

Nematron Software 5.60
Paragon
OpenControl
HyperKernel

Release Notes

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Document 5.60.00

Nematron Corporation

5840 Interface Drive, Ann Arbor, MI 48103, United States
Tel: 734-214-2000 Fax: 734-994-8408

Nematron Limited

1 The Briars, Waterberry Drive
Waterlooville, Hampshire, PO7 7YH, United Kingdom
Tel: +44.23.9226.8080 Fax: +44.23.9226.8081

www.nematron.com

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1. Introduction

Includes OpenControl, Paragon and HyperKernel on one CD-ROM

1.1 What's New in Version 5.60

*OPC Client for
Paragon...*

An OPC Client driver for Paragon's PIO subsystem has been added, which can be used to receive process data from a third-party OPC server running locally.

*Momentary Push
Button...*

Momentary push button functionality has been added to Paragon's Operator Interface Builder.

*TCP/IP Stack for
HyperKernel...*

A full-featured TCP/IP stack has been integrated into HyperKernel, making it possible to send and receive data over Ethernet independent of the Windows operating system. A complete API has been provided to allow users to add TCP/IP support to their custom HyperKernel applications.

*HyperKernel Serial
Port Filter for
Windows 2000...*

Allows HyperKernel applications to access serial ports without interference from Windows 2000 power management functions.

And more...

Version 5.60 includes other enhancements as well. HyperKernel has been updated to run in conjunction with Windows 2000 Service Packs 2 and 3.

*Continued attention
to quality.*

As always, Nematron pays careful attention to reported defects (problems, bugs, etc). We document reported problems, isolate responsible defects, then develop and field test corrections, and finally package clean corrections with each new release. The 5.60 release continues this commitment to quality. Corrections and minor enhancements made as part of the 5.60 release are summarized in a later section.

2. Installation

2.1 General Installation Notes

The Nematron Software 5.60 CD contains installations for OpenControl, Paragon and HyperKernel for Windows NT, Windows 2000 and Windows 95 (Paragon only).

Installation procedures are largely unchanged since 5.50. Upgrading from 5.50 is straightforward – simply uninstall the 5.50 version, and install the 5.60 release. Note that HyperKernel must be uninstalled separately; it is not removed by the OpenControl uninstall process, even though HyperKernel is installed as part of the OpenControl installation. (While the OpenControl install will detect and upgrade HyperKernel when necessary should you not uninstall it first, uninstalling HyperKernel is recommended.) Please review the entire Installation section before starting to use the 5.60 CD.

IMPORTANT NOTE: Customers with versions of Paragon older than 5.30 must read the release notes for 5.30 before updating to 5.60. The 5.30 release notes contain important procedures, which must be followed before moving your application to 5.60. They are located on the 5.60 CD in \Doc\Para_doc\rnote530.pdf.

2.1.1 New with this Release

- In Nematron Software Release 5.60, the default installation paths for HyperKernel and OpenControl have been changed to...

C:\Program Files\Nematron\HyperKernel

and

C:\Program Files\Nematron\OpenControl

...respectively. In previous releases, these packages were installed in

C:\Program Files\NemaSoft\.

NOTE: The default installation path for Paragon remains unchanged from Release 5.50.

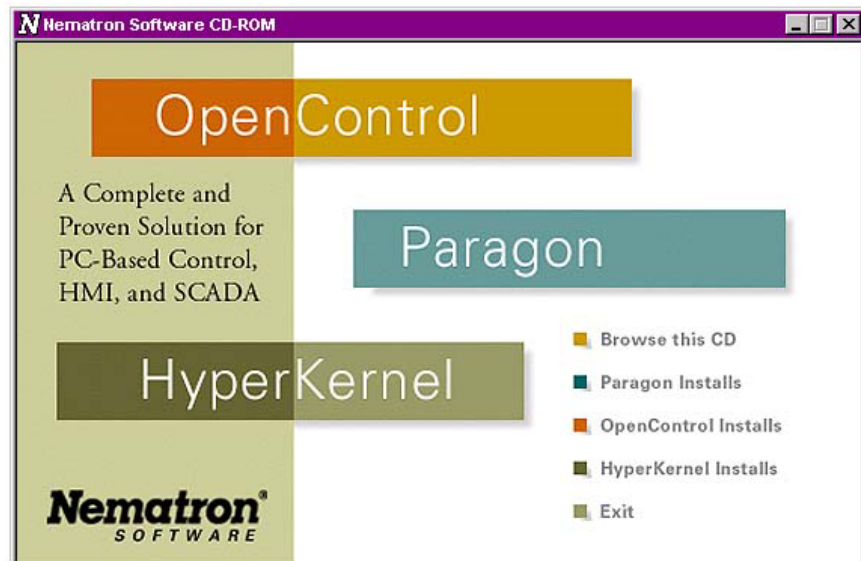
- An option to enable TCP/IP support has been added to the HyperKernel Configuration Wizard. If it is enabled during the installation of HyperKernel, a separate TCP/IP Configuration Wizard will be launched automatically after the customary HyperKernel restart. Please refer to the *HyperKernel Reference Manual* for more information on configuring TCP/IP.

- The new OPC Client driver has been added to the driver list in the Paragon installer. Also, the Paragon driver previously named “Modbus Plus Ethernet” has been renamed “Modbus TCP.”
- The HyperKernel serial port filter must be installed manually, if this feature is required. For more information, see section 3.2.2 below.
- An updated version of the Sentinel SuperPRO software activation module that can accept both USB and parallel-based hardware keys has been provided with this release. For more information, see section 2.3.6 below.

2.2 Starting the Installation Utilities

2.2.1 Using Autorun

The Nematron Software 5.60 CD will start automatically when the CD-ROM drawer is closed and the Nematron Autorun Screen should appear:



Installation options for installing Paragon, OpenControl and HyperKernel are selected from the lower right part of the screen. If the Autorun Screen does not appear, browse the CD and run “autorun.exe” manually.

2.2.2 Demo Modes

For demonstration or evaluation purposes, select the Paragon Test Drive option and OpenControl Standard Edition. This installs a fully featured version of Paragon with five hours allowed per session. OpenControl does not have a ‘test drive’ option. When run without an activation key, OpenControl defaults to demo mode, allowing 30 minutes of runtime per run. Note that HyperKernel is required for OpenControl operation and will also be installed as part of the OpenControl install procedure – be advised a separate uninstall will be required to subsequently remove HyperKernel.

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

2.2.3 Paragon SI Packages

When installing Paragon for use with a Systems Integrator Key, go to the \Paragon\Tnt directory and run the LOADWIN 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. A product configuration diskette is not needed.

2.3 New Installations

The *Paragon Getting Started Manual* and *OpenControl User Manual* (both available in PDF format on the Nematron Software CD) include detailed installation instructions for Paragon and OpenControl. The following sections give an overview for multiple product installations and 5.60 specific changes and recommendations.

2.3.1 Paragon

- Insert the Nematron Software CD in your PC's CD-ROM drive. From the Autorun Menu, click "Paragon Installs" and select any desired options, then reboot.
- If you need Paragon PDK drivers, see the section below.

2.3.2 Paragon PDK Drivers

- Obtain the driver from Software Support
- Copy the driver to the "paratnt\pio" directory. Note this assumes a default installation directory – adjust this accordingly when Paragon is not installed in the default installation directory.
- Open a command prompt window and move to the PIO subdirectory.
- Enter ".\tools\classedit manual" from the PIO subdirectory and select the desired drivers.
- Enable the drivers from the Application Manager menu bar. Select Settings, then Enablers..., then enable PIO Dev Kit – Driver 1 for one driver, Driver 1 and Driver 2 for two drivers and so on.

2.3.3 OpenControl

- Insert the Nematron Software CD in your PC's CD-ROM drive. From the Autorun Menu click "OpenControl Installs". Select Standard Edition or Professional Edition (requires a password). This will install first OpenControl and then HyperKernel.

When the HyperKernel installation completes, a configuration wizard will be activated to configure HyperKernel. Pay particular attention to the selection of the interrupt to be used by HyperKernel. 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 and configured, you will be instructed to reboot.
- After the reboot is complete, re-insert the Nematron Software CD and install any required OpenControl drivers.
- Once your system has restarted, access OpenControl from the Windows Start menu.

2.3.4 HyperKernel

- Insert the Nematron Software CD in your PC's CD-ROM drive. From the Autorun Menu, click "HyperKernel Installs" and select any desired options, then reboot.

NOTE: Installing HyperKernel is unnecessary if OpenControl is installed; the OpenControl installation automatically installs HyperKernel

2.3.5 Integrated Paragon and OpenControl Applications

- Insert the Nematron Software 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 "OpenControl Installs". Select Standard Edition or Professional Edition (requires a password). This will install first OpenControl and then HyperKernel.

When the HyperKernel installation completes, a configuration wizard will be activated to configure HyperKernel. Pay particular attention to the selection of the interrupt to be used by HyperKernel. Use the Windows NT Diagnostics, Environment Tab to locate an unused interrupt (IRQ).

NOTE: Normally it is best to select an IRQ in the range of 10-15. However, if you are installing on Windows 2000 with the ACPI HAL, you should not select IRQ11. (See section 3.2.1 below.)

- After HyperKernel is installed and configured, you will be instructed to reboot.
- After the reboot is complete, re-insert the Nematron Software CD and install any required OpenControl drivers.
- Once your system has restarted, access Paragon from the Windows Start menu.

2.3.6 Sentinel SuperPRO Module for USB-based Keys

An updated version of the Sentinel SuperPRO software activation module that can accept both USB and parallel-based hardware keys has been provided with this release.

This updated module must be installed manually from the Nematron Software CD following the regular installation of HyperKernel, OpenControl, and/or Paragon. The updated module replaces the standard, parallel-only module that is installed automatically by the installation utility.

In order to use the updated module, you must have a USB 1.1-compatible PC running Windows 2000. If your PC does not meet these requirements or you do not plan to use a USB-based hardware key, then do not install the updated module.

To install the updated module, insert the Nematron Software CD and run the installer program (.EXE) located in the \Rainbow\USB directory.

2.4 Updating Existing Installations

Existing installations of Nematron Software Release 5.50, Software Release 5.40, Paragon 5.32, Paragon 5.30, OpenControl 4.3, or HyperKernel 4.3 can easily upgrade to 5.60. Please be sure to read these release notes carefully for areas that may need attention during the upgrade. In general once an upgrade occurs, returning to an earlier release is not possible. Be sure backup versions of original application files are saved.

IMPORTANT NOTE: Customers with versions of Paragon older than 5.30 must read the release notes for 5.30 before updating to 5.60. The 5.30 release notes contain important procedures, which must be followed before moving your application to 5.60. They are located on the Nematron Software CD in \DOC\PARA_DOC\Rnotes530.PDF.

2.4.1 Paragon

- Back up your existing Paragon projects.
- Using the Windows Start menu, choose **Settings > Control Panel > Add/Remove Programs** to uninstall Paragon.
- Install Paragon 5.60 as described in section 2.3.1 above.

2.4.2 OpenControl

- Back up your existing OpenControl projects.
- Using the Windows Start menu, choose **Settings > Control Panel > Add/Remove Programs** to uninstall OpenControl.
- If you are uninstalling OpenControl 5.40 or 5.50, then also uninstall HyperKernel as described in section 2.4.3 below.

- Reboot your computer (automatically triggered by uninstalling HyperKernel).
- Install OpenControl 5.60 as described in section 2.3.3 above.

Caution: If you plan to convert any application projects from an earlier version of OpenControl to version 5.60, please refer to section 3.6 below.

2.4.3 HyperKernel

- Using the Windows Start menu, choose **Settings > Control Panel > Add/Remove Programs** to uninstall HyperKernel.
- Reboot your computer (automatically triggered).
- Install HyperKernel 5.60 as described in section 2.3.4 above.

2.4.4 Integrated Paragon and OpenControl Applications

- Back up your existing Paragon and OpenControl projects.
- Uninstall Paragon as described in section 2.4.1 above.
- Uninstall OpenControl as described in section 2.4.2 above. (NOTE: When you uninstall OpenControl 5.40 or 5.50, you must also uninstall HyperKernel.)
- Reboot your computer (automatically triggered by uninstalling HyperKernel).
- Install Paragon 5.60 as described in section 2.3.1 above.
- Install OpenControl 5.60 as described in section 2.3.3 above.

Caution: If you plan to convert any application projects from an earlier version of OpenControl to version 5.60, please refer to section 3.6 below.

2.5 Preserving the Sentinel SuperPRO driver

When OpenControl is uninstalled using the Add/Remove Programs control panel, the Sentinel SuperPRO driver is also removed. Both OpenControl and Paragon use this driver to access the hardware protection key. When Paragon is not uninstalled following the OpenControl uninstall, and OpenControl is not reinstalled, it will be necessary to reinstall the Sentinel driver. This is accomplished using the setupx86.exe install utility found on the Nematron Software CD in the \Paragon\Tnt\Win\Win_nt directory. Run the utility to reinstall the driver.

3. Software Details

3.1 Introduction

The following pages contain brief descriptions of this and other changes to HyperKernel, OpenControl and Paragon.

3.2 HyperKernel Enhancements in 5.60

3.2.1 Windows 2000 Support

Version 5.60 now supports HyperKernel execution on systems with the Windows 2000 operating system. Service Packs 1, 2 and 3 are currently supported. However, there are several known limitations regarding HyperKernel execution on Windows 2000:

- During HyperKernel execution, an IDE CD-ROM drive on the secondary IDE controller may be mistakenly reported as “removed” by the Plug & Play manager in Windows 2000. Once this condition occurs, the CD-ROM drive is nonfunctional until Windows 2000 is rebooted. Fortunately, simple rebooting is sufficient to completely restore the CD-ROM drive; no drivers or software need to be reinstalled.
- On Windows 2000 systems using the ACPI hardware abstraction layer (HAL), the new serial port filter should also be installed. For more information, see section 3.2.2 below.
- Also on systems using the ACPI HAL, an interrupt that appears to be free for use by HyperKernel may actually cause the system to blue screen at startup. This has been observed with IRQ5 and IRQ11 on various PC hardware platforms. If this problem is encountered, try a different “free” interrupt.
- If the HAL is manually changed from ACPI to standard PC, then the floppy drive will be nonfunctional during HyperKernel execution. When HyperKernel execution is terminated, the floppy drive becomes functional again. To change the HAL while retaining use of the floppy drive, you must completely reinstall Windows 2000 with the new HAL selected. For more information on installing a new HAL, see Microsoft Knowledge Base Article 216251.

Nematron will continue to investigate these issues and provide corrections or workarounds as they become available.

3.2.2 Serial Port Filter

A new serial port driver is provided that addresses a known issue on Windows 2000 systems using the ACPI hardware abstraction layer (HAL). On these systems, the HAL's power management functions conflict with HyperKernel's ability to access the serial ports. The new driver filters these functions, allowing HyperKernel to access the ports normally.

If this new driver is required by your system, it must be manually installed following the primary HyperKernel installation. The driver (HkFilter.sys) and installer (acpiInstaller.exe) are found in the "HyperKernel\Drivers\HKFilter" directory. The installer must be run from the command prompt. To install the driver:

1. In Windows, open a command Command Prompt (**Start > Programs > Accessories > Command Prompt**).
2. Change to the driver's directory. For example:

```
> cd C:\Program Files\Nematron\HyperKernel\Drivers\HKFilter
```
3. Run the driver installer:

```
> acpiInstaller.exe
```
4. Follow the onscreen instructions to complete the installation.

3.2.3 TCP/IP Stack

A full-featured TCP/IP stack has been integrated into HyperKernel, making it possible to send and receive data over Ethernet independent of the Windows operating system. A complete HyperKernel Sockets API has been provided to allow users to add TCP/IP support to their custom HyperKernel applications.

The stack currently supports the following NIC chipsets:

Novell NE2000-compatible (Windows NT 4.0 and Windows 2000)

Intel 82558 and 82559-compatible (Windows NT only)

Support for additional chipsets will be added in future releases.

3.3 OpenControl Enhancements in 5.60

3.3.1 Enhanced Drivers

3.3.1.1 ICT Profibus

The ICT (Softing) Profibus driver has been updated to include the following enhancements:

ICT's AutoConfigPro configuration tool is now installed with the driver, instead of the ProfiConfig tool that was installed by versions 5.40 and 5.50. AutoConfigPro provides several additional options for configuring Profibus communications, including the ability to configure the extended parameters required by the Siemens I/O protocol in ET200-type modules.

AutoConfigPro can be accessed via the Windows Start menu at **Programs > ICT Tools > AutoConfigPro**.

"Plug & Play" support has been added for PCI-based Profibus cards in Windows 2000.

The "byte swap" option that was missing in version 5.50 has been replaced.

Caution: Because of these changes, special care must be taken when converting application projects from earlier versions of OpenControl to version 5.60. See section 3.6.1 below.

For more information on ICT's Profibus products, please visit their Web site at <http://www.ictglobal.com/ICT010/products/products.asp?cid=1&sid=1>.

3.3.1.2 SST DeviceNET

The SST DeviceNET driver has been updated to support the following interface cards:

SST DeviceNET 5136-DN-ISA

SST DeviceNET Pro 5136-DNP-ISA

SST DeviceNET Pro 5136-DNP-PCI

SST DeviceNET Pro 5136-DNP-104

For more information on SST's DeviceNET products, please visit their Web site at <http://www.mysst.com/cards/devicenet/dn.asp>.

3.3.2 Improved "Save" dialog for online changes

When prompted to save changes made during runtime (a.k.a. online changes), OpenControl now allows the user to browse a list of existing projects to which the

changes can be saved. The user no longer needs to manually enter the project name for every save, although that option is still available.

3.3.3 Note on charts containing serial functions

Charts containing serial functions (in assignment commands or conditional tests) that do not also contain serial commands (like SerialOpenPort) will cause a crash when the project is built. The work around is to include some serial commands before building the project. Charts containing serial functions must include at least one serial command and probably need to include SerialOpenPort.

3.4 Paragon Enhancements in 5.60

3.4.1 PIO Drivers

3.4.1.1 OPC Client

An OPC Client driver for Paragon's PIO subsystem has been added to version 5.60. The client can be used to receive process data from a third-party OPC server running locally. The OPC Client is compatible with the OPC Data Access 2.0 specification.

This functionality is intended to replace the DDE Client.

For more information on using the OPC Client driver, please refer to the OPC Client help file found at \paratnt\pio\opc.hlp.

3.4.1.2 Modbus TCP

The existing Modbus Plus Ethernet driver for Paragon's PIO subsystem has been renamed "Modbus TCP," to bring it in line with industry conventions.

Also, a custom "Cognex" function class has been added to the driver, to improve interoperability with Cognex's In-Sight family of Ethernet-based camera sensors. This new class automatically recognizes the grid system used by Cognex to subset the camera's field of view, thereby eliminating the need for specialized Modbus addressing.

For more information on using the Modbus TCP driver, please refer to the Modbus help file found at \paratnt\pio\mod.hlp.

3.4.2 Momentary Push Button

Momentary push button functionality has been added to the Operator Interface. The functionality is enabled by selecting the "Momentary action" option on a regular Push Button object. For more information, see the Paragon online help files.

3.5 Documentation

Nematron Software version 5.60 includes the following additions and revisions to the user documentation:

- The online help files for the OpenControl development framework and the OpenControl Monitor utility have been updated to reflect numerous bug fixes in version 5.60. Also, the functional descriptions of the Flow Chart and Ladder Diagram blocks have been extensively revised.
- The *HyperKernel Reference Manual* has been expanded to cover the configuration and use of the new TCP/IP stack. This includes numerous additions to the HyperKernel API reference. The manual is installed with HyperKernel as an Acrobat PDF file.
- An online help file has been created for the new OPC Client driver for Paragon. The file is installed with the driver and can be accessed at `\paratnt\pio\opc.hlp`.
- The existing online help file for the Modbus drivers for Paragon has been revised and expanded to include Modbus TCP and Modbus RTU. The file is installed with the driver and can be accessed at `\paratnt\pio\mod.hlp`.
- A description of Paragon's new momentary push button functionality has been added to the main Paragon online help file. The file can be accessed at any time from within the Paragon application.

3.6 Converting Projects from Earlier Versions

Nematron Software version 5.60 is backward-compatible – in most cases, application projects created with versions 4.30 through 5.50 can be opened and recompiled in version 5.60 without further editing. However, there are some known issues described below.

3.6.1 OpenControl

- Because of changes in ICT Profibus device configuration (see section 3.3.1.1 above), the **Swap Bytes** option on all Profibus devices is automatically cleared in version 5.60 regardless of how the devices were previously configured.

To ensure correct runtime operation, you must verify all devices in version 5.60 and reenable the **Swap Bytes** option as needed.

WARNING: Improper configuration of I/O devices may result in serious damage to equipment and/or injury to personnel.

3.7 Using Microsoft Visual Studio 6.0

This section provides information that may prove helpful when creating custom software parts with the Nematron Software development kits.

3.7.1 HyperKernel 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 `.mdp` 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 to its default location, you will need to change your project settings for the new location of include and library files. They will be found in

```
"C:\Program Files\Nematron\HyperKernel\Inc"
```

and

```
"C:\Program Files\Nematron\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 current versions.

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

3.7.2 OpenControl 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.

3.7.3 Paragon 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%\sharedide\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.

3.8 Problems Corrected in 5.60

Brief descriptions of the problems corrected in 5.60 are listed below.

Note: Reports of difficulty when implementing applications using Nematron Java Beans and deficiencies in the Beans themselves have been received. While Nematron has not as yet been able to remedy these problems, there are installations that have reported success when using Nematron Java Beans. If you encounter difficulty with your Java Beans applications, please contact Nematron Software Technical Support for assistance.

3.8.1 HyperKernel Corrections

The v5.50 installer would configure the retentive memory card driver (a.k.a. BBSRAM) to start automatically on system boot, regardless of whether a card was actually installed in the computer. This would sometimes result in device

initialization errors. The v5.60 installer now correctly configures the driver according to selections made in the Memory Card Settings panel of the HyperKernel Configuration Wizard. If the driver requires further configuration after installation, then it can be accessed via the Devices control panel in Windows.

If a BBSRAM card is added to the computer *after* HyperKernel has been installed, then the HyperKernel install program must be run again in order to insure proper configuration of the card.

3.8.2 OpenControl Corrections

3.8.2.1 General

- Copying and pasting a chart with a 30-character name will no longer result in two files with the same name. A request for a unique file name is now made after a notification message is shown.
- A tag alias could be extended past the 30-character limit using expressions, and the resulting alias would not be detected as invalid. This problem has been corrected.
- Clicking on messages left over from a previous project would sometimes result in a fatal error. OpenControl will now clear the messages pane at the bottom of the window when creating or opening a new project.
- Printing cross-references would sometimes result in a fatal error. This problem has been corrected.
- Performing a 'Save' and 'Restore' of retentive memory would sometimes cause corruption of the BBSRAM card. This problem has been corrected.
- An ISA-based BBSRAM card installed in a Nematron ICC-6000 computer would always indicate a low battery (`IsRetentiveBatteryLow = 1`), even when the battery was okay. This problem has been corrected.
- When accessing the OpenControl development framework through Paragon on Windows 2000, the Retentive Memory configuration dialogs would be displayed with functional buttons but no descriptive text. All dialogs are now displayed correctly.
- The built-in OPC server would sometimes crash when the last connected client ended its session. This problem has been corrected so that the OPC server will always shut down gracefully when the last client session ends. Also, the server will restart automatically when a new client session attempts to connect.
- Performing subtraction on unsigned variables will no longer cause data corruption when the resulting value is negative.
- Finding and replacing text in a large project would sometimes result in a fatal error. This problem has been corrected.

- Finding text would sometimes return inconsistent results, depending on which blocks were used in the project. It was determined that each type of block ran its own search routine. The same search routine is now run for all block types.
- Timers will now stop automatically when they reach their preset values, rather than continue to run until stopped manually. **WARNING:** This may affect the functionality of existing OpenControl applications. Please check your applications and update them as needed.

3.8.2.2 Flow Chart

- If a Timer was given a Timer Stop command (T_STOP) immediately after it was given a Timer Reset command (T_RESET), then the Timer would be incorrectly set back to the last value before it was reset. The Timer now correctly remains at 0 until it is given a new Timer Start command (T_START).
- A cosmetic problem in which deleting one branch of an If/Then/Else group would leave blocks in the remaining branch colored yellow has been corrected.

3.8.2.3 Ladder Diagram

- Adding three or more branches to a single rung would sometimes corrupt the ladder or even cause fatal errors in OpenControl. This problem has been corrected.
- Several cosmetic glitches related to the redrawing of the right power rail have been fixed.
- Copying and pasting multiple rungs would sometimes result in the rungs being pasted in inverted order. This problem has been corrected.
- Cutting and pasting rungs would sometimes result in a fatal error during compilation. This problem has been corrected.
- Adding a rung label that contains spaces would cause compilation problems when building the runtime module; the compiler would attempt to parse the label as a command. OpenControl now checks for and rejects spaces in rung labels.
- If a ladder was larger than the visible area of the ladder editor window, then the user would have to manually scroll down to see new rungs or branches that were added to the bottom of the ladder. The editor window will now automatically center on new rungs as they are added.
- Transitional contacts (e.g. Rising Edge Relay, Falling Edge Relay) would sometimes malfunction during runtime. This problem has been corrected.
- OpenControl sometimes failed to build or commit runtime changes and incorrectly returned the error “No changes to build/commit.” This problem has been corrected for most cases, although changes may still fail for other reasons.

3.8.2.4 *OpenControl Monitor*

- Latched Coils in ladder diagrams did not show status during runtime. This problem has been corrected.
- Deleting elements from a ladder diagram during runtime would sometimes result in a fatal error. This problem has been corrected.
- When OpenControl was run under TNT Services, the OpenControl Monitor console would remain blank and not display any OpenControl runtime errors. This problem has been corrected.

3.8.3 Paragon Corrections

- Previously, if you made online/runtime changes to an OpenControl project running through Paragon, the changes were saved only in OpenControl's **\Current** directory and not in OpenControl's **\Projects** directory. The next time the project was run, it would revert to its original version and overwrite any changes that were made.

Now, when an OpenControl project is run through Paragon, Paragon will compare the version in the **\Current** directory against the version in the **\Projects** directory and preserve any changes made during the last runtime.

However, online/runtime changes are still saved only in the **\Current** directory. To permanently save changes to the **\Projects** directory, you must use the "Save Project As" command in Paragon's OC Project Builder.

- The built-in OPC server would sometimes crash when the last connected client ended its session. This problem has been corrected so that the OPC server will always shut down gracefully when the last client session ends. Also, the server will restart automatically when a new client session attempts to connect.
- An error in the **DITASK.EXE** module caused Paragon's Operator Interface to lock up when saving or executing certain OI screens. This problem has been corrected.

4. OLE for Process Control (OPC)



All Nematron Software Servers are OPC servers.

4.1.1 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.

4.1.1.1 OPC Clients And Servers

When talking about *OPC products* it is important to understand whether the products are *OPC clients* or *OPC servers* - sometimes they are both. Many vendors' HMI products 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 that provides access to information in I/O equipment, eliminating the need for each HMI and SCADA vendor to write and maintain drivers. These servers must support the operations described above.

Other OPC servers, however, provide access to 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.

4.1.1.2 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 5.50 but is available on the 5.50 CD. If you want to use OPC with VB or VBA, see the section below on how to install it.

4.1.2 Nematron Software OPC Overview

All Nematron Servers are OPC Servers.

Nematron Software 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. Although Nematron Software does not currently contain OPC clients, the 5.50 CD does contain a time-limited trial version of an OPC bridge from Northern Dynamics, Inc. This OPC bridge can be installed by running the *setup.exe* utility found in the NDIBridge directory on the CD. Documentation for the bridge utility can be found in the same directory. Should you decide to use this OPC bridge after the trial period expires, you can purchase a license for the bridge directly from Northern Dynamics, Inc.

Note that although Nematron servers now function as OPC Data servers, this in no way impacts use of Nematron clients. You can still use Nematron clients (OI, Recipe, Quick Reports and others) with Nematron servers.

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

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

- When you install Paragon, OPC support is installed automatically – Paragon has OPC built in. In this case OpenControl tag names are limited to 12 characters (longer ones are ignored when browsing).
- When you do not install Paragon, you need to install OPC server support for OpenControl. (You cannot install this if Paragon has already been installed.). OpenControl

OPC 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 5.50 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. 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 does not currently contain any OPC clients, however, the Northern Dynamic OPC bridge mentioned at the beginning of this section may help. Nematron OPC clients will be released in future products.

4.1.3 Nematron Software OPC Details

4.1.3.1 How Does OPC Help?

Although Nematron Servers are now OPC servers, existing Nematron Software applications will continue to work and existing Paragon clients (OI, Recipe, Itrends, ActiveX JavaBeans, etc.) will continue to operate. You do not have to use OPC or change anything you have been doing. Nematron OPC does offer you the potential for enhancing your Nematron applications with OPC clients as well as the potential for enhancing your 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.

4.1.3.2 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.
- Nematron Software OPC 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 with OPC starts quickly and requires few additional resources beyond those required by the application itself.
- 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 controlled by the client, but typically uses 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.

4.1.4 Installation of Nematron OPC

4.1.4.1 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 product.

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

Once you have installed Paragon, 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 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 you 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 Paragon or your client requires some other action to retrieve a list of servers. If you are sure you installed Paragon, consult the clients 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.

4.1.4.2 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 CD 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 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 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.

4.1.4.3 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, install OpenControl OPC.
- Browse the Nematron Software CD and locate the \Opc directory.
- Run (double click) Opda20.exe to install the automation wrapper components.
- Remember that the OPC Automation documentation is a good source of information defining the automation interface.

4.1.4.4 Remote OPC Using DCOM

DCOM allows you to access Paragon or OpenControl data 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 or OpenControl OPC.
- 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 administrator 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.

4.1.5 OPC Notes

4.1.5.1 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 eMation, Inc. (formerly PC Soft, Inc.)

4.1.5.2 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.