



**Nematron Software 5.40**

Paragon

OpenControl

HyperKERNEL

# **Release Notes**

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# 1. NEMATRON SOFTWARE 5.40

*Includes OpenControl, Paragon and HyperKERNEL on one CD-ROM*

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## 1.1 Introducing Version 5.4

*Strengthened by user feedback*

Nematron Software version 5.4 represents a very significant step in the evolution of PC based control solutions. This step was driven by the feedback from our entire customer base, including the feedback from a large number of applications on one program that is implementing PC based machine control on a large scale. Accordingly most of our attention in 5.4 has been directed toward OpenControl with supporting enhancements in Paragon and HyperKERNEL

*OpenControl*

Consider just a few of the OpenControl enhancements:

- On-line changes to charts
- Chart trace
- Cross reference tools
- Search and replace
- Anchored chart comments

A brief description of all changes is provided later in this document but you must try 5.40 to fully appreciate its progress.

*OPC*

The other major change is an architectural enhancement. All Nematron servers are now OPC servers allowing you to use standard clients for those special needs (or simply HMI) such as sharing Nematron Server data with enterprise applications. This was done without breaking any existing applications or losing any features. An introduction to OPC and information about Nematron OPC is provided toward the end of this document.

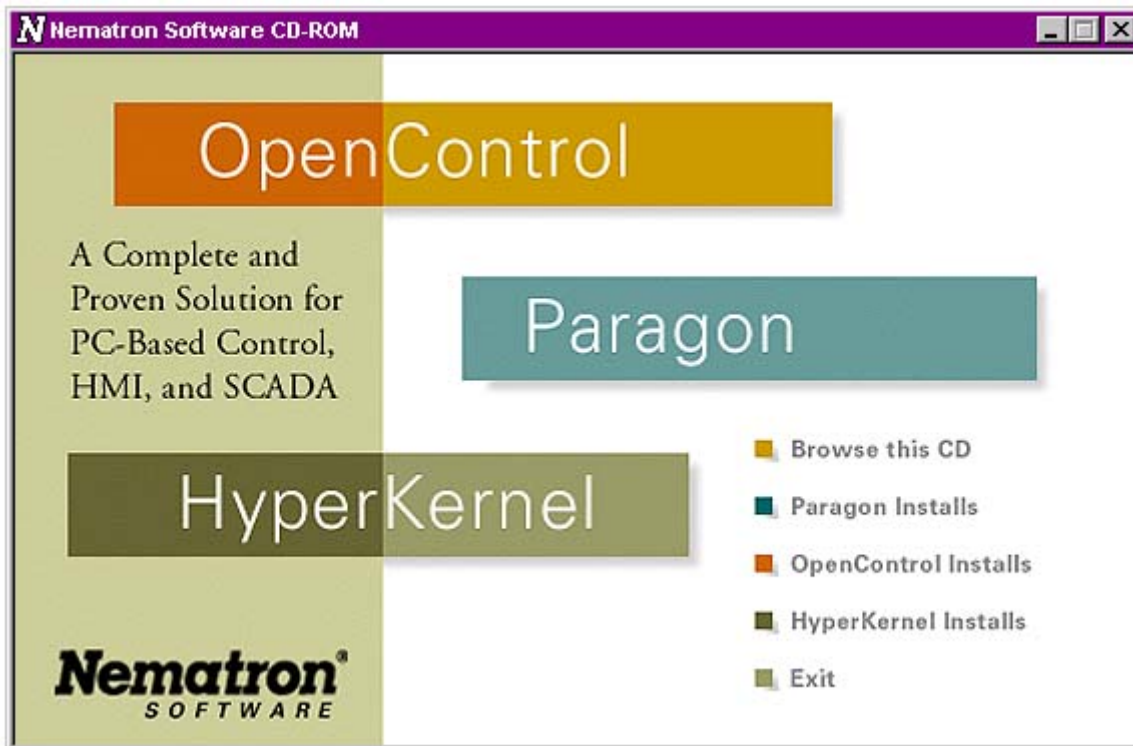
*Attention to quality.*

We pay careful attention to reported defects (problems, bugs, etc.): document all reported problems, isolate defects, field test corrections and package clean corrections with each new release. 5.40 contains several correction and these are summarized in a later section.

*Please pay particular attention to the section on Installation.*

With version 5.4 we have combined all Nematron Software onto one CD-ROM to make installation and maintenance easier. This CD serves both new and existing installations of OpenControl, Paragon and HyperKERNEL. The new opening screen offers you several new options.

Of course you will notice the new Nematron look on the CD, manual covers, product box and images throughout the product. (Remember that all software documentation is on-line, including PDFs of the printed documents.) The new look was inspired by the work on our new web site at [www.Nematron.com](http://www.Nematron.com).



*The 5.4 Autostart Screen on Windows.*

# 2. Installation

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## 2.1 General Installation Notes

The Nematron Software 5.40 CD-ROM contains installations for OpenControl 5.40, Paragon 5.40 and HyperKERNEL 5.4 eliminating the need for separate CD's for each product. This satisfies several update needs for current users as well as providing a full install for new installations. The Nematron Software CD contains everything the following CDs contained before:

- Paragon CD
- OpenControl Professional Development CD
- OpenControl Standard Development CD
- OpenControl Runtime CD
- HyperKERNEL Development CD
- HyperKERNEL Runtime CD

Some optional software is password protected and you should receive the password with your shipment. If you are missing a password, make sure your order included the optional part and then call Customer Care at Nematron headquarters (1-800-Nematron).

Previously applications needing all three products were shipped the "Paragon CD" because it contained all the parts. If you were using the Paragon CD you should update with the Nematron Software 5.4 CD. The procedures for new installations, updates and de-installations have changed and you must use the procedures described below. In general, you should de-install existing products before installing version 5.4 products.

Please review the entire Installation section before starting to use the 5.40 CD-ROM.

**IMPORTANT NOTE:** Customers with versions of Paragon older than 5.30 must read the release notes for 5.30 before updating to 5.40. The 5.30 release notes contain important procedures, which must be followed before moving your application to 5.40. They are located on the 5.40 CD in /DOC/PARA\_DOC/RNotes530.PDF.

## 2.1.1 Starting the Installation Utilities

### 2.1.1.1 Using Autorun On Windows

On Windows NT the Nematron Software 5.40 CD-ROM will start automatically when the CD ROM drawer is closed. You should see the Nematron Autorun Screen (new to 5.40) with installation options in the lower right part of the screen for installing Paragon, OpenControl and HyperKERNEL. (See Page 2 of this document.)

If the Autorun Screen does not show up, browse to the CD-ROM and run "autorun.exe" manually.

### 2.1.1.2 Installing On OS/2 Warp

On OS/2 from the CD-ROM drive ("D:" for example), directory: /PARAGON/TNT", select LOADOS2 to install Paragon on OS/2. This will start the install procedure.

### 2.1.1.3 Demo Modes

For demonstration or evaluation purposes you can select the Paragon Test Drive option and OpenControl standard edition. (HyperKERNEL is automatically installed but you need to un-install it separately.) This installs a fully featured version of Paragon with five hours allowed per session; OpenControl allows 30 minutes of runtime each run. When you run it without a protection key it will default to demo mode, giving you 30 minutes of runtime.

**IMPORTANT:** The applications built with the Paragon Test Drive can not be used with a purchased product or converted for use with standard product.

### 2.1.1.4 Paragon SI Packages

If you are installing Paragon for use with a Systems Integrator Key, go to the \PARAGON\TNT directory and run the LOADWIN or LOADOS2 file from the command line followed by the parameter SI. This will install the correct product configuration (.TEC) files for use with the SI keys. You do not need a product configuration diskette.

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## 2.2 New Installations

The Paragon Getting Started Manual and OpenControl User Manual (both available in PDF format on-line) includes detailed installation instructions for Paragon and OpenControl. The following sections give an overview for multiple product installations and 5.40 specific changes and recommendations.

## 2.2.1 Paragon And OpenControl

You can install both Paragon and OpenControl even if you are not using OpenControl for your application. This will allow you to experiment with OpenControl in demo mode.

NOTE: Paragon alters the OpenControl menu structure and you should not install Paragon if you intend to use OpenControl by itself.

- Insert the Nematron Software 5.40 CD in your PC's CD-ROM drive. From the Autorun Menu, click "Paragon Installs" and select desired options. Choose to "reboot your system later".
- On the Autorun menu, click the "Install OpenControl" button.
- This will install first OpenControl and then HyperKERNEL.  
Pay particular attention to the selection of the interrupt to be used. Use the Windows NT Diagnostics, Environment Tab to locate an unused interrupt.

TIP: Normally it is best to select an interrupt in the range of 10-15.

- After HyperKERNEL is installed, you will be instructed to reboot.
- Once your system has restarted you can access Paragon from the Windows Start menu.

### 2.2.1.1 A Note On Using Paragon PDK Drivers

The Nematron Software 5.40 CD (as did previous versions) contains about 20 drivers developed with the PIO Developers Kit which are provided as-is and must be installed manually. Before 5.40, when you were using multiple PDK drivers you had to ask us to combine the class files for you. Now you can accomplish this yourself:

- Copy the driver from a CD-ROM "paragon\misc\_pio\ subdirectory to your PC "paratnt\pio" directory.
- Open a command prompt window and move to the PIO directory.
- Enter ".\tools\classedit manual" from the PIO subdirectory.
- Select the drivers that you want to use.
- In the Application Manager, make sure you enable PDK #1 for one driver, PDK #1 and #2 for two drivers and so on.

## 2.2.2 OpenControl Only

- Insert the Nematron Software 5.40 CD-ROM and from the Autorun Menu click the "OpenControl Installs".
- On the next screen you will typically install the Standard Edition which includes the development tools unless you have purchased the full OpenControl driver and development suite, in which case you will install the Professional Edition.
- This will install first OpenControl and then HyperKERNEL.

Pay particular attention to the selection of the interrupt to be used. Use the Windows NT Diagnostics, Resources Tab to locate an unused interrupt.

TIP: Normally it is best to select an interrupt in the range of 10-15.

- After HyperKERNEL is installed, you will be instructed to reboot.
- After the reboot is complete, re-insert the Nematron Software CD and install the OpenControl driver corresponding to the I/O hardware (Profibus for example) you are using. If you installed the Professional Edition, all drivers are already installed.

### 2.2.3 Paragon Only

- Insert the Nematron Software 5.40 CD-ROM and from the Autorun Menu click the "Paragon Installs". Select the options you want and reboot. (See the notes above for OS/2.)
- If you need Paragon PDK drivers, see the section above.

### 2.2.4 HyperKERNEL Only

You do not need to install HyperKERNEL separately if you install OpenControl; it is installed automatically. (You will need to un-install it separately.)

If you are using HyperKERNEL by itself (without OpenControl):

- Insert the Nematron Software 5.40 CD-ROM and from the Autorun Menu click the "HyperKERNEL Installs". Select the options you want and reboot.

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## 2.3 Updating Existing Installations

Existing installations that are current (Paragon 5.32, OpenControl 4.3 and HyperKERNEL 4.3) can easily update to 5.40. Please be sure to read these release notes carefully for areas that may need attention during the upgrade. In general once you have upgraded, you can not return to earlier versions without going back to a saved version of your applications files; be sure to save backups.

IMPORTANT NOTE: Customers with versions of Paragon older than 5.30 must read the release notes for 5.30 before updating to 5.40. The 5.30 release notes contain important procedures, which must be followed before moving your application to 5.32. They are located on the 5.32 CD in \DOC\PARA\_DOC\Rnotes530.PDF.

### 2.3.1 Paragon Only - No OpenControl

- Backup your existing applications and put them in a safe place.

- Using "Windows Start Button | Control Panel | Add/Remove Programs", de-install the existing Paragon. (Under OS/2 the Paragon installation utility provided a removal function.)
- Use the procedure for a new Paragon installation (above).

### **2.3.2 Integrated Paragon and OpenControl Applications**

- Backup your existing applications and put them in a safe place.
- Using "Windows Start Button | Control Panel | Add/Remove Programs", de-install the existing Paragon.
- Then de-install OpenControl. (NOTE: If you decide to un-install 5.40 you must also un-install HyperKERNEL after removing OpenControl.)
- Reboot (automatically triggered by the HyperKERNEL un-install).
- Use the procedure above for a new installation of both Paragon and OpenControl.

### **2.3.3 OpenControl Only Update From A CD-ROM**

- Backup your existing applications and put them in a safe place.
- Then de-install OpenControl. (NOTE: If you decide to un-install 5.40 you must also un-install HyperKERNEL after removing OpenControl.)
- Reboot (automatically triggered by the HyperKERNEL un-install).
- Use the procedure above for a new installation of OpenControl.

### **2.3.4 HyperKERNEL Update**

- Backup your existing applications and put them in a safe place.
- Un-install HyperKERNEL
- Use the procedure above for a new installation of HyperKERNEL.

## 3. Y2K Notes

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### 3.1 A Y2K update

By the time you read this, the new millennium will probably already be here and some would think Y2K information is not needed. However our Y2K testing also took into account the fact that 2000 is also a leap year. The Nematron Software Y2K issues are largely associated with replaying historical data and this is less severe than Y2K problems in other products. Thus some customers will not be dealing with Nematron Software issues until sometime after the start of the new millennium.

Our web site ([www.Nematron.com](http://www.Nematron.com)) contains the most recent information on Y2K related issues.

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### 3.2 Paragon Y2K Considerations

Our testing of Paragon started with code inspections of Paragon 4.0 and completed with testing of all Y2K trouble situations. Very few problems were found and all were corrected before version 4.0 was released. A more complete statement is available on the Nematron Web site.

Note that your PC's operating environment (Windows NT, OS/2 Warp and Windows 95) may have Y2K problems and applications other than Paragon may have Y2K problems.

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### 3.3 OpenControl Y2K Considerations

OpenControl has been inspected for Y2K related issues and tested for various Y2K related situations. Only the Log Data Manager was affected and it has been corrected prior to 5.40.

HyperKERNEL 5.40 is required to run OpenControl on Windows NT with Service Pack 5 installed.

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### 3.4 HyperKernel Y2K Considerations

HyperKERNEL 5.4 has few functions relating to time and these have been inspected for Y2K related issues and tested for Y2K problems. There are no known Y2K problems in HyperKERNEL 5.40.

- Windows NT 4.0 Service Pack 3 and before has known Y2K problems. Depending on the implementation of your application, these may or may not affect your HyperKERNEL application. HyperKERNEL will operate properly on NT 4.0 with service pack 3 but other applications may have problems.
- HyperKERNEL 5.40 runs on Windows NT 4.0 with Service Pack 4 and 5 that have Y2K resolutions in case you need these to avoid Y2K problems with NT.
- HyperKERNEL 5.40 is required to run on NT Service Pack 5.

# 4. Nematron Software 5.4 - Details

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## 4.1 Introduction

Nematron Software 5.40 is a positive step for PC Based Control and is based largely on features requested by existing users. We thank all of you for taking the time to help us understand your problems and develop resolutions. The following sections contain brief descriptions of the changes to OpenControl, Paragon and HyperKERNEL.

Some changes are very significant and have a dramatic effect on the use of our products. Others are small but the effects accumulate, forming a better feeling product which saves you time and allows you to build a better quality application.

We want to encourage you to continue providing feedback and hope you find some of your suggestions in the following sections.

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## 4.2 Documentation

Since most of the 5.4 changes were in OpenControl, only the OpenControl documentation has been revised:

- The OC User Manual has been updated.
- The OC API section of the User Manual has been separated into a separate API Manual and is available on line in PDF format.
- The OC online help has been updated.
- The OC Driver Documentation is available online only.

Paragon and HyperKERNEL changes are documented in these release notes.

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## 4.3 OpenControl Enhancements in 5.40

### 4.3.1 On-line Changes

OpenControl now provides a very simple method to rapidly replace a running chart with a newer version while your application is running. In many situations on-line changes can greatly reduce application validation times. You do not have to use the on-line change features and can continue to use OpenControl as you have been.

Here are some notes to introduce you to the concept and how it operates:

- All changes are made from a separate environment that is launched from the OCM Tools | Make Online Configuration Changes menu item or the configuration button appearing in the OCM toolbar. This new environment is a variation of the development OCF and it can be open the same time as the OCF.
- Changes made within each environment are kept separate. At any one time OpenControl can have a single chart:
  - in the Project directory (used by the OCF)
  - in the Current directory (viewed by the debugger)
  - in the Current/Sources directory (used by OLC framework)
  - in the master directory
- Anything in program flow charts can be edited, saved, checked for integrity and built. (Subcharts can not be modified.) Memory and I/O can be viewed but not changed.
- Once all edits have been made and built, the new charts can be placed online using Tools | Commit Runtime Changes menu item. At the next scan, runtime will remove the old charts and replace them with the new charts.
- The changes are logged in the OCM “Console Window”.
- Changes can be stored in the Project Directory using the File | Save Project As menu item. The management of Master applications has not changed. Any online changes will be lost when the same or another project is reactivated and the changes were not saved back to a project. Pop-ups remind you to save your changes when you try to exit the online change environment without first saving the changes.

### 4.3.2 OC General Enhancements

#### 4.3.2.1 Floating Point Database Enhancements

Floating Point operations are secondary to many machine control applications but PC Based Control is finding its way into a wide variety of applications. In 5.40, 32-bit floating-point support in OC has been polished including displaying floating point information in the OCM view. Support for using double (64-bit) floats in charts is not available and has been removed from OCF.

#### 4.3.2.2 VFL Command and Function Enhancements

Many advanced applications have been developed with previous versions of OpenControl validating PC Based Control. But we have just scratched

the surface and continue to add new commands to allow development of even more powerful flowcharts:

- A new command type (Date/Time) provides access to system time as seconds/milliseconds and formatted as strings.
- A new command under the string type (StringFormatInteger) converts an integer to a string.
- A new command type has been added with commands for enabling and disabling OpenControl high-speed data logging. This allows logic to trigger data logging when it detects trouble situations. Logic can also turn it off more quickly than can be done manually. For example a chart can be created to collect data for a short duration or a fixed duration.
- Waits can be specified as floating-point fractions of the millisecond, second or minute time units (e.g. 0.1 sec).

#### **4.3.2.3 Multiple Time Selection for Timer Presets**

Timer presets can be specified as milliseconds, seconds or minutes. The time can be specified as a floating-point fraction of those units.

#### **4.3.2.4 Managing Yields at the Chart Level**

We continue to improve the chart execution model enabling design engineers to better control fundamental operations (and spend more time building better applications).

Loops within charts normally yield processing with each cycle through the loop. For example a While block by default will yield each time the while condition is tested. This can be disabled for each While block (individual block basis) by setting the yield property to No. A new property of the Start function block, Always Yield in Loops, is available in this release. This property, when selected, disables editing of the Yield property of all condition blocks and forces the Yield property of all condition blocks to Yes, thereby allowing management of Yields at the chart level. Unselecting the Always Yield in Loops property re-enables editing of the Yield property in condition blocks but leaves the value unchanged at Yes. Start function blocks within existing charts require no user intervention; the Always Yield in Loops property is by default unselected.

#### **4.3.2.5 Check Run Criteria**

Each chart has a “Run Criteria” parameter which is a boolean expression. In version 4.3 this expression was checked each time through the Start block. In version 5.4, this expression is checked each time the chart resumes execution, even when execution resumes from a yield point (as in a while loop). This allows the run criterion to be used to stop a chart when a fault or other general condition occurs.

#### **4.3.2.6 ‘Anchored’ Comment Blocks**

Comment blocks have a new ‘anchor’ option. When selected, the Comment block will maintain its position relative to a selected block after

the addition or deletion of other blocks in the chart. The anchor is selected by entering the X and Y grid coordinates of the function block to serve as the anchor in the 'Anchor' property of the Comment block. Deleting the coordinates in the 'Anchor' property frees the Comment block to again move. Deleting the function block referenced by the 'Anchor' property will also free the Comment block and clear the contents of the 'Anchor' property. The default for Comment blocks is unanchored. Comment blocks in existing charts will be defaulted to 'unanchored' with no action required by users.

### **4.3.3 OC Tool Enhancements**

OpenControl tools have been expanded and enhanced to make building and maintaining applications easier and more effective. This means savings in application developer time.

#### **4.3.3.1 File Save Improvements**

File | Save Project As capability has been added. Selecting Save Project As will prompt the user for a new or existing project name and all unsaved changes made to the open project will be saved to the selected project. When an existing project name is selected, verification is requested to insure a project is not inadvertently overwritten.

Other file-save improvements which have been made are:

- When a project is compiled (Project | Build Runtime), all edits made to the project, but not as yet explicitly saved, will be saved.
- When a project save fails (typically because files are read-only), the user is now informed.
- When project files are protected from inadvertent change (marked read-only before distribution), the read-only status prevents updates to those files at project activation after an updated distribution. The read-only attribute is now ignored at project activation.

#### **4.3.3.2 Project Printing**

A menu item, File| Print Project has been added to the OpenControl Framework for triggering a report of all charts and database items. This makes documenting your projects easier by allowing a single action to replace the many actions required to print each chart and database table in prior releases.

#### **4.3.3.3 Cross Reference Report**

An OpenControl variable cross-reference has been added to allow users to determine where in charts an OC variable is used. Typically this is important when you have used a variable in several charts or places in a chart and then you want to change the variable name. You may also have a problem with a variable changing unexpectedly and have forgotten where your logic changes it.

The cross-reference report is triggered from a new menu item (File | Print Cross-reference) in the OpenControl Framework. When selected, a print dialog is shown allowing the user to select a printer and page orientation (portrait/landscape). The Primary key for the report is the OC alias name. When listed, the Primary sort key (Alias) is shown first. For each tag listed the following information is shown:

- Alias
- DRV Name
- Location of the blocks using the variable. The chart X/Y coordinates indicate Block location.
- Command type and command indicate usage of the variable.

Sometimes a printer is not handy for control applications or you may just not want more paper. The cross-reference can also be viewed in a window by clicking on a VFE tool bar button. From this window the report can also be printed. Formats for all cross-reference reports are identical, whether started from the tool bar button or the menu item.

#### **4.3.3.4 Replace Text**

A new menu item (Edit | Replace Text in Project...) activates a replace dialog. This allows simple replacement of strings within any strings contained within flowcharts and /or Logic Memory. Optionally, replacement occurs for whole words only or charts only. Default operation is to replace all matching sub-strings in text occurring in charts and logic memory. The text search may be either case-sensitive or case-insensitive (the default)

#### **4.3.3.5 Find Text**

The Find Text...dialog has been modified to match the capabilities in the new Replace Text functionality.

#### **4.3.3.6 Add View and Options Menus For HyperKERNEL Settings**

As a convenience, the capability to view and/or customize HyperKERNEL settings has been added to OCF. This functionality is identical to that available in OCM. This functionality is available via two new menu items, View | HyperKERNEL Configuration and Options | Customize HyperKERNEL.

#### **4.3.3.7 Multiple Block Selection**

Multiple block selections can be made by using a rubber-banding cursor or by holding the shift key while clicking.

#### **4.3.3.8 VFE Context Menus**

Right click context menus are added to both the VFE main flow chart pane and the detail pane. When right clicking on a chart object or previously selected objects, a pop-up menu appears with entries for:

- Cut, Copy, Paste and Delete

- Size to content
- Comment Out
- Properties

Cut, copy, paste, delete and size-to-content (new function with this release) operate on selected blocks.

When right clicking on the detail pane, a context menu appears allowing you to select the chart view, structured text view or hide the pane altogether. The tool bar button to switch between the detail views has been removed.

#### **4.3.3.9 Flow Chart Properties Enhancements**

A preference property and dialog has been added to the Start function block properties dialog consolidating several properties and adding several new properties. The preference property now controls the following:

- Block text margins.
- Size-to-content preferences, including an option to always size to content. This option automatically changes the size of blocks so that all the text is visible in each block.
- Yield options (always yield in loops, check run criterion on yields).
- Freeze the chart detail pane (moves only when a block is clicked in the right pane).

### **4.3.4 OC Monitor**

#### **4.3.4.1 Shutdown Options**

Closing OC Monitor now allows a user the option to leave the application active. A pop-up dialog appears asking whether the application should be left running or terminated. When left running the application continues to run but visibility to the application is no longer available via the OC Monitor. When OC Monitor is reactivated at a later time, it will automatically attach to the active OC application. When termination of the application is selected, OC Monitor first terminates the application before closing the OC Monitor window.

This option is also presented to the user when logging off Windows NT when OC Monitor is left active. This option is not available when OC Monitor is shutdown via Paragon - when started via Paragon, an OC application remains active only while Paragon is active. As Paragon can run as an NT Service this does not prevent Paragon/OC applications from continuing to run when a user logs off from Windows NT.

#### **4.3.4.2 Improved Memory Window**

The OCM Logic Memory and Forces pages, have been modified to allow simultaneous display of DRV, Alias and Wire Label names in addition to the variable value. Any combination of DRV, Alias and Wire Label may be selected for display via a context menu viewed by right clicking on the

window. (Previous releases allowed only one name selection.) The displayed values may also be sorted by Alias, DRV, or Wire Label; sorting is controlled by selections on the same context menu.

The Value column of these windows now allows selection of the displayed data format for integer type values. The format is selectable from among Binary, Hex, Decimal (the default) and Octal. The selection of the display format is also made via the context menu discussed in the previous paragraph. Float values are not affected by the format selection.

#### **4.3.4.3 Time Stamping Messages**

All messages concerning significant events are time stamped when sent to the OCM Console pane. As potentially many threads share use of the Console pane, the addition of the time stamp allows accurate sequence of events monitoring via the Console.

#### **4.3.4.4 “Float” Watch Window**

An option has been added to the Watch window to force it to float on top of OCM and OCM-initiated displays. (Other applications will obscure it.) The float feature is selectable and controlled by clicking on the pushpin icon appearing in the upper left corner of the window.

### **4.3.5 OpenControl Debugger**

#### **4.3.5.1 Block Watch Window Improvements**

The timer status (started, stopped, reset) is included when timers are displayed. Forced values are displayed in bold.

#### **4.3.5.2 Breakpoint List Double Click To Breakpoint Location**

Double clicking on a breakpoint in the breakpoint list brings the block into view.

#### **4.3.5.3 Chart Trace**

OpenControl flowcharts execute at very high speeds, of course much faster than a human can view. When validating an application or when trouble shooting new logic, it is helpful to look back at the path logic taken to get to a certain point (or for that matter look at the path logic is taking when looping).

A Chart Trace feature is available in this release to assist in validation and debugging the OpenControl applications. Three buttons controlling the feature now appear in the Debugger window toolbar, one to start/stop tracing of the selected chart, one to highlight the blocks in the current execution flow, and one to display a trace file. Tracing will consist of recording the chart id and X, Y grid position of each block (including those in any called sub-charts) as it executes.

Trace data will be periodically saved (asynchronously with chart execution) to a disk file for subsequent viewing. Trace records are not saved in user-specified files- initiating a new trace destroys any previously recorded trace data. Trace data from each chart cycle overwrites data from prior cycles so trace data files will not consume all available disk space.

The Chart Trace control buttons are interlocked such that the View Flow and View File buttons are disabled while tracing is not selected. The View File button activates a trace window to display the contents of the last saved trace file. The window does not update dynamically (to give you a chance to look at it) but may be refreshed by re-selecting the button.

Trace records appear as simple ASCII records consisting of three fields, one each for the chart id, X coordinate, and Y coordinate. Page/scroll capability allows viewing the entire trace file. The trace may be printed or saved to a text file from the View window.

The View Flow button highlights blocks in the most current flow of execution. Highlights are refreshed each chart cycle. When View Flow is selected and View File is subsequently selected, dynamic updating of the execution flow stops and highlights show the flow depicted by the displayed trace file.

#### **4.3.5.4 Auto-sizing for charts in Debugger window**

The size-to-content option of selected blocks is now honored in the debugger window.

#### **4.3.5.5 Freeze Pane**

The freeze-chart-detail pane option, selected when a chart is developed, is also functional in the debugger window.

### **4.3.6 OpenControl Drivers**

#### **4.3.6.1 Genius I/O**

The Genius driver for OpenControl includes startup and device fault problem corrections plus dual channel PCIM support. Both channels on the Genius PCIM card are now supported.

The following problems were corrected:

- When Genius IO blocks were powered off during a network startup and later powered up and reset, outputs could not be generated. This problem is fixed in 5.4.
- On a fault or power down condition for Genius IO blocks, the inputs would retain their last known state. (This is a problem when the safe state is "0".) Inputs now go to zero when a block fails. Existing applications that rely on the input data of failing blocks will need to be modified to save the input states in logic memory.

#### **4.3.6.2 DeviceNet SST**

Device and controller diagnostics have been added to the DeviceNet driver:

- Diagnostic tabs were added to the device and controller card configurators.
- The runtime driver was enhanced to support diagnostic messaging between the devices, the controller and OpenControl. This will allow status and extended status information to be obtained and processed by mapping this information to the OpenControl database. This enhancement also allows control commands to be sent to any devices capable of responding.

#### **4.3.6.3 Interbus-S**

The enhanced Interbus-S driver includes support for the 4.36 Interbus-S firmware and PCP messaging. PCP messaging for Interbus-S was added to the runtime driver using level 4.36 Interbus-S firmware. Applications wishing to use this feature will need to upgrade their controller card to that level of firmware.

#### **4.3.6.4 Profibus (ICT)**

The Profibus driver has been enhanced to include a PCI option and more robust network disruption protection.

The driver supports operation on either ISA or PCI versions of the Softing ProfiCard by making a selection in the OpenControl Profibus configurator. Otherwise the operation of the driver is identical for each card and transparent to the user and application.

During testing it was discovered that severe disruptions of the network led to loss of status information in OpenControl. The profibus driver was enhanced to confirm the status of all devices in such cases.

Complete shutdown of the driver resulting from the severe disruptions could also leave outputs in their current state. Application logic is typically designed such that this is an unsafe condition. Thus OpenControl now sets all outputs to zero before exiting. (Applications relying on the outputs remaining in their current state need to be modified.)

#### **4.3.6.5 Drivers Unchanged**

Honeywell SDS, Seriplex, AB Remote I/O and Modicon Remote I/O drivers have not changed for 5.4. (They have been re-built and the 5.40 driver must be used with the 5.40 release.)

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## **4.4 Paragon Enhancements in 5.40**

Paragon continues to be important to Nematron both for process industry applications (HMI and SCADA) and to complete Nematron solutions for manufacturing. Paragon has been employed as the HMI in a majority of

our PC Based Control applications giving us valuable feedback on complementary machine control features and how to better integrate Paragon and OpenControl parts.

#### **4.4.1.1 ICCFrames Supports Color Connected Softkeys**

ICCFrames has been key to achieving the performance needed in machine control applications and effective application maintenance. The complexion of ICCFrames has been enhanced with the capability to specify static or dynamically changing colors for configured softkey labels (buttons).

Existing frames will still function without required modification; button colors will default to a static selection of black on gray. New frames may specify either static foreground/background colors for buttons or dynamic colors based on the value of a connection to a process or application variable.

Color selections are made via the modified Buttons configuration dialog. A checkbox controls the dynamic/static color selection. When checked the color selection is based on a connection to a process variable. Foreground and background colors for both the zero-state and one-state of the connection are made via a pull-down color menu. When the checkbox remains unchecked (the default selection) only a single background/foreground color combination selection is allowed.

#### **4.4.1.2 Stronger Integration with OpenControl**

The use of Paragon clients as the OpenControl HMI has given us several good ideas for improving the integration of these powerful products:

- The capability to save and restore the optional battery-backed static RAM (BBSRAM) of Nematron's ICC series computers has been added to the AM Diagnostics menu. Selection of the 'Restore Memory from Disk' or 'Save Retentive Memory to Disk' menu items in the Diagnostics menu will allow an upload or download of the BBSRAM. Access to BBSRAM is permitted only when no OpenControl applications are active; the interlocks controlling BBSRAM access from OpenControl apply to Paragon access as well. A complete description of BBSRAM usage is contained in the OpenControl User's Guide.
- The ability to invoke OpenControl's Online Change Environment (new feature of this release- see following sections for a description) is available via the AM builder's menu. A new item, OC Online Change now appears in the OpenControl Server sub-menu. This menu item allows modifications to be made to an active OpenControl project. Access via Paragon is essential for those OpenControl/Paragon applications in which the OpenControl Monitor is intentionally made inaccessible. The online change capability is described in subsequent sections.
- Additional safety measures have been added to OpenControl to prevent inadvertent shutdown, when an OpenControl project is

activated via Paragon. Prior releases disabled the Start, Stop and Exit OCM functions accessed by buttons or menus. This release further disables inadvertent shutdown by disabling OCM shutdown due to the <Alt>F4 key combination and the task bar Close menu selection.

- Prior releases required a two-step configuration to utilize HKCS- a strategy construction step using the HKCS builder invoked from the AM Builders menu and a scan program list configuration accomplished via the OpenControl Development Framework (OCF). This required second step has been eliminated; Paragon now automatically builds a new Scan Program List or modifies an existing one making access to the OCF for HKCS configuration unnecessary. Existing applications are unaffected. New applications using HKCS will avoid the now obsolete Scan List configuration.

#### **4.4.1.3 Regulatory Control Message Logging**

Like all other HyperKERNEL programs HKCS messages to the OCM Console window are now time-stamped.

#### **4.4.1.4 Paragon Now Supports 32 Serial Ports**

The number of supported serial ports has been increased from 16 to 32. This enhancement does not require any modification to existing Paragon applications. The enhancement affects the serial port configuration dialog accessed via the Application Manager (AM) Settings|Serial Ports... menu item. Viewing this list for new applications will show ports with default names COM 1 through COM 32.

Existing applications will not be changed; the port list will still contain COM1 through COM 16 (or the last specified names when changed as part of the application configuration), however up to 16 more ports may be added as needed. However, if you are adding additional ports to an existing application, the procedure is to allow AM to create a "New" application, so that all 32 ports will be configured in their proper slots. Otherwise you **MUST** add ports in sequence. (For example to use COM18 add COM17 and then COM18, even if you are not using COM17).

This enhancement also affects the CS subsystem and the PIO subsystem along with their associated builders. In the case of CS, the SINP and SOUT function blocks may now be configured to use ports 1-32, and PIO serial drivers may now be configured to use COM1 through COM32.

#### **4.4.1.5 Modicon RTU Driver Tuning**

The Modicon RTU driver now provides support for an inter-message delay. The driver can be configured to allow a certain amount of 'dead time' on the serial port before sending its next message. This may be needed in some environments to conform to the Modbus protocol. To use this feature, edit your PIO database and change the Parameter Sets you are using to the "MbusRTU PS" type. Then edit the "InterMsgDly" parameter within the parameter set. Enter the amount of delay in milliseconds: zero

means no delay. If you do not edit your PIO database, the modicon RTU driver will function as before (no intermessage delay).

#### **4.4.1.6 Time Tagged Value Quick Report For Larger Data Sets**

The Quick Reports TTVRPT has been enhanced to allow reporting on larger data sets. Prior releases were limited in the total number of values (tags times sample count) which could be reported. This restriction has been removed, allowing report generation on virtually unlimited data values. Existing TTVRPT configurations are unaffected by this enhancement and new configurations require no special actions to take advantage of this enhancement.

#### **4.4.1.7 AB-KT String function Modification**

The latest release version of the Paragon Allen-Bradley KT (ABKT) driver has been modified to include a PIO String function. The new String function will provide Paragon access to the ST Data File that is supported by AB Enhanced PLC-5 and SLC 5/03, 5/04, 5/05 Control Processors. Each of the ST File DATA elements can be addressed as an 82-byte string through the String function ReadIn & WriteOut elements. The StartReg specifies the ST element number (0-based) for the first string in the function, with NumPoints specifying the total number of strings mapped by the function.

Configurable elements of the new String function follow:

- UnitAddr- Data Highway address of the PLC in decimal (octal addresses must be converted to decimal). For the PLC-5 & SLC-500, the address is set by the dip switches on the PLC. If the target unit is on a remote network, UnitAddr specifies the address on the local network of the gateway to be used.
- Remote- Specifies whether the target unit is on the local or remote Data Highway Plus.
- RemAddr1 - Specifies the first level of remote addressing in decimal notation. Used only when Remote is set to 'Y'.
- RemAddr2- Specifies the second level of remote addressing in decimal notation. Used only when Remote is set to 'Y'.
- PLCType - Selects the type of PLC you will be connecting to. Select PLC-5 or SLC-500.
- FileNumber - Refers to the PLC Data File Number 9-999.
- StartReg - The number of the first referenced element in the ST file. The address must be entered as a decimal.
- NumPoints - Number of referenced elements or strings. For example, to address a set of 5 strings from Element 3 to Element 7, configure StartReg to 3 and NumPoints to 5.
- InitMode - Initial Value. Default initialization mode is Read First to read values from the hardware before initial writes. Write First writes

the initial value into the hardware without regard for the current hardware settings.

- ReadIn - Initial input value if Read First mode is selected.
- WriteOut - Initial output value if Write First mode is selected.
- Description - Any string up to 28 characters describing this function. Appears in any alarm messages in the Description Field.
- Scan Period - The period, in seconds, to update data points. Select one of six scan periods as defined in the configuration file.
- Scan Always - Scan-always enabler. Configure to Y to enable the scan-always function, N to disable. Communication occurs only when a query for a data value or connection is made.
- CommEnb - Communication enabler. Configure to Y to enable communication, N to disable.
- CommEnbName - External Paragon element (point) identifier to be used to enable and disable communications with the hardware. This element may be any Paragon subsystem (except PIO) digital element, such as CS.Tank.CommEnbFunc.Out. This allows an active high external element to control communications.

#### **4.4.1.8 Applicom Support For Siemens S7**

The Applicom PIO driver has enhanced to add direct support for Siemens Simatic S7 protocol to the driver by the addition of a new PIO process class (Applicom\_S7) and associated Analog, Digital and String Function classes. The new process class is "Applicom\_S7" and the parameter set is the same as for the Applicom\_S5 block.

The Analog, Digital and String functions are identical to those of Applicom\_S5, with following exceptions:

- S5\_DataTyp, S5\_DB\_num, S5\_BitNum and S5\_WrdBytNum function parameters are called S7\_DataTyp, S7\_DB\_num, S7\_BitNum and S7\_WrdBytNum, respectively.
- DataTypes supported are S7\_DataBlock, S7\_Memo, S7\_Input and S7\_Output

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## **4.5 HyperKERNEL Enhancements in 5.40**

HyperKERNEL is important to the performance of the Nematron complete solution for PC Based Control and has established itself as a reliable means of providing hard realtime performance to Windows NT.

### **4.5.1.1 HyperKERNEL Tasks Keep On Running**

A new HyperKERNEL monitoring service allows HK tasks to keep running when the user logs out from NT. HyperKERNEL Runtime Manager (HKRTM) is closed by a logout but any active HK applications continue to run. When the same or another user logs back into NT, HKRTM may be reactivated to continue monitoring the still active

application. HKRTM automatically attaches to the active application with no user action required.

#### **4.5.1.2 Viewing Named Memory Segments**

HKRTM has been enhanced to allow viewing named memory segments in a new HKRTM tab window, accessed via the Named Memory Segments tab. The window lists named memory segments and the segment size. Selecting one of the list entries displays the segment contents in the right half of the tab window. Displayed values may be formatted in any of the bit, byte, word, long, or float views and are dynamic, changing as the active application modifies the contents corresponding memory address.

#### **4.5.1.3 NT Service Pack Support**

Version 5.40 includes support for Microsoft NT Service Packs 4 and 5.

### **4.5.2 HyperKERNEL Development**

HyperKERNEL sample projects now include the linker switches required by Visual C 5.0 and will now compile and link more cleanly. If you are still using Visual C 4.2, these switches will produce an “unrecognized option” warning that may be ignored. (See notes below on using VS 6.0.)

The HyperKERNEL API function `hkPrint()` has been modified. In the past, if the message output queue (64 messages) for `hkPrint()` was filled, the function would block until space in the queue became available. While this preserved all information in that no messages were lost, this forced an interruption of the calling thread, in direct contradiction to the documented and desired behavior of `hkPrint()`.

The enhanced `hkPrint()` now discards any messages received while the queue is full and returns an error code of `-2` to indicate that the request failed due to overflow. The calling thread can be designed to process this return code in an appropriate manner.

In addition, the message queue has been extended to buffer up to 200 messages, rather than 64.

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## **4.6 Using Microsoft Visual Studio 6.0**

This section provides information that may be helpful if you are trying to create custom software parts with the Nematron Software development kits that are supplied with HyperKERNEL, OpenControl and Paragon. You may wish to review this section even if you are using an older version of Visual C++ as some of the information is new to Nematron Software version 5.4.

### **4.6.1 HyperKERNEL 5.4 Development**

HyperKERNEL application development under Visual C++ 6.0 is essentially the same as under VC++ 5.0. When building applications that will run within HyperKERNEL, it is important to make sure the linker

switch "/fixed:no" is appended to the Link settings of your project. Also remember to set the entry point to "hkMain", and to use only "Release" builds. All of this is noted in the HyperKERNEL Reference Manual (regarding VC++ 5.0).

If you wish to open a project created in Visual C++ 4.2, with version 5.0 or 6.0 (including our samples), you will notice that the "Open Workspace" dialog does not immediately show the file to be opened. This is because version 5.0 and 6.0 are looking for Workspace files (.dsw or .msp extension) which were not used by VC++ 4.2. To find the older project, use the "Files of type" combo box to choose the Makefiles (.mak extension) selection. When you open the Makefile, Visual Studio will warn you that it will convert the old project to the new format, and ask you to confirm the operation.

If you install HyperKERNEL 5.4 to its default location, you will need to change your project settings for the new location of the include and library files. They will be found in

"C:\Program Files\NemaSoft\HyperKERNEL\Inc"

and "C:\Program Files\NemaSoft\HyperKERNEL\Lib"

respectively. If you have created private copies of the include and library files for your projects, be sure to update them with the 5.4 versions.

There are no special considerations for the building of HyperSHARE applications with Visual C++ 6.0.

## 4.6.2 OpenControl 5.4 Development Kits

For any executables that will operate within HyperKERNEL (scan programs, drivers, etc.) all the notes in the previous section apply. For executables that operate on the Windows NT side and use the OpenControl API, there are no known issues with VC++ 6.0. If you are building a Configurator (a DLL that operates within the OpenControl Framework) please contact Nematron for the latest information.

## 4.6.3 Paragon 5.4 Development Kits

There are no special considerations for using the Block Development Kit, User Draw Kit, or Client Objects with VC++ 6.0.

For the PIO Development Kit, the sample command files, LINKPDK.CMD and LINKMBUS.CMD, require modification. A section of each command file sets up the PATH, LIB and INCLUDE environment variables for Visual C++. These sample files are designed specifically for Visual C++ 5.0, and do not setup the environment properly for VC++ 6.0. Here are the lines in question:

```
set VS50DIR=c:\msdev50
set PATH=%VS50DIR%\shaderride\bin;%VS50DIR%\vc\bin;%PATH%
set LIB=%VS50DIR%\vc\lib;
set INCLUDE=%VS50DIR%\vc\include;
```

We recommend that you delete or comment out (place "REM" in front of) each of these lines. If you allowed Visual Studio to register environment variables during installation, you do not need to do anything else. If you did not allow Visual Studio to register environment variables, you must call the VCVARS32.BAT file provided by Visual Studio. We recommend that you call this file once per command session before using our sample command files. If you place a call to VCVARS32.BAT within our command files, each invocation will append more data to the environment variables, yielding undesirable results.

Because Microsoft has changed the file structure of Visual Studio for each of the past two releases, it is best to assume they will change it again in the future. If you are using only one compiler on your system, allowing the Visual Studio installation to setup the environment is the best way to go. If you require more than one version of the compiler, use the VCVARS32.BAT file to setup your command sessions as needed. The Visual Studio documentation should help you locate the VCVARS32.BAT file, or you can search your Visual Studio installation with Windows Explorer.

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## 4.7 Problems Corrected in 5.4

Brief descriptions of the problems corrected in 5.4 are listed below. If you require more detail or a better explanation please contact Nematron Software Technical Support.

### 4.7.1 OpenControl

- DDE Strings- When strings were added to OC the changes were not propagated to the DDE interface. This has been completed.
- Comment blocks in the OC Debugger window now open and close using the pin as in the development environment.
- File/Import Database destination now defaults to NULL (blanks).
- Both the OCF Find and Replace algorithms have been enhanced to include block captions and Comment blocks.
- Configure Chart List dialog has been widened and scroll bars added when necessary to view long chart names.
- Charts are displayed in the mode (maximized or cascaded) last selected.
- Edit | Preferences dialog is now identical to the dialog used in the OCM.
- Timer configuration dialog has been corrected to avoid shifting to the left (making the alias name scroll off-screen) when ENTER is pressed after typing an alias name.
- String configuration dialog column for the name has been renamed "Alias" for consistency with other Logic Memory configuration dialogs.

- Logic Memory pull-down lists have been corrected to work in a standard fashion (selecting the pull-down now closes the list when it is already open).
- Using the keyboard accelerator keys to Cut/Paste (Ctrl-C, Ctrl-V) was internally latched and prevented subsequent attempts to build the project (Ctrl-C cancels an in-progress build). This has been corrected.

## 4.7.2 Paragon Corrections

### 4.7.2.1 *PIO corrections:*

- Remote connections to PIO were not functional in 5.32 but are in 5.40.
- Written values showed read-only status when viewed from EI in a remote node.
- Browsing the RawValue parameter returned random values.
- Access to string sets operated only on the first string in the set instead of indexed string.
- CommEnable connections to AB Interchange, ABKT, AB PLC5, JCI, PAMUX, Seriplex, SquareD, Maxcom, Moore APACS are now fully functional.
- The consolidation of I/O transactions have been improved for SquareD, Gem80, ABKT, ABSLC, DGH, Moore APACS, GE Ethernet, OptoMux, Yokogawa, Mitsubishi Ethernet.
- ABKT PLC5 functions with more than 122 words/bits or 61 floats no longer generate a runtime error.
- Communications between AB Interchange and SLC 500 have been corrected.
- Online changes made to Cyrano Arcnet are now accepted.
- Start bit parameter is now correctly handled for Gem80.
- Unconnected digital outputs for Gem80 are always properly initialized in 5.40.
- Bricks are now conditionally initialized by Mystic driver on startup.
- Correct value for digital alarm priorities are now returned for Mystic 200.
- TCS LIN now starts when a multiple I/O function is configured.
- TCS Serial driver now correctly ACKs the final data packet all the time.
- Digital output values are always transmitted for Tiway.
- D registers greater than 999 for Toshiba EX are now accessible.
- C registers are now accessible for Toshiba EX.

### 4.7.2.2 *DM corrections:*

- Data conversion errors on import no longer cause an infinite loop.

#### **4.7.2.3 CS corrections:**

- String blocks downstream from SPSP, SPSF, SSWH, MSGO, UMSG, EXEC with input connections no longer execute unexpectedly.
- Failure of shared memory allocations are correctly reported and no longer cause a crash.
- Conversion of 550 strategies containing USER blocks have been corrected.

#### **4.7.2.4 Miscellaneous corrections:**

- RTS serial port control now works in Windows 95.
- Acknowledging inactive alarms via the TNTAlarm OCX control sometimes crashed the control. This has been corrected.
- Configuring TNTAlarm() method of the TNTAlarm OCX now operates consistently.
- Subsequent reads of link-enabled connections via COI now correctly indicate the data type when the initial read returns a NULL\_DATA\_TYPE.
- Exiting Itrends after opening a login window and leaving the window open no longer crashes.
- OI screens with plots no longer leak memory if the screen is closed before the plot is drawn.
- OI use of a quality color no longer causes a crash (was random).
- OC Server no longer crashes on startup when all CS library files referenced by the CS configuration file are not accessible by OC Server.
- OPC Server can now be started before Paragon starts.

### **4.7.3 HyperKERNEL**

- Configuring an invalid HyperKERNEL interrupt and rebooting caused NT to blue-screen. This has been corrected.

# 5. OLE For Process Control (OPC)



All Nematron Software 5.4 Servers are OPC servers.

## 5.1.1 OPC Introduction

OPC (OLE for Process Control) is a COM (Microsoft Windows) based technology. Specifically OPC is a defined, standard interface between COM clients and COM servers. The interface definition is under the control of the OPC Foundation, which can be found at "<http://www.opcfoundation.org/>". From the OPC web site you can download an overview of OPC and even the complete OPC specifications.

### 5.1.1.1 OPC Clients And Servers

When talking about *OPC products* it is important to understand whether they are *OPC clients* or *OPC servers* - sometimes they are both. Many HMI vendors act as OPC clients to access data in I/O vendor and other servers. Clients should have the capability to:

- List available (installed) OPC servers and connect to them.
- Browse OPC server tags - so you do not have to type them. Note that tag browsing is an OPC option thus not all servers support this. (Nematron servers support full browsing.)
- Create OPCGroups in OPC servers and add OPCItems to groups for reading and writing. OPCItems correspond to a tag in OPC servers. OPC servers have a variety of tag implementations (flat, hierarchical, mixed) and the client must be able to handle all of them.
- Read and write data in various formats.
- Disconnect from servers when operations are complete.

Note that some clients connect once when they are started and keep all connections open until they shut down. This places a much heavier load on your system than clients that connect only when the data is needed.

The most common OPC server is a server which provides access to information in I/O equipment, eliminating the need for each HMI, SCADA vendor to write and maintain drivers. These servers must support the operations described above.

However other OPC servers provide access to much more extensive data. For example all Paragon data is accessible including PIO driver data, CS control block parameters, DM data (only as strings) and OpenControl variables. This allows a different HMI (or other client) to be used with Paragon drivers or control applications.

#### **5.1.1.2 Using OPC with Visual Basic and VBA**

OPC servers provide a COM interface that is used directly by most OPC HMI clients. Microsoft Visual Basic and VBA do not use the direct COM interface. Instead they require an *Automation Interface* which was defined by the Microsoft Visual Basic development team.

The OPC foundation has defined an Automation Interface as a *Wrapper* (add on) to the OPC COM interface. This is not installed with 5.40 but are available on the 5.40 CD. If you want to use OPC with VB or VBA, see the section below on how to install it.

### **5.1.2 Nematron Software OPC Overview**

*All Nematron Servers are OPC Servers in 5.4.*

*Paragon has OPC built in. There is nothing to install and no enablers to turn on.*

Nematron Software 5.40 Servers (OC, PIO, CS and DM) are OPC Data servers, allowing you to use any Nematron server with competitive HMI and other OPC client applications. (Nematron Software 5.40 does not contain any OPC clients but you can still use Nematron Clients with Nematron Servers.)

The OPC support provided is slightly different depending on whether you install Paragon or not.

- When you install Paragon 5.40, OPC is installed automatically when you install Paragon – Paragon has OPC built in. In this case OC tag names are limited to 12 characters (longer ones are ignored when browsing).
- When you do not install Paragon 5.40, you need to install the OPC server support for OC. (You can not install this if Paragon is installed.). The OC OPC server provides full tag name browsing.

If you intend to use Visual Basic or VBA as the client to Nematron OPC servers, you will need to install the OPC Automation Wrapper separately. The OPC Foundation defines Automation support separate from the OPC COM interface and this can be installed from the 5.40 CD as described below.

This was done at the Paragon level and OpenControl by itself is not yet an OPC server. If you have an OPC Client, you will see "Nematron.OPCServer.1" when your client lists available servers for you, when you have properly installed Paragon 5.40. See the section below for more detail.

Several hardware vendors (ICT, SST, Siemens, OPTO-22, etc.) provide OPC servers that will allow OPC clients to configure and access their

hardware. To use OPC Servers from hardware vendors you will need Nematron Software to act as an OPC Client. Nematron Software 5.40 does not contain any OPC clients. Nematron OPC clients will be released in future products.

### **5.1.3 Nematron Software OPC Details**

#### **5.1.3.1 How Does OPC Help?**

Nematron Software 5.40 turns all Nematron servers into OPC servers. But existing Nematron Software server applications work and existing paragon clients (OI, Recipe, Itrends, ActiveX JavaBeans, etc.) operate unmodified. You do not have to use OPC or change anything you have been doing. Nematron Software OPC does offer you the potential for enhancing your applications with OPC clients and also enhancing non-Nematron applications with Nematron Software Servers.

Nematron Software's "designed in" true client server architecture makes it easy and efficient to use any Nematron Software server with any OPC based application. For example you might:

- Expand your Nematron Solution using OPC clients to add functionality. Advanced alarming or annunciation can easily access Nematron server data.
- Add a special OPC enabled recipe user interface client to an existing Nematron Software application.
- If you have standardized on a competitive operator interface product, add Nematron Software advanced distributed servers to enhance your non-Nematron Software application.
- Use just Paragon PIO server and one or more of the Paragon I/O drivers with your own custom application written in VB, C, C++.  
(Actually our ActiveX controls are still easier to use and faster but if you have already implemented OPC client code, Paragon will fit in.)
- Use OpenControl for high speed, deterministic sequential control with your existing OPC enabled user interface (especially when you discover that your existing control engine is not good enough).
- Use Paragon HKCS regulatory control with an existing OPC enabled user interface.

With Nematron Software you never have to throw away an entire application. That's what an open, client server architecture offers.

#### **5.1.3.2 Nematron OPC Implementation**

Here are several points about Nematron implementation of OPC:

- Nematron Software conforms to the OPC Data Access 2.0 specification. Neither OPC Alarms (v1.0 specification) nor History (draft specification) are supported at this time.

- Nematron Software OPC modules do not take CPU or memory resources until used.
- It has been designed to have minimum impact on your existing applications. In fact, your existing application is useable in an OPC based application with no modifications.
- Nematron Software 5.40 with OPC still starts quickly and does not require noticeably more resources than before.
- Nematron Software OPC provides access to all Nematron Software data and data types. DM's complex values (alarms and history) can only be accessed as strings at this time.
- Full browsing is supported. The presentation of the name hierarchy is up to the client but will typically use a tree view. The client may assign the top level (Paragon, Nematron) a name like "root" or it may allow you to specify a name when it supports more than one server simultaneously. Under the top-level name, you will see the normal Nematron Software name structure: all of the normal Nematron Software server level names (AM, DM, PIO, CS, etc.), containing process level names, containing tag names, containing element names.
- Some clients let you choose the data type. When the "native" data type is available, choose it and the OPC Server will handle everything. If that does not work out, you can try specifying the format.
- Nematron Software OPC supports access to Paragon arrays a single element at a time. It does not support accessing multiple elements of an array in one transaction.
- All data is time stamped.
- Nematron Software Quality Flags are mapped to OPC flags where they make sense.

## 5.1.4 Installation of Nematron OPC

### 5.1.4.1 Installing Paragon OPC

There is nothing special to install to use Paragon Servers as OPC servers and there are no enablers to turn on. This support is part of the base Paragon 5.40 product.

There is nothing to configure for OPC in your Paragon application.

Once you have installed 5.40, you can verify the installation of Paragon OPC with any OPC client that browses OPC servers:

- If you plan to use VB or VBA you must obtain and install the Automation Wrapper. One is available on the 5.40 CD as described below.
- Start Paragon. As a minimum Application Manager must be running. Start an application to browse and access PIO, CS, DM or OC data.

- Run your OPC client and consult the documentation to learn how to connect to an OPC server. Typically a menu item is provided. When you attempt to connect, the client will present a list of OPC Servers available on your PC. You should see "Nematron.OPCServer.1" in the list. If this is there, you are on your way.
- If you do not see the entry listed above, then you either have not installed 5.40 or your client requires some other action to retrieve a list of servers. If you are sure you installed Paragon 5.40, consult the client's documentation for the proper procedure.
- If none of this works, contact Nematron Software Technical Support providing the name of the client application and we will help you get started.

Usually "Nematron.OPCServer.1" will be listed and you can connect to Paragon servers. When you first run it, you may hear a few disk clicks as the OPC modules initialize. You should then be able to browse Paragon servers (AM, CS, PIO, DM, etc.) and drill down to server tags.

#### **5.1.4.2 Installing OpenControl OPC**

*WARNING! Do not install the OpenControl OPC Server with Paragon*

If you are not using Paragon then you need to install the OPC Server for OpenControl on the same station as OpenControl. Do this as follows:

- Browse the Nematron Software 5.40 CD ROM and locate the \OC\OcoPC directory.
- Run (double click) Setup.exe

There are no configuration requirements for the OPC Server for OpenControl. You can set an environment variable to change the rate that the OpenControl database is scanned. The default value is 100 milliseconds (10 scans per second):

- Open the Windows NT Control Panel/System Settings.
- Add environment variable "NEMA\_OCS\_UPDATERATE".
- Set its value to a number larger than 100 (milliseconds) such as 1000 (scan once each second).

Once you have installed the OPC Server for OpenControl, you can verify the installation of Paragon OPC with any OPC client that browses OPC servers:

- If you plan to use VB or VBA you must obtain and install the Automation Wrapper. One is available on the 5.40 CD as described below.
- Start OpenControl. An OpenControl application must be running to browse tags or access data.
- Run your OPC client and consult the documentation to learn how to connect to an OPC server. Typically a menu item is provided. When you attempt to connect, the client will present a list of OPC Servers

available on your PC. You should see "Nematron.OPCServer.1" in the list. If this is there, you are on your way.

- If you do not see the entry listed above, then you either have not installed the OPC Server for OpenControl or your client requires some other action to retrieve a list of servers. Consult your client documentation for the proper procedure.
- If none of this works, contact Nematron Software Technical Support providing the name of the client application and we will help you get started.
- Usually "Nematron.OPCServer.1" will be listed and you can connect to the OPC Server for OpenControl. When you first run it, you may hear a few disk clicks as the OPC modules initialize. You should then be able to browse OpenControl and drill down to server tags.

#### **5.1.4.3 Installing The Automation Wrapper**

If you plan on using OPC with MS Visual Basic or VBA you must install the Automation wrapper on the same PC as Nematron Software. The installation is the same for all Nematron Software configurations.

On the server station:

- Install Paragon or OpenControl (or both)
- If Paragon is not installed the OPC Server for OpenControl.
- Browse the Nematron Software 5.4 CD and locate the \OPC directory.
- Run (double click) OPCDA20.exe to install the automation wrapper components.
- Remember that the OPC Automation documentation is a good source of information, defining the automation interface.

#### **5.1.4.4 Remote OPC Using DCOM**

DCOM allows you to access Paragon OPC Servers from a remote station without having Paragon installed on the remote station. (Note that some OPC clients will not let you connect over DCOM.) Here is the general procedure for setting this up.

On the server station:

- Install paragon 5.40.
- This installs the required "OPCProxy.DLL" for you.
- Using the Windows Start | Run menu, run the DCOM configuration tool "Dcomcnfg.exe" in "Windows/System32 directory.
- Select "Nematron OPC Server" from the list of applications and then click the "Properties" button.
- On the "Location" page, check the "Run application on this computer" box.

- The default permissions should work in many cases. Check with your network expert if they do not.

On the client station:

- Go to the remote station and install your OPC client application.
- If the "OPCProxy.DLL" is not installed by the OPC client application, copy it from the Paragon station to the client station and register it on the client station using a command like:  

```
regsvr32.exe opcproxy.dll
```
- Using the Windows Start | Run menu, run the DCOM configuration tool "Dcomcnfg.exe" in "Windows/System32 directory.
- On the "Location" page, check the "Run application on the following computer" box.
- From the network list, select the node name for the station that contains Paragon.

## 5.1.5 OPC Notes

### 5.1.5.1 OPC Issues

Please be aware of the following OPC related issues and monitor our software support web site for updates:

- Occasionally the Nematron OPC server name may not appear in the OPC server list during browsing. This has been traced to a Windows problem. Until a resolution is available you can enter the server name ("Nematron.OPCServer.1") manually.
- Note that some clients connect once when they are started and keep all connections open until they shut down. This places a much heavier load on your system than clients that connect only when the data is needed.
- Nematron does not offer OPC development kits. In fact our OPC development work is based on kits we have purchased from PC Soft, Inc.

### 5.1.5.2 OPC and Paragon COI

OPC and Paragon's COI (Client Object Interface) are very similar in concept. The main differences are:

- OPC is Windows COM based which is useful from C++.
- OPC provides an Automation Interface (for VB and VBA). COI uses language specific bindings (VB, VBA, C, C++ and Java.).
- OPC is windows only. COI runs on non-Windows platforms.
- COI is optimized for Nematron servers and may be faster than the OPC interface.

COI provides access to DM alarms and history; our OPC does not support alarms and history access yet. (You can read an alarm or history record as a string).

The most important difference is that several other vendors of HMI and SCADA products support OPC allowing them to inter-operate with Nematron products.