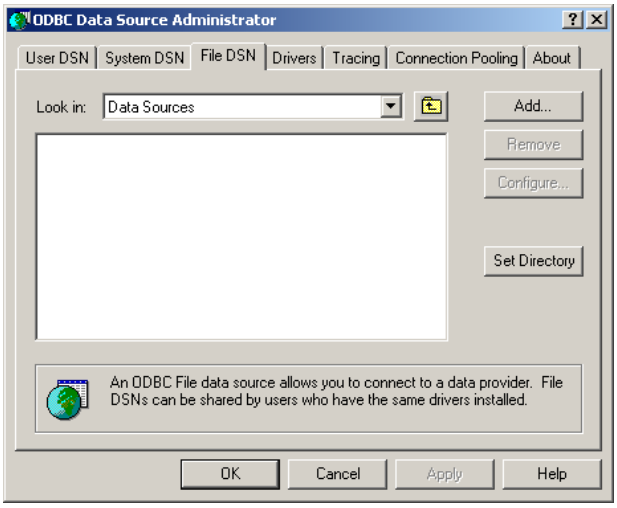
EXPORT0=0 *This section lists which of the corresponding DLLs in the DLL section have been activated for use, e.g. Export0=0, Export1=1, Export2=2, etc.*

Exporting Harvester Data to an SQL Server

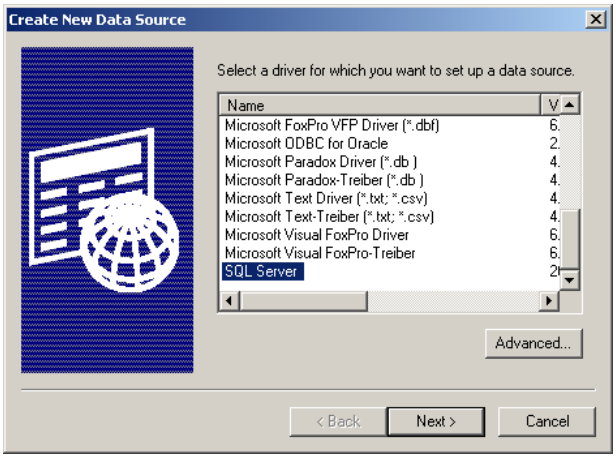
If, instead of exporting Harvester data to a database or CSV format, Flow-Cal™, etc., you want to use the EXBBODBC DLL to export data to an SQL Server, you must follow steps similar to those shown below.

Start the Windows™ Control Panel, by clicking on **Start → Settings → Control Panel**, then double-click on the 'Data Sources (ODBC) icon.

Go to the 'File DSN' page of the ODBC Data Source Administrator, and click on the **[Add]** button.

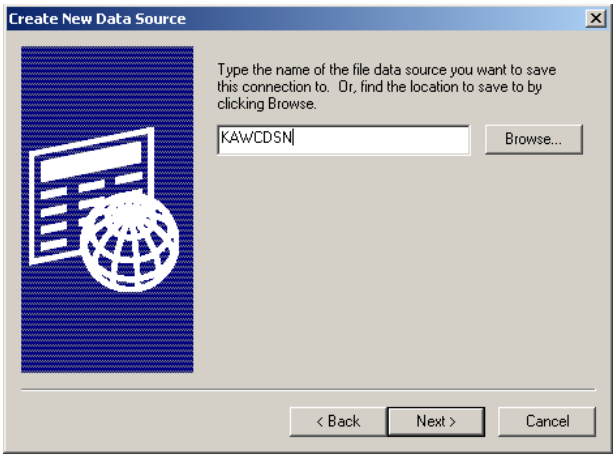


The Create New Data Source dialog box will appear. Scroll though the list of drivers until you locate 'SQL Server', then select it, and click on the **[Next]** button.

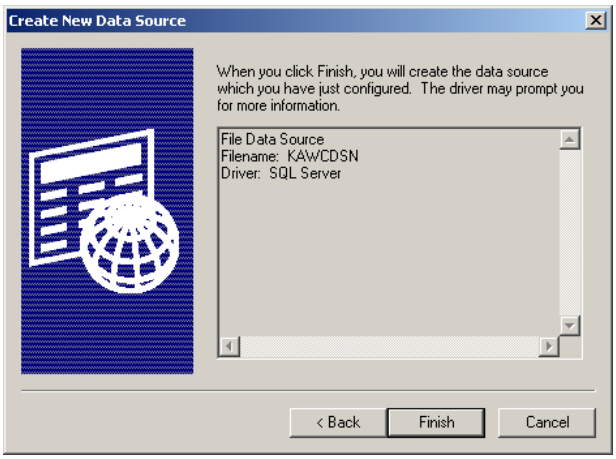


Enter the name of the file data source, then click on **[Next]**.

(NOTE: This name must match the name entered previously in the **"Select File DSN"** field on the 'Data Source' page of the EXBBODBC DLL Setup Dialog Box.)

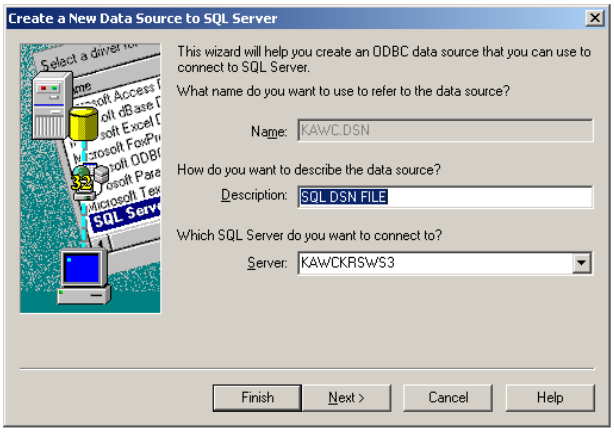


Now click on **[Finish]**.

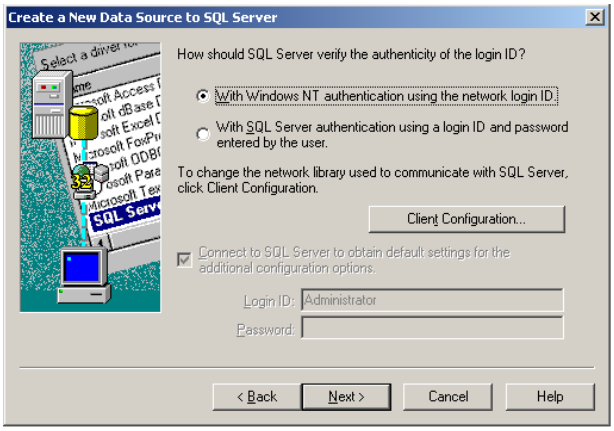


The Create a New Data Source to SQL Server dialog box will appear.

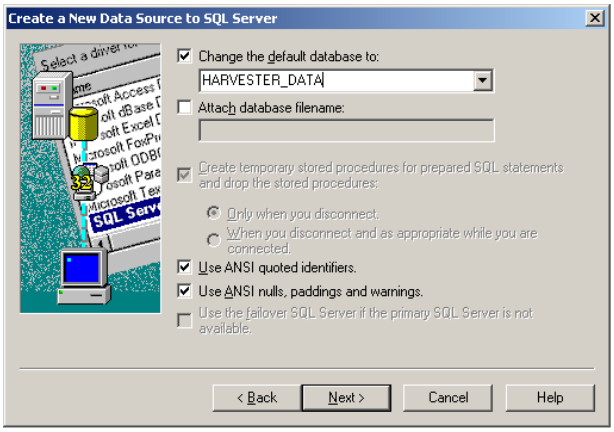
Enter a textual description of the data source file, in the **"Description"** field, then choose from the list of SQL server(s) in the **"Server"** field.



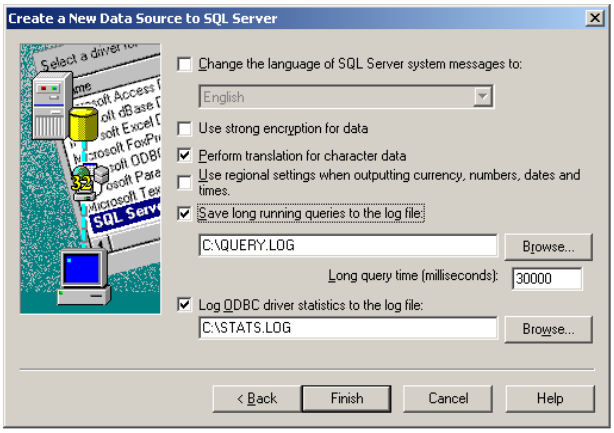
Choose the method by which the SQL Server will verify logins, then click on **[Next]**.



Assign a name for the database within the SQL Server, which will be receiving the data from the Converter. Then click on **[Next]**.



Specify a path and file name for the log files, then click on **[Finish]**.



A summary page, indicating whether the connection to the SQL Server was successful, will appear. If it was, click on **[OK]** and you're done.

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