

MET 382
Spring '08

Working with Local I/O



Topics

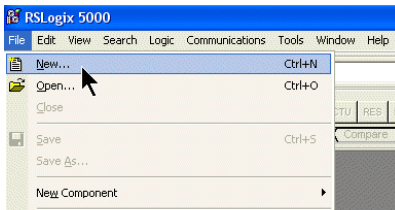
- Creating a new RSLogix 5000 project
- Working with local I/O
 - What is local I/O?
 - Configuring local I/O
 - Creating alias tags
- Downloading a PLC program
- Using the tag database to monitor inputs
- Using the tag database to test outputs

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Creating a New RSLogix 5000 Project

Creating a new RSLogix 5000 project

Select New... from the File menu



Creating a new RSLogix 5000 project

Select the 1756-L55 processor

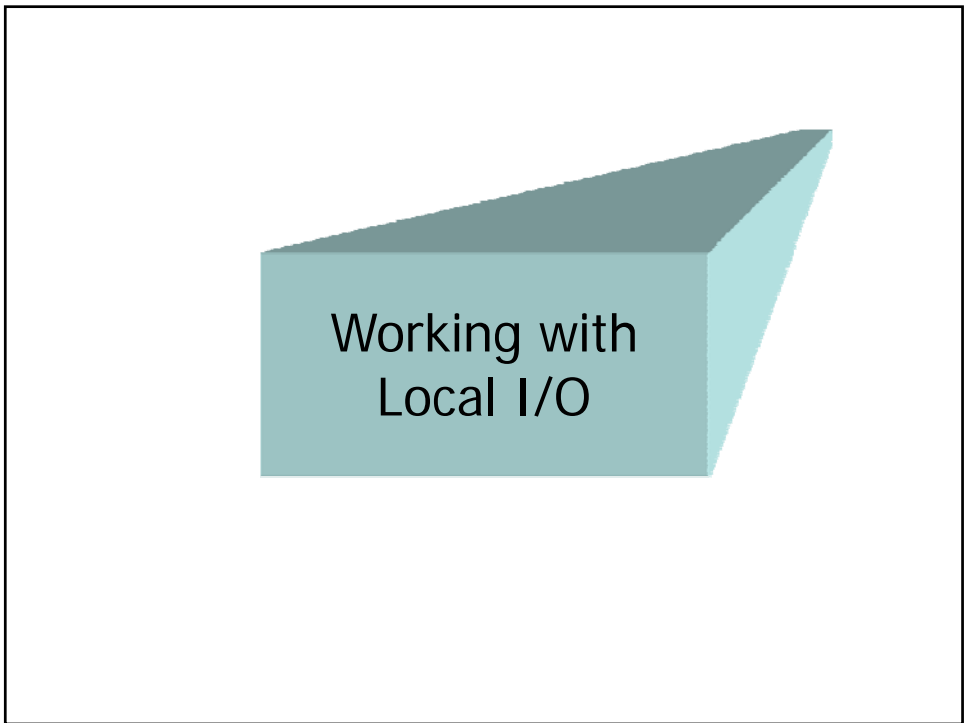
Enter name of project

Enter a description (optional)

All dropline PLCs are 13 slots

The controller resides in slot 5

Click the Browse button and specify where to store the program



Working with Local I/O

- What is Local I/O?
 - Local I/O is located in the same chassis as the Logix 5555 controller

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Working with Local I/O



Each dropline PLC has the following local I/O:

AC input (1756-IA16)


AC output (1756-OA16)

DC input (1756-IB16I)

DC output (1756-OB16I)

Each of the above modules have 16 inputs or outputs.


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Working with Local I/O

Dropline PLC Module Placement		
Slot	Part Number	Description
0	1756-DHRIO/B	Channel A: Data Highway Plus, Channel B: Remote I/O
1	1756-CNB/D	ControlNet Bridge (Node # = Dropline #), "Global ControlNet"
2	1756-CNB/D	ControlNet Bridge (Node # =1), "Local ControlNet"
3	1756-DNB/A	DeviceNet Bridge (Node 0 on dropline DeviceNet)
4	1756-ENBT	Ethernet Module
5	1756-L55/A	Logix 5555 Controller with 7.5 Meg memory expansion
6	1756 IA16/A	16 AC inputs (dropline panel local inputs)
7	1756 OA16/A	16 AC outputs (dropline panel local outputs)
8	1756 IB16/A	16 DC inputs (sink or source, available at patch panel)
9	1756 OB16/A	16 DC outputs (sink or source, available at patch panel)
10	spare	
11	spare	
12	spare	

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Working with Local I/O

- In this class we will use the AC input and AC output modules
- The AC I/O (Input/Output) modules are used as follows:
 - Some of the AC I/O are wired to the drop line panel (see next slide)
 - Some of the AC I/O are wired to the trunkline PLC

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Working with Local I/O

- Some of the AC I/O are wired to the dropline panel




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Working with Local I/O




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Working with Local I/O

Control	Control Description	Base Address	Alias Name	Comments
Pushbutton 0	Normally open momentary pushbutton	Local:6:I.Data.0	I_PB0	Typical use = START
Pushbutton 1	Normally closed momentary pushbutton	Local:6:I.Data.1	I_PB1	Typical use = STOP
Pushbutton 2	Normally open/normally closed momentary pushbutton	Local:6:I.Data.2	I_PB2_no	Goes ON when PB2 is pushed
		Local:6:I.Data.3	I_PB2_nc	Goes OFF when PB2 is pushed
Selector Switch 0	Two position selector switch	Local:6:I.Data.4	I_SS0_Pos_A	ON when switch is turned to the right
		Local:6:I.Data.5	I_SS0_Pos_B	OFF when switch is turned to the right
Red Pilot light	Red pilot light	Local:7:O.Data.0	O_Red_PL	
Amber Pilot light	Amber pilot light	Local:7:O.Data.1	O_Amber_PL	
Blue Pilot light	Blue pilot light	Local:7:O.Data.2	O_Blue_PL	

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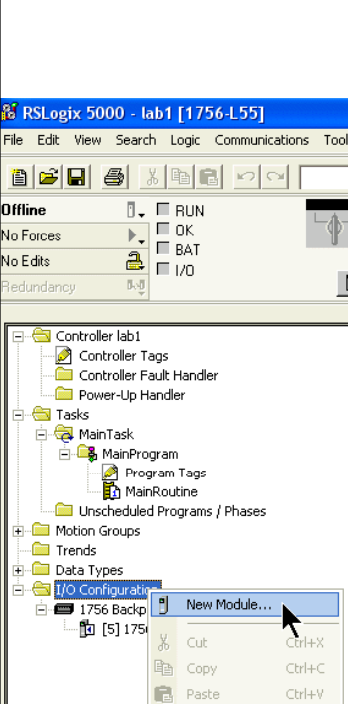


Configuring Local I/O

- On a ControlLogix system ALL I/O must be configured using RSLogix 5000
- The next few slides illustrate how to configure the AC **input** module (1756-IA16) which resides in slot 6.

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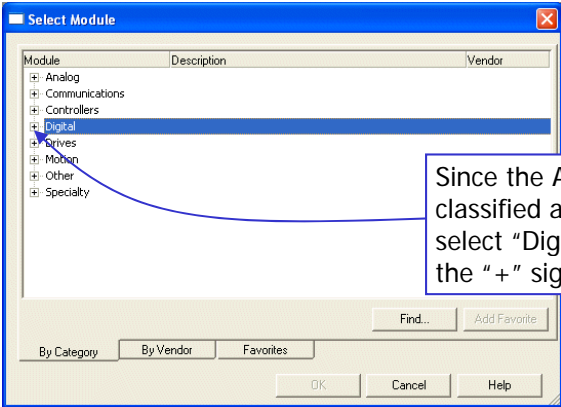
Configuring Local I/O



Right click on "I/O Configuration" folder and select New Module...

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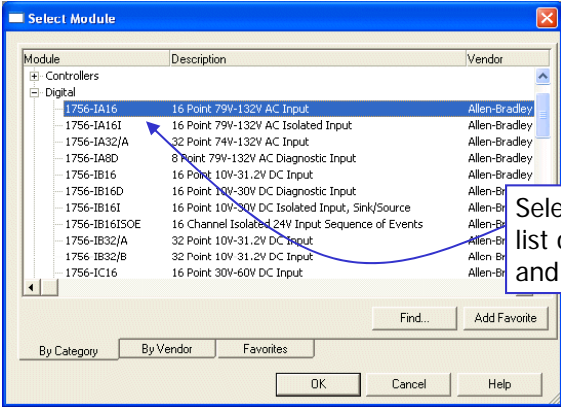
Configuring Local I/O



Since the AC input module is classified as a digital module, select "Digital" and then click the "+" sign

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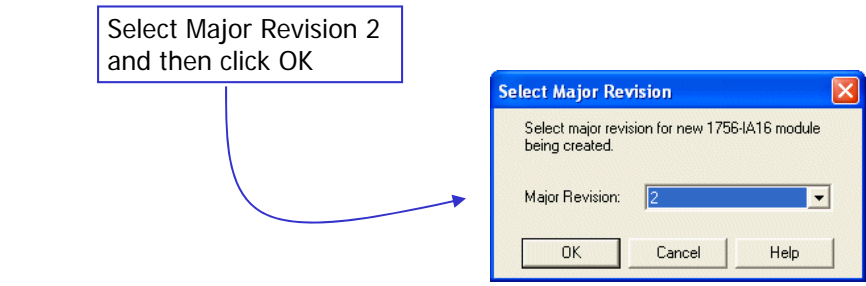
Configuring Local I/O



Module	Description	Vendor
1756-IA16	16 Point 79V-132V AC Input	Allen-Bradley
1756-IA16I	16 Point 79V-132V AC Isolated Input	Allen-Bradley
1756-IA32/A	32 Point 74V-132V AC Input	Allen-Bradley
1756-IA8D	8 Point 79V-132V AC Diagnostic Input	Allen-Bradley
1756-IB16	16 Point 10V-31.2V DC Input	Allen-Bradley
1756-IB16D	16 Point 10V-30V DC Diagnostic Input	Allen-Bradley
1756-IB16I	16 Point 10V-30V DC Isolated Input, Sink/Source	Allen-Bradley
1756-IB16ISOE	16 Channel Isolated 24V Input Sequence of Events	Allen-Bradley
1756-IB32/A	32 Point 10V-31.2V DC Input	Allen-Bradley
1756-IB32/B	32 Point 10V-31.2V DC Input	Allen-Bradley
1756-IC16	16 Point 30V-60V DC Input	Allen-Bradley

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Configuring Local I/O



Select Major Revision 2 and then click OK

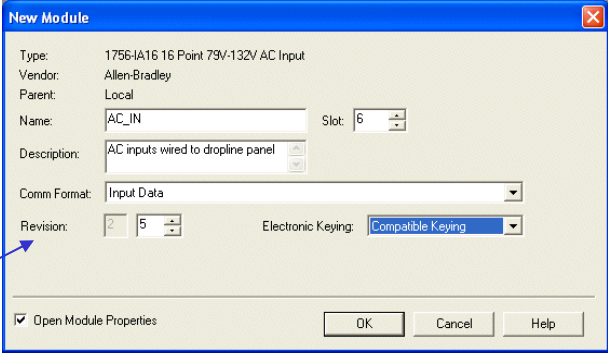
Major Revision
2

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Configuring Local I/O

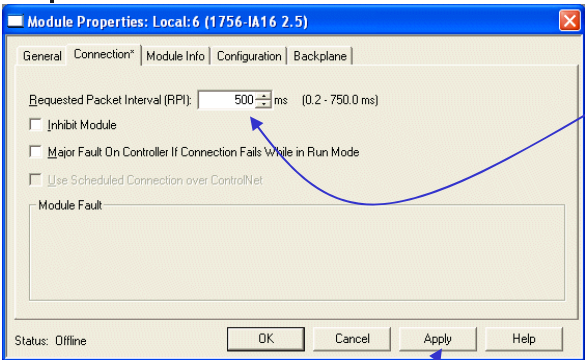
Enter and select the options shown below and then click "OK". Note: the AC input module resides in slot #6.

The modules firmware revision is 2.5
(major revision 2, minor revision 5)



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Configuring Local I/O



Set the RPI to 500 ms
The RPI specifies how often the module produces new input data.
An input module is a **producer** of data.
Note that the module will also be configured to produce on change of state (COS) – see next slide

Enter an RPI rate of 500 and then click on the apply button

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Configuring Local I/O

Click on the "Configuration" tab. Go with the default settings – Note that the module will produce data whenever an input changes state from off-to-on or from on-to-off (in addition to the RPI rate).

Point	Enable Change of State	
	Off -> On	On -> Off
0	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Points	Input Filter Time	
	Off -> On	On -> Off
0 - 7	1 ms	9 ms
8 - 15	1 ms	9 ms

Status: Offline OK Cancel Apply Help

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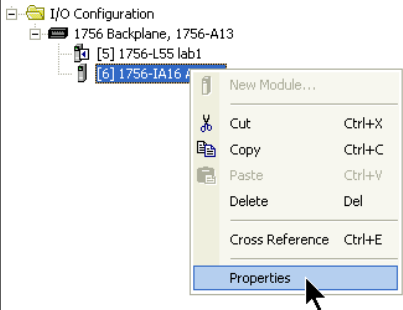
Configuring Local I/O

The module is now configured and resides in the I/O configuration folder

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Configuring Local I/O

Anytime after a module has been configured, its properties can be examined and (most of the properties) can be modified, if desired.



To view a modules current configuration:

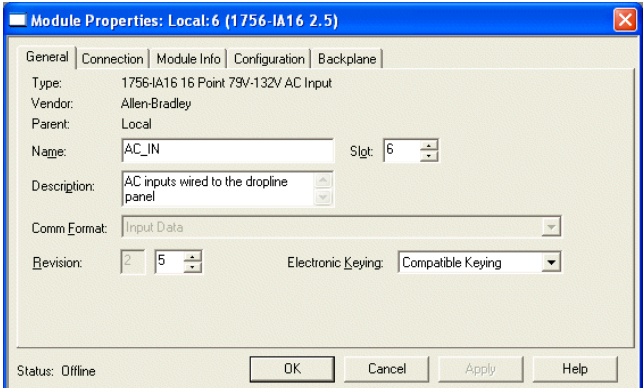
- > Right click on the module
- > Select "Properties" from the right mouse menu

(see next slide ...)

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Configuring Local I/O

Properties screen for AC input module previously configured.



Status: Offline OK Cancel Apply Help

Configuring Local I/O

Double click here to see resulting I/O tags.
This is the tag database.

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Configuring Local I/O

Resulting Controller Tags

Name	Value
+ Local:6:C	
+ Local:6:I	

Click the "+" in order to expand

Configuration data

Input data

These I/O tags are automatically generated after you configure the I/O module. I/O Tags can be referenced in the ladder program.

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Resulting Controller Tags Expanded

Name	Value
Local:6:C	{...}
Local:6:C.FilterOffOn_0_7	1
Local:6:C.FilterOnOff_0_7	9
Local:6:C.FilterOffOn_8_15	1
Local:6:C.FilterOnOff_8_15	9
Local:6:C.FilterOffOn_16_23	0
Local:6:C.FilterOnOff_16_23	0
Local:6:C.FilterOffOn_24_31	0
Local:6:C.FilterOnOff_24_31	0
Local:6:C.COSOnOffEn	2#0000_0000_0000_0000_1111_1111_1111_1111
Local:6:C.COSOffOnEn	2#0000_0000_0000_0000_1111_1111_1111_1111
Local:6:I	{...}
Local:6:I.Fault	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:6:I.Data	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:6:I.Data.0	0
Local:6:I.Data.1	0
Local:6:I.Data.2	0
Local:6:I.Data.3	0
Local:6:I.Data.4	0
Local:6:I.Data.5	0
Local:6:I.Data.6	0
Local:6:I.Data.7	0
Local:6:I.Data.8	0

This is the base address of the first (of 16) AC input

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Creating alias tags

- Local:6:I
- Local:6:I.Fault
- Local:6:I.Data
- Local:6:I.Data.0
- Local:6:I.Data.1
- Local:6:I.Data.2
- Local:6:I.Data.3
- Local:6:I.Data.4

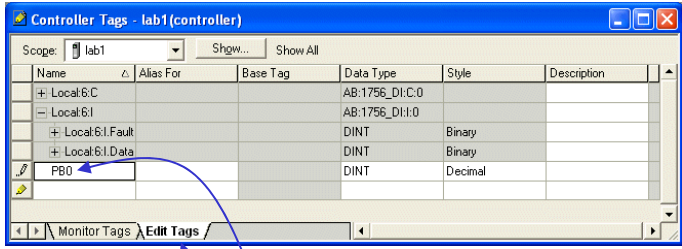
Problem:
The address "Local:6:I.Data.0" is too cumbersome to work with.

Solution:
Create an alias tag that points to the base tag "Local:6:I.Data.0"

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Creating alias tags

To create an alias tag ...

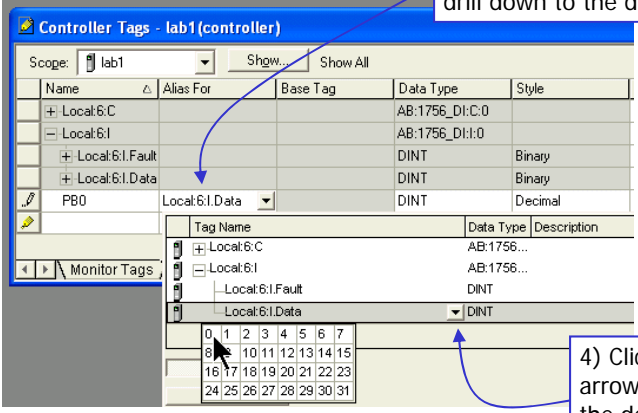


1) Click on the "Edit Tags" tab

2) At the bottom of the list of existing controller tags enter the desired name of the alias tag ("PB0" in this example).

Continued on next slide ... 29

Creating alias tags



3) Tab over to the "Alias For" column and drill down to the desired input.

4) Click this down arrow and then select the desired bit number (0 in this example)

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Creating alias tags

Resulting alias definition ...

Name	Alias For	Base Tag	Data Type	Style	Description
Local:6:C			AB:1756_DI:C:0		
Local:6:I			AB:1756_DI:I:0		
Local:6:I.Fault			DINT	Binary	
Local:6:I.Data			DINT	Binary	
PBO	Local:6:I.Data.0	Local:6:I.Data.0	BOOL	Decimal	

In this example, the alias PBO points to the base tag "Local:6:I.Data.0". The base tag "Local:6:I.Data.0" is type "BOOL" or Boolean. A Boolean tag is a bit, it is either a 1 or a 0.

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Configuring Local I/O

- Your Instructor will demonstrate how to configure the AC output module (1756-OA16) which resides in slot 7.

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Configuring Local I/O

The 1756-OA16 AC output module is now configured and resides in the I/O configuration folder.

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Configuring Local I/O

Desired properties for the 1756-OA16 AC output module (slide 1 of 3):

Module Properties: Local: 7 (1756-OA16 2.3)

General | Connection | Module Info | Configuration | Backplane

Type: 1756-OA16 16 Point 74V-265V AC Output
Vendor: Allen-Bradley
Parent: Local
Name: AC_OUT Stgt: 7
Description: AC outputs wired to dropline panel
Comm Format: CST Timestamped Fuse Data - Output Data
Revision: 2 3 Electronic Keying: Compatible Keying

Status: Offline [OK] [Cancel] [Apply] [Help]

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Configuring Local I/O

Desired properties for the 1756-OA16 AC output module (slide 2 of 3):

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Configuring Local I/O

Desired properties for the 1756-OA16 AC output module (slide 3 of 3):

Point	Output State During	
	Program Mode	Fault Mode
0	Off	Off
1	Off	Off
2	Off	Off
3	Off	Off
4	Off	Off
5	Off	Off
6	Off	Off
7	Off	Off
8	Off	Off

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Configuring Local I/O

Resulting Controller Tags

Name	Value	Force	Description
Local:6:C	{...}		
Local:6:I	{...}		AB-1756_DI:1:0
Local:7:C	{...}		AB-1756_DO:C:0
Local:7:I	{...}		AB-1756_DO_Fused1:0
Local:7:O	{...}		AB-1756_DO:0:0
PRN	0		RNNI

Click the "+" in order to expand

Resulting Controller Tags Expanded

Name	Value
Local:6:C	{...}
Local:6:I	{...}
Local:7:C	{...}
Local:7:C.ProgToFaultEn	0
Local:7:C.FaultMode	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:7:C.FaultValue	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:7:C.ProgMode	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:7:C.ProgValue	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:7:I	{...}
Local:7:I.Fault	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:7:I.Data	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:7:I.CSTTimestamp	{...}
Local:7:I.FuseBlown	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:7:O	{...}
Local:7:O.Data	2#0000_0000_0000_0000_0000_0000_0000_0000
Local:7:O.Data.0	0
Local:7:O.Data.1	0
Local:7:O.Data.2	0
Local:7:O.Data.3	0
Local:7:O.Data.4	0
Local:7:O.Data.5	0

The based address of the first (of 16) AC output is here



Downloading a PLC Program



ControlLogix Communications Options

- RS-232 Serial (Channel 0, DF1)
 - Serial port built into Logix5555 controller
 - 19.2 Kbps

- DH+ via 1756-DH/RIO module
 - Supports both DH+ and Universal Remote I/O
 - 57.6 Kbps

Continued ...

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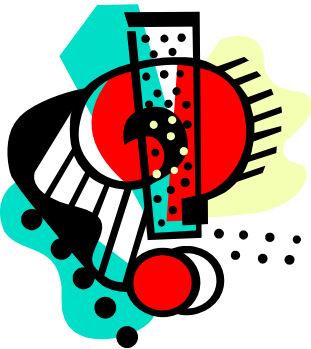
ControlLogix Communications Options

- ControlNet via 1756-CNB module
 - Each dropline PLC has two ControlNet modules
 - 10 Mbps
- Ethernet via 1756-ENBT module
 - 10/100 Mbps

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ControlLogix Communications Options

- Lets use Ethernet via the 1756-ENBT module!



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TCP/IP Addresses for the CIMT Lab

ControlLogix PLCs (1756-ENBT module):

PLC:	Address:
DL1	192.168.1.15
DL2	192.168.1.25
DL3	192.168.1.35
DL4	192.168.1.45
DL5	192.168.1.55
DL6	192.168.1.65
TrunkLine	192.168.1.75

192.168.1.n5 (where n = the dropline number)


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Downloading over Ethernet

- Download → A copy of the PLC program is transferred from the computers memory to the PLCs memory
- During the download process:
 - The original program in the PLCs memory is erased
 - All PLC outputs are turned off


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Downloading over Ethernet

- Upload → A copy of the PLC program is transferred from the PLCs memory to the computers memory
- During the upload process:
 - The PLC can remain in the RUN mode

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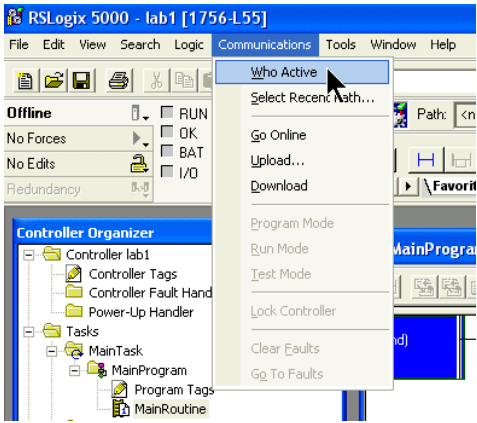
Downloading over Ethernet

- Going Online → After a program has been downloaded, the program can be monitored by simply going online.

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Downloading over Ethernet

In RSLogix 5000, Select "Who Active" from Communications menu.

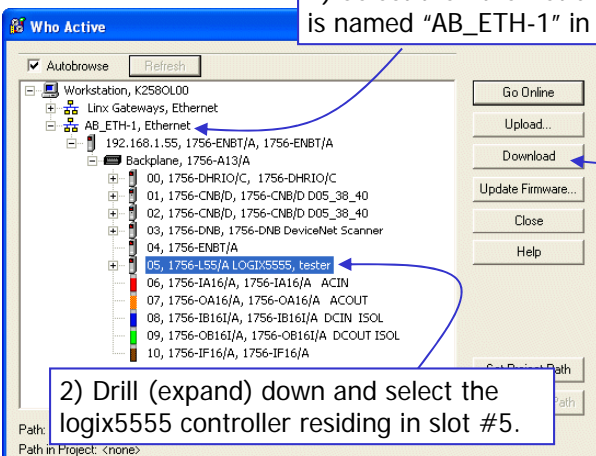


Continued on next slide ...

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Downloading over Ethernet

1) Select the Ethernet driver (which is named "AB_ETH-1" in this example)



2) Drill (expand) down and select the logix5555 controller residing in slot #5.

3) Click on the "Download" button

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Downloading over Ethernet

Download

Download offline project 'lab1' to the controller.

Connected Controller:

Name: tester
Type: 1756-L55/A 1756-M16/A ControllLogix5555 Controller
Path: AB_ETH-1\192.168.1.55\Backplane\5
Serial Number: 000DE1A7
Security: No Protection

The controller is in Remote Run mode. The mode will be changed to Remote Program prior to download.

Download Cancel Help

Click the download button

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The Classic Online Toolbar

Classic Online Toolbar:

Remote Program No Forces
No Edits Forces Disabled
Path: AB_ETH-1\192.168.1.55\Backplane\5*

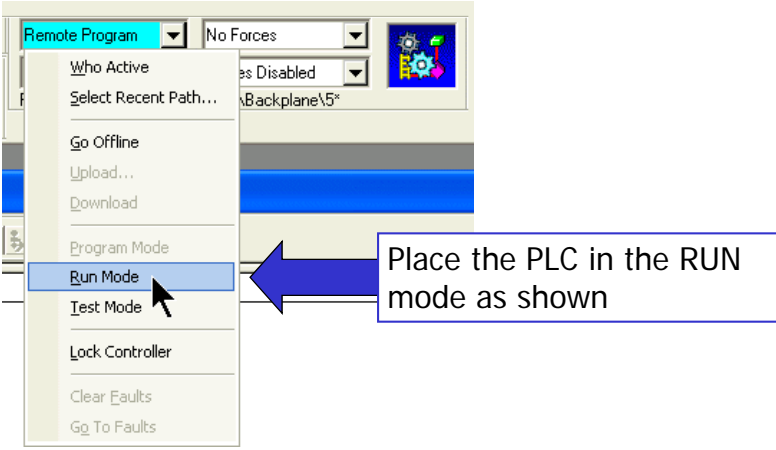
This icon becomes animated when you are online with the Logix 5555 controller

The Online Toolbar:

Rem Prog No Forces No Edits Redundancy
Program Mode Controller OK Battery Fault I/O OK
REM

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The Classic Online Toolbar



Who Active
Select Recent Path...
Go Offline
Upload...
Download
Program Mode
Run Mode
Test Mode
Lock Controller
Clear Faults
Go To Faults

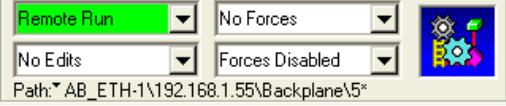
No Forces
Forces Disabled
Backplane\5*

Place the PLC in the RUN mode as shown

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The Classic Online Toolbar

Classic Online toolbar when PLC is in RUN mode:

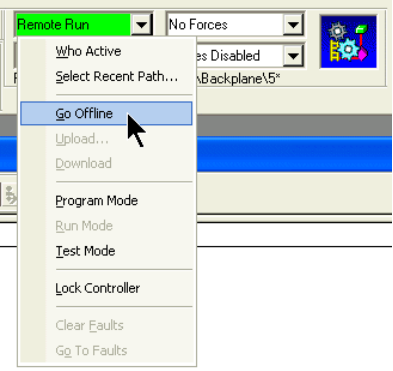


Remote Run
No Forces
No Edits
Forces Disabled
Path: *AB_ETH-1\192.168.1.55\Backplane\5*

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The Classic Online Toolbar

Using The Classic Online Toolbar to go back offline




The screenshot shows a software interface with a toolbar. A dropdown menu is open, listing several options. The 'Go Offline' option is highlighted with a mouse cursor. Other options include 'Remote Run', 'No Forces', 'Who Active', 'Select Recent Path...', 'Upload...', 'Download', 'Program Mode', 'Run Mode', 'Test Mode', 'Lock Controller', 'Clear Faults', and 'Go To Faults'. The background shows a partially visible window with a 'Backplane\5' label.

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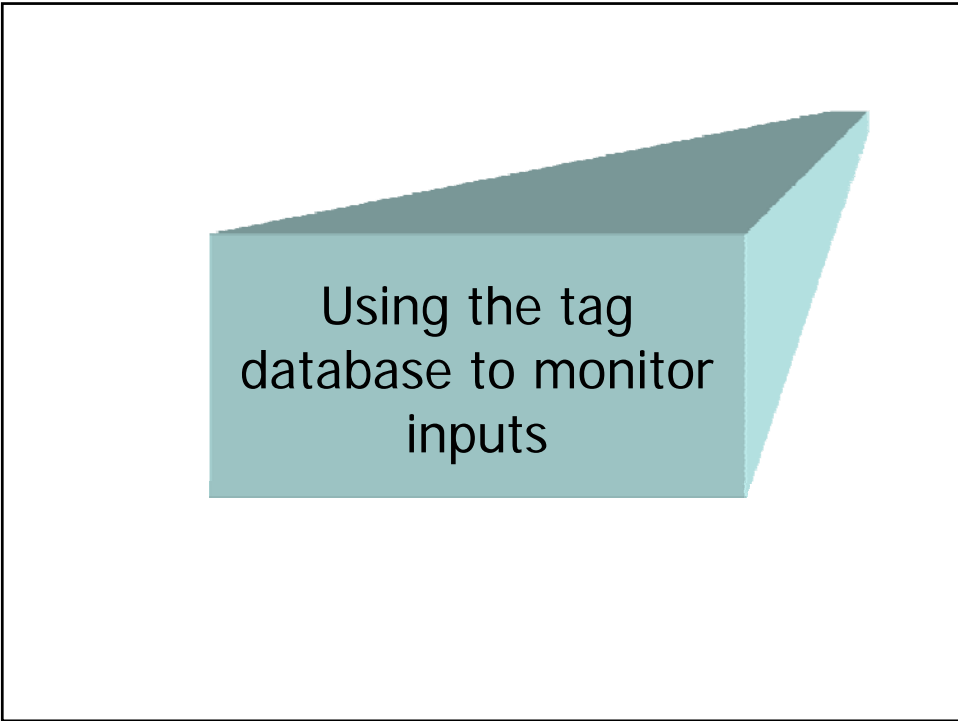
CAUTION!!!

- From a single PC, you can download to ANY PLC on the network - this is a problem if you download your program to the wrong PLC!



The warning icon consists of a black spiral, a yellow exclamation mark, and a black star, all set against a white background.

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Monitoring Inputs

Inputs can be monitored using the tag database.

Double click here

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Monitoring Inputs

PB0 is an alias tag which points to a discrete PLC input. In the above example, the input is on (its value = 1) since the pushbutton is being pushed.

Name	Value	Force Mask	Style	Data Type
+ Local:6:C	{...}	{...}		AB:1756_DI:C:0
+ Local:6:I	{...}	{...}		AB:1756_DI:I:0
+ Local:7:C	{...}	{...}		AB:1756_DO:C:0
+ Local:7:I	{...}	{...}		AB:1756_DO_Fused:I:0
+ Local:7:O	{...}	{...}		AB:1756_DO:O:0
PB0	1		Decimal	BOOL
Red_PL	0		Decimal	BOOL

Select the "Monitor Tags" tab

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Using the tag database to test outputs

Testing Outputs

Outputs can be manually turned on and off using the tag database. Red_PL is an alias tag which points to a discrete PLC output. In the above example, the output has been turned on (its value has been set to a 1).

Name	Value	Force Mask	Style	Data Type
Local:6:C	{...}	{...}		AB:1756_DI:C:0
Local:6:I	{...}	{...}		AB:1756_DI:I:0
Local:7:C	{...}	{...}		AB:1756_DO:C:0
Local:7:I	{...}	{...}		AB:1756_DO_Fused:I:0
Local:7:O	{...}	{...}		AB:1756_DO:O:0
PB0	0		Decimal	BOOL
Red_PL	1		Decimal	BOOL

Select the Monitor Tags tab