

M-Tool

M-Tool transforms the way you create control strategies by providing a suite of tools with an intuitive and efficient work environment. M-Tool is an easy-to-use programming tool for application engineers and facility operators.

M-Tool consists of two major groups of tools: System Tools and Configuration Tools. Both of these groups can be installed independently to support different types of control products.

M-Tool comes packaged with the System Configuration Tool/Application and Data Server (SCT/ADS).



Figure 1: M-Tool CD

Features and Benefits	
☐ System Configuration and Project Management	Defines a network of controllers and the control points, schedules, calendars, interlock, applications, and others
☐ Commissioning Tools	Allows fast adjustment and commissioning of systems
☐ Remote Access	Allows quick access to systems over telephone lines or Wide Area Networks (WANs)
☐ Question/Answer Style Application Development	Provides simple and consistent definition of tested control strategies
☐ Graphical Program Development	Allows fully flexible programming for custom applications

Product Overview

M-Tool is divided into two major groups of tools: System Tools and Configuration Tools. System Tools (Table 1), including Project Builder, Site Book, M-Pro, and Comm Pro, is the programming toolset for BACnet® and LONWORKS® based controllers.

Table 2 lists the components of Configuration Tools, including HVAC PRO, ZT PRO, GX-9100 Configuration Tool, DX Commissioning, and XTM Configurator. These components are used to support N2-based field controllers.

M-Tool also includes the Variable Air Volume Modular Assembly (VMA) Balancing Tool, used with a Palm™ compatible handheld device.

Table 1: System Tools

Tool	Description
Project Builder	Develops a control system using N30 Series supervisory controllers. Defines features, and maps points from field devices into the N30 database for use in monitoring and managing the system. Acts as the central point from which editing, commissioning, simulation, and loading components can be seamlessly launched.
M-Pro	Creates and downloads applications for the VMA1200 controller. M-Pro can be used in a standalone fashion or as a plug-in to a LONWORKS Network Services (LNS®) Network Management tool at Version 2.0.
Comm Pro	Commissions LONMARK® compliant Johnson Controls® application specific devices, such as the VMA1200 Series controllers. Comm Pro may also be used to monitor the DX-9200 Series of controllers from Johnson Controls and LONWORKS devices from other manufacturers that meet LONMARK guidelines.
Site Book	Defines and saves site information for N30 networks. This site information includes connection information such as network addresses to automate communications when needed.

Table 2: Configuration Tools

Tool	Description
HVAC PRO Software	Creates control strategies for the Air Handling Unit (AHU) controller, Unitary (UNT) controller, Variable Air Volume (VAV) controller, Variable Air Volume Modular Assembly (VMA1400), Phoenix Fume Hood (PHX) controller, N2 Dialer Module (NDM), and Terminal Controller (TC) devices. It provides commissioning tools, data graphing, and loop tuning.
ZT PRO	Programs the Zone Terminal Unit (ZTU100). Supports configuration files created by the HVAC PRO software.
GX-9100 Configuration Tool	Programs the DX-91xx and DX-92xx controllers, the DT-9100 LCD Display, and the XT-9100 and XTM905 Point Expansion Modules.
DX Commissioning	Supports DX-91xx/92xx controllers (Point Template Program). DX Commissioning is a subset of the HVAC PRO software Template Commissioning feature.
XTM Configurator	Programs the XTM105/XPx Point Expansion Modules.

System Configuration and Project Management

Project Builder

Use Project Builder, a component of System Tools, to define an N30 Supervisory Controller network that includes supervisory and field controllers (Figure 2). Before installing the hardware, define the control points and alarm limits offline as a complete system.

In order to reuse proven control strategies, copy sections of programs from other project files.

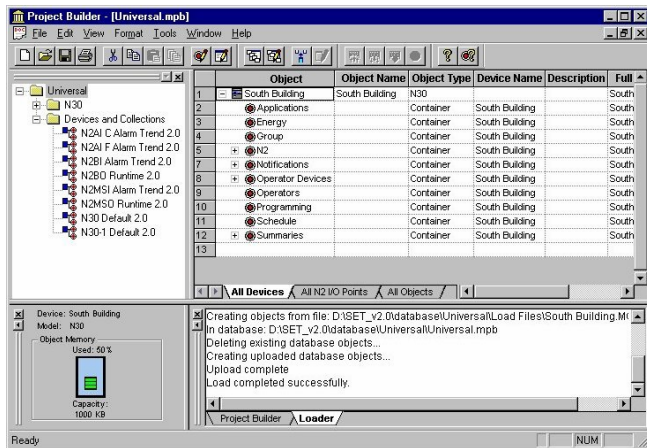


Figure 2: Project Builder

Field Inputs and Outputs (I/O) and Object Definition (Point Mapping)

Import Metasys Integrator® point-mapping tables, programs created by Question and Answer (Q and A) sessions, or graphical tools. The import utility automatically includes all I/O points with associated alarms and trends/histories.

You can edit in a spreadsheet format. Expand I/O through standard copy-and-paste editing or use the Object Browser, a floating window designed to make these operations more efficient.

Simulation Feature

Project Builder's Simulation feature allows databases to be downloaded and tested in an environment simulating an N30 network in the user's computer. The process for downloading to this simulated environment is the same as the process used to download to an actual N30 device. This feature allows for error checking of the database before actually downloading to the physical device.

Once invoked, other M-Components see the Simulator as an N30 network. This feature allows offline graphical binding via M-Graphics, browsing the virtual network via M-Explorer, and more.

Schedules and Calendars

Project Builder features Schedule and Calendar tools that allow the graphical creation and editing of BACnet Schedules and Calendars.

The Schedule tool allows you to run events at specified times. The Schedule also allows you to specify times that are exceptions to the schedule. These exceptions can be single date events, or you can set up an entire calendar of exception days using the Calendar tool. For example, you could set up a calendar to change the building's parameters on all non-working holidays.

Both the Schedule and Calendar tools feature:

- graphical interface
- compatibility with M-Workstation products
- simple date definition procedures such as click-and-drag and copy and paste

Defining Control Features

M-Tool allows the quick and easy definition of control features such as:

- Interlock
- Demand Limiting Load Rolling (DLLR)
- Alarm Definition and Routing
- Totalization/Trend Data
- Access Levels/Passwords
- Global Data Sharing
- Multiple Command Object
- Optimal Start
- Utility Profile
- Dial In/Out
- Local Display Terminal (LDT)

Site Book

M-Tool also installs Site Book, which allows you to define and save communication setups for uploading and downloading to the controllers configured with M-Tool. You only need to define your communications parameters once in Site Book; they can be used with either M-Tool or the M3 Workstation.

Site Book allows you to set up communications parameters for:

- Ethernet networks
- direct serial connections using Windows® 2000 Professional or Windows XP Professional operating system
- dial-up connections through modems

Remote Access

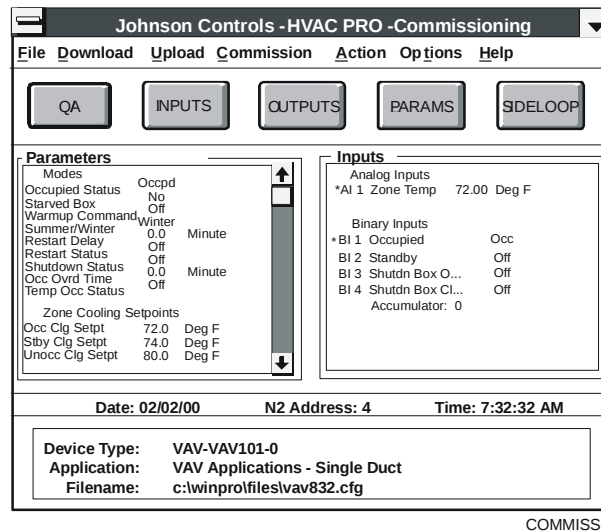
M-Tool provides remote access options:

- Project Builder supports connections to remote sites via network or dial-up connections.
- M-Tool supports network or dial-up connections for HVAC PRO software and GX-Tools.

Commissioning Utilities

M-Tool has utilities to help you commission and service a system. You can access and change a controller's operating parameters (such as setpoints, gains, PI loop tuning, and others) using any operator device or laptop computer. You can commission using a standard HVAC PRO configuration file, an uploaded configuration, or a user-defined point template (Template Commissioning).

The HVAC PRO tool, for example, addresses your installation needs by displaying or printing the N2 Bus controller I/O point assignment connections. Figure 3 shows an example of the Commissioning window.



COMMISS

Figure 3: HVAC PRO Commissioning Window Example

M-Tool can also help if you have a network of LONMARK compliant devices. Just connect to your LONWORKS network and use Comm Pro to explore the Network Variables (NVs) and Configuration Properties (CPs) of the network's controllers. Special plug-ins make the user experience even easier when working with LONMARK compliant Johnson Controls Application Specific Controllers (ASCs), such as the VMA1200 Series controllers. Figure 4 shows an example of a VMA1200 Commissioning window in Comm Pro.

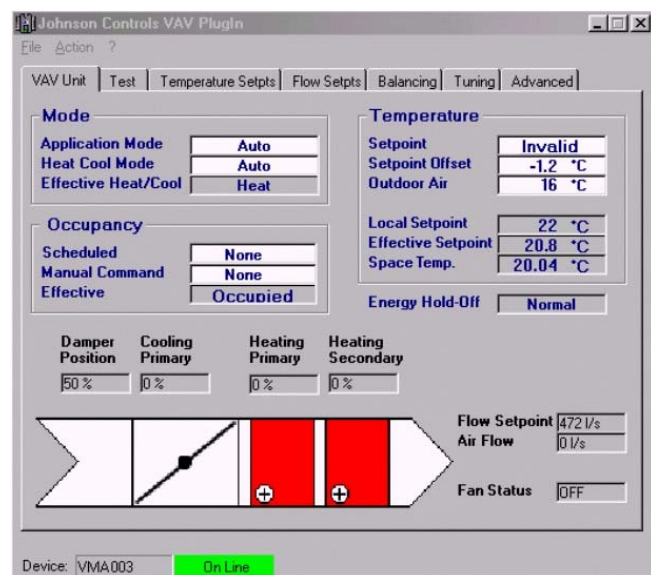


Figure 4: Comm Pro Commissioning Window Example

Controller Networking

After you configure control strategies and download them to the controller, you can place the controller on a network supervised by a Metasys® system. For example, the VMA1400 is supported on Metasys systems using Network Control Modules (NCMs), N30s, Network Automation Engines (NAEs), or as a stand-alone device.

M-Tool can run on Metasys Operator Workstation (OWS) or the ADS. You can use most M-Tool features, including uploading or downloading controllers via the N2 Bus, without interrupting OWS features.

Loop Tuning

M-Tool incorporates automated tuning. This feature is available through the Commissioning menu of the HVAC PRO software for Air Handling Unit (AHU), Unitary (UNT), Variable Air Volume (VAV), and Phoenix (PHX) controllers. You can use loop tuning to monitor and/or tune proportional plus integral process control loops. Figure 5 illustrates loop monitoring using the Graphing window.

Data Graphing

This feature allows you to graph any three analog points and view the response to changes within the system. This is a great commissioning tool for troubleshooting and loop tuning.

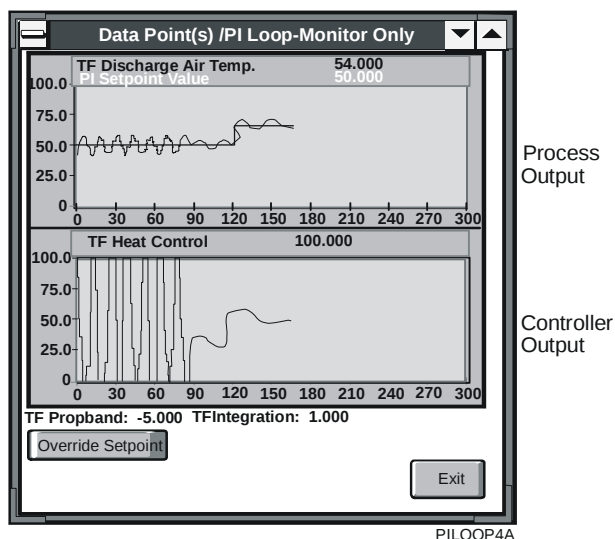


Figure 5: Data Graphing Example

Programming Capabilities

M-Tool keeps programming easy and user friendly through intuitive programming interfaces.

Question and Answer Program Configuration

Defining input/output point assignments and the necessary control sequences, algorithms, and operating parameters is as simple as responding to a series of yes-no and multiple choice questions in M-Pro or HVAC PRO software (Figure 6). This approach is consistent for controllers that are configured to sit either on the N2 trunk or on a LONWORKS network. Default setpoints and operating parameters are modified as needed.

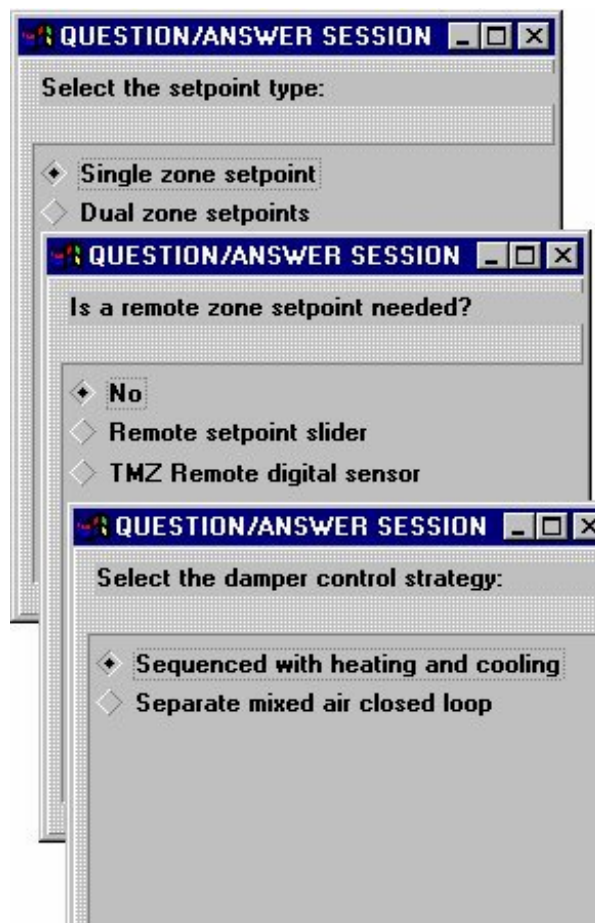


Figure 6: Question and Answer Windows Example

Full Graphical Programming

The GX-9100 tool in Configuration Tools provides graphical programming of the DX-91xx and DX-9200 controllers, the DT-9100 LCD Display, the XT-9100, and the XTM-905 Point Expansion Modules.

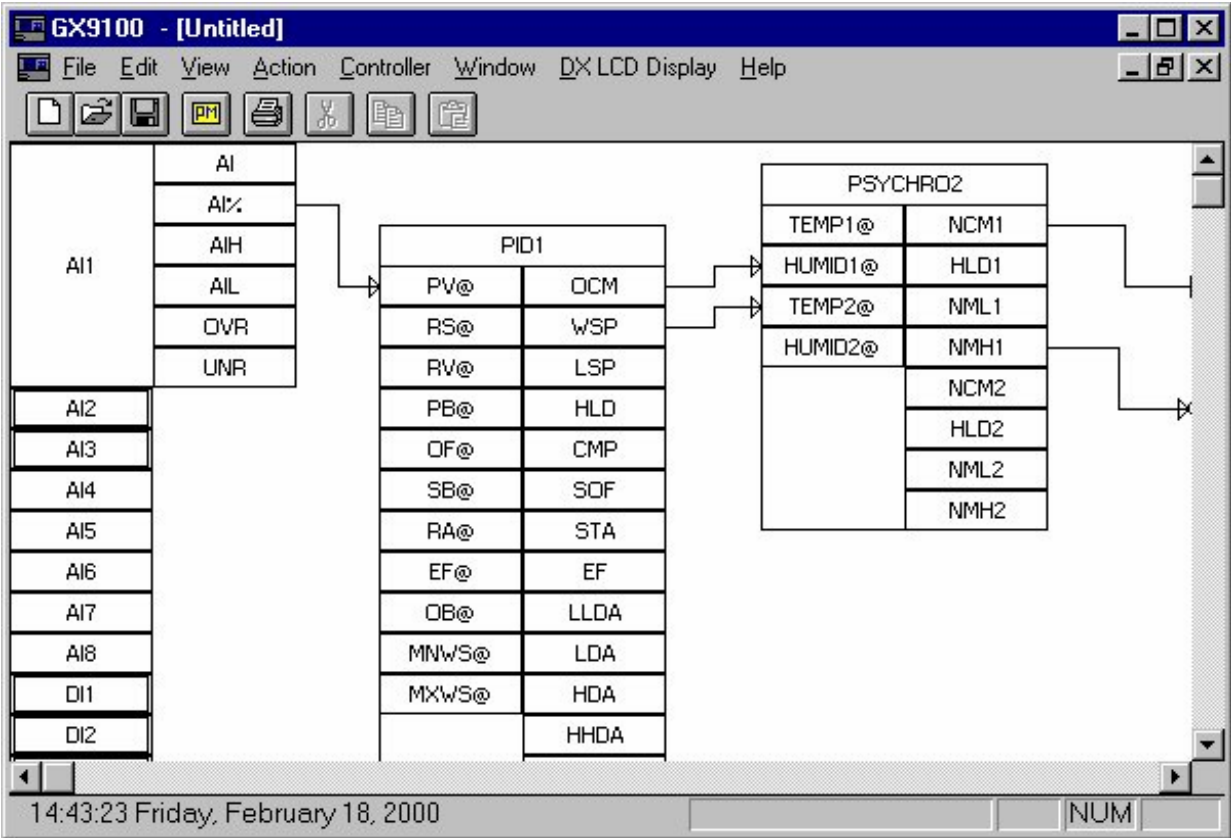


Figure 7: GX-9100 Program Screen

Related Information

Table 3: Related Literature

For Information On	Refer To
System Tools	<i>M-Tool Overview and Installation Technical Bulletin (LIT-693100)</i>
	<i>Project Builder User's Guide (LIT-693205)</i>
	<i>M-Pro User's Guide (LIT-693305)</i>
	<i>Comm Pro User's Guide (LIT-1162551)</i>
	<i>System ConfigurationTool Technical Bulletin (LIT-1201534)</i>
	<i>Variable Air Volume Modular Assembly (VMA) 1200 Series Controllers Application Note (LIT-1162500)</i>
N30 Supervisory Controller	<i>Site Book User's Guide (LIT-6893100)</i>
	<i>Direct Connect and Dial-Up Connection on Windows 2000 and Windows XP Operating System Application Note (LIT-6893450)</i>
	<i>BACnet OPC Attribute Naming Technical Bulletin (LIT-6893700)</i>
System 9100	<i>GX-9100 Software Configuration Tool User's Guide (LIT-120182)</i>
	<i>XTM Configurator Technical Bulletin (LIT-6364220)</i>
HVAC PRO Software	<i>HVAC PRO User's Guide (LIT-63750402)</i>
	<i>AHU Applications Application Note (LIT-6375080)</i>
	<i>UNT Applications Application Note (LIT-6375100)</i>
	<i>VAV Terminal Control Applications Application Note (LIT-6375120)</i>
	<i>Variable Air Volume Modular Assembly (VMA) 1400 Series Application Note (LIT-6375125)</i>
	<i>TC-9102 Applications Application Note (LIT-6375130)</i>
	<i>Zone Terminal Application Note (LIT-6375140)</i>
	<i>N2 Dial Application Application Note (LIT-6375150)</i>
VBT for VMA1200	<i>Using the VMA1200 Balancing Tool (VBT) Software Technical Bulletin (LIT-1162400)</i>
VBT for VMA1400	<i>Using the VMA1400 Balancing Tool (VBT) Software Technical Bulletin (LIT-6363092)</i>
Object Attributes	<i>Object Dictionary (LIT-694010)</i>
Installation and Platform Requirements	<i>Metasys Software Installation and Platform Requirements Technical Bulletin (LIT-12012)</i>

Technical Specifications

Product	MW-MTOOL-0: M-Tool* MW-MTOOL-6: M-Tool Upgrade from a previous release of M-Tool* *(MW-MTCBT-0: M-Tool Computer-Based Training package included with each package)
Recommended Computer Platform	500 MHz Pentium® III processor for Microsoft® Windows® 2000 Professional Operating System (OS); 2.6 GHz Pentium 4 processor for Windows XP Professional OS, particularly if also running an M-Series Workstation on the same computer
Operating System	Windows 2000 Professional OS with Service Pack 4 or Windows XP Professional OS with Service Pack 1
Random Access Memory (RAM)	256 MB of RAM recommended for Windows 2000 Professional OS and Windows XP Professional OS (128 MB of RAM minimum for Windows 2000 Professional OS and Windows XP Professional OS)
Hard Disk	40 GB minimum hard disk. If also running an M-Series Workstation on the same computer, we recommend that you maintain 600 MB of free space for virtual memory.
CD-ROM	4X or higher speed
Monitor	17-inch monitor with 1024 x 768 resolution
Video Memory	2 MB of VRAM
Hardware Options	Windows OS supported printer

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



Controls Group
507 E. Michigan Street
P.O. Box 423
Milwaukee, WI 53201

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