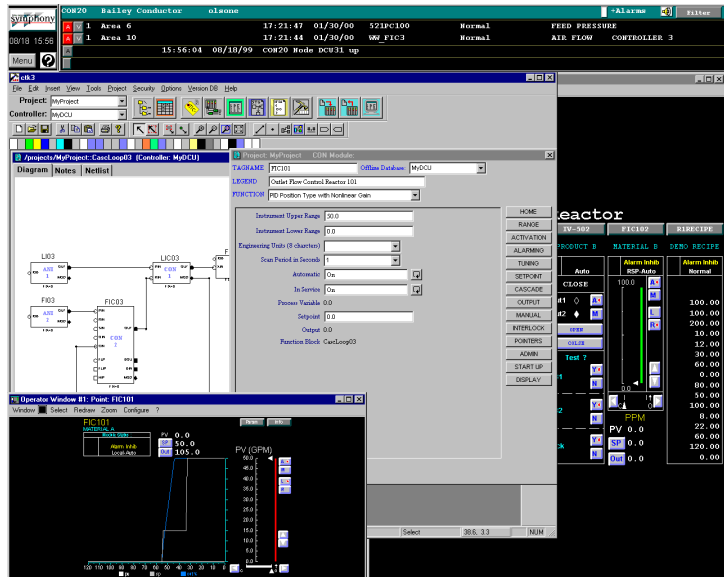


Features and Benefits

- Windows-based configuration of Harmony DCU Controlware II™ logic.
- Runs on Pentium® PC platforms in the Windows® 2000 operating environment.
- Supports both online and offline configuration of Controlware II modules.
- Provides CAD-like configuration to generate function blocks by graphically linking modules to create a pictorial view of the logic.
- Ability to graphically define the Harmony DCU hardware with automatic generation of I/O related modules.
- Ability to import spreadsheet data to create Controlware II modules.
- Ability to upload existing Harmony DCU databases and interactively generate graphical representations of Controlware II logic.
- Enhanced CCL editor with syntax verification and function wizard access to available CCL statements.
- Dynamic Controlware II module allocation to automatically add module types as needed.
- Ability to create and store templates of modules and function blocks in a library for recall as a starting point for creating new logic in a Harmony DCU.
- Ability to assign version numbers to provide an audit trail of configuration changes.
- Bar graph representation of Harmony DCU memory and scan processing load.
- Extensive hardcopy cross referenced documentation of Harmony DCU hardware and software.
- Profibus Configuration (PC) tool for Profibus network setup.



TC02548A

Composer Configuration Toolkit (Composer CTK) is a software application package used to perform configuration of Harmony DCU Controlware II logic. Composer CTK software is designed for use both within the Symphony (DCI System Six compatible) network architecture and as an offline development tool. Use of Composer CTK as an offline development tool permits users to begin configuration of Controlware II logic prior to delivery of the target Harmony DCU on which the configuration will eventually be used. When used in a networked environment, Composer Configuration Toolkit communicates with Harmony DCU (DCU) via an Ethernet™ data highway network.

With Composer CTK software, configuration of an entire Controlware II project design can be accomplished in an orderly and expedient manner. Using vivid displays and versatile functionality, Composer CTK provides form, structure, and discipline through all phases of the project design process. A Composer CTK project design encompasses the hardware configuration, creation of all the process loops using graphically interconnected modules, and parametrization for each module. The target project can be a single Harmony DCU controller or a whole jobsite of many Harmony DCU controllers.

Without requiring a single line to be drawn, configuration and graphical representation of each Harmony DCU controller hardware component is easily created using Composer CTK software. Using Composer CTK's hardware and I/O configuration tool, frames, internal boards, power supplies, ITB's (interface terminal boards), and ITB I/O connections, can be configured for the entire project, via a graphical user interface. Except for I/O tag name entries, which can be entered manually from the keyboard or imported from a file, the hardware and I/O configuration tool can be used to deploy each board in the frame. Each board is positioned in the empty frame slot specified using the pointing device (e.g., a mouse). The entered tag names also appear in the configured I/O connections on the graphic representing the ITB.

Even the most complex process loops can be expertly created using STG (Softwiring-Through-Graphics), the graphics tool provided as a part of Composer CTK software. STG contains graphical models of the entire suite of Harmony DCU Controlware II modules, with similar types grouped together in a menu format for easy identification and access. A module is selected from the menu, dragged onto the graphics drawing grid and positioned, then dropped into place. This procedure can be repeated as often as necessary to build a process loop. Each module requires only a minimal of input and output signal connections, so that focus is maintained on the loop design. If more or different connections are required, these preconfigured models can be modified as necessary. The STG application toolbar provides the ability to add text and an assortment of graphical objects to the process loop drawing. The configured process loops are saved as part of the project; they can also be saved as Composer CTK system library templates, which are accessible from all other projects.

Using Composer CTK's visual module configuration (VMC) tool, parametrization of a module is an organized process of entering atom values in a pop-up window. Values are entered in prescribed fields, selected from drop down lists, or selected from scroll boxes. To eliminate the need for a complex system of overlaid windows, the atoms are grouped thematically (e.g., all atoms associated with alarming and dead band are together), and the titles are clearly marked on a panel of buttons, which are used to select an atom group. The parameters for each module are also saved as part of the project; they can also be saved as Composer CTK system library templates, which are accessible from all other projects.

The availability of system library templates for process loops and their module parameters speeds project development, as these resources can be recalled for similar applications. A template can also be opened, modified, then saved as either an instance for use in a project or as a new template for use in new process loop applications that are slightly different from the original version.

Composer CTK Functionality

Composer CTK provides a set of window-based graphical user interface software tools to perform and document configuration of the Harmony DCU controller. These tools are displayed as icons in the project status bar. Below is a brief listing of these tools and their functionality.

Hardware and I/O Configuration

The I/O and hardware configuration tool provides a graphical interface used to define the hardware configuration of each Harmony DCU in a project. The result is a pictorial representation of Harmony DCU hardware that is used to automatically create tags for Controlware II software I/O modules that are used to store information about the Harmony DCU hardware operation. In addition, the tool is used to document the Controller with hardcopy printouts of I/O and ITB board physical relationships, as well as the relationship between field signals and Controlware II software I/O modules.

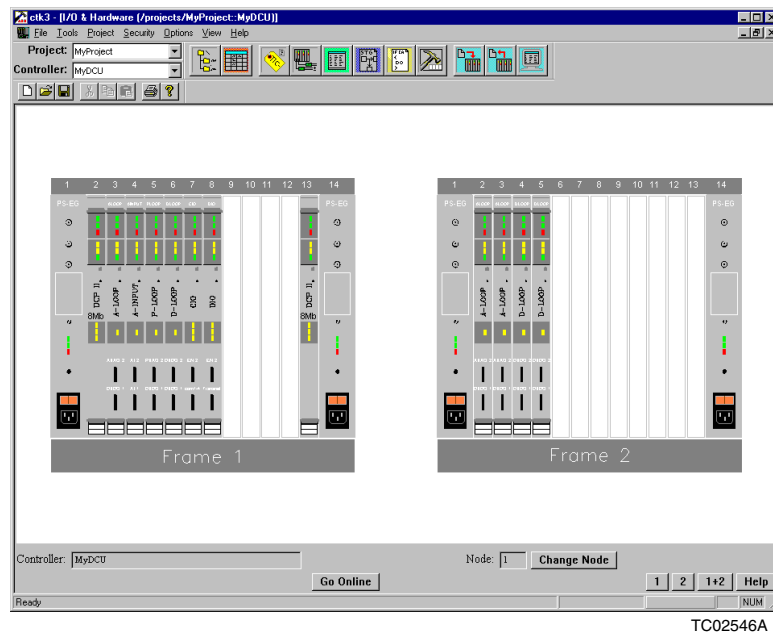


Figure 1. Hardware and I/O Configuration

The main window used to select and place I/O boards, control processors, and power supplies in appropriate frame slots is shown on the following page. Access to a pop-up window for assigning I/O tag names for a particular board is also available. From this window, users can edit the frame arrangement by changing board types, removing boards, or moving boards to another slot via drag and drop. Board redundancy can also be established via pop-up selections. A second window allows the user to view individual I/O boards, depicting the connectivity to interface terminal boards (ITBs). Users can assign appropriate ITB types for connection to the I/O board. A third window (not shown) is used to depict the actual type of ITB including the I/O tag names that are assigned to each channel. In online mode, this display also indicates actual I/O values for maintenance and engineering calibration and process troubleshooting.

Profibus Configuration (PC) Tool

This powerful and easy-to-use tool is used to configure each Profibus network connection made with the Profibus (PBUS) I/O board. A tree structure menu is used where the PBUS board is shown as the Master device on the network. The configuration of the tree structure is derived from Profibus GSD files supplied from the Profibus device manufacturers. As a result, all options for configuration are specific to and appropriate for the intended device. An import tool within the PC tool makes it easy to install the GSD files in order for them to be used in the PC tool configuration. The PC tool includes the GSD files for all of the supported S800 Profibus slaves and I/O modules minimizing the time it takes to get started with an S800 I/O installation. With the GSD files installed, Profibus slave devices can then be added, removed, or modified through commands accessed via a right mouse click. Profibus I/O modules can then be added, removed or modified in the same manner once the Profibus slave devices are added. The parameters for the Profibus I/O channels for each module can then be configured. The available parameters for read / write access are defined by the GSD file. This tool is linked to the Hardware and I/O Configuration tool allowing users to configure I/O tags in either tool with the data synchronized between each.

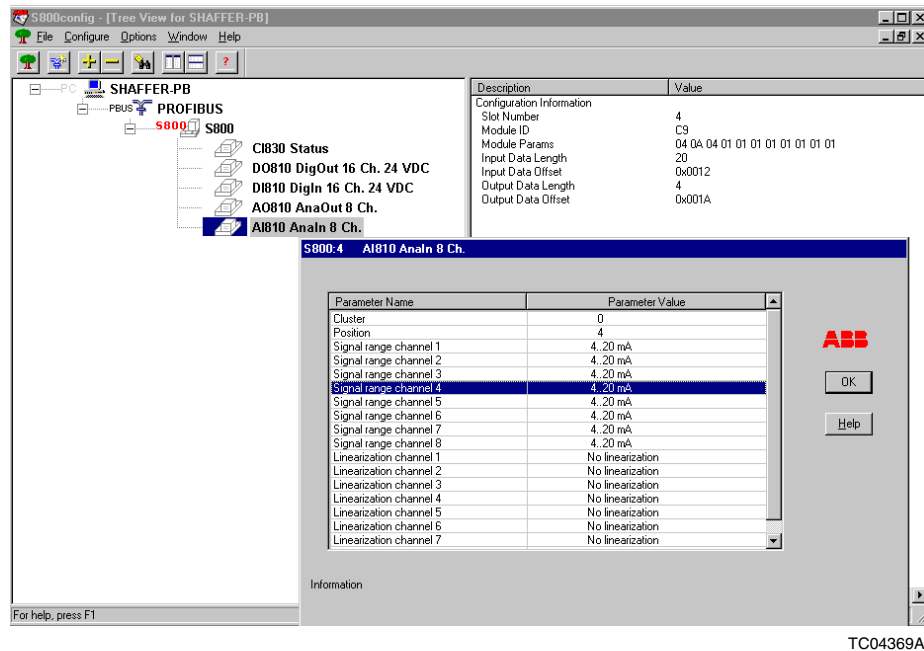
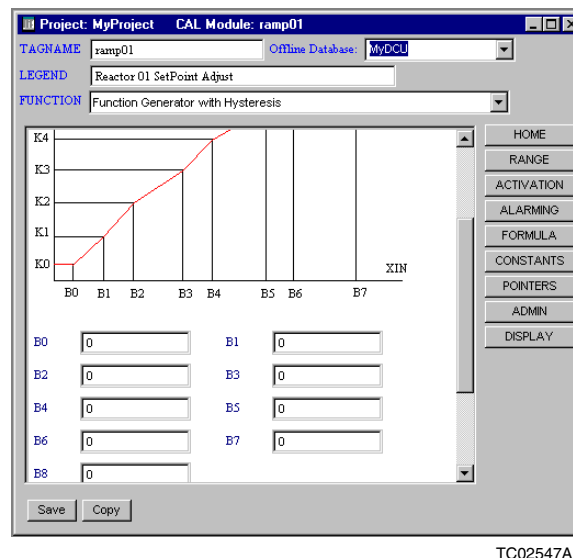


Figure 2. Profibus Configuration (PC) Tool

Visual Module Configuration (VMC)

The visual module configuration is a windows-based tool used to individually configure Controlware II modules using pop-up windows, buttons, menu bars, etc. Composer CTK includes pre-defined ABB-supplied templates of all Controlware II modules where the modules have default atom values. VMC can use these ABB-supplied templates, or custom templates created through VMC, to install a named instance of the module in a project database. The ability to create custom templates is especially convenient when multiple instances of modules are needed, where the modules have atom values which differ from the ABB-supplied templates, but are common to one another. A template of the desired module can be made and saved with the non-default common values. Multiple instances of Controlware II modules can then be made from the template as needed.



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Figure 3. Visual Module Configuration (VMC)

VMC can be used as both an offline and online tool for configuring Controlware II module parameters. VMC incorporates a number of windows-based features that simplify the task of configuration. These features include pull-down selection menus, full name descriptive text choices, toggle selector buttons to quickly change on-off selection states, pop-up windows that identify legitimate pointer attachments for soft wiring to other modules, and grouping of associated parameter items such as alarm limits for call-up by a single topic button. With VMC, users can open configuration sessions for multiple modules at the same time, and can copy modules with automatic numeric sequencing, if required. Hardcopy documentation of module configurations is available using the configuration reporter tool, described in a later section.

Softwiring Through Graphics (STG)

The soft wiring-through-graphics tool is a graphical object-oriented editor used to configure function blocks. Function blocks are control strategies created as CAD-like drawings of one or more interconnected Controlware II modules (or other function blocks). User-defined function blocks can be created as templates and stored in the Composer CTK library. A copy of such a template can then be installed as a named instance in an individual project database. In addition to user-defined function blocks, a set of predefined function block templates for frequently used control tasks such as a cascade loop is provided with the Composer CTK software.

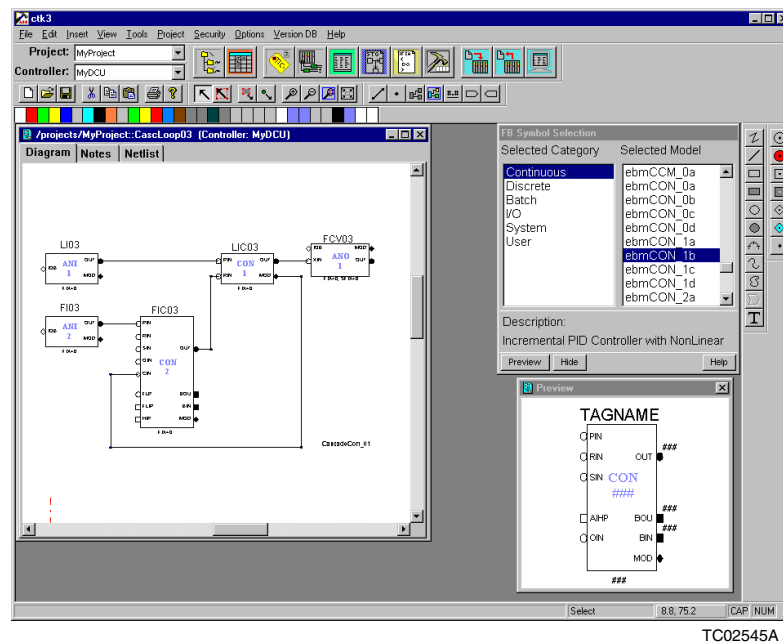


Figure 4. Softwiring Through Graphics (STG)

Within STG, a predefined graphical template of each Controlware II module is provided. These templates are called base function blocks, and are used to represent individual Controlware II modules in a derived function block (a control strategy that requires multiple Controlware II modules or other function blocks). Users can create their own views of the base function blocks to reflect different soft wiring requirements and to provide the user with a simplified display containing only those items essential to the process loop requirements. Although all of the predefined base function blocks are depicted as boxes, a function block can be any symbol. A user could create a discrete control device module for motor or valve control that looks like a pump or valve.

Selection of function blocks for inclusion in a derived function block is quickly accomplished by drag and drop from a pop-up menu listing of existing function block templates. Point and click attachment of soft wiring that connects modules in a control strategy automatically routes the soft

wiring lines at 90 degree angles. Softwiring attachments between modules is verified to ensure that data types are compatible. Users can change a module's parameters by simply double clicking on a base function block to call-up the VMC window for the selected module.

Function blocks can incorporate not only symbols related to Controlware II modules, but any other available object (i.e., text, boxes, circles) with differing attributes (i.e., color, size). Function blocks can optionally be placed under version control requiring the user to update the version number whenever a modified function block is installed.

In situations where tag names have similar constructs, a variable name construct can be defined within STG. The variable naming allows users to enter values for items such as a plant ID, or area location number in one place, and use the variable names in the tag name construct. When the function block is saved, the variable names are replaced with the associated values to create the tag names.

STG supports both online and offline configuration tasks. In online mode, engineers can monitor module output values for debug and troubleshooting, and can make changes to the module configurations.

Tag Manager

The tag manager lists all the tags configured within a project. Tags can be graphically assigned to controllers, to other projects, to module sets, or for printing through an intuitive drag and drop mechanism. In addition, tags can be deleted using the same intuitive drag and drop mechanism. The tag manager can be used to filter the list of available tags by text search, by type and by controller. It also provides access to visual module configuration (VMC) for a configured point.

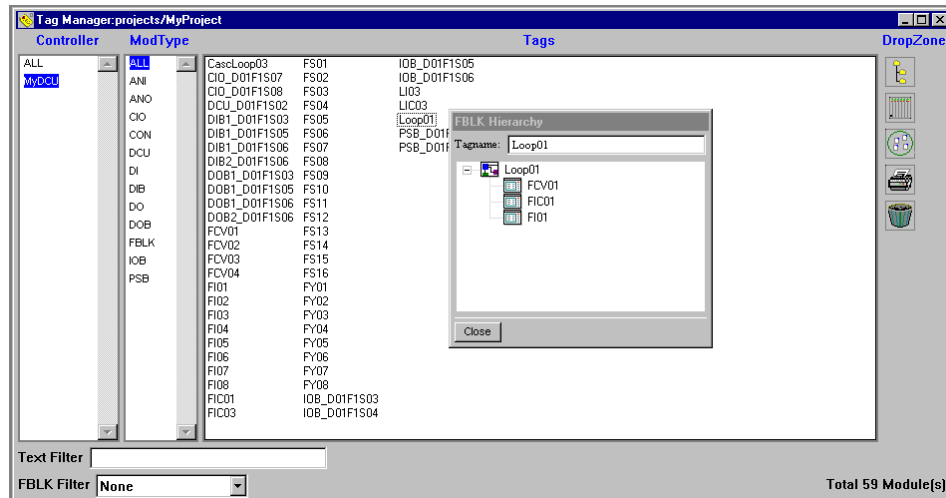
Project Tables

Project tables are tabular spreadsheet-like listings of I/O, tag, and controller data. These tables are lists of configuration information, similar to spreadsheet tables both in appearance and in the methods used to edit them. Editing tools include copy, paste, and cut. Project tables are used for both tracking and documentation purposes. The project table tool provides access to:

- The *I/O table*, a sorted list of I/O tag names in a project. The tags in this table are a subset of those in the tag table. The I/O table is used to view and assign tag names for I/O modules within a project.
- The *tag table*, a sorted list of all tag names used in all Controlware II databases in a project. The tag table is used to view and assign these tag names.
- The *controller device table*, a sorted list of Harmony DCU controllers in a project. The controller device table is one method used to view and assign controller names within a project. These controller names are used for tag assignments in the tag table.

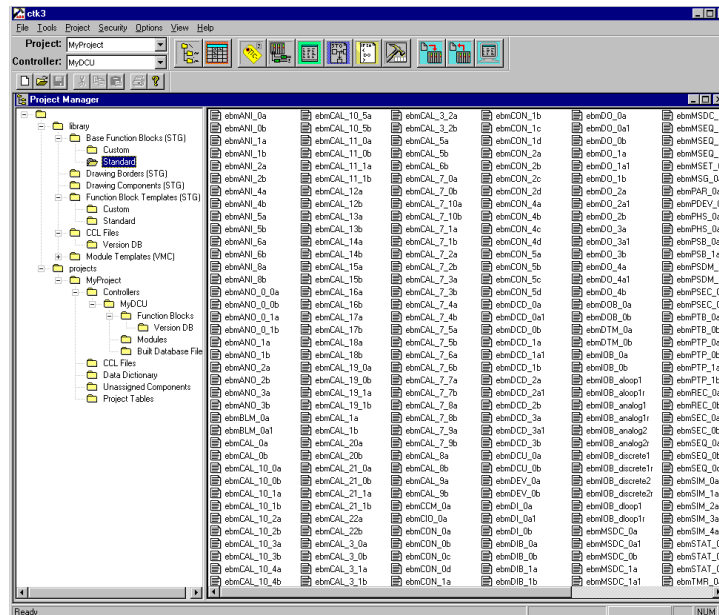
Project Manager

Composer CTK supports management of multiple projects as well as providing a library for access to reusable components. A Composer CTK project in basic terms provides a folder for storing groups of Harmony DCU databases that contain a set of Controlware II modules. The Composer CTK software provides secure access via user management through a set of user-defined project teams. Team members can be given access rights within a project. In addition, users may be given administration rights for creating and maintaining projects. Changes to control strategies, which can optionally be maintained under version control, can be tracked on a team member basis. A component marked *out-for-edit* by one user can not be modified by other users.



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Figure 5. Tag Manager



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Figure 6. Project Manager

The project manager tool provides a hierarchical view of the components of Composer CTK that displays a listing of projects and library directories similar to Microsoft's file manager.

This tool provides a consistent road map for access to project information yielding the following advantages:

- Ease of copying and moving Controlware II modules between Harmony DCU controllers with drag-and-drop operation.
- Open multiple windows for editing with the ability to configure multiple databases simultaneously.
- Acts as a navigation tool, providing direct access to other configuration tools.
- Ability to add or modify module attributes via editing of a project-wide data dictionary.

Controlware Command Language (CCL) Editor

Controlware command language (CCL) is a statement type language employed for expanded process control functionality for sequencing and batch control. Creation of CCL logic is performed using the CCL editor. A CCL function wizard is available with pull-down menus for selecting CCL statements and for entering statement arguments. The pull-down menu serves to inform and remind users of all of the CCL statements available for use, and reduces potential syntax errors as statements which are entered with correct placement of commas, parentheses, etc. A verify tool is provided that checks the syntax and variable definitions prior to installing the CCL file. Any errors found are listed in plain text with the offending statements highlighted as each found error is selected.

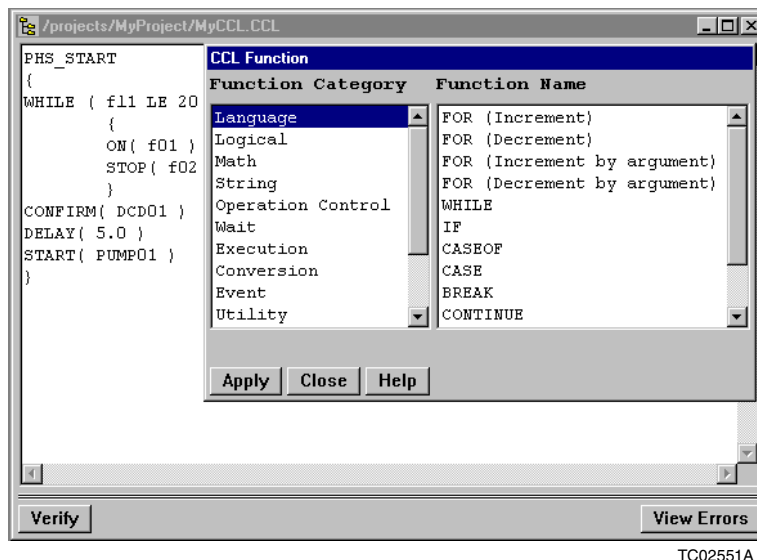


Figure 7. Controlware Command Language (CCL) Editor

Reusable CCL file templates can also be created and stored as part of the Composer CTK library. CCL files are under version control requiring the user to update the version number whenever a modified CCL file is installed. Through use of pseudo-name and pseudo-addressing schemes, the same CCL file can be used multiple times in multiple Harmony DCUs.

Database Builder

Composer CTK software provides the ability to work offline, configuring a downloadable database file for each Harmony DCU controller in a project without the need to have Symphony (DCI System Six compatible) equipment present. The database builder tool provides a user interface for building downloadable database files. Users can use the default module execution order, or they can define their own order of execution. Harmony DCU databases are under version control requiring the user to update the version number whenever a modified Harmony DCU database is installed.

Upload and Download Database

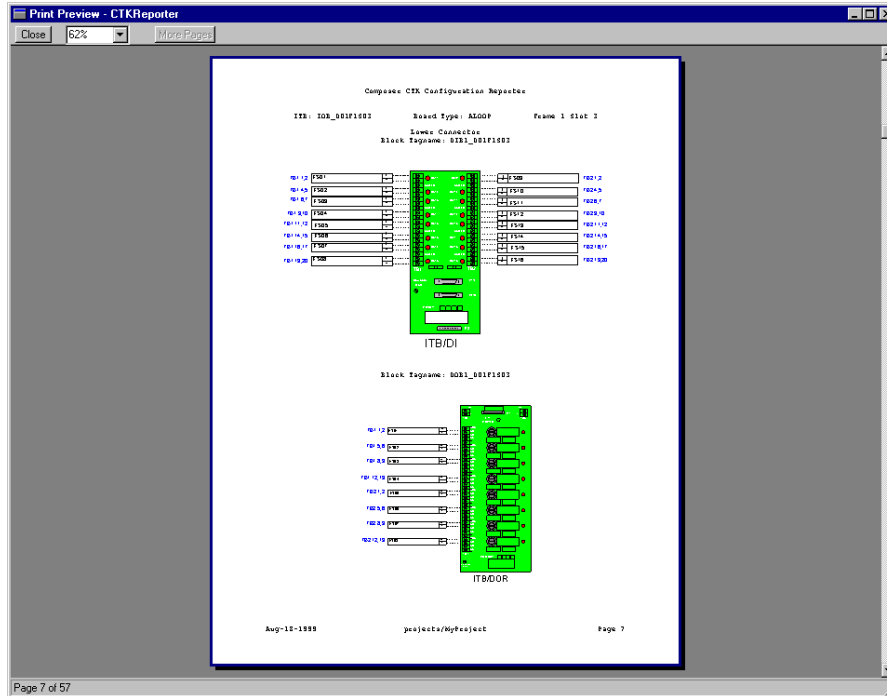
If the Composer CTK software is running on a computer that is properly connected to a Harmony DCU, then a copy of the Harmony DCU database can be uploaded from the controller's DCP memory to the computer's hard disk. Once the database file has been copied to the computer, Composer CTK software can be used to edit function blocks from the modules in the existing database. Conversely, once a downloadable database file has been created, it can be downloaded to the controller for which it was built, using the download database tool.

Online Configuration

When properly connected to a Harmony DCU controller, the computer hosting the Composer CTK interface can be used to configure the controller directly in real time. This tool calls up the VMC editor, but the displayed database is now one that resides in the selected executing Harmony DCU controller. Other online functions are available from within the I/O and hardware configuration tool which allows display of real-time signals at the ITB, and from STG which allows function blocks to be attached to a controller for display of real-time data.

Configuration Reporter

Harmony DCU database configurations produced by Composer CTK are documented with the configuration reporter tool. The report generated can be limited to specific types of information, or expanded to include all information about the configuration of a given controller. Module cross-referencing is provided to quickly navigate from one module to a dependent module. Other hard-copy printouts are available from within the I/O and hardware configuration tool which provides graphical printouts of the Harmony DCU and I/O hardware, from the CCL editor that provides printouts of CCL files, and from STG which provides graphical printouts of function blocks.



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Figure 8. Interface Terminal Board (ITB) View

Harmony DCU Resource Usage

Since Composer CTK can be used as an offline configuration tool, an estimated Harmony DCU resource tool is available that allows users to view a bar graph display of the percent of RAM and scan processing time that is expected to be consumed by the configured logic. A numeric indication is also provided, and a detailed list of each module's memory and scan time consumption is accessible for users to analyze the resource usage on a module-by-module basis.

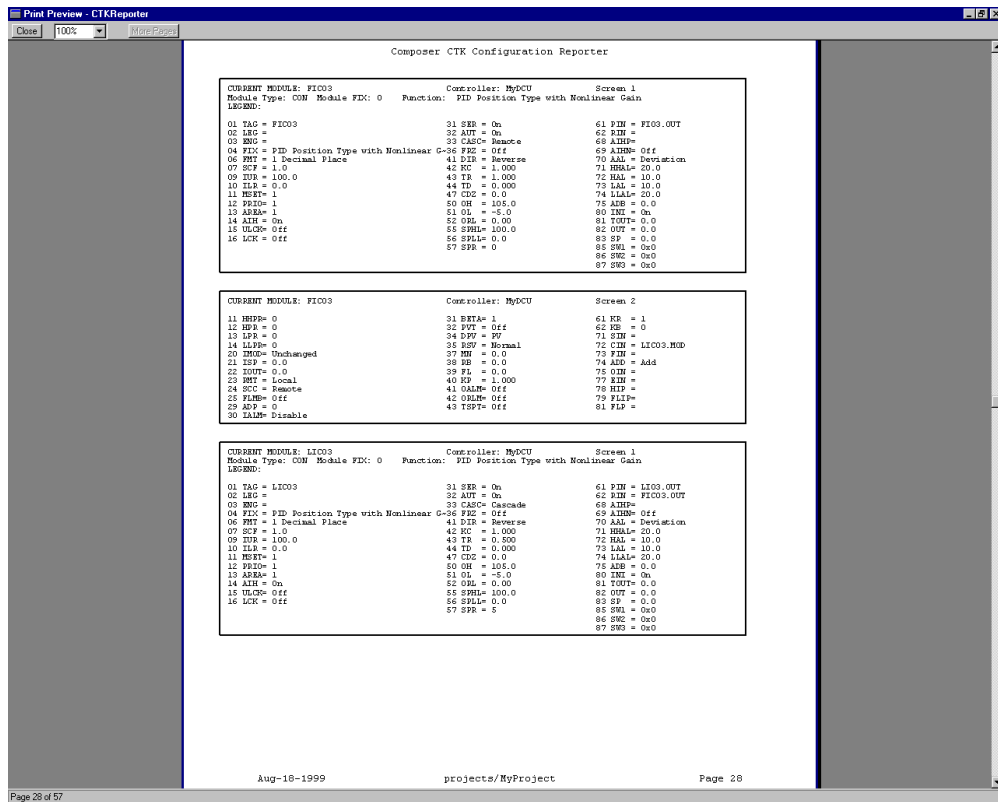


Figure 9. Configuration Reporter

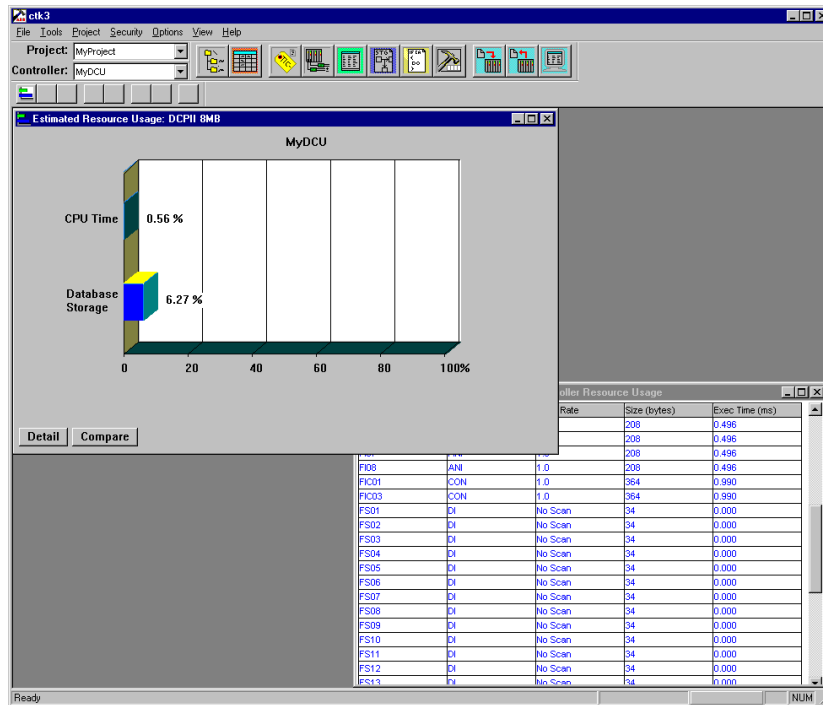
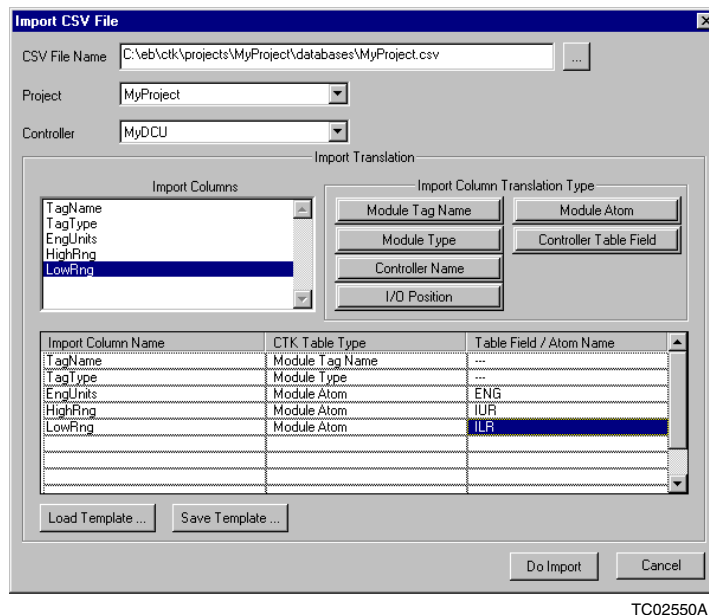


Figure 10. Harmony DCU Resource Usage

Import and Export

The ability to import a comma separated value file generated by a spreadsheet or database tool into Composer CTK is a powerful function which allows users to continue to use spreadsheet or database tools that they are already familiar with, and to make use of existing work without having to manually re-enter data into Composer CTK. Each record in the comma separated value file represents a Controlware II module and the import function automatically creates a specified Controlware II module with a tag name for each record included in the import data. Any other attributes of the module can also be imported (i.e., alarm limits, range limits, engineering units). The export function allows users to take Composer CTK project tables and convert each into a comma separated value file. The resulting files can then be imported into a spreadsheet or database tool that the user is already familiar with. Users can then perform their own data sorts, and create tailor-made configuration reports for documenting the Harmony DCU database logic.



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Figure 11. Import/Export

Interactive Builder

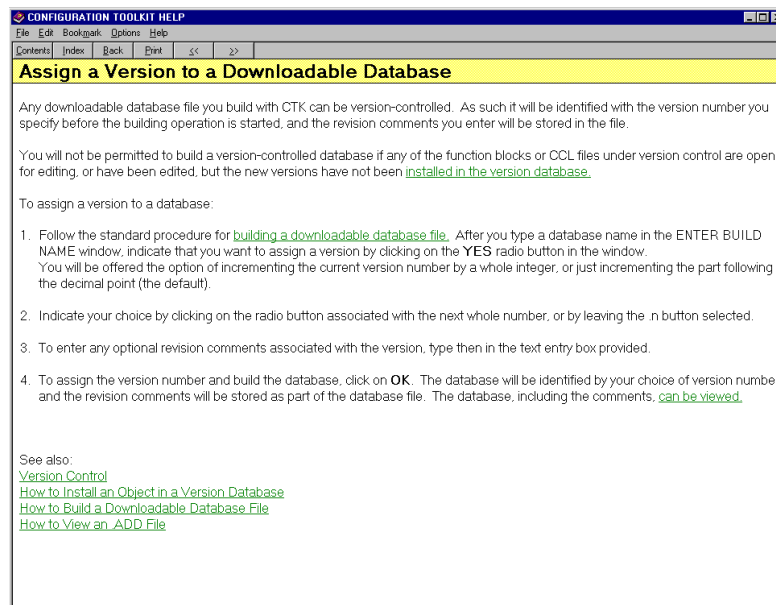
Existing Harmony DCU database files that were not created with Composer CTK can be imported and converted to a graphical Composer CTK type file. This is a user-interactive process requiring multiple Composer CTK tools. Database files are up dumped from an existing Harmony DCU, and then using a Composer CTK import function, each Controlware II software module is extracted from the file and is individually accessed by its tag name. A Composer CTK diagram assistant function is then used to identify module relationships, and to allow the user to select and drop predefined Controlware II module types associated to each tag name onto a drawing. Users then soft wire the tag.atoms as presented in the module relationship cross reference, and these connections are verified against the imported file to ensure accuracy. The combined up dump, import and diagram assistant functions make up an interactive building process that provides a comprehensive and efficient means to accurately create graphical documentation from an existing non-graphical database.

Summary of Composer CTK Advantages

As a comprehensive software application, Composer CTK offers many advantages with the main focus of minimizing the consumption of a valuable resource: time.

- The ability of saving your work as a template in Composer CTK library provides a reusable starting point for developing project-specific control logic. This means that those control strategies that get used over and over only need to be created and tested once. Thereafter, a template gets pulled from the library, and all that is required is assignment of tag names to each of the Controlware II modules contained in the template.
- The ability to easily copy Controlware II module configuration and control logic in the form of Controlware command language (CCL) files from one controller to another, and to other projects, provides an efficient means to adapt to ever changing project requirements.
- The ability to enter tag names according to a consistent scheme by providing a variable construct within the tag name which allows repetitive tasks to be handled with minimal effort.
- The ability to select an existing tag name from a list and drag-and-drop or copy it to another window where you need it minimizes typing efforts, and helps to eliminate entry errors.
- Tag name pop-up lists avoid duplicate I/O assignments. The ability to select from a list of available options minimizes the potential for syntactical mistakes, and eliminates the need to constantly use mnemonic devices and/or look up configuration options.
- The capability to refine the structured database online without having to stop the Harmony DCU controller execution, allowing the process to continue, reduces operational downtime.
- The capability to run Composer CTK on the same platform with Conductor NT allows one PC to support all configuration tasks for the Harmony DCU and the operator console graphics, trends, etc.
- Composer CTK help is accessible from almost every window which provides immediate access to information about the current configuration activity. As a result, less time is spent locating and referring to the *Composer CTK User Guide* allowing users to quickly continue configuration tasks with improved understanding of the Composer CTK functions. In addition, the CCL function wizard and VMC tools eliminate the need for looking up CCL syntax and atom descriptions in the *Harmony DCU Configuration Reference Manual*.
- Softwiring-through-graphics (STG) provides a graphical view of the configuration logic that improves user interpretation and understanding of the process control strategies. This means it takes less time for personnel to learn and understand the process control design, and, with better understanding, less time is spent when troubleshooting process logic.
- A set of preconstructed function block process loop designs are provided to implement commonly used control strategies (such as cascade and PID control). These can be copied and the copies can be used as a starting point for customization to meet installation requirements.
- Configured control strategies can be saved as graphical objects that can be used to create higher level control strategies. This allows larger control strategies to be built from smaller control strategies that have already been tested. As a result, the highest level control strategy can be quickly deployed with a high degree of confidence.
- Softwiring attachment information provided visually by line connections between function block symbols (e.g., CON002.OUT provides the input for ANO001.XIN) is automatically added to the configuration for the modules.

- Importation of spreadsheet files in CSV format (e.g., Microsoft Excel files formatted as comma separated values) eliminates unnecessary retyping of I/O and other tag related data.
- Automatically generated channel assignments for configured hardware allows users to document the hardware configuration while simultaneously configuring the Controlware II I/O related modules.
- Hardcopy output capability of function block drawings, Controlware II module configuration, CCL files, I/O tag name assignments, and other supplementary files provide extensive and accurate documentation of the design strategies. The hardcopy outputs are provided as a direct result of the required process logic configuration, and are not separately developed functions that require re-entry of existing data. These documents also aid when troubleshooting, and can be used for planning future potential process changes.
- Version control can be used to quickly verify if the existing logic differs with past approved logic.
- Resource allocation management displays estimated memory and scan processing usage allowing users to optimize offline configurations prior to putting them into service.
- Administrative functions to assign user security permissions to prevent unauthorized access to Composer CTK eliminates the need to spend time procedurally managing access to the platform that hosts Composer CTK software. Only users with appropriate user login/password entry are granted rights to access and use Composer CTK.



TC02556A

Figure 12. Help Screens

Minimum Platform Requirements for Standalone Composer CTK

- Pentium 120 MHz processor (Fastest Pentium class PC recommended).
- Microsoft Windows 2000 with SP2.
- 32 MB RAM memory (128 MB RAM memory is recommended).
- 2 GB hard disk (4 GB hard disk is recommended).
- Mouse (or other pointing device).
- 101-key keyboard (IBM-AT compatible).
- CD-ROM drive (Composer CTK software is distributed on CD-ROM).
- Parallel port for hardware key and optional printer.
- SVGA video board and monitor supporting 256 colors at 1024 x 768 resolution minimum (65K colors, 1280 x 1024 resolution preferred).
- As an option, an available PCI slot for the ECCP (ethernet communications controller for the PCI bus) card or an equivalent replacement.

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