

Metalink User's Guide

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Introduction

Welcome

Welcome to the Metasys® *Metalink User's Guide*. Metalink™ is a standard feature of the Metasys system, providing a Microsoft® Windows® Dynamic Data Exchange (DDE) interface to the Metasys Network. This interface allows the exchange of information between the Metasys system and independent third-party Windows applications such as Microsoft Excel. This guide provides an overview of DDE, explains the Metalink implementation of DDE, and describes how to use Metalink with third-party packages.

The *Metalink User's Guide* assumes you know general Facility Management System concepts and the information in the *Learning the Basics* section of the *Operator Workstation User's Manual (FAN 634)*. It also assumes you have a working knowledge of any third-party Windows applications you intend to interface to the Metasys Network.

Note: This guide contains information Metalink Release 6.0 or later.

About Metalink

Metalink is a software program provided with the Metasys Operator Workstation or Metasys Application Enabler (MAE) software. (Both workstations are hereafter identified as Operator Workstation or OWS.) It comes standard at no additional cost with the Operator Workstation Person-Machine Interface (PMI) software Release 6.0 or later.

To use Metalink, no additional software or hardware upgrades to your computer are required, but it may be necessary to increase the amount of memory in your computer to accommodate the additional requirements of the third-party applications. Metalink must be loaded on a workstation with Metasys PMI or MAE.

With Metalink, you can access data anywhere on a Metasys Network using many Windows applications that support DDE. This allows you to use Windows applications such as database managers, spreadsheet packages, and report generators to collect and manipulate Metasys data and produce management reports. In addition, Windows applications can command Metasys objects, change attribute values, perform scheduling operations, and subscribe for various types of reports. The management capabilities this brings to the OWS are limited only by the power and flexibility of available Windows applications.

Metalink 6.0 Enhancements

Metalink 6.0 enhancements include two new keywords that allow you to subscribe for various reports, discard reports, and create time schedules. These keywords are:

- Report
- Schedule

Another important change is that many of the parameters in the item may be either abbreviated as before, or spelled out fully. For example, the Number of Samples parameter can be written as .NS or .NumberSamples. You may find it more meaningful to spell out the parameters than to use abbreviations. Either way is acceptable.

Metalink 6.0 is backward compatible with earlier versions of Metalink. That means, any applications created with an older version of Metalink will function with Metalink 6.0. You shouldn't need to make changes.

Application Examples

A Metalink application example would be to use Microsoft Excel (a spreadsheet program) to collect data from the objects in a chiller system and produce a report of energy usage and efficiency. The necessary calculations would be done within the worksheet. An Excel macro could run periodically to save the data to a disk file along with the calculated results. The macro might also produce a chart or graph in any one of a number of styles supported by Excel, as well as compare information such as energy consumption in the last period or a comparable period.

Another application might be to use Excel or a database program to build a simple maintenance manager, which would collect runtime information and, based on additional information such as manpower availability and maintenance history, produce work orders.

Yet another application would be to use Excel to create a customized user interface for controlling an air handler. You would create a worksheet that lists the statuses of all Metasys objects that pertain to the air handler. You could even add Start and Stop buttons on the worksheet to enable the operator to control the air handler via Metalink. For the programming required for this application, refer to the *Air Handler Report* section in the *Appendix*.

Samples on Diskette

Disk 1 of the Metasys Workstation PMI diskettes includes example files for a few different third-party programs. These examples are explained in text files on the diskette, as well as within the example files themselves. The *Appendix* contains many other examples, including some comprehensive applications. Of course, you will have to make slight changes to these examples for them to work on your system.

Using Microsoft Excel

You may use Microsoft Excel to write Metalink applications. Excel includes Visual Basic® for Applications, which Microsoft recommends you use for writing DDE (i.e., Metalink) applications.

To use a worksheet or macro sheet that was created with a previous version of Excel, open the file as you would any Excel file. If you make changes to the file and try to save it, Excel tells you this file was created with a previous version of Excel, and asks whether you want to update the file to the current version. Click Yes to save the file in the current version.

If you need to create a new worksheet or a new macro with Excel, use the procedure outlined in Microsoft documentation.

Metalink examples in this user's guide have been tested with Excel Versions 4.0, 5.0/95, and 97.

DDE Concepts

Introduction

Dynamic Data Exchange (DDE) is a message passing protocol. It is defined by Microsoft as a Windows standard to allow the exchange of information between two independent Windows applications. The Metasys Operator Workstation software, although it consists of a large number of programs, functions as a single Windows application. Metalink is the DDE server interface portion of the OWS.

The exchange of information between two Windows applications is referred to as a DDE conversation. There are two participants in a DDE conversation:

Client: initiates the conversation (also called Destination)

Server: responds to the client's request (also called Source)

An application is able to function as a client, a server, or both. Most applications will support more than one DDE conversation at one time.

Figure 1 illustrates these concepts.

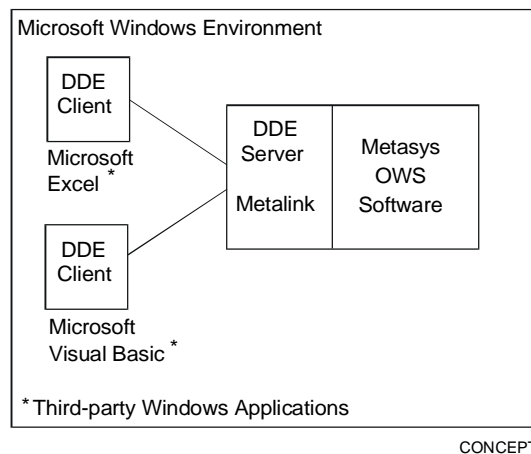


Figure 1: DDE Concepts

A DDE conversation has three stages: initiation, transaction, and termination. Each application may handle these steps in slightly different ways. In some cases, these steps will be automated and, therefore, invisible to you. For example, a DDE link initiated from an Excel worksheet is of this nature. In other cases, you must explicitly execute these steps using the application's macro language. Refer to the documentation for the application to determine how it uses macros to implement these steps.

DDE Initiation

The client requests a conversation with the server by sending an Initiate message. If the prospective server is available for a DDE conversation, a DDE link is established. In some applications, this link is known as a channel. Each DDE link that an application establishes will have a unique identity.

DDE Transaction

The client requests the desired transactions. The client can initiate one of four types of transactions:

DDE Request a one time request for the value of a data item. Sometimes called a cold link or link request.

DDE Advise requests continuous updates to the value of a data item. Sometimes called a hot link. In Metalink, the protocol timer determines how often an update occurs (default is 20 seconds).

DDE Poke sends a value to a data item.

DDE Execute sends the server a command to be executed (not supported in Metalink).

DDE Termination

At any time, the client or the server can end a conversation by sending a Terminate message.

DDE Implementation

Metalink as the Server

Metalink can act only as a DDE server. Since it responds only to messages from a client application, a user interface is not required. Metalink, therefore, has no visible window to indicate its presence on the Operator Workstation. However, a Metalink icon appears in the lower left corner of the screen to indicate its presence in memory. This icon cannot be expanded to a full window.

Note: You can close Metalink by using the Windows method for closing a program from an icon. However, **this is not recommended**, since you'll have to restart Metalink manually for Metalink to function.

Installation

The Metalink program files are included with the Metasys Workstation PMI diskettes. Therefore, when you install the workstation software, you also install Metalink. For any last minute changes, refer to the INSTALL.OWS file on *Disk 1* of the Metasys Workstation PMI diskettes. You may view this file with an editor such as Notepad.

A number of sample Metalink applications are included on *Disk 1*. These are not copied to your hard disk during installation. If you want them copied, you'll have to do so manually.

After installation, you'll need to decide how Metalink will be launched. Every workstation that is involved in DDE conversations must have Metalink running. To start Metalink, you have two choices:

- launch Metalink automatically every time the Operator Workstation is started
- launch Metalink from the third-party application that requires it to run

In the first choice, you can either add Metalink to the 'load=' line of the WIN.INI file or place the Metalink icon under the StartUp program group in Windows.

To add Metalink to the load line, open the WIN.INI file and add METALINK.EXE to the end of the line as follows:

```
load=n1hook.exe METALINK.EXE
```

This causes Metalink to be launched automatically each time the OWS is started. If you would ever need to disable it, simply remove the Metalink portion from this line and restart Windows.

To add the Metalink icon under the StartUp group, open the StartUp group and define Metalink as a new program item. The METALINK.EXE file is most likely under the C:\FMS\BIN directory. If you don't know how to add a program item, refer to your Windows documentation. After Metalink is in the StartUp group, it is launched automatically each time the OWS is started. If you would ever need to disable this function, simply move the Metalink icon to another program group or delete the Metalink icon from StartUp.

To launch Metalink from the third-party application, refer to the literature of the application. Many applications, such as Microsoft Excel, offer to start Metalink if it detects DDE is needed.

The METASYS.INI file includes the following subsection for Metalink:

```
[METALINK]
;protocol timer is period that signed up items
are checked
;with value being read from Metasys and send to
third-party product
ProtocolTimer=20
ValidDataTimeout=40000
RequestTimer=20000
AllowXlTable=0
AllowXlTableForPokes=0
```

Protocol Timer

Defines how often data for Advise transactions is updated. (In Metalink, the Advise function is performed with the Read topic; described later). Its default value is 20 seconds, which you may modify. Only integers are allowed (i.e., 15.5 is unacceptable). The minimum period is 1 second. You may also disable updating by using 0.

Note: If you change the protocol timer to less than 20 seconds, be aware that the performance of the Operator Workstation on which Metalink is installed may noticeably decrease. How much depends on the type of PC. For example, a 486-66 PC may be able to handle a protocol timer of 5 seconds, while a 386SX PC could handle only 20 seconds.

ValidData Timeout

Determines how long Metalink waits for requested data before returning a DDE failed message. You may need to increase this value if you are using a dial-up network with heavy traffic. The default is 40,000 milliseconds (40 seconds) with a range of 55 to 65,536 ms.

RequestTimer Determines how often the table of pending requests is scanned to check for timeouts of ValidDataTimeout timers. The value should be less than ValidDataTimeout. You may need to increase this value if you are using a dial-up network with heavy traffic. The default is 20,000 milliseconds (20 seconds) with a range from 1 to 65,536 ms.

AllowXITable Enables and disables support of a special Microsoft Excel data format that the WonderWare™ toolkit, used to build Metalink, supports. Setting this parameter to 0 forces Excel to use the CF_TEXT data format when passing data to Metalink. Always use the default of 0 (1 enables support).

Note: XI in the above parameter is X and the letter I, not the number 1.

AllowXITableFor Pokes Enables and disables support of a special Microsoft Excel data format that the WonderWare toolkit, used to build Metalink, supports. Setting this parameter to 0 forces Excel to use the CF_TEXT data format when passing data to Metalink for the DDE Poke transaction. Always use the default of 0 (1 enables support).

Note: XI in the above parameter is X and the letter I, not the number 1.

Online Help

Metalink has an online version of this document. The online help is available through the Help menu of the Operator Workstation Network Map. To access help:

1. Display the Network Map.
2. Click the Help option on the Network Map menu bar. The Help menu appears.
3. Click the Features Help option in the Help menu. The Features Help menu appears.
4. Click the Metalink option in the Features Help menu. The Help window appears.

As you'll notice on the help screens, some text is highlighted in green and underlined (single or dashed). Clicking on green text performs one of three actions. The actions are shown in Table 1:

Table 1: Purpose of Highlighted Text in Help File

Type Of Text	Screen Action Performed
Table of Contents Entry (single underline)	Jumps to the section selected
Term (dash underline)	Displays the definition of the term in a pop-up window
Section Reference (single underline)	Jumps to the referenced section

All other particulars of Metalink online help follow the conventions of the Microsoft Windows help screens. Refer to your *Microsoft Windows User's Guide* for details.

DDE Parameters

In order to carry on a DDE conversation with a server, the client requires three pieces of information: the server name, a topic, and an item name.

DDE Server Name

The server name identifies the DDE application. For example, the Metalink server name is always METALINK. When a client initiates a DDE conversation with a server, it addresses the server by name. Like Metalink, most applications use some form of their application name as their server name.

DDE Topic

The topic describes something in the server that the client wants to access. For example, in Microsoft Excel, the name of each open worksheet is a topic. A DDE link is established to a topic on the server. The combination of the server name and the topic uniquely define the DDE link.

Topics in Metalink are more complex. Each topic is a combination consisting of a keyword and a network name written as:

Keyword.*Network*

where **Keyword** is one of a set of eight possible keywords, as shown in Table 2, and *Network* is the name of any one of the networks to which the OWS has access.

Table 2: DDE Topic Keywords in Metalink

Keyword	Description
Command	Issues commands to objects
History	Requests History data
Read	Requests attribute data
Report	Subscribes for various reports
Schedule	Schedules time programs
Totalization	Requests Totalization data
Trend	Requests Trend data
Write	Modifies attribute data

There is one additional topic, the System topic, which is different from all the others. It is provided to allow a third-party application to obtain revision level information about Metalink itself rather than a Metasys Network. Therefore, it does not need or use the *Network* extension.

Each topic is described in detail in the *Reference* section of this document.

DDE Item

The item describes the data item that a value is being requested from or passed to. Each DDE request must reference an item. The server dictates the format of the item. The client must use the item syntax expected by the server.

Item names are often specific to a topic. Metalink item names are a combination consisting of a `system\object` pair followed by additional parameters that are determined by the nature of the topic.

One of the simplest items is the Read topic item. The Read topic's item is written as:

System\Object.Attribute

where *System\Object* is the keyword of the item and *Attribute* is a parameter of the item. The `system\object` pair can be any valid system and object that is defined under the network named in the topic. The attribute must be a valid attribute for the type of object named in the first part of the item. The attribute is an optional parameter. If you do not specify an attribute, the read will return the value of the default attribute, which is often DISPLAY.

Windows DDE supports the passing of data in any of Windows predefined clipboard formats. Metalink, however, uses only the CF_TEXT clipboard format for data exchange. This detail of DDE usage is normally transparent to the user. The DDE protocol will automatically determine the optimum data format to use between client and server.

The item for each topic is described in detail in the *Reference* section of this document.

Reference

Introduction

This section provides complete details of the topics supported by Metalink. (For a two page summary of all Metasys topics, refer to the *Quick Reference* section in the *Appendix*.) The topics are arranged alphabetically, each starting on a new page. The descriptions include the following information:

Topic: This section shows the topic, written as **Keyword**.*Network* with the **Keyword** shown in bold. *Network* is in italics to indicate a placeholder that must be replaced with the name of any one of the networks to which the OWS has access. Note that a period is used as a delimiter between the parts of the topic. For example, the Read topic accessing the Johnson Controls demonstration OWS database would be written as: Read.JCI-NET.

Purpose: This section explains the topic.

Item: This section shows the syntax of the item and explains the parameters applicable to the item. A typical item is given as:

System\Object [.Attribute]r

where:

Italics indicate placeholders for appropriate names or values.

Parameters inside square brackets [] are optional.

Parameters inside braces { } indicate that only one of the parameters listed between the braces can be specified.

A lowercase r after a set of brackets indicates the information within the brackets may be repeated up to ten times. The repeats may have different values. Each parameter (including repeated parameters) is delimited by a period.

For example, the Read topic item to read the Low Limit, High Limit, and differential of a specific analog object would be:

AHU-1\Supply.LO_LIMIT.HI_LIMIT.DIFF

Many of the parameters in the item may be either abbreviated or spelled out fully. For example, the Number of Samples parameter can be written as .NS or .NumberSamples. You may find it more meaningful to spell out the parameters than to use abbreviations. Either way is acceptable.

Return: This section shows the syntax of the data returned to the client by Metalink. Individual pieces of data are delimited by tabs (denoted as **TAB**). Sets of data are delimited by carriage return-line feed characters (denoted as **CR-LF**).

Example: This section presents an example that is based on Microsoft Excel as the client. The examples are provided primarily to illustrate the Metalink syntax. A working knowledge of Excel will be necessary to fully understand the examples. All the examples show a segment of an Excel macro sheet. In most cases, using an Excel macro function is more appropriate than using a formula in an Excel worksheet, because most of the Metalink topics do not automatically provide updates.

The network, system, and object names are from the Johnson Controls Metasys demonstration OWS database.

For more examples, refer to the *Appendix*.

Command	This section explains the Command topic.
Topic	Command . <i>Network</i>
Purpose	Opens a link through which a command can be issued to a Metasys object. The Command topic can perform the same commands as can be programmed with Graphic Programming Language (GPL) or JC-BASIC. (Refer to Table 3 for available commands.)
Item	<i>System\Object.Command</i> [<i>.Attribute</i>] [<i>Data1</i>] TAB [<i>Data2</i>]... TAB [<i>DataN</i>] Command items are used with the DDE Poke message. Data for the item (if any) must be supplied as a tab delimited string separate from the item name. <i>System\Object</i> identifies the object you want to command. <i>Command</i> is which command you want to issue to the object (e.g., SET_AD). Available commands are the same as those available to GPL and JC-BASIC. (Refer to the COMMANDS column in Table 3.) The optional <i>Attribute</i> is the name of the attribute associated with the command. The attribute must be included when more than one attribute of an object can be commanded. An example is an Adjust command to a CS object. The item must specify which attribute to adjust.

Data includes any additional parameters that the Metasys system needs to issue the command. For example, the Start command requires a priority level that you must also specify with the command. The required parameters are the same as those needed by JC-BASIC. (Table 3 lists these parameters.) If a command has multiple parameters, they must be tab delimited by the client application.

How the data is specified depends on the application. For Excel, the data is entered into separate cells and the range of the cells specified after the command name. (For an example, see Figure 2.) Excel then appends this data to the command.

For more information about commands, refer to the object's technical bulletin in the *Objects* section of the *Metasys Network Technical Manual (FAN 636)*.

The complete syntax of an item which would change the limits of an AI object, for example, would have the following format:

System\Object.Alarms

Low LimitTABHigh LimitTABDifferential

The data must be supplied as a tab delimited string separate from the item name.

As with JC-BASIC, if a command has parameters, it is necessary to supply all the parameters. However, if you do not want to change an existing parameter, you may send a null value. For example, the following syntax will not alter the existing High Limit value of the object:

System\Object.Alarms

Low LimitTABTABDifferential

Some attributes, those which can have no value as indicated by a blank value field on a focus window, support the special keyword 'DEL' (delete) as a value to allow an existing value to be removed rather than modified or retained. For example, the syntax to remove an existing High Limit would be:

Low LimitTABDELTABDifferential

Return

There is no return data; however, most DDE clients have a method for indicating DDE status. With Excel, the characters #N/A appear in a cell if the data requested is not available and #REF! if the system\object name specified is invalid.

If Metalink is unsuccessful in carrying out the Command operation, it displays a Windows message box. See the *Error Messages* section for information on Metalink error messages.

Command Table

Table 3 lists the commands and parameters for each object type. Asterisks and double asterisks indicate which commands cannot be scheduled with the Schedule topic. (The table was taken from the *Command Reference* section of the *JC-BASIC Programmer's Manual [FAN 632]*.)

Note: If you are using Microsoft Excel to send commands, you'll need to add an empty cell reference to the Poke statement for those commands that do not have parameters. Refer to the *Excel Rules for Metalink* section for details.

Table 3: Commands per Object Type

Object Type	Commands	Parameters	Comments
Access Controller	LOC_TRIG	None	Disable process triggering
	UNL_TRIG	None	Enable process triggering
Accumulator	LOC_REP	None	Disable COS reporting
	UNL_REP	None	Enable COS reporting
	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
	ALARMS	Low limit High limit Differential	Set/change alarm parameters
	WARNINGS	Setpoint Normal band Feedback time Differential	Set/change warning parameters
Analog Data	LOC_REP	None	Disable COS reporting
	UNL_REP	None	Enable COS reporting
	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
	ALARMS	Low limit High limit Differential	Set/change alarm parameters
	WARNINGS	Setpoint Normal band Feedback time Differential	Set/change warning parameters
	SET_AD* RELEASE*	Value Priority (2 or 3) None	At Priority 2 override value At Priority 3 replace value Release Priority 2 value
Analog Input	LOC_REP	None	Disable COS reporting
	UNL_REP	None	Enable COS reporting
	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
	ALARMS	Low limit High limit Differential	Set/change alarm parameters
	WARNINGS	Setpoint Normal band Feedback time Differential	Set/change warning parameters
Analog Output Digital	LOC_REP	None	Disable COS reporting
	UNL_REP	None	Enable COS reporting
	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
	SET_AOD*	Value	Override output at Priority 2
	RELEASE*	None	Release Priority 2 value
Analog Output Setpoint	LOC_REP	None	Disable COS reporting
	UNL_REP	None	Enable COS reporting
	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
	SET_AOS*	Value Priority (2 or 3)	At Priority 2 override value At Priority 3 replace value
	RELEASE* RELEASE3	None None	Release Priority 2 override value Release Priority 3 value
* This command at Priority 2 cannot be scheduled with Metalink.			
** Cannot be scheduled with Metalink.			
Continued on next page . . .			

Object Type (Cont.)	Commands	Parameters	Comments
Binary Data	LOC_REP UNL_REP LOC_TRIG UNL_TRIG	None None None None	Disable COS reporting Enable COS reporting Disable process triggering Enable process triggering
	SET_BD*	Value Priority (2 or 3)	At Priority 2 override value At Priority 3 replace value
	RELEASE* UNLATCH**	None None	Release Priority 2 value Reset latched condition
Binary Input	LOC_REP UNL_REP LOC_TRIG UNL_TRIG UNLATCH**	None None None None None	Disable COS reporting Enable COS reporting Disable process triggering Enable process triggering Reset latched condition
Binary Output	LOC_REP UNL_REP LOC_TRIG UNL_TRIG REL_PRI START STOP	None None None None Priority Priority Priority	Disable COS reporting Enable COS reporting Disable process triggering Enable process triggering Release specified priority Output State 1 at Priority Output State 0 at Priority
Card Reader	LOC_REP UNL_REP LOC_TRIG UNL_TRIG	None None None None	Disable COS reporting Enable COS reporting Disable process triggering Enable process triggering
Control System	LOC_REP UNL_REP LOC_TRIG UNL_TRIG	None None None None	Disable COS reporting Enable COS reporting Disable process triggering Enable process triggering
	STCSAN* (see note)	Value Priority (2 or 3)	At Priority 2 override value of analog attribute At Priority 3 adjust value of analog attribute
	STCSBN* (see note)	Value Priority (2 or 3)	At Priority 2 override value of binary attribute At Priority 3 adjust value of binary attribute
	STCSMS* (see note)	Value Priority (2 or 3)	At Priority 2 override value of multi-state attribute At Priority 3 adjust value of multi-state attribute
	REL_CS* (see note)	Priority (2 or 3)	At Priority 2 releases override of attribute At Priority 3 releases adjust of attribute
	Note:	You must specify the attribute. You must know from the software model the CS object is based on, whether the attribute is defined to be adjustable. For STCSAN, STCSBN, and STCSMS commands, you must know which attributes are valid for each command.	
* This command at Priority 2 cannot be scheduled with Metalink.			
** Cannot be scheduled with Metalink.			
Continued on next page . . .			

Object Type (Cont.)	Commands	Parameters	Comments
DCDR	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
DSC8500	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
Demand Limiting and Load Rolling	LOC_REP UNL_REP LOC_TRIG UNL_TRIG LOC_LOAD UNL_LOAD DL_TARGET LR_TARGET DL_MON DL_SHED LR_MON LR_SHED RESETPR	None None None None System\object System\object Value Tariff (0,1,2,3) Value Tariff (0,1,2,3) None None None None None	Disable COS reporting Enable COS reporting Disable process triggering Enable process triggering Don't allow load to be shed Allow load to be shed Change demand limit target Change load rolling target Disable load shedding for DL Enable load shedding for DL Disable load shedding for LR Enable load shedding for LR Set current demand and consumption to 0
Expansion Module	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
FIRE	LOC_REP UNL_REP LOC_TRIG UNL_TRIG	None None None None	Disable COS reporting Enable COS reporting Disable process triggering Enable process triggering
FPU	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
JC-BASIC	PRC_ENA PRC_DIS TRIGGER	None None None	Enable process operation Disable process operation Force a JC_BASIC process to run
Lighting Control Group	LOC_REP UNL_REP LOC_TRIG	None None None	Disable COS reporting Enable COS reporting Disable process triggering
	UNL_TRIG TIMED_ON**	None Hours (optional)	Enable process triggering Timed override for hours or default time if hours omitted
	ON** OFF**	None None	Turn group on, will override LC schedule Turn group off, will override LC schedule
	RELEASE**	None	Release JC_BASIC control
N2OPEN	LOC_TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
PID Controller	LOC-TRIG UNL_TRIG	None None	Disable process triggering Enable process triggering
* This command at Priority 2 cannot be scheduled with Metalink.			
** Cannot be scheduled with Metalink.			
Continued on next page . . .			

Object Type (Cont.)	Commands	Parameters	Comments
PID Loop	LOC_REP	None	Disable COS reporting
	UNL_REP	None	Enable COS reporting
	LOC_TRIG	None	Disable process triggering
	UNL_TRIG	None	Enable process triggering
	AUX_ENA	None	Allow Aux input to be passed through PID Loop
	AUX_DIS	None	Don't allow AUX input to be passed through PID Loop
	SET_PIDL* (see note)	Value Priority (2 or 3)	At Priority 2, override value of attribute At Priority 3, replace value of attribute
REL_PIDL* (see note)	None	Release Priority 2 value of attribute	
	<p>Note: You must specify attribute. TELL '<system/object/attribute>'TO "<command>" [<p1, p2, ...pn>] Valid attributes are: INP1VAL, INP2VAL, INP3VAL, INP4VAL, INP5VAL, INP6,VAL, SETPOINT, HI_SAT_V, AUX_IN, SEL_INP</p>		
	STARTUP	None	Restart PID algorithm
Trend	BEG_TRND	None	Start trend sampling for attribute. Must specify attribute.
Totalization	BEG_TOT	None	Start tot sampling for attribute. Must specify attribute.
	END_TOT	None	Stop tot sampling for attribute. Must specify attribute.
	RES_TOT	Value	Reset totalized value of specified attribute. Must specify attribute.
Zone	LOC_REP	None	Disable COS reporting
	UNL_REP	None	Enable COS reporting
	LOC_TRIG	None	Disable process triggering
	UNL_TRIG	None	Enable process triggering
* This command at Priority 2 cannot be scheduled with Metalink.			
** Cannot be scheduled with Metalink.			

Example

The example in Figure 2 is for a SET_AD command. Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Command and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Poke function uses a cell reference to obtain the channel number and then pokes the Mixed Air object AHU-1\Mixed with the data contained in cells B4 and C4. The value of AHU-1\Mixed is commanded to 70 at a priority of 3.

	A	B	C	D
1	SET AD Mixed Air Temperature			
2				
3	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\Mixed.SET_AD",B4:C4)	70	3	Sends 70 to Mixed Air Tmp at Priority 3
5	=TERMINATE(A3)			Ends DDE connection with Metasys
6	=RETURN()			Ends macro
7				

SETAD

Figure 2: Command Example

History

This section explains the History topic.

Topic

History.*Network*

Purpose

Opens a link through which online or archived point history data for an object can be obtained.

Item

System\Object[**.Read**][**.ReportDestination**-*OWS,Report Destination*]
[**.BeginPeriod**-*date,time*][**.EndPeriod**-*date,time*]
[**.NumberSamples**-*n*]

History items can be used with either DDE Request or Advise messages. In either case, the data is sent only once. History items **do not** automatically provide updates, as is usually the case, in response to the DDE Advise message.

System\Object identifies the object for which you want history data. The default history data returned is the online data, which is stored at the Network Control Module.

.Read Read specifies that you want to read history data. Unlike trend and totalization data, online or archived point history data cannot be deleted through Metalink. This is an optional parameter. If you do not specify it, Read will be the default.

The other optional parameters of the item are used to specify the location and scope of archived history data. Each of the parameters consists of a keyword and a variable separated by a dash (-).

.ReportDestination (or **.RD**)-*OVS,Report Destination* Report Destination specifies the name of the Operator Workstation and the PC File destination on the OWS from which the archive data should be retrieved. Each OWS accessed through Metalink must be running Metalink. If you omit the **.ReportDestination** parameter, the online data from the NCM will be returned, and the begin and end periods are ignored.

.BeginPeriod (or **.BP**)-*date,time* Begin Period specifies the date and time of the earliest sample to return. If the specified begin period is earlier than the earliest sample, the returned data will begin with the earliest sample. If you do not specify the **.BeginPeriod** parameter, the number of samples returned will be determined by the **.NumberSamples** parameter, ending at End Period. For *Date*, use the format currently being used by Windows. Use 24-hour format for *Time*.

.EndPeriod (or **.EP**)-*date,time* End Period specifies the date and time of the last taken sample of historical data to return. If the specified end period is later than the last sample, the returned data will end with the last sample taken. Make sure you enter an end period that is later than the begin period. If you do not specify the **.EndPeriod** parameter, the number of samples returned will be determined by the **.NumberSamples** parameter. For *Date*, use the format currently being used by Windows. Use 24-hour format for *Time*.

.NumberSamples (or **.NS**)-*n* Number of Samples gives you the ability to control the number of samples returned. The total number of samples that can be returned is only limited by the available buffer memory in Windows. If the number of samples being returned exceeds the available buffer space, the operation will fail and Metalink will produce a warning message. You must either make more memory available (by closing applications or adding memory to the computer) or reduce the number of samples to correct the problem. If no number follows the **.NumberSamples** parameter, a default of 10 for binary objects and 48 for analog objects is used. Also, if you specify 1 for the number of samples and do not specify a begin or end period, the last sample (most recent) is returned.

Return

The returned data is a tab delimited string of ten different pieces of data per sample. The syntax is:

```
[TimeTABDateTABValueTABEngineering UnitsTABStatusTAB  
Commanding FeatureTABSoftware Override FlagTABHardware Override  
FlagTABOffline FlagTABEnable FlagCR-LF]r
```

It is up to the receiving application to parse the string on the tab delimiters.

If Metalink is unsuccessful in accessing the history data, it returns an error message as the data. It also displays a Windows message box. See the *Error Messages* section for information on Metalink error messages.

Examples

The example in Figure 3 obtains online history data and the example in Figure 4 obtains archived history data.

Figure 3 uses the Initiate function to establish a DDE conversation with Metalink, using the History and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Request function uses a cell reference to obtain the channel number and then requests two samples of the online history data for the Supply Air Temperature object AHU-1\Supply. Optionally, this example could have specified a report destination, begin time, and end time.

If successful, the request will return two samples (most recent) of the online history data of object AHU-1\Supply. The data will be returned to a range of cells, R12C3 to R13C12.

	A	B
1	Online History Example	
2		
3	=INITIATE("METALINK","History.JCI-NET")	Initiates DDE link to Metalink
4	=FORMULA.ARRAY(REQUEST(A3,"AHU-1\Supply.NS-2"), "R12C3:R13C12")	Reads point history of object from online source
5	=TERMINATE(A3)	Ends DDE connection
6	=RETURN()	Ends macro
7		

Note: In the actual macro file, the formula in Cell A4 would be on one line, not split on two lines as shown.

	C	D	E	F	G	H	I	J	K	L
10						FEAT.	SW	HW	OFF-	DIS-
11	TIME	DATE	VALUE	UNITS	STATUS	PRIOR	OVERRIDE	OVERRIDE	LINE	ABLED
12	11:05	1/4/93	72.8	DEGF	0	1	N	N	N	N
13	11:35	1/4/93	71.1	DEGF	0	1	N	N	N	N

Note: You must enter the column headings in Rows 10 and 11 manually. Also, you will need to change the format of Cells 12 to D13 to get the desired time and date display format.

ONHIST

Figure 3: Online History Example

In Figure 4, Excel uses the Initiate function to establish a DDE conversation with Metalink, using the History and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Request function uses a cell reference to obtain the channel number and then requests the archived data for the Supply Air Temperature object: AHU-1\Supply. Metalink obtains ten samples from the archive, collected on 1/4/93 between 6:00 and 10:30 a.m.

	A	B
1	Archived History Example	
2		
3	=INITIATE("METALINK","History,JCI-NET")	Initiates DDE link to Metalink
4	=FORMULA.ARRAY(REQUEST(A3,"AHU-1\Supply.RD-PC1,HISTORY.BP-1/4/93,6:00:00.NS-10"),"R12C3:R21C12")	Reads point history of object from archive source
5	=TERMINATE(A3)	Ends DDE connection
6	=RETURN()	Ends macro
7		

Note: In the actual macro file, the formula in Cell A4 would be on one line, not split on two lines as shown.

	C	D	E	F	G	H	I	J	K	L
10						FEAT.	SW	HW	OFF-	DIS-
11	TIME	DATE	VALUE	UNITS	STATUS	PRIOR	OVRIDE	OVRIDE	LINE	ABLED
12	6:00	1/4/93	72.8	DEGF	0	1	N	N	N	N
13	6:30	1/4/93	71.1	DEGF	0	1	N	N	N	N
14	7:00	1/4/93	72.1	DEGF	0	1	N	N	N	N
15	7:30	1/4/93	72.5	DEGF	0	1	N	N	N	N
16	8:00	1/4/93	71.9	DEGF	0	1	N	N	N	N
17	8:30	1/4/93	72.0	DEGF	0	1	N	N	N	N
18	9:00	1/4/93	72.4	DEGF	0	1	N	N	N	N
19	9:30	1/4/93	72.7	DEGF	0	1	N	N	N	N
20	10:00	1/4/93	72.5	DEGF	0	1	N	N	N	N
21	10:30	1/4/93	71.8	DEGF	0	1	N	N	N	N

Note: You must enter the column headings in Rows 10 and 11 manually. Also, you will need to change the format of Cells C12 to D21 to get the desired time and date display format.

ARHIST

Figure 4: Archived History Example

Note: To retrieve all archived data, the Network Controller (NC) must be online. If it is offline, an error message will be returned.

Read	This section explains the Read topic.
Topic	Read.Network
Purpose	Opens a link through which the values of one or more attributes of an object can be read.
Item	<p><i>System\Object[.Attribute]r</i> (all objects except Access/Fire objects)</p> <p>or</p> <p><i>System\Object:Card ID or Device ID</i> (only Access/Fire objects)</p> <p>Read items can be used with either DDE Request or Advise messages. If used with a Request message, the item will be read once. If used with an Advise message, the item will be updated periodically at a rate determined by the ProtocolTimer parameter in the METASYS.INI file. The default period is 20 seconds. However, for fire devices and card readers, the item is read only once with both Request and Advise messages. (For more information, refer to the <i>DDE Implementation</i> section.)</p> <p><i>System\Object</i> identifies the object that you want to read. <i>Attribute</i> is the name of the attribute you want to read. <i>Card ID</i> is the card number assigned when the access card was defined (Access Controller object). The Card ID is listed on the Access Cards summary. <i>Device ID</i> is the four character ID that the system assigns to the fire controller object, which is listed on the Input or Output Device summary available at the Operator Workstation. You cannot specify any attributes for Fire devices and card readers.</p> <p>You may read the values of up to ten attributes with one Read topic. Each attribute must be a valid attribute for the object, and spelled out correctly. The attribute is an optional parameter. If you do not specify an attribute, the DISPLAY attribute will be returned.</p> <p>You'll find information about the attributes in the <i>Objects</i> section of the <i>Metasys Network Technical Manual (FAN 636)</i>. Each object documented in the section has a table at the end of its technical bulletin that lists all the object's attributes. The column PMI LABEL lists the descriptive name used on the object's Focus window. The column. SOFTWARE LABEL gives the corresponding true attribute name. This is the name that you must use in the parameter string for the Read topic. All data is returned as text. Attributes that are described as float pt. (floating point) are returned in numerical form (e.g., -.0003, 10.2, and 1000).</p> <p>For example, the complete syntax of an item that would read the limits and differential of an AI object would have the following format:</p> <p><i>System\Object.LO_LIMIT.HI_LIMIT.DIFF</i></p>

Return

The returned data is a string with the data for individual attributes delimited by tabs. The syntax depends on the type of object.

For all objects except Fire Devices and Card Readers:

[Data1[TABData2][TABData3]...[TABDataN]CR-LR]r

For Fire Input Devices:

*DeviceIDTABTypeTABAddressTABStatusTABDescriptionTAB
ApplicationTABValueTABAnalogReadingTABVerifyCountTAB
DefaultSensitivityTABVerifyTABDay/NightAdjustmentTABLoop*

For Fire Output Devices:

*DeviceIDTABTypeTABAddressTABStatusTABDescriptionTAB
ApplicationTABValue*

For Card Readers:

CardIDTABLastNameTABFirstNameTABProcessGroup

It is up to the receiving application to parse the string on the tab delimiters. For example, Excel automatically divides the data into separate cells on each tab character.

If a DDE Advise message is used to send the item to Metalink, Metalink updates the client periodically. If a DDE Request message is used to send the item to Metalink, Metalink provides the data once.

If Metalink is unsuccessful in accessing the object, it returns an error message as the data. It also displays a Windows message box. See the *Error Messages* section for information on Metalink error messages.

Examples

Six different examples, shown in Figures 5 to 10, are given for the Read topic:

- Figure 5** Read data macro (macro sheet cold link)
- Figure 6** Read Advise (worksheet hot link)
- Figure 7** Read macro and store data in named cell
- Figure 8** Read four data items from one object
- Figure 9** Read data items from fire output device
- Figure 10** Read data items from card reader

In Figure 5, Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Read and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Request function uses a cell reference to obtain the channel number and then requests data for the Outside Air Temperature object AHU-1\OAT.VALUE.

If the macro runs successfully, the request will return the current value of AHU-1\OAT. As shown in Figure 5, the data will be returned to the cell in which the Request array formula was entered.

Note: To view the data, you'll need to turn off the display of formulas under the Excel Options Display menu.

	A	B
1	Read Example	
2		
3	=INITIATE("METALINK","Read.JCI-NET")	
4	=REQUEST(A3,"AHU-1\OAT.VALUE")	
5	=TERMINATE(A3)	
6	=RETURN()	

	A	B
1		
2		
3	0	
4	76.0	
5	TRUE	
6	TRUE	

READ1

Figure 5: Read Data Macro Example

In Figure 6, the Read Advise topic is used on an Excel worksheet to obtain the current value of the object. The required syntax for the Read Advise topic is shown below the example. The worksheet hides the details of DDE from you by reducing the DDE process to the entry of the formula into cell B4 of the worksheet. The formula, behind the scenes, establishes a DDE link with a DDE Advise message. Metalink will continue to update the worksheet until the formula is deleted or the sheet is closed.

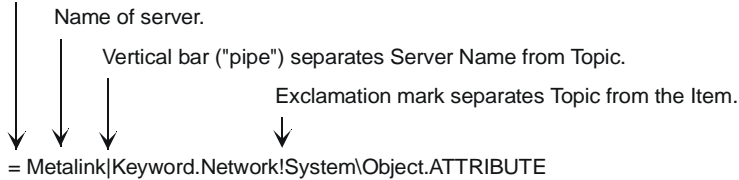
Example

	A	B	C
1	Worksheet		
2	Report for AHU-1\OAT		
3			
4	Current Temperature	78.0 Deg F	

↑
= Metalink|Read.JCI-NET!'AHU-1\OAT.DISPLAY'

Formula Syntax

Equal sign indicates that this is a formula.



Topic: Keyword + Network Name, separated by a period.

Item, which consists of the System\Object Name + Attribute, separated by a period. If no attribute is specified, VALUE is used. If system or object name contains a dash (-), enclose system\object name.attribute name in single quotes.

Read2

Figure 6: Read Advise Example

The example in Figure 7 uses the Read topic to obtain the value of the AHU-1\OAT object and sends it to a particular cell: R5C2.

	A	B
1	Read Example	
2		
3	=INITIATE("METALINK","Read.JCI-NET")	
4	=FORMULA(REQUEST(A3,"AHU-1\OAT.VALUE"),"R5C2")	
5	=TERMINATE(A3)	
6	=RETURN()	

		Column 2	
		B	C
	4	VALUE	
Row 5	5	76.0	
	6		

Note: You must enter the column heading in Cell B4.

READ3

Figure 7: Read Macro with Data Stored in Cells

The example in Figure 7 shows only one attribute being retrieved. You can retrieve multiple attribute values on the worksheet by entering the formula as an array. To do so, use the standard Excel procedure for entering an array formula. (See Note below.) For example, if you are requesting the VALUE, LO_LIMIT, HI_LIMIT, and STATUS values for an AI object, you would define the array formula in four consecutive columns. The values would be returned to those cells. Remember, the number of columns in the array must equal the number of attributes you are requesting. Using the array function, you can obtain a maximum of ten attribute values.

In Figure 8, the Read topic obtains several attribute values for AHU-1\OAT and sends them to an Excel worksheet (JCI-NET.XLS). The attributes are inserted in a range of cells from R5C2 to R5C5. (The row-column specification is required.) The worksheet must be open to receive the values.

Note: To create an array formula in adjacent cells, select the range of cells that will hold the attribute values you are requesting, type the formula, then press Ctrl-Shift-Enter. The formula is repeated in each cell that was selected.

	A
1	Read Example
2	
3	=INITIATE("METALINK","Read.JCI-NET")
4	=FORMULA.ARRAY(REQUEST(A3,"AHU-1\OAT.VALUE.LO_LIMIT.HI_LIMIT.STATUS"),"JCI-NET.XLS!R5C2:R5C5")
5	=TERMINATE(A3)
6	=RETURN()
7	

Note: In the actual macro file, the formula in cell A4 would be on one line, not split on two lines as shown.

JCI-NET.XLS:

ATTRIBUTES FOR AHU-1\OAT:				
	VALUE	LO LIMIT	HI LIMIT	STATUS
	C2			C5
R5	76.0	50.0	100.0	4

Note: You must add the column headings.

READ4

Figure 8: Read Macro with Various Object Data

In Figure 9, the Read topic obtains data from a fire output device called FIRESYS1\IFC_1 and sends it into a range of cells from R7C1 to R7C7. (The row-column specification is required.)

	A	B
1	Read Fire Output Device Example	
2		
3	=INITIATE("METALINK","Read.JCI-NET")	Initiates DDE link to Metalink
4	=FORMULA.ARRAY(REQUEST(A3,"FIRE\IFC:6720"), "R7C1:R7C7")	Reads attributes of fire object
5	=TERMINATE(A3)	Ends DDE connection
6	=RETURN()	Ends macro
7		

Note: In the actual macro file, the formula in Cell A4 would be on one line, not split on two lines as shown.

	A	B	C	D	E	F	G
6	Device ID	Type	Addr	Status	Description	Application	Value
7	6720	M	5	*	Strobe-Control Module	Control	On

Note: You must enter the column headings in Row 6 manually.

READ5

Figure 9: Read Macro for Fire Output Device

In Figure 10, the Read topic obtains data from SECURITY\AC3 and sends it into a range of cells from R7C1 to R7C4. (The row-column specification is required.)

	A	B
1	Read Card Reader Example	
2		
3	=INITIATE("METALINK","Read.JCI-NET")	Initiates DDE link to Metalink
4	=FORMULA.ARRAY(REQUEST(A3,"SECURITYPROXIM:2"), "R7C1:R7C4")	Reads attributes of card reader
5	=TERMINATE (A3)	Ends DDE connection
6	=RETURN()	Ends macro
7		

Note: In the actual macro file, the formula in Cell A4 would be on one line, not split on two lines as shown.

	A	B	C	D
6	Card ID	LastName	FirstName	ProcessGroup
7	2	Amenson	Mary	0

Note: You must enter the column headings in Row 6 manually.

READ6

Figure 10: Read Macro for Card Reader

Report

This section explains the Report topic.

Topic

Report.Network

Purpose

Opens a link through which a Metasys report can be sent to a client application. Two examples of such reports include a critical alarm and a totalization value.

Item

System\Object{**.Subscription, .Discard**}{**.Crit1, .Crit2, .Crit3, .Crit4, .Critical, .Followup, .Status, .Transaction, .Cardreader**}

Report Subscription items can only be used with DDE Advise messages. The item is updated each time a Metasys report is received. Report Discard items are used with the DDE Poke message.

System\Object identifies the object whose reports you want to receive. The System and Object parameters accept the DOS wildcard asterisk character (*). It can be used as a substitute for a system name or any number of characters in an object name. The Object parameter also accepts the question mark (?) wildcard. (System does not accept the ? wildcard.) The ? is used as a substitute for a single character position in an object name. These wildcards allow you to subscribe to or discard reports for multiple systems and objects with one command.

Table 4 contains several examples to illustrate how the two wildcard characters can be used. Notice that the System parameter can use the * wildcard as a standalone character only. For example, ZONE*\AHU would not be valid.

Table 4: Wildcard Examples

System	Object	Description
ZONE1	AHU*	All objects that begin with the letters AHU in system ZONE1, such as AHU-1, AHU-FLR2, and AHU123.
ZONE1	*	All objects under the system ZONE1.
*	OAT	All systems with an object called OAT.
*	*	All systems and all objects.
ZONE1	A???	All objects that have four characters and start with the letter A, such as AHU1, AHU5, AIR5.
ZONE1	???	All objects that have three characters and are under the system ZONE1, such as AHU, HTG, and CLG.

Note: For the Report topic, Metalink checks for a valid network and system name, but does not check for a valid object name.

.Subscription Subscription specifies that you want to sign up for a report. In order for Metalink to receive reports, you must add a PC file destination called USER_APP to the report/access group that the system belongs to (Figure 11). The PC you select must be the one on which the Metalink client application is running. When defining USER_APP, select which report types can go to that destination (e.g., Critical, Status, Card Reader). Thereafter, when a report of this type is generated, the Metasys system sends the report to USER_APP which Metalink receives and sends to the client application. (For details on how to add destinations, refer to the *Operator Workstation User's Manual (FAN 634)* under the *Advanced User's Guide* section.)

When subscribing for a report, specify the type of report that you want to receive: **.Crit1**, **.Crit2**, **.Crit3**, **.Crit4**, **.Critical** (all Critical reports), **.Followup**, **.Status**, **.Transaction**, or **.Cardreader**. Select only one.

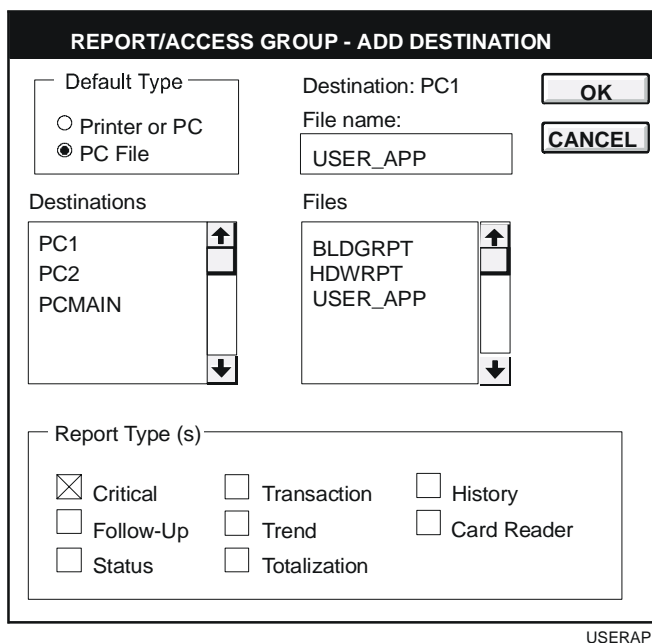


Figure 11: Adding USER_APP Destination to PC File

.Discard Discard specifies that you want to discard a particular critical report. This function is equivalent to clicking the Discard button on a Critical Report Message Box on the Operator Workstation. You can discard critical reports only. Refer to the *Send Format for Discard* section below.

When discarding a report, only specify Critical, since you can only discard critical reports.

Return for Subscription

The returned data for Subscription is a tab delimited string containing the report information. The information returned depends on the report type.

For Critical 1 - Critical 4 and Critical:

*ReportTypeTABAlarmTypeTABTimeTABDateTABGroupTABSystem
TABObjectTABValueTABUnitsTABAttributeTABExpandedIDTABText
TABAlmMsgTABPriority*

For Followup:

*ReportTypeTABAlarmTypeTABTimeTABDateTABGroupTABSystem
TABObjectTABValueTABUnitsTABAttributeTABExpandedIDTABText
TABAlmMsgTABPriorityTABTransferTABCrit-timeTABCrit-date*

For Status:

*ReportTypeTABAlarmTypeTABTimeTABDateTABGroupTABSystem
TABObjectTABValueTABUnitsTABAttributeTABExpandedIDTABText
TABAlmMsg*

For Transaction:

*ReportTypeTABAlarmTypeTABTimeTABDateTABGroupTABSystem
TABObjectTABValueTABUnitsTABAttributeTABExpandedIDTABText*

For Cardreader:

*ReportTypeTABStatusTABTimeTABDateTABSystemTABObject
TABCardNumberTABLastNameTABFirstNameTABText*

Send Format for Discard

ReportTypeTABAlarmTypeTABTimeTABDate

As a *hint* to easily discard a report, simply use the first four parameters in the returned report. All parameters after Date are ignored.

where:

ReportType = always CRITICAL, since you can only discard Critical reports.

AlarmType = alarm type, such as HI ALARM, LO WARNING.

Time = time of day of the report. Specify time in 24-hour format only (i.e., 00:00 to 23:59).

Date = date in Windows format (e.g., MM/DD/YY) of the report.

Example

In Figure 12, the DDE Advise topic is used on an Excel worksheet to subscribe to critical reports for the object called OAT under the system AHU-1. (The syntax for the Read Advise topic is shown in Figure 6.) The Excel formula is entered as an array by highlighting Cells A4 to I4 and using the Ctrl-Shift-Enter key sequence. This duplicates the formula into Cells A4 to I4, so that the returned data is parsed into these cells. Note, however, that the worksheet hides the formula. You can view it by marking the Formulas checkbox under the Display option. Since this is a DDE Advise command, Metalink will continue to send reports as they become available until the formula is deleted or the sheet is closed. Notice the single quotation marks within the formula; they are necessary because the system name AHU-1 contains a dash.

	A	B	C	D	E	F	G	H	I
1	Worksheet								
2	Report for AHU-1\OAT								
3									
4	CRITICAL	LO WARN	15:28	12/15/93	EASTFLOOR1	AHU-1	OAT	66.9	DEGF

↑
{=Metalink|Report.JCI-NET!AHU-1\OAT.SUBSCRIPTION.CRITICAL'}

REPORT1

Figure 12: Report Subscription Example

Figure 13 shows an Excel macro sheet example that discards the report in the above example (Figure 12). Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Report and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Poke function uses a cell reference to obtain the channel number and then discards the report for AHU-1\OAT, using the data in cells R4C1 to R4C4 of the SHEET.XLS worksheet.

	A	B
1	Discard Report Example	
2		
3	=INITIATE("METALINK","Report.JCI-NET")	Initiates DDE link
4	=POKE(A3,"AHU-1\OAT.DISCARD","SHEET.XLS!R4C1:R4C4")	Deletes report for object
5	=TERMINATE(A3)	Ends DDE connection

REPORT2

Figure 13: Discard Report Example

Schedule

This section explains the Schedule topic.

Topic

Schedule.Network

Purpose

Opens a link through which weekly and temporary schedules can be read, added, or deleted. The Schedule topic can perform the same scheduling commands as can be programmed with the Operator Workstation. (Refer to the *Operator Workstation User's Manual* for details on the Scheduling feature.)

Item

System\Object.Attribute{**.Read, .Add, .Delete**}
{**.Weekly, .Temporary**}[**.NumberSamples-n**]
[*Data1*]**TAB**[*Data2*]...**TAB**[*DataN*]

Read Schedule items are used with DDE Request messages. Add or Delete Weekly Schedule items are used with DDE Poke messages. Data for any of the Schedule items must be supplied as a tab delimited string separate from the item name.

System\Object identifies the object that you want to schedule. *Attribute* is the name of the attribute to be scheduled.

The .Read, .Add, and .Delete parameters select the three scheduling operations that are available. Select only one of the three. If you do not select any one of these, the default will be .Read.

.Read Read specifies that you want to read a schedule.

.Add Add specifies that you want to add a schedule for an attribute. If you use .Add, omit the .NumberSamples parameter.

.Delete Delete specifies that you want to clear a schedule. If you use .Delete, omit the .NumberSamples parameter.

When reading, adding, or deleting a schedule, you have a choice of selecting either weekly or temporary scheduling.

.Weekly Weekly specifies that you want to read, add, or delete a regular, alternate, or holiday schedule.

.Temporary Temporary specifies that you want to read, add, or delete a one time schedule for a particular date.

.NumberSamples (or **.NS**)-*n* Number of Samples gives you the ability to control the number of schedules returned by the Read operation. The maximum number of schedules that can be returned is 32. If you do not specify the .NumberSamples parameter, its default value is the maximum schedules that Metalink can return, which is 32. Specify this parameter **only** when using the .Read parameter.

Data includes the additional parameters that the Metasys system needs in order to add or delete a schedule. (No additional parameters are needed to read a schedule.) The required parameters are the same as those required when using the Scheduling feature on the Operator Workstation. (Table 3 lists these parameters.) The general formats for adding or deleting schedules are shown below under *Send Formats*.

Since all scheduling commands have multiple parameters, they must be tab delimited by the client application. How the data is specified depends on the application. For Excel, the data is entered into separate cells and the range of the cells specified after the command name. (For an example, see Figure 15.) Excel then appends this data to the command.

Metalink checks whether a valid command and the correct number of parameters are being used with the Schedule topic. Also, Metalink performs limited checks on parameter values, but not all values are checked. Therefore, you must be sure the values and their formats that are passed to Metalink are correct. For example, if a date is being sent, the application must format the data as a date.

For more information about scheduling, refer to the *Scheduling Technical Bulletin* under the *Feature Software* section of the *Metasys Network Technical Manual (FAN 636)* and the *Operator's Guide* section of the *Operator Workstation User's Manual (FAN 634)*.

Send Formats

The send format depends on whether this is a Weekly or Temporary schedule and whether you are performing an Add or Delete operation.

.Weekly Schedule - Add

*Days*TAB*Time*TAB*Command*TAB*Attribute*TAB*Parameter1*TAB
*Parameter2*TAB...*ParameterN*

.Temporary Schedule - Add

*Date*TAB*Time*TAB*Command*TAB*Attribute*TAB*Parameter1*TAB
*Parameter2*TAB...*ParameterN*

.Weekly Schedule - Delete

*Days*TAB*Time*TAB*Command*TAB*Attribute*

.Temporary Schedule - Delete

*Date*TAB*Time*TAB*Command*TAB*Attribute*

where:

Days = SMTWTFSSMTWTFSH, which are abbreviations for the day of the week and holiday, as follows:

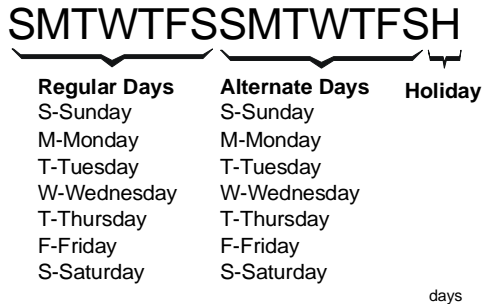


Figure 14: Date Format

For example, to create a regular schedule for Monday through Friday, you would specify: `_MTWTF_`. The underscore characters are required to show which days in the schedule are to be skipped. Use one underscore for each day to be skipped. If you want to create an alternate schedule for Sunday through Saturday, you would specify seven underscore characters, `SMTWTFSS` and one underscore for holiday (i.e., `_____SMTWTFSS_`). To create a holiday schedule, you would specify 14 underscore characters and H (i.e., `_____H`).

Date = date in Windows format (e.g., MM/DD/YY) on which the temporary schedule is to be effective. For example, to create a temporary schedule for Christmas in 1994, you would specify 12/25/94.

Time = time of day at which you want to schedule the command. Specify time in 24-hour format only (i.e., 00:00 to 23:59).

Command = particular command you want to schedule. Refer to Table 3 for a list of commands that can be scheduled. Asterisks and double asterisks indicate those commands that cannot be scheduled. Use the command name exactly as listed in the table.

Attribute = object's attribute that is to be commanded. When adding a schedule, Metalink checks for whether the attribute is valid for the object, but does not check whether the attribute is valid for the command.

Parameter1-ParameterN = parameters that the command requires. To determine which parameters a command requires (if any), refer to Table 3.

For the Schedule Delete commands, all schedules for the system\object that match the specified time, command, and days are deleted.

Return

The .Add and .Delete operations have no return data.

For the .Read operation, the returned data is a tab delimited string of scheduling information per command. If the command includes an attribute, the actual attribute is returned; otherwise, it will be blank. The syntax depends on whether a Weekly or Temporary schedule is being returned.

.Weekly Schedule - .Read

**[DaysTABTimeTABCommandTABAttributeTABParameter1TAB
Parameter2TAB...ParameterN]r**

Days are indicated as SMTWTFSSMTWTFSH. An underscore character (_) is returned in place of a day abbreviation on a non-applicable day.

.Temporary Schedule - .Read

**[DateTABTimeTABCommandTABAttributeTABParameter1TAB
Parameter2TAB...ParameterN]r**

It is up to the receiving application to parse the string on the tab delimiters. If Metalink is unsuccessful in accessing the scheduling data, it returns an error message as the data. It also displays a Windows message box. See the *Error Messages* section for information on Metalink error messages.

Examples

The example in Figure 15 reads five weekly schedules and the example in Figure 16 adds a temporary schedule.

In Figure 15, Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Schedule and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Request function uses a cell reference to obtain the channel number and then requests five weekly schedules for the binary object AHU-1\SF-CTRL.

If the macro runs successfully, Metalink will return five weekly schedules for AHU-1\SF-CTRL. The data is sent to Cells R11C3 to R15C9.

	A	B
1	Read Schedule Example	
2		
3	=INITIATE("METALINK","Schedule.JCI-NET")	Initiates DDE link to Metalink
4	=FORMULA.ARRAY(REQUEST(A3,"AHU-1\SF-CTRL.READ.WEEKLY.NumberSamples-5"),"R11C3:R15C9")	Reads schedule of object from online source
5	=TERMINATE(A3)	Ends DDE connection
6	=RETURN()	Ends macro
7		

Note: In the actual macro file, the formula in Cell A4 would be on one line, not split on two lines as shown.

	C	D	E	F	G	H	I
10	DAYS	TIME	COMMAND	ATTRIBUTE	P1	P2	P3
11	_M__F_____H	12:46	LOC_REP	N/A	N/A	N/A	N/A
12	_____MTWTF__	11:24	UNL_REP	N/A	N/A	N/A	N/A
13	S_____	18:10	START	N/A	7	N/A	N/A
14	_MTWTF_____	01:04	LOC_TRIG	N/A	N/A	N/A	N/A
15	_____H	11:43	UNL_TRIG	N/A	N/A	N/A	N/A
16							

Note: You must enter the column headings in Row 10 manually. Also, you will need to change the format of Cells D11 to D15 to get the desired time display format.

SCHEDUL1

Figure 15: Read Schedule Example

In Figure 16, Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Schedule and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Poke function uses a cell reference to obtain the channel number and then adds a temporary schedule for the binary object AHU-1\SF-CTRL, a supply fan that must be turned on at 12:30 p.m. in preparation for a meeting at 1:00. The data Metalink sends is in Cells A7 to E7.

	A	B
1	Add Temporary Schedule Example	
2		
3	=INITIATE("METALINK","Schedule.JCI-NET")	Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\SF-CTRL.ADD.TEMPORARY",A7:E7)	Sends temp. schedule to object
5	=TERMINATE(A3)	Ends DDE connection

	A	B	C	D	E
6	DATE	TIME	COMMAND	ATTR	PRIORITY
7	12/13/93	12:30	START		7

Note: You must enter the column headings in Row 6 manually. Also, you will need to change the format of Cells A7 and B7 to get the desired date and time display format.

SCHEDUL2

Figure 16: Add Temporary Schedule Example

System

This section explains the System topic.

Topic

System

Purpose

Provides a standard topic name; i.e., one which is also supported by other Windows applications, which other applications can use to test for the presence of Metalink and ascertain information about Metalink itself. The advantage of using the System topic is that a valid Metasys Network name is not required for the test.

Item

Revision

The revision item returns the revision number of Metalink and a copyright notice.

System items can be used with either DDE Request or Advise messages.

Return

The returned data is the following string:

METALINK 10.0-METASYS DDE Server, Copyright JOHNSON CONTROLS 1999

Example

For the example in Figure 17, Excel uses the System topic to test for the presence of Metalink and to display the Metalink copyright statement. The IF(ISERROR) function tests the return value of the cell containing the INITIATE function. If the value is an error value, as would be the case if the INITIATE failed, the IF statement will be True and a message will be displayed. When the message is acknowledged, the macro is ended. Otherwise, the macro continues, first closing the channel opened to the System topic, since it is no longer required.

Note: To view the data returned, you'll need to turn off the display of formulas under the Excel Options Display menu.

	A	B
1	System Example	
2		
3	=INITIATE("Metalink","System")	
4	=IF(ISERROR(A3))	
5	=ALERT("Metalink is not present.")	
6	=RETURN()	
7	=END.IF()	
8	=REQUEST(A3,"REVISION")	
9	=TERMINATE(A3)	
10	=RETURN()	
11		

	A	B	C
3		0	
4	TRUE		
5	FALSE		
6	FALSE		
7	FALSE		
8	METALINK 10.0-METASYS DDE Server, Copyright JOHNSON CONTROLS 1999		
9	TRUE		
10	TRUE		
11			

SYSTEM

Figure 17: System Example

Totalization	This section explains the Totalization topic.
Topic	Totalization.Network
Purpose	Opens a link through which online or archived totalization data for an object can be obtained. Also, archived totalization data can be deleted.
Item	<p><i>System\Object.Attribute</i>{.Delete, [.Read]}</p> <p>[.ReportDestination-<i>OWS,Report Destination</i>][.BeginPeriod-<i>date,time</i>] [.EndPeriod-<i>date,time</i>][.NumberSamples-<i>n</i>]</p> <p>Totalization items can be used with either the DDE Request or Advise messages. In either case, the data is sent only once. Totalization items do not automatically provide updates, as is usually the case, in response to the DDE Advise message.</p> <p><i>System\Object</i> identifies the object for which you want totalization data. <i>Attribute</i> is the name of the totalized attribute. The default totalization data returned is the online data that is stored at the NCM. This will be for the current period and the previous period.</p> <p>.Delete Delete specifies that you want to clear out <i>all</i> the Totalization data from the archive file of the local PC (remote PCs not allowed). When using .Delete, the only other parameter to specify is .ReportDestination. You cannot use the .BeginPeriod, .EndPeriod, and .NumberSamples parameters.</p> <p>.Read Read specifies that you want to read totalization data. If you do not use this or the .Delete option, the Read option is assumed.</p> <p>The other optional parameters of the item specify the location and scope of archived totalization data. Each of the parameters consists of a keyword and a variable separated by a dash (-).</p> <p>.ReportDestination (or .RD)-<i>OWS,Report Destination</i> Report Destination specifies the name of the Operator Workstation and the PC File destination on the OWS that the archive data should be retrieved or deleted from. Each OWS accessed through Metalink must be running Metalink. If you omit the .ReportDestination parameter, the online data from the NCM will be returned and the begin and end period are ignored. If you are deleting archived data, you must use the .ReportDestination parameter.</p>

.BeginPeriod (or **.BP**)-*date,time* Begin Period specifies the date and time of the earliest totalization data sample to return. If the specified begin period is earlier than the earliest sample, the returned data will begin with the earliest sample. If you do not specify the .BeginPeriod parameter, the number of samples returned will be determined by the .NumberSamples parameter, ending at End Period. For *Date*, use the format currently being used by Windows. Use 24-hour format for *Time*.

.EndPeriod (or **.EP**)-*date,time* End Period specifies the date and time of the last taken sample of totalization data to return. If the specified end period is later than the last sample, the returned data will end with the last sample taken. Make sure you enter an end period that is later than the begin period. If you do not specify the .EndPeriod parameter, the number of samples returned will be determined by the .NumberSamples parameter. For *Date*, use the format currently being used by Windows. Use 24-hour format for *Time*.

.NumberSamples (or **.NS**)-*n* Number of Samples gives you the ability to control the number of samples returned. The total number of samples returned is only limited by the available buffer memory in Windows. If the number of samples being returned exceeds the available buffer space, the operation will fail and Metalink will produce a warning message. You must either make more memory available (by closing applications or adding memory to the computer) or reduce the number of samples to correct the problem. If no number follows the .NumberSamples parameter, a default of two samples is used.

Return

The returned data is a tab delimited string of four different pieces of data per sample. The syntax is:

```
[TimeTABDateTABValueTABEngineering UnitCR-LF]r
```

It is up to the receiving application to parse the string on the tab delimiters.

If Metalink is unsuccessful in accessing the totalization data, it returns an error message as the data. It also displays a Windows message box. See the *Error Messages* section for information on Metalink error messages.

Example

The example in Figure 18 obtains online totalization data and the example in Figure 19 obtains archived totalization data.

In Figure 18, Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Totalization and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Request function uses a cell reference to obtain the channel number and then requests online totalization data for the Boiler Status object: BOILER\BLR1-STS.

If successful, the request returns one totalized sample of the VALUE attribute of object BOILER\BLR1-STS. (The sample obtained is the sample on the bottom of the totalization data window.) The data is returned to the cells in the range of R11C2 to R11C5.

	A
1	Online Totalization Example
2	
3	=INITIATE("METALINK", "Totalization.JCI-NET")
4	=FORMULA.ARRAY(REQUEST(A3, "BOILER\BLR1-STS.VALUE"), "R11C2:R11C5")
5	=TERMINATE(A3)
6	=RETURN()
7	

Note: As an alternative, the sample data can be sent to a worksheet. For example, Cell A4 would be:

=FORMULA.ARRAY(REQUEST(A3, "BOILER\BLR1-STS.VALUE"), "TOWER.XLS!R11C2:R11C5")

		Column 2	Column 3	Column 4	Column 5
		B	C	D	E
10		TIME	DATE	VALUE	UNITS
Row 11	11	1:00PM	2/10/93	500	HRS
	12				

Note: You must add the column headings in Row 10.

ONTOTAL

Figure 18: Online Totalization Example

In Figure 19, Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Totalization and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Request function uses a cell reference to obtain the channel number and then requests the archived data for the Boiler Status object: BOILER\BLR1-ST5. Metalink obtains ten samples from the archive, collected between 2/10/93 and 2/19/93 at 6:00 a.m.

	A
1	Archived Totalization Example
2	
3	=INITIATE("METALINK","Totalization.JCI-NET")
4	=FORMULA.ARRAY(REQUEST(A3,"BOILER\BLR1-ST5.RD-PC1,TOTAL.BP-2/10/93,6:00:00.NS-10"),"R11C2:R20C5")
5	=TERMINATE(A3)
6	=RETURN()
7	

Note: In the actual macro file, the formula in Cell A4 would be on one line, not split on two lines as shown.

	Column 2	Column 3	Column 4	Column 5	
	B	C	D	E	
	10	TIME	DATE	VALUE	UNITS
Row 11	11	6:00	2/10/93	10	HRS
Row 12	12	6:00	2/11/93	9	HRS
Row 13	13	6:00	2/12/93	12	HRS
Row 14	14	6:00	2/13/93	13	HRS
Row 15	15	6:00	2/14/93	8	HRS
Row 16	16	6:00	2/15/93	11	HRS
Row 17	17	6:00	2/16/93	10	HRS
Row 18	18	6:00	2/17/93	14	HRS
Row 19	19	6:00	2/18/93	13	HRS
Row 20	20	6:00	2/19/93	0	HRS

Note: You will need to add the column headings in Row 10 and format the data in the columns.

ARTOTAL

Figure 19: Archived Totalization Example

Trend	This section explains the Trend topic.
Topic	Trend.Network
Purpose	Opens a link through which online or archived trend data for an object can be obtained. Also, archived trend data can be deleted.
Item	<p><i>System\Object.Attribute</i>{.Delete, [.Read]}</p> <p>[.ReportDestination-<i>OWS,Report Destination</i>][.BeginPeriod-<i>date,time</i>] [.EndPeriod-<i>date,time</i>][.NumberSamples-<i>n</i>]</p> <p>Trend items can be used with either DDE Request or Advise messages. In either case, the data is sent only once. Trend items do not automatically provide updates, as is usually the case, in response to the DDE Advise message.</p> <p><i>System\Object</i> identifies the object for which you want trend data. <i>Attribute</i> is the name of the trended attribute. The default trend data returned is the online data that is stored at the NCM.</p> <p>.Delete Delete specifies that you want to clear out all the Trend data from the archive file of the local PC (remote PCs not allowed). When using .Delete, the only other parameter to specify is .ReportDestination. You cannot use the .BeginPeriod, .EndPeriod, and .NumberSamples parameters.</p> <p>.Read Read specifies that you want to read trend data. If you do not use this or the .Delete option, the Read option is assumed.</p> <p>The other optional parameters of the item specify the location and scope of archived trend data. Each of the parameters consists of a keyword and a variable separated by a dash (-).</p> <p>.ReportDestination (or .RD)-<i>OWS,Report Destination</i> Report Destination specifies the name of the Operator Workstation and the PC File destination on the OWS that the archive data should be retrieved or deleted from. Each OWS accessed through Metalink must be running Metalink. If you omit the .ReportDestination parameter, the online data from the NCM will be returned and the begin and end period are ignored. If you are deleting archived data, you must use the .ReportDestination parameter.</p>

.BeginPeriod (or **.BP**)-*date,time* Begin Period specifies the date and time of the earliest trend data sample to return. If the specified begin period is earlier than the earliest sample, the returned data will begin with the earliest sample. If you do not specify the **.BeginPeriod** parameter, the number of samples returned will be determined by the **.NumberSamples** parameter, ending at End Period. For *Date*, use the format currently being used by Windows. Use 24-hour format for *Time*.

.EndPeriod (or **.EP**)-*date,time* End Period specifies the date and time of the last taken sample of trend data to return. If the specified end period is later than the last sample, the returned data will end with the last sample taken. Make sure you enter an end period that is later than the begin period. If you do not specify the **.EndPeriod** parameter, the number of samples returned will be determined by the **.NumberSamples** parameter. For *Date*, use the format currently being used by Windows. Use 24-hour format for *Time*.

.NumberSamples (or **.NS**)-*n* Number of Samples gives you the ability to control the number of samples returned. The total number of samples that can be returned is only limited by the available buffer memory in Windows. If the number of samples being returned exceeds the available buffer space, the operation will fail and Metalink will produce a warning message. You must either make more memory available (by closing applications or adding memory to the computer) or reduce the number of samples to correct the problem. If no number follows the **.NumberSamples** parameter, a default of 50 samples is used.

Return

The returned data is a tab delimited string of four different pieces of data per sample. The syntax is:

`[TimeTABDateTABValueTABEngineering UnitsCR-LF]r`

It is up to the receiving application to parse the string on the tab delimiters.

If Metalink is unsuccessful in accessing the trend data, it returns an error message as the data. It also displays a Windows message box. See the *Error Messages* section for information on Metalink error messages.

Example

The example in Figure 20 shows a macro sheet to obtain archived trend data. In Figure 21, the collected data is shown on a worksheet and a line graph is created from the worksheet. Each is described separately.

In Figure 20, Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Trend and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Request function uses a cell reference to obtain the channel number and then requests samples for the Mixed Air Temperature object (AHU-1\MIXED) beginning on February 10, 1993 at 12:00 Midnight.

If successful, Metalink will return 15 trend samples of the VALUE attribute for the object AHU-1\MIXED, along with engineering units. The samples will be from PC1 in file destination AHU-1. The data will be sent to a worksheet (JCI-NET.XLS) in the cells R20C1 through R35C4. Figure 21 shows the worksheet. Also shown is a line graph that was created from the values shown on the left using the standard Excel method. The graph plots how the value of the AHU-1\MIXED object changed over time.

	A
1	Trend Example
2	
3	=INITIATE("METALINK","Trend.JCI-NET")
4	=FORMULA.ARRAY(REQUEST(A3,"AHU-1\MIXED.VALUE.RD-PC1,AHU-1.BP-02/10/93,12:00:00.NS-15"),"JCI-NET.XLS!R20C1:R35C4")
5	=TERMINATE(A3)
6	=RETURN()
7	

Note: In the actual macro file, the formula in Cell A4 would be on one line, not split on two lines as shown.

TREND

Figure 20: Trend Example--Formulas

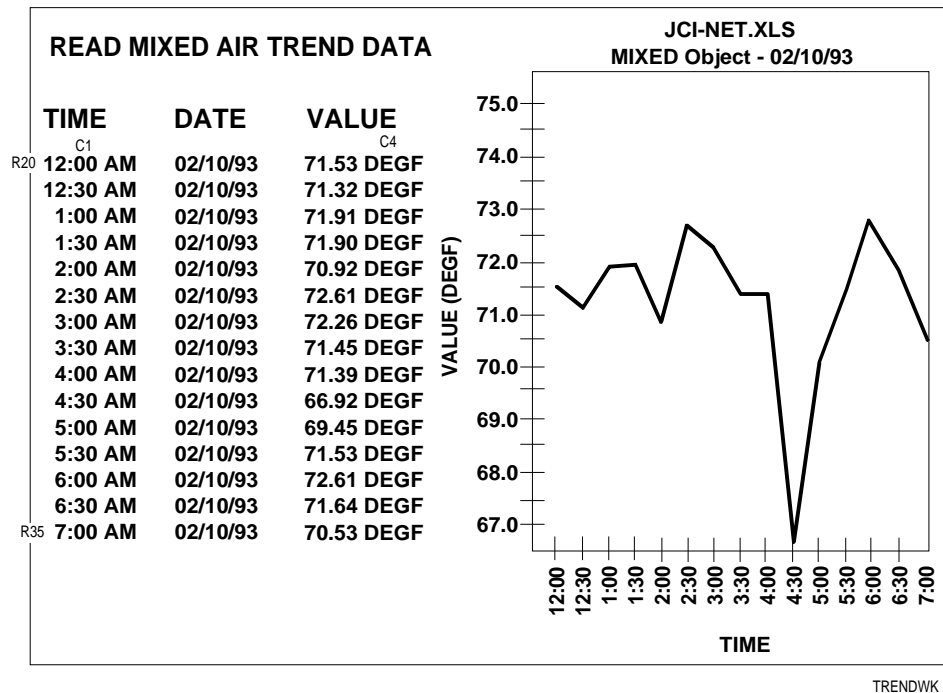


Figure 21: Trend Example--Worksheet

Write

This section explains the Write topic.

Topic

Write.*Network*

Purpose

Opens a link through which the value of an object's attribute can be changed. With the Write topic, you can modify any attribute that can be edited on an Operator Workstation Focus window.

Item

System\Object.Attribute

Data

Write items are used with the DDE Poke message. The data must be supplied to the DDE Poke command separate from the item name.

System\Object identifies the object for which you want to perform a write. Attribute is the name of the attribute whose value you want to change. The item requires one attribute. The attribute must be a valid writable attribute of the type of object named in the first part of the item.

You'll find information about the attributes in the *Metasys Network Technical Manual (FAN 636)* in the *Objects* section. Each object documented in the section has a table at the end of its technical bulletin that lists all the object's attributes. The column, **PMI LABEL**, lists the descriptive name used on the object's Focus window. The column, **SOFTWARE LABEL**, gives the corresponding true attribute name that must be used with the Write topic. Only those attributes listed as **Writable** or **JC-BASIC Writable** in the **USAGE** column may be written. Attributes that are described as **float pt.** (floating point) are sent a value in numerical form (e.g., -.0003, 10.2, and 1000).

The complete syntax of an item that would change the Filter Weight attribute of an AI object, for example, would have the following format:

System\Object.FILTER

Filter

Where *Filter* represents the data for the attribute.

Return

There is no return data; however, most DDE clients have provision for providing a DDE status indication.

If Metalink is unsuccessful in carrying out the Write operation, it displays a Windows message box. See the *Error Messages* section for information on Metalink error messages.

Example

In the example in Figure 22, Excel uses the Initiate function to establish a DDE conversation with Metalink, using the Write and JCI-NET network topic. If successful, Excel returns a channel number to the cell containing the Initiate function. The Poke function uses a cell reference to obtain the channel number and then pokes the object AHU-1\Supply.FILTER with the data contained in Cell B7. The data is a new value for the Filter Weight attribute.

	A	B	C	D
1	Write Example			
2				
3	=INITIATE("METALINK", "Write.JCI-NET")			
4	=POKE(A3,"AHU-1\Supply.FILTER",B7)			
5	=TERMINATE(A3)			
6	=RETURN()			
7		1.2		
8				

Write

Figure 22: Write Example

Error Messages

Introduction

This section lists the error messages that you may encounter as you develop an application that communicates with Metalink. The majority of messages are displayed in a Windows message box with Metalink in its title bar. These messages require the user to acknowledge them by selecting OK. Some Metalink topics also return error messages as item data through DDE when Metalink fails to obtain the requested data.

The messages below are listed in two sections. The first lists the message box error messages. The second lists the messages returned as item data through DDE. The messages are listed alphabetically.

Message Box Messages

By default, all message reporting is enabled. However, there are some circumstances, such as when Metalink is used on a normally unattended Operator Workstation to automatically access Metasys data, where you may want to disable certain messages. An option in the language file allows individual messages to be disabled.

For additional information on this option, see the Metalink language file C:\FMS\LANGUAGE\220.ENG.

An Attempt Was Made To Delete a Data Value Which Cannot Be Deleted. The command was *'Command'*

You used the special keyword 'DEL' as a data value for an attribute that cannot have no value. The message displays the Metasys command Metalink received from the client.

An Attempt Was Made To Default a Data Value For Which a Value Must Be Supplied. The command was *'Command'*

You supplied a NULL data value or used the special keyword 'DEF' as a data value for an attribute that does not have a default value and therefore cannot be defaulted. The message displays the Metasys command Metalink received from the client.

Error! End Period Date Earlier Than Begin Period Date. The End Period has been ignored.

The date provided with the .EP parameter was earlier than the date provided with the .BP parameter. The .EP parameter is ignored and the number of samples returned will default to the .NS parameter.

Error in Discarding REPORT: *'System\Object'*

Metalink could not discard this report, even though a valid system and object name was specified. The message displays the name of the system/object Metalink attempted to access.

Error in SCHEDULE date: 'Date'

Metalink could not add or delete the temporary schedule because an error was made in specifying the date. The format for the date is in Windows format (e.g., MM\DD\YY). For example, January 1, 1994 should be specified as 01/01/94. The message displays the invalid date in place of 'Date'.

Error in SCHEDULE day: 'Day'

Metalink could not add or delete the weekly schedule because an error was made in specifying the day. The format for the day is SMTWTFSSMTWTFSH, where these letters are abbreviations for the day of the week. For example, a regular schedule for Monday through Friday should be specified as _MTWTF_____. The message displays the invalid day in place of 'Day'.

Error in SCHEDULE Operation

The schedule could not be read, added, or deleted. The syntax of the message is OK, but for some reason, the Metasys system or the NCM was unable to accept the scheduling operation. Try the operation again.

Error in SCHEDULE operation: 'Type'

Metalink could not read, add, or delete the schedule because a memory allocation failure occurred. The message displays the word 'Weekly' or 'Temporary' in place of 'Type'.

Error in SCHEDULE parameters

Metalink could not add or delete the schedule because an error was made in specifying one or more of the parameters. The parameters you need to specify depends on the type of schedule and whether you are adding or deleting a schedule. Refer to the *Schedule* section for the required parameters.

Error in SCHEDULE Time: 'Time'

Metalink could not add or delete the schedule because an error was made in specifying the time. The format for time is in 24-hour format (00:00 to 23:59). For example, 7:00 a.m. is 7:00 and 7:00 p.m. is 19:00. The message displays the invalid value in place of 'Type'.

Error in Subscribing for REPORT: '*System\Object*'
Metalink could not subscribe to the report you requested, even though a valid system and object name was specified. The message displays the name of the system\object Metalink attempted to access.

Error in Writing Schedule

Metalink was unable to add or delete the schedule. The NCM might be offline or something may be wrong with the Operator Workstation.

Error! Only One Attribute Is Allowed For a Write Topic. The extra attributes have been ignored.

The Write Topic Item included more than one attribute. The item was accepted but the additional attributes were ignored. To prevent the message from recurring, the item syntax should be corrected.

Error Reading Object Data, see the error log file for details. The System\Object was '*System\Object*'

This message potentially indicates a problem with the NCM database. If the problem persists, consult a Johnson Controls Systems representative for technical assistance. The message displays the name of the system\object Metalink attempted to access.

Error SCHEDULE Add: Matching schedule found

Metalink could not add the schedule you requested because a schedule of that kind already exists. If the schedule you are trying to add is supposed to be different, make sure you are specifying the correct days or date.

Error SCHEDULE Delete: No Matching Schedule

Metalink could not delete the schedule because it could not find a schedule that matches the specified days or date. Check the days or date and parameters you specified.

Error SCHEDULE Delete: Schedule does not exist

Metalink could not delete the schedule because no schedule of any kind for that feature or object exists. Verify that the specified system and object names are correct.

Error Writing Attributes, see the errorlog file for details. The System\Object was 'System\Object'

This message potentially indicates a problem with the NCM database. If the problem persists, consult a Johnson Controls Systems representative for technical assistance. The message displays the name of the system\object Metalink attempted to access.

Error Writing To Attribute, the attribute name passed was 'Attribute'

The data written to the attribute is either outside the allowable range of values for the attribute or is of the wrong type. Refer to the *Metasys Network Technical Manual (FAN 636)* for information on the attribute data. The message displays the attribute name Metalink received from the client.

Incorrect Begin Period. The correct format is: .BP-date,time. Date and time must be in the current Windows format. The parameter passed was '.BP-'

The date and/or time specified with the BP keyword is formatted incorrectly. The current Windows date and time formats can be viewed in the Windows Control Panel Date/Time dialog box. The message displays the BP parameter Metalink received from the client.

Incorrect Discard Parameters

Either the discard parameters are not specified or the discard parameters are incorrect. The correct parameters are: report type, alarm type, time, and date.

Incorrect End Period. The correct format is: .EP-date, time. Date and time must be in the current Windows format. The parameter passed was '.EP-'

The date and/or the time specified with the EP keyword is formatted incorrectly. The current Windows date and time formats can be viewed in the Windows Control Panel Date/Time dialog box. The message displays the EP parameter Metalink received from the client.

Incorrect Report Destination. The correct format is: .RD-OWS name, report destination. The parameter passed was '.RD-'

Either the Operator Workstation name provided with the keyword could not be found in the database or the report destination file name provided with the keyword does not exist on the specified OWS. The message displays the RD parameter Metalink received from the client.

Insufficient Memory Available To Read The Requested Number Of Samples. Please decrease the number of samples or close some windows and try again. The OWS name was 'OWS'

The Operator Workstation does not currently have sufficient free memory to create a buffer large enough for the number of samples requested. By decreasing the number of samples, you reduce the amount of memory required. By closing another application, you will free up memory. Adding additional memory to the OWS also may resolve the problem. The message displays the name of the OWS that does not have sufficient memory.

Insufficient Memory Available To Return The Requested Number Of Samples. Please decrease the number of samples and try again. The OWS name was 'OWS'

The remote Operator Workstation containing the archive file that is being accessed does not currently have sufficient free memory to create a buffer large enough for the number of samples requested. By decreasing the number of samples, you reduce the amount of memory required. The message displays the name of the OWS that does not have sufficient memory.

Insufficient Number of Schedule command parameters

One or more of the required parameters are not specified. Refer to the *Schedule* section for the required parameters.

Invalid alarm limits for 'System\Object'

The data specified for the alarm limits in the schedule command is not correct. Check to see if the Low Limit is greater than the High Limit; the High Limit must always be greater. For details on alarm limits, refer to the object's technical bulletin in the *Objects* section of the *Metasys Network Technical Manual (FAN 636)*. The message displays the name of the system\object Metalink attempted to access.

Invalid Attribute, the name passed was '*Attribute*'

The attribute name provided in the item is not a valid attribute for the object specified in the item. The message displays the attribute name Metalink received from the client.

Invalid Command, the command name was '*Command*'

The Metasys command in the item is not a valid command for the object specified in the item. The message displays the Metasys command Metalink received from the client.

Invalid Command Priority for '*System\Object*'

The command priority specified in the schedule command is not correct. For details on priorities for the command you are trying to schedule, refer to the object's technical bulletin in the *Objects* section of the *Metasys Network Technical Manual (FAN 636)*. The message displays the name of the system\object Metalink attempted to access.

Invalid Item Parameter, the parameter passed was '*Parameter*'

An optional parameter of the Item was incorrectly entered. The message displays the parameter Metalink received from the client.

Invalid Network, the name passed was '*Network*'

The network name provided in the topic could not be found in the Operator Workstation database. The message displays the network name Metalink received from the client.

Invalid Number Of Parameters Passed With Command, the command was '*Command*'

You did not provide the correct number of parameters for the Metasys command sent as part of the Item of a Metalink Command Topic. The message displays the Metasys command Metalink received from the client.

Invalid Object, the name passed was '*Object*'

The object name provided in the item could not be found in the NCM database. The message displays the object name Metalink received from the client.

Invalid Operator Workstation Name, the name passed was `'OWS'`

The OWS name provided in the item could not be found in the database. The message displays the OWS name Metalink received from the client.

Invalid REPORT operation: `'Type'`

The report type that was specified for discarding cannot be discarded. Only the four Critical report types can be discarded. The message displays the word 'Discard' in place of 'Type'.

Invalid REPORT type: `'Type'`

The report type that was specified for subscription or discard is not valid. In most cases, the report type was spelled or entered incorrectly. The message displays the invalid report type in place of 'Type.'

Invalid SCHEDULE option: `'Text'`

The scheduling option that was specified is not correct. For example, the .Weekly parameter was spelled incorrectly or a wrong parameter like .Alternate was specified. The message displays the incorrect option in place of 'Type'.

Invalid System, the name passed was `'System'`

The system name provided in the item could not be found in the Operator Workstation database. The message displays the system name Metalink received from the client.

Invalid System\Object, the System\Object passed was `'System\Object'`

Metalink was unable to parse the System\Object because the '\' was missing. The message displays the System\Object name Metalink received from the client.

Invalid Topic, the topic passed was `'Topic'`

The syntax of the topic was incorrect. Refer to the *Reference* section of this guide for details of the syntax. The message displays the topic Metalink received from the client.

Invalid Warning parameters for 'System\Object'

The data specified for the Warning parameters in the schedule command is not correct. The Warning parameters are: Differential, Setpoint, Normalband, and Warning Delay. For details on warning parameters, refer to the object's technical bulletin in the *Objects* section of the *Metasys Network Technical Manual*. The message displays the name of the system\object Metalink accessed.

Invalid Write Topic. The Write Topic Requires An Attribute Name. The System\Object was 'System\Object'

The write topic requires one attribute name. There is no default write attribute. The message displays the System\Object the client attempted to write to.

Item name is too long, the maximum number of characters allowed is 255. The item name passed was 'item'

You have created an item that exceeds the maximum number of characters Metalink can handle in an item name. You must reduce the number of components of the item name below a total of 255 characters. The message displays the item name Metalink received from the client.

Node Offline Or Not Responding, the System\Object was 'System\Object'

You attempted to get data from a NCM that is currently not online to the network. The message displays the name of the system\object Metalink attempted to access.

Non-schedulable command for 'System\Object'

The command you are trying to schedule cannot be scheduled. For a list of commands that can be scheduled, refer to the *Scheduling Technical Bulletin* in the *Metasys Network Technical Manual*. The message displays the name of the system\object Metalink attempted to access.

REPORT options are missing

One or more of the required parameters for the Report topic are not specified. Refer to the item syntax for the Report topic in the *Report* section of the *Reference* section in this document.

Request To OWS For Data Failed. The OWS name was 'OWS'

The requested data was not available. The most likely reason is that the data has been deleted from the report destination. The message displays the name of the OWS Metalink attempted to access.

Request To OWS For Data Failed Because Metalink Was Not Running on the OWS. The OWS name was 'OWS'

You attempted to get data from an Operator Workstation that does not have Metalink running on it. Each OWS that Metalink accesses report destinations on must have a copy of Metalink installed and running on it. The message displays the name of the OWS Metalink attempted to access.

Request To OWS For Data Failed Because OWS Is Offline. The OWS name was 'OWS'

You attempted to get data from an Operator Workstation that is currently not online to the network. The message displays the name of the OWS Metalink attempted to access.

SCHEDULE operation is not specified

The schedule operation, either Read, Add, or Delete, is not specified or is spelled incorrectly. For details, refer to the item syntax for the Schedule topic in the *Schedule* section of *Reference*.

SCHEDULE options are missing

The schedule operation, either Read, Add, or Delete, is not specified or is spelled incorrectly. Or, the schedule type, either Weekly or Temporary, is not specified or is spelled incorrectly. For details, refer to the item syntax for the Schedule topic in the *Schedule* section of *Reference*.

SCHEDULE type is not specified

The type of schedule, either weekly or temporary, is not specified. Metalink requires this information. For details, refer to the item syntax for the Schedule topic in the *Schedule* section of the *Reference* section in this document.

DDE Messages

Some Metalink topics return error messages through DDE as item data when Metalink fails to obtain the requested data. By default, the messages are returned as the text given here. However, you have the option of instead receiving the message error#*n* where the number code given in brackets before each message is substituted for *n*. The option is available on a per message basis.

For additional information on this option, see the Metalink language file `C:\FMS\LANGUAGE\220.ENG`.

(1) Failed

This message is returned by Metalink if it fails to return data for any reason other than the specific cases of the other DDE messages.

(2) Invalid PC Name

The OWS name provided in the item could not be found in the database.

(3) Memory Error

The Operator Workstation does not currently have sufficient free memory to create a large enough buffer to hold the requested data. The problem could be with either the local OWS or, if data is being requested from an archive, the remote OWS. Decreasing the number of samples requested may allow the operation to succeed.

(4) Metalink Not Running

You attempted to get data from an Operator Workstation that does not have Metalink running on it. Each OWS that Metalink accesses report destinations on must have a copy of Metalink installed and running on it.

(5) No Records Found

A request for archive data failed because no archive data exists.

(6) PC Offline Error

You attempted to get data from an Operator Workstation that is currently not online to the network.

(7) Send Error

Metalink was unable to communicate with other Operator Workstation programs. Check the errorlog file for details. This message potentially indicates a problem with the OWS software. If the problem persists, consult a Johnson Controls Systems representative for technical assistance.

Ordering Information

Since Metalink Release 6.0, Metalink has come standard with Metasys Operator Workstation or Metasys Application Enabler PMI software. Therefore, you do not have to order Metalink separately.

Appendix

Command Examples Using Excel

The following examples use Microsoft Excel and the Johnson Controls Metasys demonstration OWS database (JCI-NET).

SET_AD - Command Damper Minimum Position

	A	B	C	D
1	SET AD Damper Minimum Position			
2				
3	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\DMPR-MIN.SET_AD",B4:C4)	25	3	Sends 25% to Damper at Priority 3
5	=TERMINATE(A3)			Ends DDE connection
6	=RETURN()			Ends macro
7				

ADEX

Figure 23: SET_AD Example

SET_BD - Set Economizer Status

	A	B	C	D
1	SET BD Economizer Status			
2				
3	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\ECON.SET_BD",B4:C4)	1	3	Sends State 1 command (MIN) to Economizer at Priority 3
5	=TERMINATE(A3)			Ends DDE connection
6	=RETURN()			Ends macro
7				

BDEX

Figure 24: SET_BD Example

SET_AOD - Command Cooling Valve Output

	A	B	C	D
1	SET AOD Cooling Valve Output			
2				
3	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\CLG-AOD.SET_AOD",B4:C4)	30	3	Sends 30% to CLG-AOD at Priority 3
5	=TERMINATE(A3)			Ends DDE connection
6	=RETURN()			Ends macro
7				

AODEX

Figure 25: SET_AOD Example

SET_PIDL - Change SETPOINT Attribute on PIDL Object

	A	B	C	D
1	SET_PIDL Command - SETPOINT Attribute			
2				
3	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\SP-CTRL.SET_PIDL.SETPOINT",B4:C4)	1.2	3	Sends 1.2 in. wg to SETPOINT attribute of SP-CTRL at Priority 3
5	=TERMINATE(A3)			Ends DDE connection
6	=RETURN()			Ends macro
7				

Note: In the actual macro file, the formula in Cell A4 would be on one line, not split on two lines as shown.

PIDLEX

Figure 26: SET_PIDL Example

START - Turn On Return Fan

	A	B	C	D
1	START Command			
2				
3	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\RF-CTRL.START",C4)		7	Sends Start to RF-CTRL at Priority 7
5	=TERMINATE(A3)			Ends DDE connection
6	=RETURN()			Ends macro
7				

STARTEX

Figure 27: START Example

STOP - Turn Off Return Fan

	A	B	C	D
1	STOP Command			
2				
3	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\RF-CTRL.STOP",C4)		7	Sends Stop to RF-CTRL at Priority 7
5	=TERMINATE(A3)			Ends DDE connection
6	=RETURN()			Ends macro
7				

STOPEX

Figure 28: STOP Example

ALARMS - Set New Alarm Limits

	A	B	C	D	D
1	Set New Alarm Limits				
2					
3	=INITIATE("METALINK","Command.JCI-NET")				Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\Supply.ALARMS",B4:D4)	10	30	2	Sends Supply object to alarm of 10, hi alarm at 30 at Priority 2
5	=TERMINATE(A3)				Ends DDE connection
6	=RETURN()				Ends macro
7					

ALMNEX

Figure 29: Setting New Alarm Limits

ALARMS - Delete Alarm Limits

	A	B	C	D	E
1	Delete Alarm Limits				
2					
3	=INITIATE("METALINK","Command.JCI-NET")				Initiates DDE link
4	=POKE(A3,"AHU-1\Supply.ALARMS",B4:D4)	DEL	DEL	DEL	Deletes lo alarm, hi alarm, and priority values
5	=TERMINATE(A3)				Ends DDE connection
6	=RETURN()				Ends macro
7					

ALMDEX

Figure 30: Deleting Alarm Limits

RELEASE - Release AOD

	A	B	C
1	RELEASE AOD Cooling Valve Output		
2			
3	=INITIATE("METALINK","Command.JCI-NET")		Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\CLG-AOD.RELEASE",B4)		Releases control of CLG-AOD
5	=TERMINATE(A3)		Ends DDE connection
6	=RETURN()		Ends macro
7			

Note: Even though this command has no parameters, you must provide an empty cell reference to the Poke function. In this example, the cell reference is B4.

RELEX

Figure 31: Releasing AOD Object

Command Examples Using Visual Basic

The following examples use Microsoft Visual Basic. You'll find the executable and source files for them on *Disk 1* of the Metasys Workstation diskettes. For details on how to use Visual Basic, refer to its documentation.

SET_AD - Command Analog Data Object

The following customized screen is used to adjust any Analog Data object defined in the Metasys system. It requires that you fill in four items: the network name, system name, object name, and adjustment value. (No error checking for the correct names and values is performed.) After typing in the data, click the SET_AD button to issue the command. You may also click Exit to escape this operation.

Note: When you send the command, you may notice that the program will add a small black bar and the number 3 after the entered value. This represents the Tab character and a command priority of 3. The program clears the Value box after the command is sent.

Figure 32: SET_AD Screen

The following code is for the SETAD.BAS and SETAD.FRM modules.

```
'The following are global variables used for controlling
the 'LinkMode property of the Value control in the
SETAD.FRM
```

```
Global Const NONE = 0
Global Const COLD = 2
Global Const HOT = 1
```

Figure 33: Code for SETAD.BAS Module

```
Sub Command1_Click ()
'
'In this example the value to be sent is entered by the user as text into
'the Visual Basic Text Control SETAD.Value.Text
'
On Error GoTo Err_msg1      'Calls error message routine if error occurs in this
routine

Net1$ = SETAD.Net.Text      'Network name
Sys1$ = SETAD.Sys.Text      'System name
Obj1$ = SETAD.Obj.Text      'Object name
SETAD.Value.Linkmode = NONE      'Assures link is closed
I% = DoEvents()              'Allow time to close link
SETAD.Value.LinkTopic = "METALINK|COMMAND." + Net1$      'Sets linktopic
SETAD.Value.LinkItem = Sys1$ + "\" + Obj1$ + ".SET_AD" 'Sets linkitem
SETAD.Value.Text = SETAD.Value.Text + Chr$(9) + "3"      'Value + tab + priority
SETAD.Value.Linkmode = COLD      'Sets cold link
I% = DoEvents()              'Allows time to establish link
SETAD.Value.LinkPoke      'Sends value to Metalink
I% = DoEvents()              'Allows Metalink time to send
I% = DoEvents()              'the value
SETAD.Value.Linkmode = NONE      'Closes link
I% = DoEvents()              'Allow time to close link
SETAD.Value.Text=""          'Clears Value entry

Exit Sub

Err_msg1:                    'Error msg called if error
occurs
MsgBox (Error$(Err))        'Displays error dialog box
Resume Next                  'Resumes program after error
seen

End Sub
```

Figure 34: Code for SETAD.FRM Module

SET_BD - Turn On/Off Binary Data Object

The following customized screen is used to turn On (set to 1) or Off (set to 0) any Binary Data object defined in the Metasys system. It requires that you fill in three items: the network name, system name, and object name. (No error checking for the correct names is performed.) After typing in the data, click the SET_BD On or SET_BD Off button to issue the command. You may also click Exit to escape this operation.

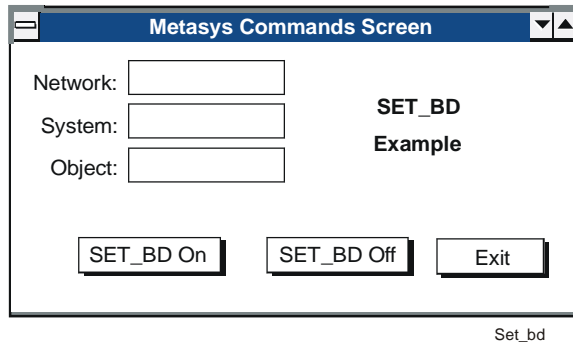


Figure 35: SET_BD Screen

The following code is for the SETBD.BAS and SETBD.FRM modules.

```
'The following are global variables used for controlling  
the 'LinkMode property of the Value control in the  
SETBD.FRM  
  
Global Const NONE = 0  
Global Const COLD = 2  
Global Const HOT = 1
```

Figure 36: Code for SETBD.BAS Module


```

Sub Command1_Click ()
'
'In this example a value of 1 is sent to the BD object when the user
'clicks on this button
'
On Error GoTo Err_msg1      'Calls error message routine if error occurs in this
routine

Net1$ = SETBD.Net.Text      'Network name
Sys1$ = SETBD.Sys.Text      'System name
Obj1$ = SETBD.Obj.Text      'Object name

SETBD.Value.Linkmode = NONE      'Assures link is closed
I% = DoEvents()                'Allow time to close link

SETBD.Value.LinkTopic = "METALINK|COMMAND." + Net1$      'Sets linktopic
SETBD.Value.LinkItem = Sys1$ + "\" + Obj1$ + ".SET_BD"  'Sets linkitem
SETBD.Value.Text = "1" + Chr$(9) + "3"                  'Value + tab + priority
SETBD.Value.Linkmode = COLD      'Sets cold link
I% = DoEvents()                'Allows time to establish
link

SETBD.Value.LinkPoke          'Sends value to Metalink
I% = DoEvents()              'Allows Metalink time to
send

I% = DoEvents()              'the value
SETBD.Value.Linkmode = NONE  'Closes link
I% = DoEvents()              'Allow time to close link

Exit Sub

Err_msg1:                    'Error msg called if error
occurs
MsgBox (Error$(Err))        'Displays error dialog box
Resume Next                  'Resumes program after
error seen

End Sub

```

Figure 37: Code for SETBD.FRM Module

```

Sub Command2_Click ()
'
'In this example a value of 0 is sent to the BD object when the user
'clicks on this button
'
On Error GoTo Err_msg2      'Calls error message routine if error occurs in this
routine

Net1$ = SETBD.Net.Text      'Network name
Sys1$ = SETBD.Sys.Text      'System name
Obj1$ = SETBD.Obj.Text      'Object name

SETBD.Value.Linkmode = NONE      'Assures link is closed
I% = DoEvents()                'Allow time to close link

SETBD.Value.LinkTopic = "METALINK|COMMAND." + Net1$      'Sets linktopic
SETBD.Value.LinkItem = Sys1$ + "\" + Obj1$ + ".SET_BD"  'Sets linkitem
SETBD.Value.Text = "0" + Chr$(9) + "3"                'Value + tab + priority
SETBD.Value.Linkmode = COLD      'Sets cold link
I% = DoEvents()                'Allows time to establish
link

SETBD.Value.LinkPoke      'Sends value to Metalink
I% = DoEvents()          'Allows Metalink time to
send
I% = DoEvents()          'the value
SETBD.Value.Linkmode = NONE      'Closes link
I% = DoEvents()          'Allow time to close link

Exit Sub

Err_msg2:                  'Error msg called if error
occurs
MsgBox (Error$(Err))      'Displays error dialog box
Resume Next               'Resumes program after
error seen

End Sub

```

Figure 38: Code for SETBD.FRM Module

START/STOP - Start or Stop Binary Output Object (Visual Basic)

The following customized screen is used to Start and Stop any Binary Output object defined in the Metasys system. It requires that you fill in three items: the network name, system name, and object name. (No error checking for the correct names is performed.) After you type in the data, you click the Start or Stop button to issue the command. You may also click Exit to escape this operation.

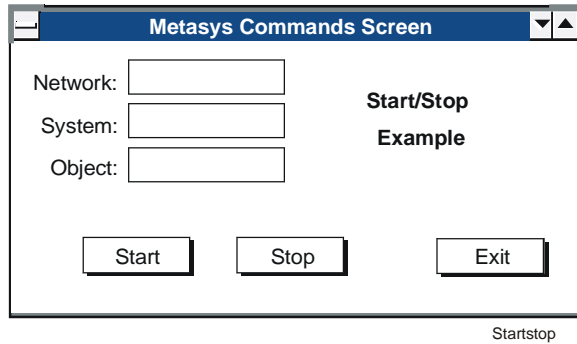


Figure 39: Start/Stop Screen

The following code is for the STA_STO.BAS and STA_STO.FRM modules.

```
'The following are global variables used for controlling
'the LinkMode property of the 'Value control in the STA_STO.FRM

Global Const NONE = 0
Global Const COLD = 2
Global Const HOT = 1
```

Figure 40: Code for STA_STO.BAS Module

```

Sub Command1_Click ()
'
' This code is for sending a Start command to a BO object.
'
On Error GoTo Err_msg1          'Calls error message routine if error occurs in
this routine

Net1$ = STA_STO.Net.Text        'Network name
Sys1$ = STA_STO.Sys.Text        'System name
Obj1$ = STA_STO.Obj.Text        'Object name

STA_STO.Value.Linkmode = NONE          'Assures link is closed
I% = DoEvents()                        'Allow time to close link

STA_STO.Value.LinkTopic = "METALINK|COMMAND." + Net1$    'Sets linktopic
STA_STO.Value.LinkItem = Sys1$ "\" + Obj1$ + ".START"    'Sets linkitem
STA_STO.Value.Text = "7"                                'Priority
STA_STO.Value.Linkmode = COLD                          'Sets cold link
I% = DoEvent(s)                                         'Allows time to establish
link

STA_STO.Value.LinkPoke                                'Sends value to Metalink
I% = DoEvents                                           'Allows Metalink to send
I% = DoEvents                                           'the value
STA_STO.Value.Linkmode = NONE                          'Closes link
I% = DoEvents                                           'Allow time to close link

Exit Sub

Err_msg1:                                              'Error msg called if error
occurs
MsgBox (Error$(Err))                                  'Displays error dialog box
Resume Next                                           'Resumes program after
error seen

End Sub

```

Figure 41: Code for STA_STO.FRM Module

```

Sub Command2_Click ()
'
' This code is for sending a Stop command to a BO object.
'
On Error GoTo Err_msg2          'Calls error message routine if error occurs in
this routine

Net1$ = STA_STO.Net.Text        'Network name
Sys1$ = STA_STO.Sys.Text        'System name
Obj1$ = STA_STO.Obj.Text        'Object name

STA_STO.Value.Linkmode = NONE          'Assures link is closed
I% = DoEvents()                        'Allow time to close link

STA_STO.Value.LinkTopic = "METALINK|COMMAND." + Net1$      'Sets linktopic
STA_STO.Value.LinkItem = Sys1$ "\" + Obj1$ + ".STOP"      'Sets linkitem
STA_STO.Value.Text = "7"                                  'Priority
STA_STO.Value.Linkmode = COLD                          'Sets cold link
I% = DoEvent(s)                                          'Allows time to establish
link
STA_STO.Value.LinkPoke                                  'Sends value to Metalink
I% = DoEvents                                           'Allows Metalink to send
I% = DoEvents                                           'the value
STA_STO.Value.Linkmode = NONE                          'Closes link
I% = DoEvents                                           'Allow time to close link

Exit Sub

Err_msg2:                                               'Error msg called if
error occurs
MsgBox (Error$(Err))                                   'Displays error dialog
box
Resume Next                                           'Resumes program after
error seen

End Sub

```

Figure 42: Code for STA_STO.FRM Module

Daily Report

The Daily Report example displays a report to show you how a Metasys object changed over the course of the day. The report consists of a color line graph showing how the object's value changed within its high and Low Limits. It also lists the values in table format under the line graph. The variable measured in this example is chilled water supply temperature (CHILLER1\CHS1-T). Microsoft Excel is the third-party application used.

This example presumes that an object called CHILLER1\CHS1-T is defined on the network and is currently being trended every 30 minutes. The Trend feature in the Metasys system is used to perform this function. The TREND topic in Metalink retrieves the trended data.

To run this example, follow these steps:

1. Start Microsoft Excel.
2. Open the files DREPORT.XLM and DREPORT.XLS. Both must be opened for this example to work.
3. Click the Collect Data Chilled Water Supply button on the DREPORT.XLS worksheet. This runs the macros in the DREPORT.XLM file.

The macro sheet DREPORT.XLM retrieves the trended data and obtains the high and Low Limits of the object (Figure 41). These values are sent to the DREPORT.XLS worksheet.

The DREPORT.XLS worksheet displays the values in table format (Figure 42). The values in the table are read and placed into the line graph, with TIME on the x-axis and DEG F on the y-axis.

The high and Low Limits for the object are obtained and graphed so that you can easily see when the object goes outside the limits. The past 24 trended samples are obtained.

This example is on *Disk 1* of the Metasys diskettes. To use it for your purposes, change the network, system, and object names to valid entries. The object must be analog. You'll also need to begin a 30 minute trend on the object.

	A	B
1	DREPORT.XLM	
2		
3	Collect Data	
4	=INITIATE("METALINK","TREND.JCI-NET")	Initiates DDE link to Metalink
5	=FORMULA.ARRAY(REQUEST(A4,"CHILLER1\CHS1-T.NS-24"),"DREPORT.XLS!R26C1:R49C4")	Reads trended data of object and sends to worksheet
6	=TERMINATE(A4)	Ends DDE connection
7	Obtain Limits	
8	=INITIATE("METALINK","READ.JCI-NET")	Initiates DDE link to Metalink
9	=FORMULA.ARRAY(REQUEST(A8,"CHILLER1\CHS1-T.HI_LIMIT.LO_LIMIT"),"R26C5:R49C6")	Reads high and low limits for object
10	=TERMINATE(A8)	Ends DDE connection
11	=RETURN()	Ends macro
12		

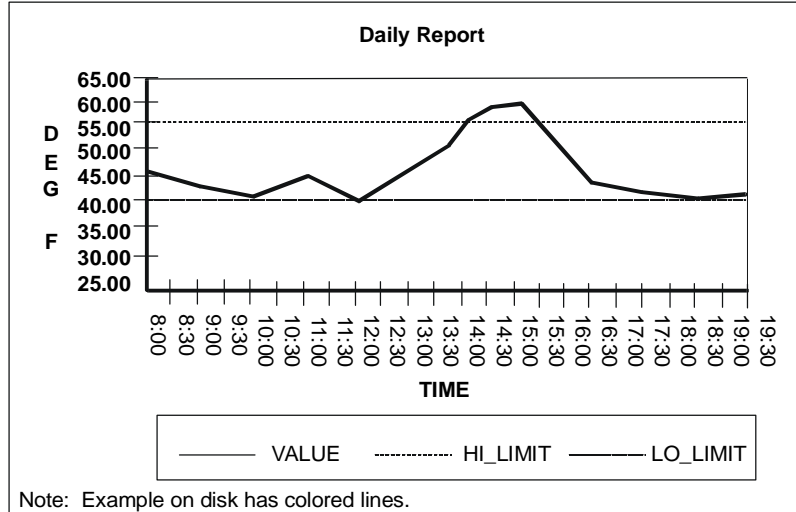
Note: In the actual macro file, the formulas in Cells A5 and A9 would each be on one line, not split on two lines as shown.

DREPORT

Figure 43: Macro Sheet for Retrieving Samples and Reading Limits

**Collect Data
Chilled Water Supply**

JCI-NET CHILLER1
CHS1-T



	A	B	C	D	E	F
25	TIME	DATE	VALUE	UNITS	HI LIMIT	LO LIMIT
26	8:00	3/10/93	45.5	DEG F	55.0	40.0
27	8:30	3/10/93	45.0	DEG F	55.0	40.0
28	9:00	3/10/93	43.5	DEG F	55.0	40.0
29	9:30	3/10/93	42.1	DEG F	55.0	40.0
30	10:00	3/10/93	40.5	DEG F	55.0	40.0
31	10:30	3/10/93	42.8	DEG F	55.0	40.0
32	11:00	3/10/93	44.1	DEG F	55.0	40.0
33	11:30	3/10/93	43.6	DEG F	55.0	40.0
34	12:00	3/10/93	40.0	DEG F	55.0	40.0
35	12:30	3/10/93	42.5	DEG F	55.0	40.0
36	13:00	3/10/93	45.3	DEG F	55.0	40.0
37	13:30	3/10/93	48.4	DEG F	55.0	40.0
38	14:00	3/10/93	55.2	DEG F	55.0	40.0
39	14:30	3/10/93	56.6	DEG F	55.0	40.0
40	15:00	3/10/93	57.5	DEG F	55.0	40.0
41	15:30	3/10/93	55.4	DEG F	55.0	40.0
42	16:00	3/10/93	53.0	DEG F	55.0	40.0
43	16:30	3/10/93	50.3	DEG F	55.0	40.0
44	17:00	3/10/93	45.9	DEG F	55.0	40.0
45	17:30	3/10/93	44.2	DEG F	55.0	40.0
46	18:00	3/10/93	45.7	DEG F	55.0	40.0
47	18:30	3/10/93	43.1	DEG F	55.0	40.0
48	19:00	3/10/93	41.5	DEG F	55.0	40.0
49	19:30	3/10/93	41.1	DEG F	55.0	40.0

GRAPH

Figure 44: Worksheet for Displaying Line Graph and Samples

Energy Savings Profile

The Energy Savings Profile example uses the Metasys Totalization feature and Metalink to create an energy savings report. When the operator clicks the Calculate Runtime button, the report obtains the totalization data from the Operator Workstation and calculates the amount of energy saved by using the Metasys system as the Energy Management System (EMS). The savings calculation presumes that without the Metasys system, the fan system would be running 24 hours a day, 7 days a week. Various other information is also presented for analysis.

This example consists of an Excel worksheet (Figure 45) and a macro sheet (on Metasys Workstation *Disk 1*). The worksheet displays the report, while the macro sheet retrieves totalization data from Metasys objects and sends it to the RUN TIME column on the worksheet (Column 7). For each object, the worksheet multiplies the kW rating of the fan (R22C6:R31C6) by the runtime hours (R22C7:R31C7) to obtain kW hours. This value is then subtracted from kW hours that would have been expended without energy management (R22C8:R31C8). The total savings is reported on the lower left corner of the worksheet.

Disk 1 of the Metasys diskettes contains the files for this example (EPROFILE.XLS and EPROFILE.XLM).

	A	B	C	D	E	F	G	H	I
1			Monthly Energy Profile						
2			3/31/93		5:00 PM				
3			HOURS THIS MONTH:		744				
4									
5	SYSTEM1	OAT1	32.8						
6	SYSTEM2	OAT2	47.6						
7	SYSTEM3	OAT3	33.6						
8									
9	MAIN		BOILER1:	23,987	#				
10	BOILERS		BOILER2:	60,842	#				
11		MAKE-UP WATER:	2,869.79		GALLONS				
12									
13	15-HP		BOILER1:	33,362	KBTU				
14	BOILERS		BOILER2:	16,196	KBTU				
15									
16	CHILLER	MNTHLY MAX:	66.2		TONS				
17									
18									
19					KW	KW	RUN TIME	KWHrs.	KWHrs.
20	SYSTEM	OBJECT	TONS	HP	Compressor	Fan	Hours	w/out EMS Fan	w/ EMS Fan
21									
22	AHU-1	UNIT-1	15	3	23	2.80	322.3	1879.9	901.6
23	AHU-1	UNIT-2	50	8	76	7.23	670.2	4861.2	4848.4
24	AHU-1	UNIT-3	50	8	76	7.23	670.2	4861.2	4848.4
25	AHU-1	UNIT-4	50	8	76	7.23	670.2	4861.2	4667.0
26	AHU-1	UNIT-5	30	5	46	4.66	645.2	3133.2	1352.7
27	AHU-1	UNIT-6	12	2	18	1.99	290.1	1336.8	1333.9
28	AHU-1	UNIT-7	3	1	5	0.99	670.6	668.4	178.7
29	AHU-1	UNIT-8	3	1	5	0.99	179.7	668.4	218.8
30	AHU-1	UNIT-9	15	3	23	2.80	220.0	1879.9	998.3
31	AHU-1	UNIT-10	60	8	92	7.23	356.9	4861.2	3369.0
32									
33	TOTALS:		288	47	440	43.15	4695.4	29011.40	22716.80
34			TONS	HP	KW	KW	Hours	KWHrs.	KWHrs.
35									
36	TOTAL SAVINGS:								
37			6294.60		KWHrs.				
38									

EPROFILE

Figure 45: Operational Worksheet for Energy Profile Example

Air Handler Report

This example enables you to gather various data from an air handling system and prepare a comprehensive, meaningful report. It also allows you to Start and Stop the air handler by simply clicking a button on the screen.

The example consists of an Excel worksheet and macro sheet. The worksheet, shown in Figure 46, shows the gathered data and the air handler Start and Stop buttons. Figures 47 and 48 show the formulas that are part of the worksheet. The macro sheet, shown in Figure 49, contains the code for the Start and Stop buttons on the worksheet.

When you open the worksheet, the proper links are made and the values are updated. You are then able to analyze and print the report, or Start and Stop the air handler. When you click the button to Start or Stop the air handler, an Excel macro located in a separate macro (.XLM) file is run.

	A	B	C	D	E	F	G	H
1								
2		Better Health Hospital						
3		Air Handling System Report for AHU-1						
4			5:00 PM			1-Mar-93		
5								
6		Outdoor Air Temperature	65.0 Deg F			Outdoor Air Humidity	28 %RH	
7								
8		AHU-1	<input type="button" value="START"/>		<input type="button" value="STOP"/>			
9								
10		Supply Fan Status	On			Return Fan Status	On	
11		Filter Status	Clean			Return Air Smoke	Normal	
12		Supply Air Temperature	48.5	Deg F		Return Air Temperature	65.1 Deg F	
13		Mixed Air Temperature	61.5	Deg F		Return Air Humidity	10 %RH	
14		Static Pressure	1.10	In Wg				
15		Supply Fan Flow	17.97	K Cfm		Supply Fan Speed	43 % Capacity	
16		Return Fan Flow	12.88	K Cfm		Return Fan Speed	34 % Capacity	
17								

HANDLE1

Figure 46: Operational Worksheet

Figures 46 and 48 show the detail of the cells, including the formulas that are used to obtain the values shown in Figure 46. *Disk 1* of the Metasys diskettes contains the files for this example (HOSPITAL.XLS and HOSPITAL.XLM).

	A	B	C	D
1				
2				
3			Better Health Hospital	
4			Air Handling System Report for AHU-1	
5				=NOW()
6		Outdoor Air Temperature	=METALINK READ.HOSPITAL!'AHU-1\OAT'	Deg F
7				
8		AHU-1	START STOP	
9				
10		Supply Fan Status	=METALINK READ.HOSPITAL!'AHU-1\SF_STAT'	
11		Filter Status	=METALINK READ.HOSPITAL!'AHU-1\FILTER'	
12		Supply Air Temperature	=METALINK READ.HOSPITAL!'AHU-1\SUPPLY'	Deg F
13		Mixed Air Temperature	=METALINK READ.HOSPITAL!'AHU-1\MIXED'	Deg F
14		Static Pressure	=METALINK READ.HOSPITAL!'AHU-1\STATIC'	In Wg
15		Supply Fan Flow	=METALINK READ.HOSPITAL!'AHU-1\SF_FLOW'	K Cfm
16		Return Fan Flow	=METALINK READ.HOSPITAL!'AHU-1\RF_FLOW'	K Cfm
17				

HANDLE2

Figure 47: Worksheet Formulas: Cells A1 to D16

	E	F	G	H
1				
2				
3				
4		=TODAY()		
5				
6		Outdoor Air Humidity	=METALINK READ.HOSPITAL!'AHU-1\OA_HUMID'/100	%RH
7				
8				
9				
10		Return Fan Status	=METALINK READ.HOSPITAL!'AHU-1\RF_STAT'	
11		Return Air Smoke	=METALINK READ.HOSPITAL!'AHU-1\RA_SMOKE'	
12		Return Air Temperature	=METALINK READ.HOSPITAL!'AHU-1\RETURN'	Deg F
13		Return Air Humidity	=METALINK READ.HOSPITAL!'AHU-1\RA_HUMID'/100	%RH
14				
15		Supply Fan Speed	=METALINK READ.HOSPITAL!'AHU-1\SF_SPEED'	% Capacity
16		Return Fan Speed	=METALINK READ.HOSPITAL!'AHU-1\RF_SPEED'	% Capacity
17				

HANDLE3

Figure 48: Worksheet Formulas: Cells E1 to H16

	A	B	C	D
1	Start AHU-1			
2				
3	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
4	=POKE(A3,"AHU-1\CTRL-FAN.START",C4)		7	Sends Start to CTRL-FAN at Priority 7
5	=TERMINATE(A3)			Ends DDE connection with Metasys
6	=RETURN()			Ends macro
7				
8	Stop AHU-1			
9				
10	=INITIATE("METALINK","Command.JCI-NET")			Initiates DDE link to Metalink
11	=POKE(A10,"AHU-1\CTRL-FAN.STOP",C11)		7	Sends Stop to CTRL-FAN at Priority 7
12	=TERMINATE(A10)			Ends DDE connection with Metasys
13	=RETURN()			Ends macro
14				

HANDLE4

Figure 49: Macro Sheet for Start and Stop Buttons

Excel Rules for Metalink

The following is a list of important tips to keep in mind when working with the Metalink server and the Excel client.

- When using the FORMULA. ARRAY function in a macro sheet, you must use R (row) and C (column) as cell references, **not** cell identifiers, such as A4 or F12. A valid reference is R9C3.
- To display the results of an executed macro, make sure that the Formulas checkbox under Options Display is not checked. Otherwise, the calculated values will be hidden.
- The print function prints the active worksheet only.
- In order for a Metasys command that does not require parameters to work with Excel, you must add a null cell reference to the end of the Poke statement. Otherwise, an error message displays when you try to leave the cell, because the Poke function requires a data reference. Here are two examples showing a null cell reference added to the Poke statement:

To send a RELEASE command to an AOD object:

=POKE(A3,"AHU-1\CLG-AOD.RELEASE",B4) where B4 is an empty cell

To send a LOC_REP command to a BD object:

=POKE(A3,"AHU-1\CLG-AOD.LOC_REP",B4) where B4 is an empty cell

When these commands are sent, the null value from the cell is sent also, but does not affect the Metasys system.

- Excel automatically divides the data that Metalink returns into separate cells on each tab character.
- Within a macro file, Excel does not allow you to reference a worksheet that contains a dash (e.g., SHEET-1.XLS). It reads the dash as a subtraction sign. Also, within a worksheet, Excel does not allow a reference to a system or object that contains a dash. If you must use a dash in any of these names, place single quotation marks around the name in the reference (e.g., "SHEET-1.XLS"!R10C1:R12C4" and JCI-NET!'AHU-1(OAT-1)').
- If you want to display the current value of a Metasys object attribute on an Excel worksheet that is updated periodically, use the DDE Advise topic (hot link). The syntax is:
=METALINK|DDE_Topic!DDE_Item
- If you want to display or command the current value of a Metasys object attribute on an Excel macro sheet, use a DDE Request topic (cold link). The syntax is:
=INITIATE("METALINK","DDE_Topic")
=DDE Transaction(channel,"DDE_Item",Cell_Range)
=TERMINATE(channel)
=RETURN()

where:

channel = the cell reference for the INITIATE command.

Refer to the *Reference* section for more details.

Quick Reference

Use this section as a handy reference to Metalink topics, items, and syntax. The abbreviated forms of the keywords are used.

COMMAND.network

```
system\object.command[.attribute]
[data1][data2]...[datan]
```

HISTORY.network

```
system\object[.Read][.RD-ows,report destination[.BP-date,time]
[.EP-date,time][.NS-n]]
```

READ.network

```
system\object[.attribute]r
```

For access/fire controllers: system\object[:card ID or device ID]r

REPORT.network

system\object.attribute{.subscription, .discard}{.crit1, .crit2, .crit3, .crit4, .critical, .followup, .status, .transaction, .cardreader}

SCHEDULE.network

system\object.attribute{.read, .add, .delete}
{.weekly, .temporary}[.NS-n]
[data₁][data₂]...[data_n]

SYSTEM

Revision

TOTALIZATION.network

system\object.attribute{.delete, [.read]}[.RD-ows,report destination
[.BP-date,time][.EP-date,time][.NS-n]]

TREND.network

system\object.attribute{.delete, [.read]}[.RD-ows,report destination
[.BP-date,time][.EP-date,time][.NS-n]]

WRITE.network

system\object[.attribute]

Abbreviations:

network = OWS Network Name (job specific)

system = Metasys System Name (job specific)

object = Metasys Object Name (job specific)

command = any GPL or JC-BASIC command

attribute = any valid Metasys object attribute

.RD-ows,report_destination= Report Destination on the PC
(OWSname,filename)

.BP-date,time = Begin Period (CurrentWindowsDateFormat,
24-HourFormat)

.EP-date,time = End Period (CurrentWindowsDateFormat,
24-HourFormat)

.NS-n = Number of Samples(data array size)

r = Repeat (up to 10 attributes)

revision = Returns the revision level of Metalink

**Excel
Information**

EXCEL Hot Link (.XLS)

=METALINK|DDE_Topic!DDE_Item

EXCEL Cold Link (.XLM)

=INITIATE("DDE_Server","DDE_Topic")

=POKE(initiate_cell,"DDE_Item",information_array_cell_range)

{=REQUEST(initiate_cell,"DDE_Item")}

=TERMINATE(initiate_cell)

=RETURN()

Note: The parentheses around the {=REQUEST} function indicate an array.

Glossary

Advise	A DDE transaction in which the client requests continuous updates to the value of a data item.
Application	A software program that is used to perform some task.
Client	The requester. The software application that initiates the DDE conversation.
Command	A Metalink topic that enables you to issue instructions to objects.
Conversation	Communication between two applications through Microsoft DDE.
DDE (Dynamic Data Exchange)	A message passing protocol defined by Microsoft as a Windows standard for allowing the exchange of information between two independent Windows applications.
Execute	A DDE transaction in which the client sends the server a command to be executed.
History	A Metalink topic that enables you to request history data of an object.
Initiation	A DDE function in which the client requests a conversation with the server by sending an Initiate message.
Item	Identifies what is being requested.
Link	Connection between two Windows applications over which communication can occur.
Metalink	A feature of the Metasys system that provides a Microsoft DDE interface to Metasys Network. This enables you to import Metasys data into Windows software applications, command objects, and read/write object attributes.
Poke	A DDE transaction in which the client sends a value to a data item.

Protocol Timer	Defines how often data for Advise transactions is updated. Its default value is 20 seconds, which you may modify in the METASYS.INI file.
Read	A Metalink topic that enables you to request an object's attribute data.
Report	A Metalink topic that enables you to subscribe (sign-up) for reports.
Request	A DDE transaction in which the client requests the value of a data item just once.
Schedule	A Metalink topic that enables you to read, add, or delete a weekly or temporary schedule on the Metasys system.
Server	The provider. The software application that responds to the client's request.
System	A Metalink topic that enables you to obtain information about Metalink.
Termination	A DDE function in which the client or server ends the conversation.
Topic	Describes something in the server that the client wants to access.
Totalization	A Metalink topic that enables you to request or delete an object's totalization data.
Transaction	A DDE function during which the client and server interact.
Trend	A Metalink topic that enables you to request or delete an object's trend data.
Write	A Metalink topic that enables you to modify the value of an object's attribute.

Notes

Notes



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

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