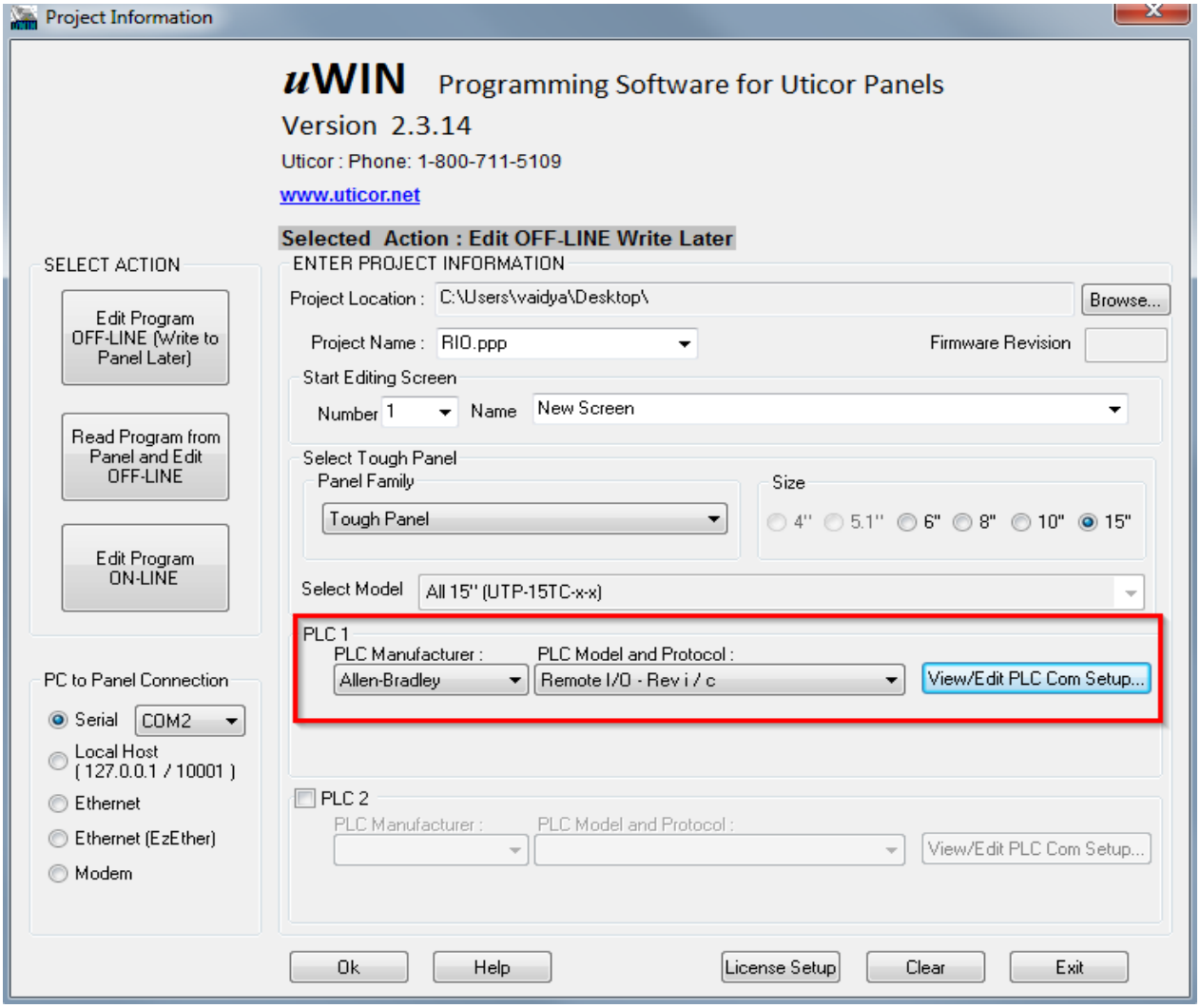
Getting Started with Allen-Bradley Remote IO on Uticor HMI

Allen-Bradley's Remote I/O network is used for distributed I/O control. Its architecture is similar to client server. In every remote station there is a RIO adapter which has unique node number and it is scanned by RIO Scanner in main controller. Uticor HMIs are capable of reading/writing to any rack that is defined in the system.

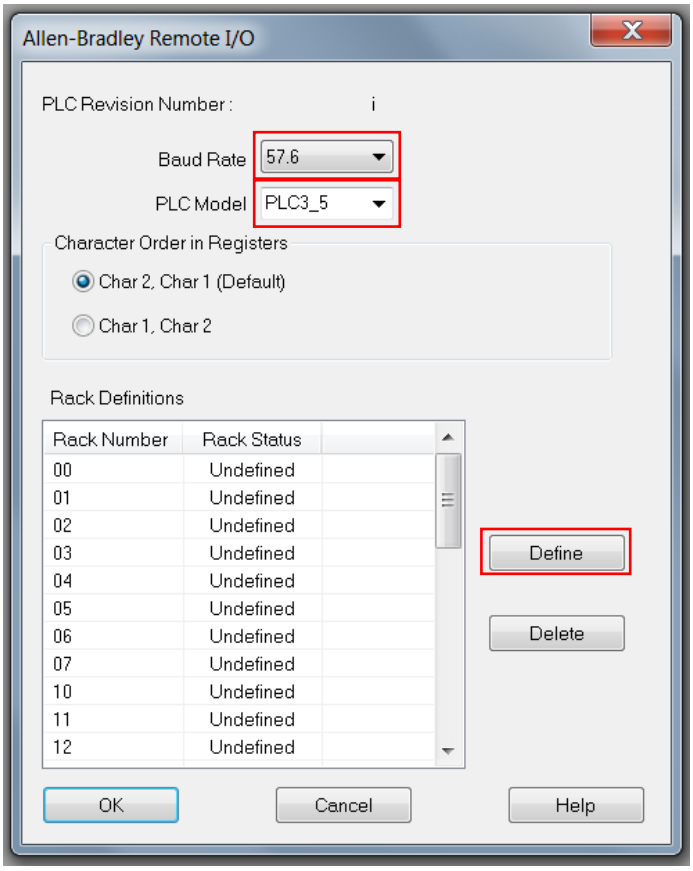
Required:

- Uticor HMI with DH+/Remote IO connectivity card
- uWin ToughPanel Edit v 2.3 or greater

When you create your project, please select Allen-Bradley as your PLC and Remote I/O as your protocol.

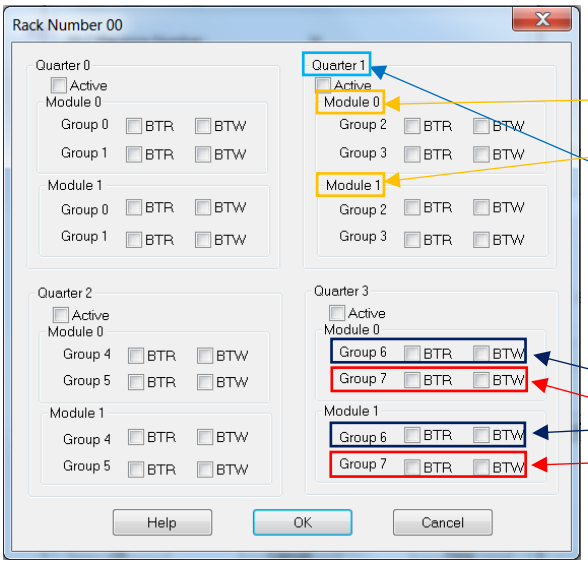


Click on “View/Edit PLC Com setup”. Select the Baud Rate and PLC Model you want to connect to. Then double click on the Rack number you want to define.

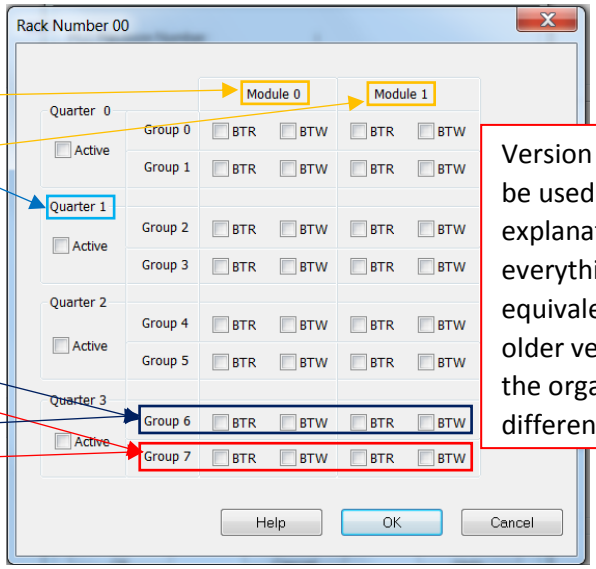


The following window will appear:

Version 2.3.7 or less

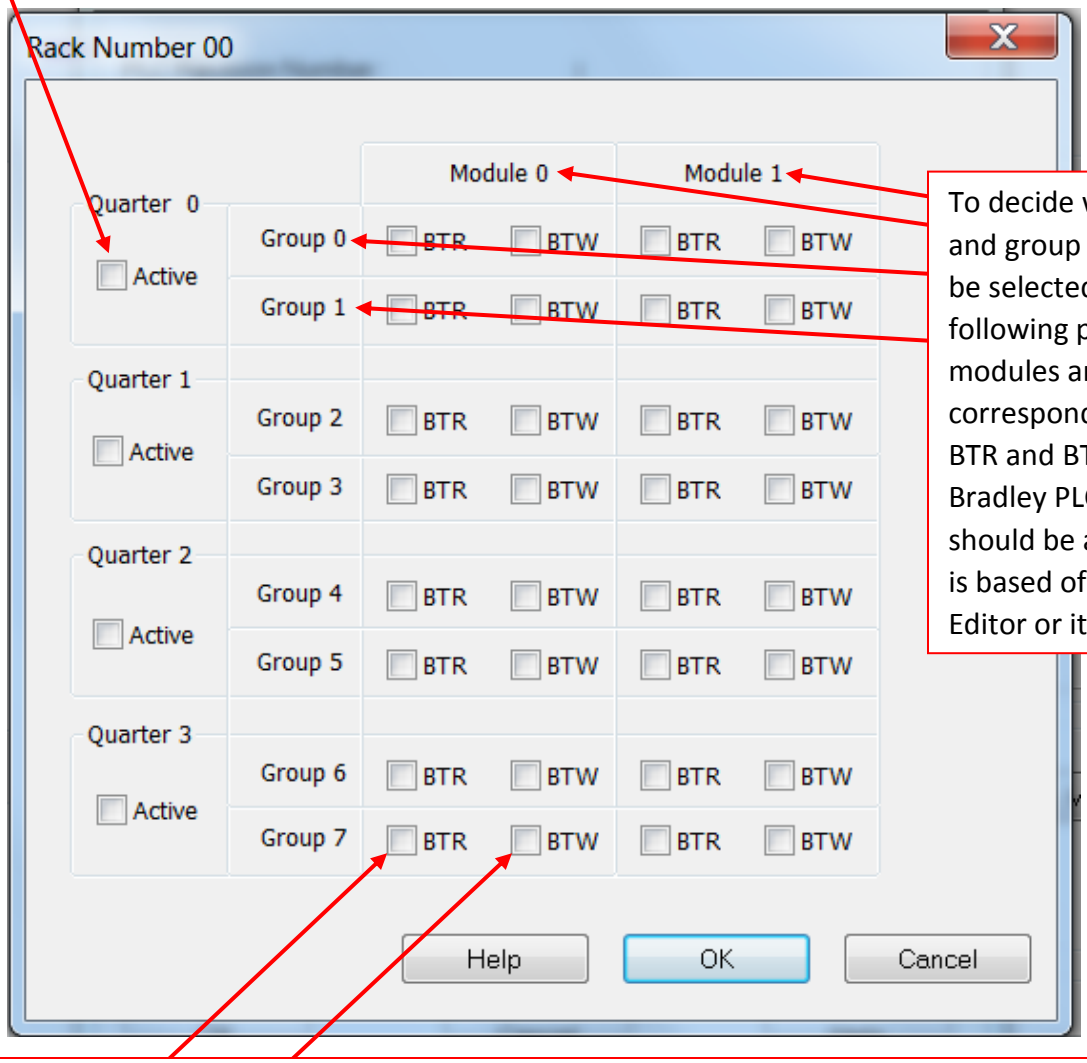


Version 2.3.8 or greater



Version 2.3.8 will be used for further explanation but everything is equivalent in the older version. Only the organization is different.

To turn a quarter Active click on the box in front of Active. Do this only if the Uticor HMI is to be the only I/O to respond on that quarter. If selected, the Tough Panel will simulate the quarter. Note that the Uticor HMI must be the only one to respond to information for that quarter. If anything else responds the results could be in error. Do not enable if the Uticor HMI is to monitor only that quarter. This is to be done if there is a real quarter or maybe another Uticor HMI active on that quarter. This allows for reading only that quarter — any writes will not be returned to the PLC.



To decide which module and group number should be selected refer to the following page. Only modules and groups that correspond to the correct BTR and BTW in the Allen-Bradley PLC software should be activated. This is based off of the Block Editor or its equivalent.

To ensure that a block transfer is handled by the Uticor HMI, all modules that are to have a block transfer monitored must be selected from this screen. If data is to be transferred by a BTR from the Tough Panel to the PLC it must be in an active quarter. The BTW and BTR instructions must still be executed in the PLC logic. To select BTRs or BTWs for a quarter simply click on all that are to be used.

Based on information from the Allen-Bradley Block Editor or equivalent you need to activate and turn on the BTR and BTW in the correct quarters and modules. Information and equivalency is below and examples are on the following pages.

BLOCK TRANSFER FILE

PanelBuilder 1400e (c)

File Number	Rack Number	Word	Byte	Usage	File Size	Access
B1	3	5	Low	Read	32	Full
B10	3	7	High	Write	32	Full
B2	3	6	High	Read	32	Full
B3	3	6	Low	Read	32	Full
B4	3	7	High	Read	32	Full
B7	3	5	Low	Write	32	Full
B8	3	6	High	Write	32	Full
B9	3	6	Low	Write	32	Full

Below is how Uticor HMI represent the RIO addressing as compared to PanelView.

AB		Uticor
Rack Number	=	Rack
Word	=	Group
Byte: Low	=	Module 0
Byte: High	=	Module 1
Usage	=	Read or Write

Below are the memory types which we support in our panel programming software.

MEMORY TYPE	RACK ADDRESS	GROUP ADDRESS	IO_TYPE	VALUE_TYPE	MAPPING EXAMPLES
O - Output	0-37	0-7	READ_ONLY	WORD	O:377
I - Input	0-37	0-7	READ_WRITE	WORD	I:010
			READ_WRITE	DISCRETE	I:010/17

MEMORY TYPE	RACK ADDRESS	GROUP ADDRESS	MODULE ADDRESS	BT WORD NUMBER	IO_TYPE	VALUE_TYPE	MAP STRING EXAMPLES
BTR - Block Transfer Read	0-37	0-7	0-1	0-63	READ_WRITE	WORD	BTR3771-0
BTW - Block Transfer Write	0-37	0-7	0-1	0-63	READ_WRITE	WORD	BTW0150-63
					READ_WRITE	DISCRETE	BTR3771-0/15
					READ_WRITE	DISCRETE	BTW0150-63/4

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Examples

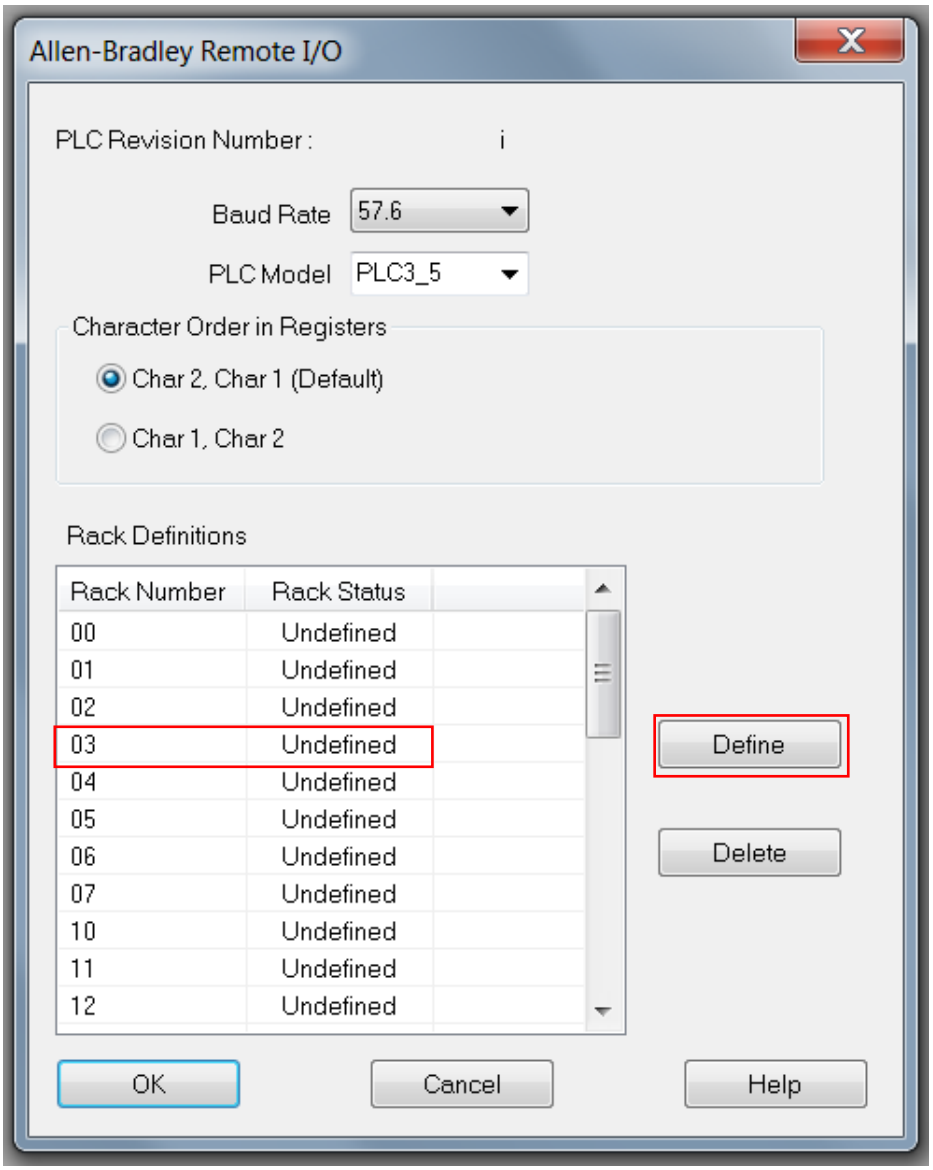
Block Transfer Read (BTR)

Examining the first two Block Transfer Writes from the Block Transfer File Table on page 4.

File Number	Rack Number	Word	Byte	Usage	File Size	Access
B1	3	5	Low	Read	32	Full
B2	3	6	High	Read	32	Full

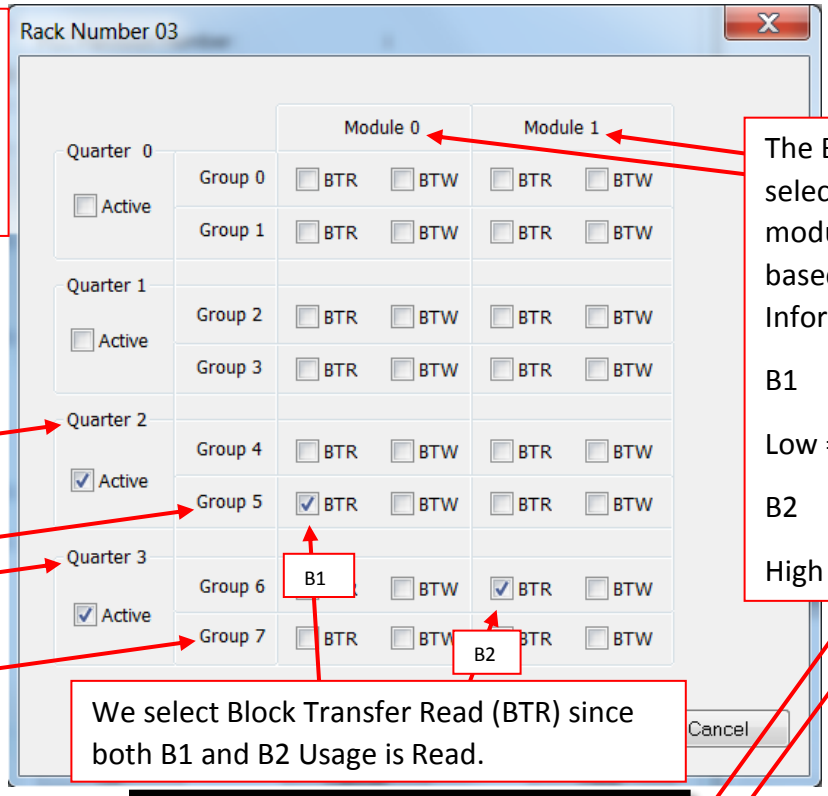
To setup the Uticor HMI to process these two BTR, follow the directions below:

1. First the correct Rack Number needs to be selected for the Uticor HMI to interact with the correct Rack. In the Allen-Bradley Remote IO menu select the Rack 3, then click the Define button.



2. Next in the following screen that pops up we need to select the Group (Quarter), Module and Usage.

Note: Any quarter that is active can only be monitored by 1 Uticor HMI. If more than 1 Uticor HMI attempt to monitor the same quarter then there will be errors.



Quarter 2 and Quarter 3 are active based on the Word number (Uticor equivalent is Group number).

B1

Word 5 = Group 5

B2

Word 6 = Group 6

The BTR selection is selected in either module 0 or module 1 based on Byte Information.

B1

Low = Module 0

B2

High = Module 1

We select Block Transfer Read (BTR) since both B1 and B2 Usage is Read.

AB		Uticor
Rack Number	=	Rack
Word	=	Group
Byte: Low	=	Module 0
Byte: High	=	Module 1
Usage	=	Read or Write

File Number	Rack Number	Word	Byte	Usage	File Size	Access
B1	3	5	Low	Read	32	Full
B2	3	6	High	Read	32	Full

Uticor equivalent values from AB Block Transfer Table

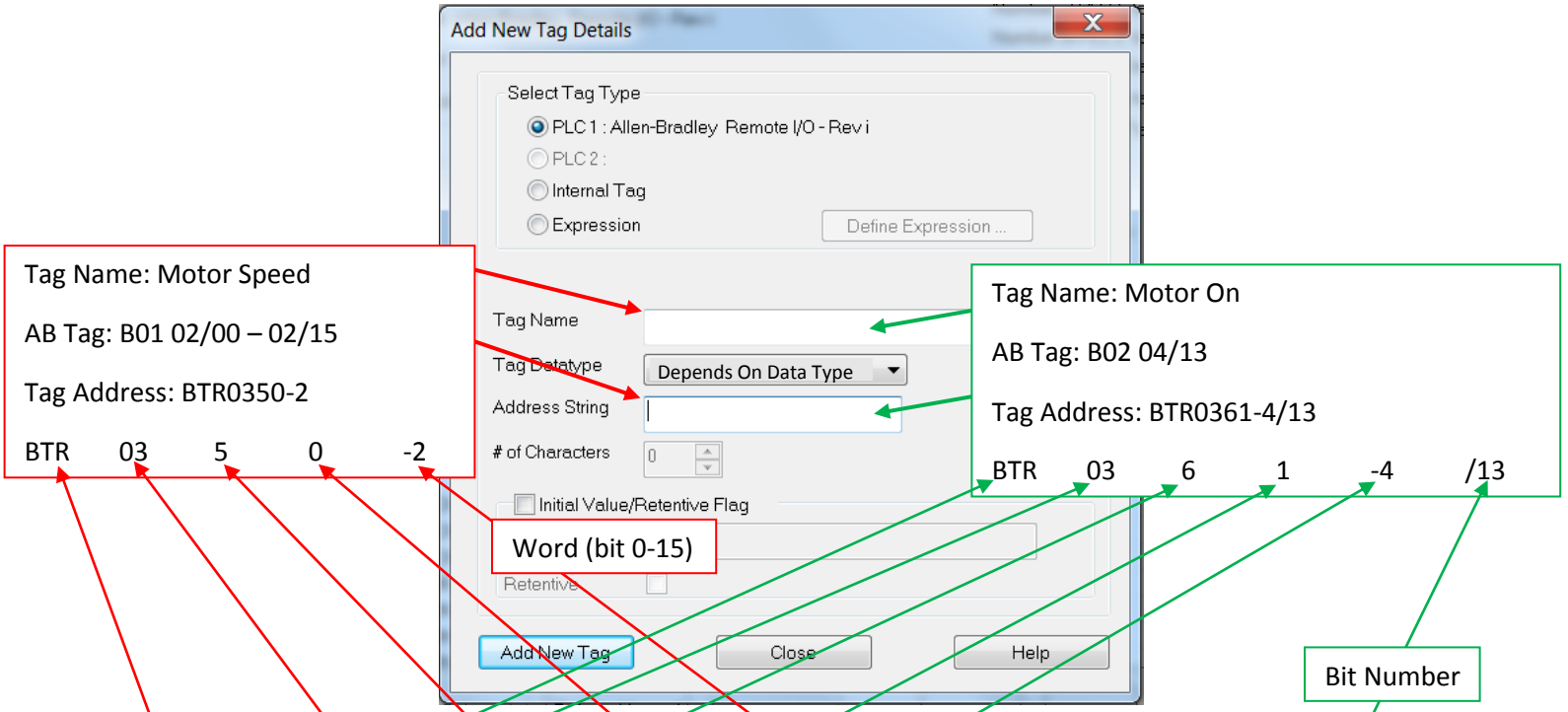
AB File Number	AB Rack Number	AB Word	AB Byte	AB Usage
B1	3	5	Low	Read
B2	3	6	High	Read
(Not used in UT)	**UT Rack**	**UT Group**	**UT Module**	**UT Usage**
B1	3	5	Module 0	BTR
B2	3	6	Module 1	BTR

Uticor equivalent values from AB Block Transfer Table (Needed for Uticor Tag Addressing)

(Not used in UT)	UT Rack	UT Group	UT Module	UT Usage
B1	3	5	Module 0	BTR
B2	3	6	Module 1	BTR

3. After the correct options are selected in Rack screen. Click OK till you get into the uWin ToughPanel Editor screen. Then go to **Setup > Tag Database** and click on Add/Edit. This is where the actual tag address will be added. The Uticor Tag Address is again based on the AB tags address.

TAG NAME	Allen-Bradley Tag Address	Uticor Tag Address
Motor Speed (File Number B1)	B01 02/00 – 02/15	BTR0350-2
Motor On (File Number B2)	B02 04/13	BTR0361-4/13



MEMORY TYPE	RACK ADDRESS	GROUP ADDRESS	MODULE ADDRESS	BT WORD NUMBER	IO_TYPE	VALUE_TYPE	MAP STRING EXAMPLES
BTR - Block Transfer Read	0-37	0-7	0-1	0-63	READ_WRITE	WORD	BTR3771-0
					READ_WRITE	DISCRETE	BTR3771-0/15

4. You have now added the correct tag addressing for BTR tags.

Examples Cont.

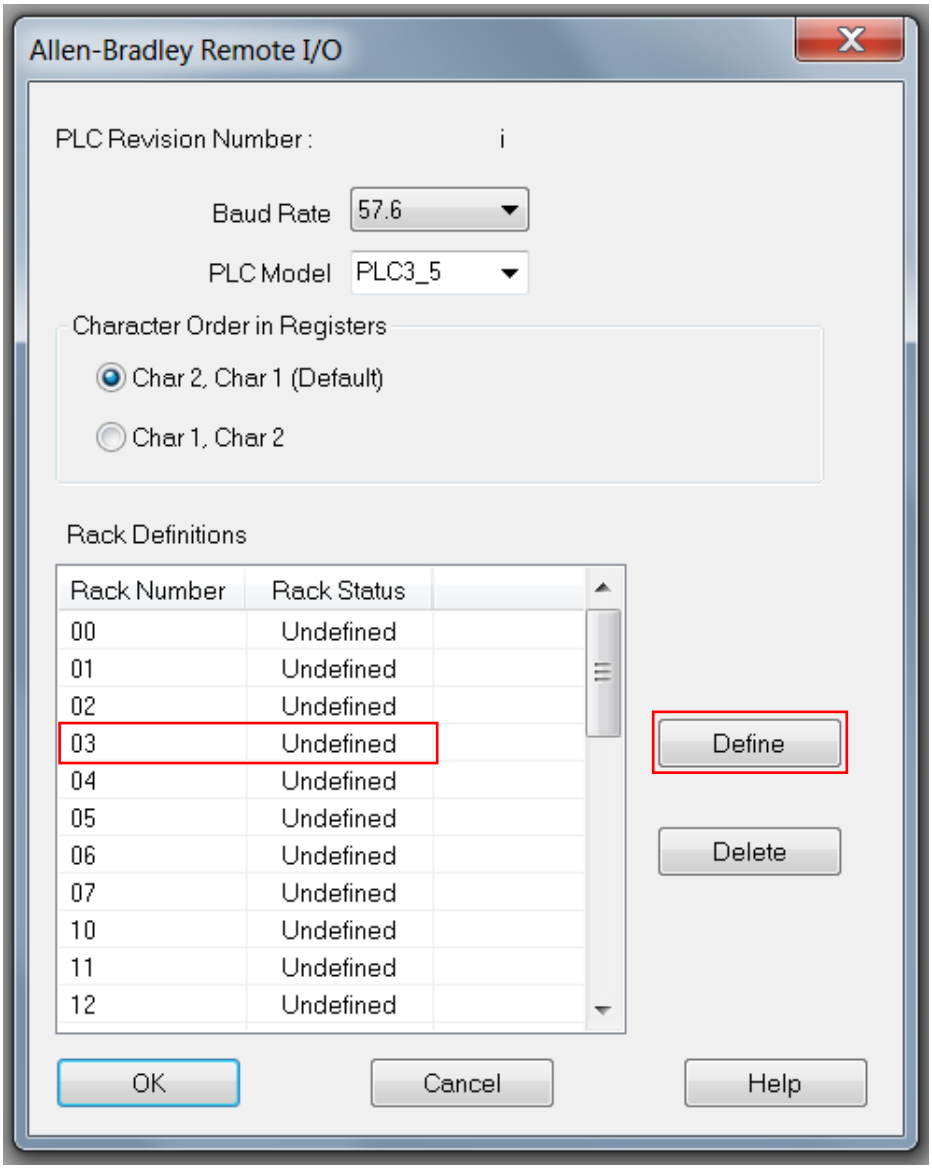
Block Transfer Write (BTW)

Examining the first two Block Transfer Writes from the Block Transfer File Table on page 4.

File Number	Rack Number	Word	Byte	Usage	File Size	Access
B10	3	7	High	Write	32	Full
B7	3	5	Low	Write	32	Full

To setup the Uticor HMI to process these two BTW, follow the directions below:

1. First the correct Rack Number needs to be selected for the Uticor HMI to interact with the correct Rack. In the Allen-Bradley Remote IO menu select the Rack 3, then click the Define button.



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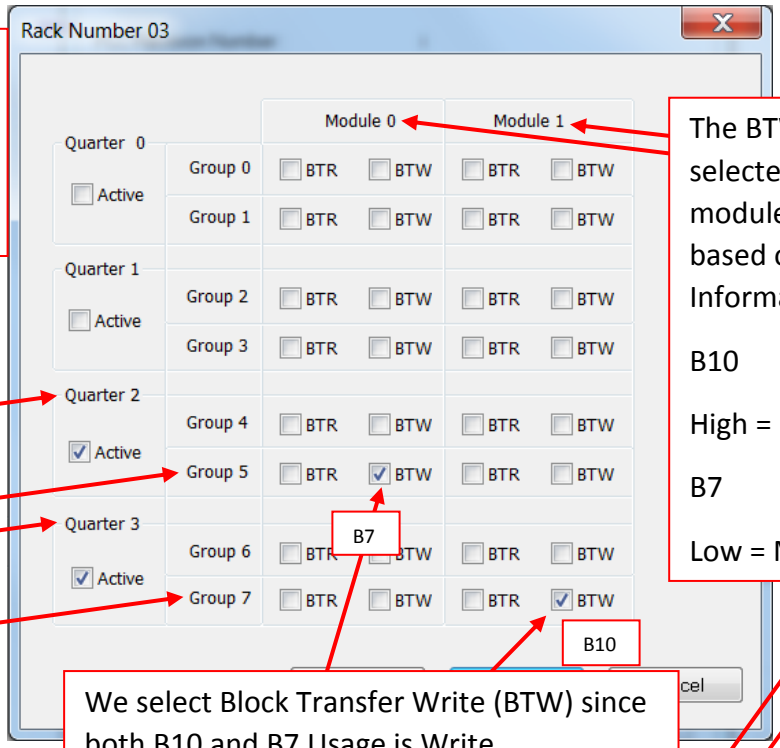
2. Next in the following screen that pops up we need to select the Group (Quarter), Module and Usage.

Note: Any quarter that is active can only be monitored by 1 Uticor HMI. If more than 1 Uticor HMI attempt to monitor the same quarter then there will be errors.



Quarter 2 and Quarter 3 are active based on the Word number (Uticor equivalent is Group number).

B10

Word 7 = Group 7

B7

Word 5 = Group 5

The BTW selection is selected in either module 0 or module 1 based on Byte Information.

B10

High = Module 1

B7

Low = Module 0

We select Block Transfer Write (BTW) since both B10 and B7 Usage is Write.

AB		Uticor
Rack Number	=	Rack
Word	=	Group
Byte: Low	=	Module 0
Byte: High	=	Module 1
Usage	=	Read or Write

File Number	Rack Number	Word	Byte	Usage	File Size	Access
B10	3	7	High	Write	32	Full
B7	3	5	Low	Write	32	Full

Uticor equivalent values from AB Block Transfer Table

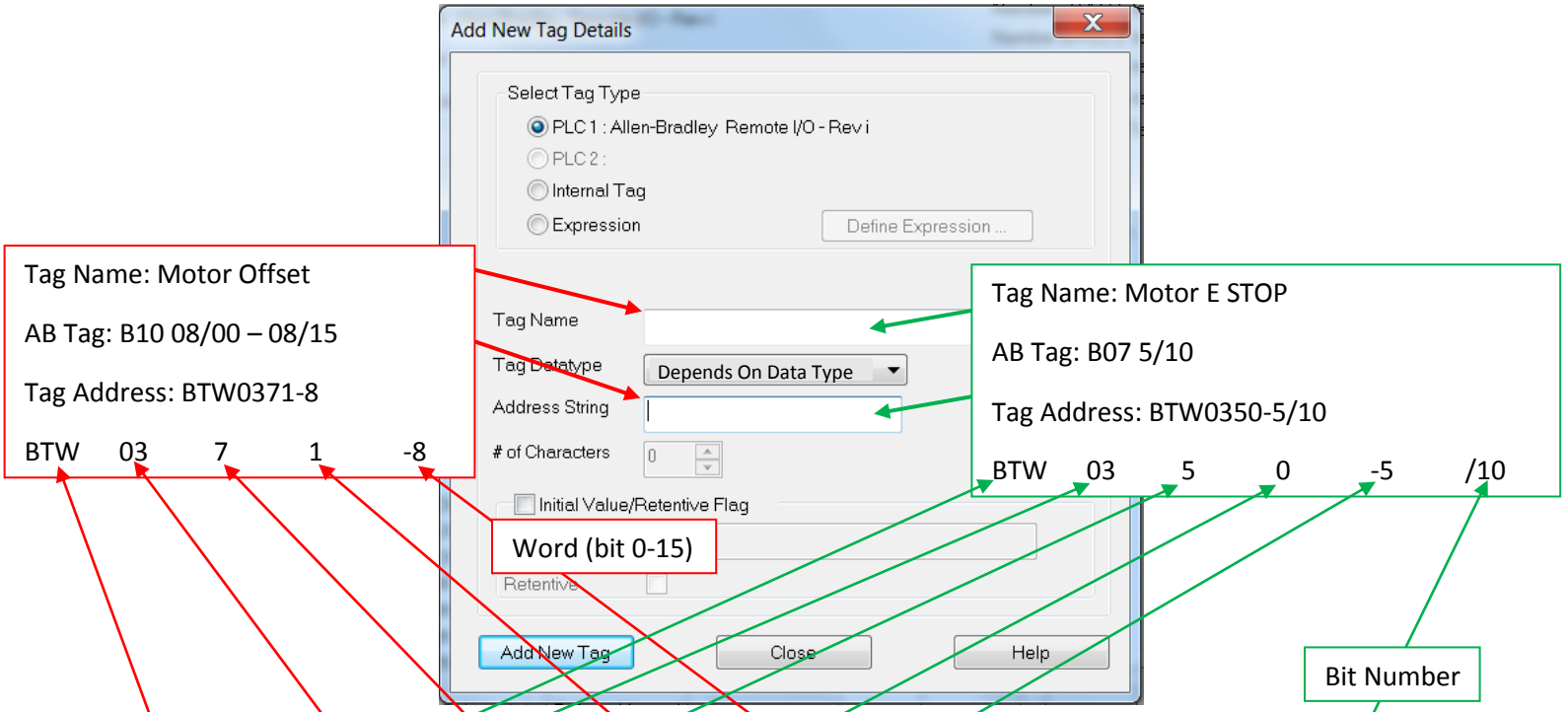
AB File Number	AB Rack Number	AB Word	AB Byte	AB Usage
B10	3	7	High	Write
B7	3	5	Low	Write
(Not used in UT)	**UT Rack**	**UT Group**	**UT Module**	**UT Usage**
B10	3	7	Module 1	BTW
B7	3	5	Module 0	BTW

Uticor equivalent values from AB Block Transfer Table (Needed for Uticor Tag Addressing)

(Not used in UT)	Rack Number	Group	Module	Usage
B10	3	7	Module 1	BTW
B7	3	5	Module 0	BTW

3. After the correct options are selected in Rack screen. Click OK till you get into the Tough Panel Editor screen. Then go to **Setup > Tag Database** and click on Add/Edit. This is where the actual tag address will be added. The Uticor Tag Address is again based on the AB tags address.

TAG NAME	Allen-Bradley Tag Address	Uticor Tag Address
Motor Offset (File Number B10)	B10 08/00 – 08/15	BTW0371-8
Motor E STOP (File Number B7)	B07 5/10	BTW0350-5/10



MEMORY TYPE	RACK ADDRESS	GROUP ADDRESS	MODULE ADDRESS	BT WORD NUMBER	IO_TYPE	VALUE_TYPE	MAP STRING EXAMPLES
BTW - Block Transfer Write	0-37	0-7	0-1	0-63	READ_WRITE	WORD	BTW0150-63
					READ_WRITE	DISCRETE	BTW0150-63/4

4. You have now added the correct tag addressing for BTW tags.

Examples Cont.

Input/ Output Addressing

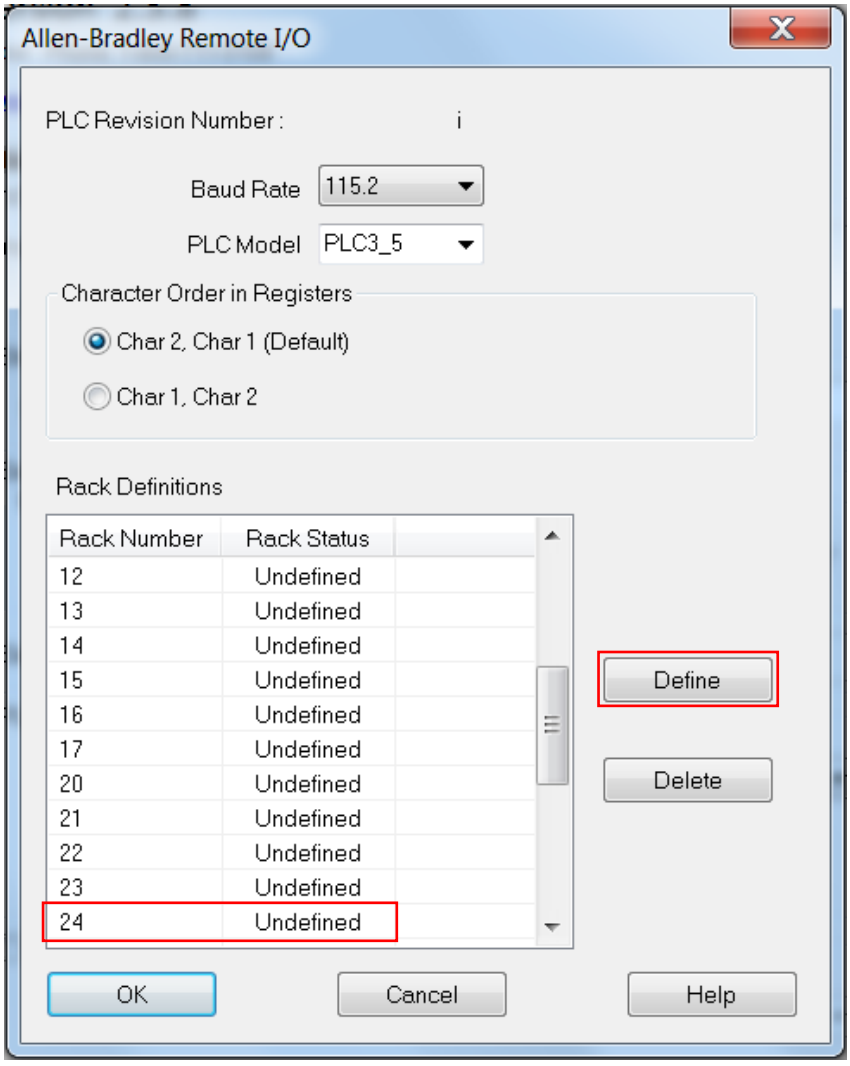
Examining the two Input and two Outputs in the following tables.

	Tag Name	Data Type	Array Size	Description	Node Name	Address	Initial Value
60	select_manual	Bit	0		BUFFER	I:247/03	0
61	select_bypass	Bit	0		BUFFER	I:247/04	0

	Tag Name	Data Type	Array Size	Description	Node Name	Address	Initial Value
246	xy_slide_ready	Bit	0		BUFFER	O:245/00	0
247	xy_slide_in_position	Bit	0		BUFFER	O:245/01	0

To setup the Uticor HMI to process these two Inputs and two Outputs, follow the directions below:

1. First the correct Rack Number needs to be selected for the Uticor HMI to interact with the correct Rack. In the Allen-Bradley Remote IO menu select the Rack 24 (since the Inputs and Outputs are addressed to Rack 24), then click the Define button.



	Tag Name	Data Type	Array Size	Description	Node Name	Address	Initial Value
60	select_manual	Bit	0		BUFFER	I:247/03	0
61	select_bypass	Bit	0		BUFFER	I:247/04	0
	Tag Name	**Data Type**	**Array Size**	**Description**	**Node Name**	**Address**	**Initial Value**
246	xy_slide_ready	Bit	0		BUFFER	O:245/00	0
247	xy_slide_in_position	Bit	0		BUFFER	O:245/01	0

2. Next in the following screen that pops up we need to make the correct Quarter active. The addressing is the same as the Allen-Bradley addressing.

Note: Any quarter that is active can only be monitored by 1 Uticor HMI. If more than 1 Uticor HMI attempt to monitor the same quarter then there will be errors.

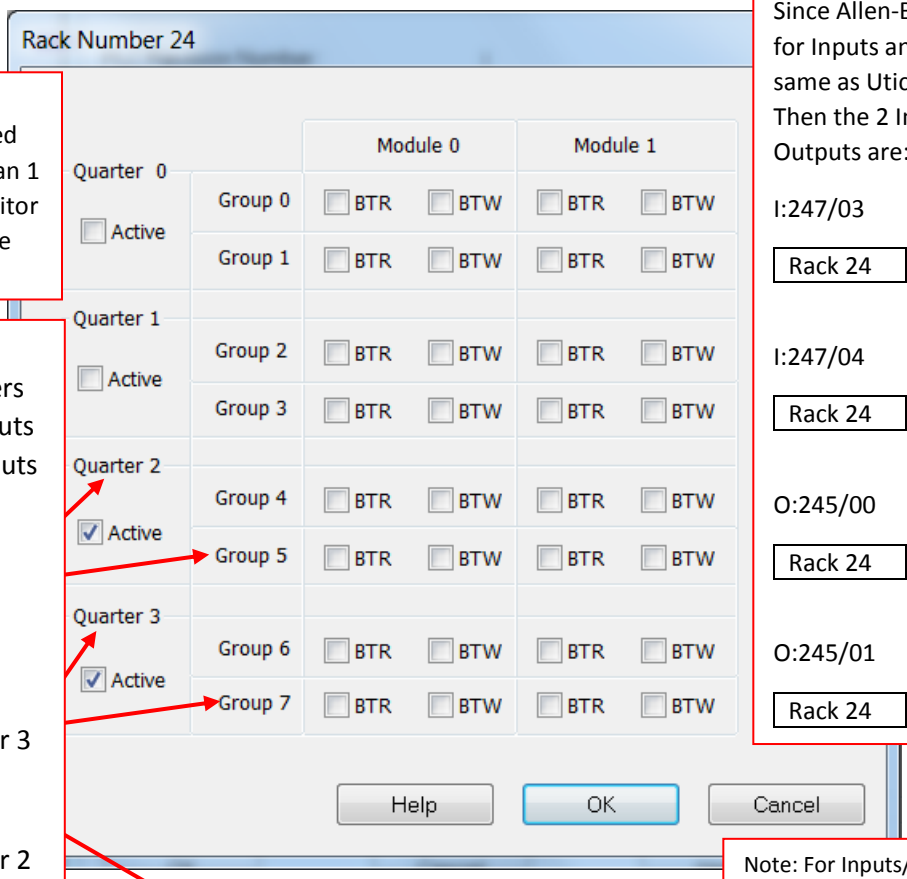
The Uticor panel needs to actively monitor the quarters where the Inputs and Outputs are. Therefore for the 2 Inputs and 2 Outputs the quarters which contain the Group (Word) number need to be Active.

I:247/04 I:247/03

Group 7 (Word 7)-> Quarter 3

O:245/00 I:245/01

Group 5 (Word 5)-> Quarter 2



Since Allen-Bradley addressing for Inputs and Outputs is the same as Uticor Addressing. Then the 2 Inputs and 2 Outputs are:

I:247/03

Rack 24	Word 7	Bit 3

I:247/04

Rack 24	Word 7	Bit 3

O:245/00

Rack 24	Word 5	Bit 0

O:245/01

Rack 24	Word 5	Bit 1

Note: For Inputs/Outputs no BTR or BTW need to be selected since those functions are not being used.

AB		**Uticor**
Rack Number	=	Rack
Word	=	Group

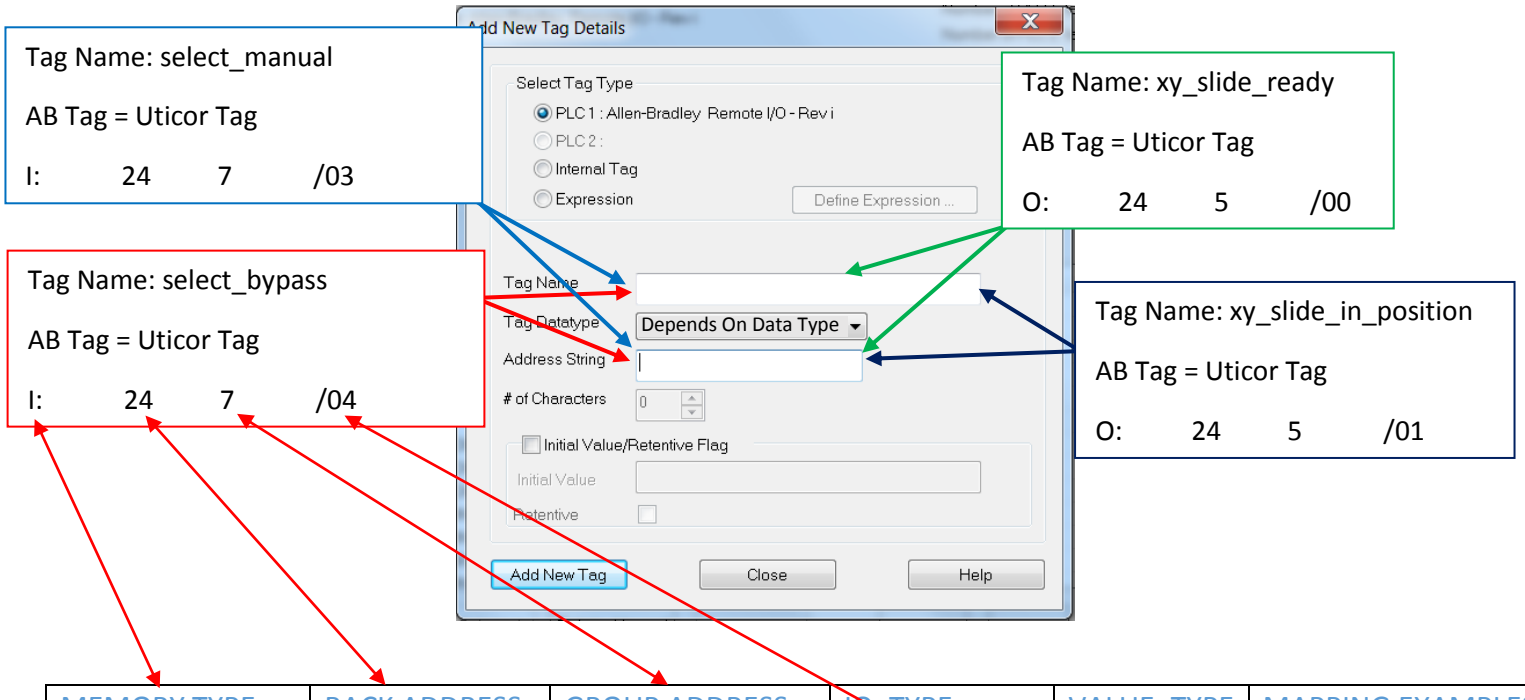
MEMORY TYPE	RACK ADDRESS	GROUP ADDRESS	IO_TYPE	VALUE_TYPE	MAPPING EXAMPLES
O - Output	0-37	0-7	READ_ONLY	WORD	O:377
I - Input	0-37	0-7	READ_WRITE	WORD	I:010
			READ_WRITE	DISCRETE	I:010/17

Uticor Input / Output Table

Tag Name	Rack Number	Group	Data Type	Usage
select_manual	24	7	Discrete	Input
select_bypass	24	7	Discrete	Input
xy_slide_ready	24	5	Discrete	Output
xy_slide_in_position	24	5	Discrete	Output

3. After the correct options are selected in Rack screen. Click OK till you get into the Tough Panel Editor screen. Then go to **Setup > Tag Database** and click on Add/Edit. This is where the actual tag address will be added. The Uticor Tag Address is the same as AB tags address.

TAG NAME	Allen-Bradley Tag Address	Uticor Tag Address
select_manual	I:247/03	I:247/03
select_bypass	I:247/04	I:247/04
xy_slide_ready	O:245/00	O:245/00
xy_slide_in_position	O:245/01	O:245/01



MEMORY TYPE	RACK ADDRESS	GROUP ADDRESS	IO_TYPE	VALUE_TYPE	MAPPING EXAMPLES
O - Output	0-37	0-7	READ_ONLY	WORD	O:377
I - Input	0-37	0-7	READ_WRITE	WORD	I:010
			READ_WRITE	DISCRETE	I:010/17

4. You have now added the correct tag addressing for Input and Output tags.

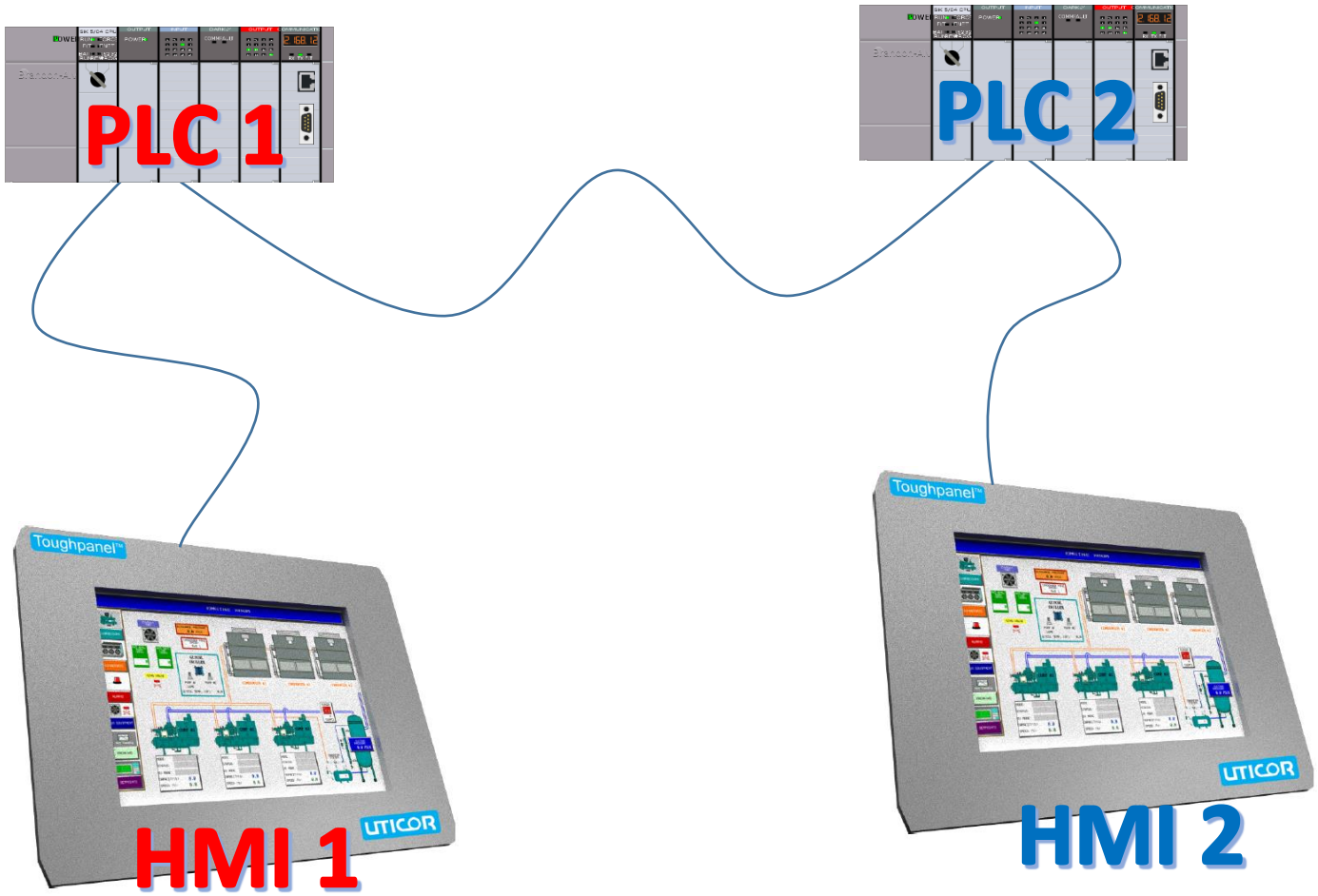
Inputs/Outputs on different Racks

Note as mentioned before any quarter that is active can only be monitored by 1 Uticor HMI. If more than 1 Uticor HMI attempt to monitor the same quarter then there will be errors. Therefore to work with inputs and outputs on different racks either the needed quarter with the inputs/outputs cannot already be monitored by an Uticor HMI or the need input/output needs to be mirrored on the main PLC for the HMI. To understand better see examples below.

Monitoring different quarters

Setup:

- 2 Uticor HMIs with Remote IO
- 2 Allen-Bradley PLCs with Remote IO (Rack 1 and 2)

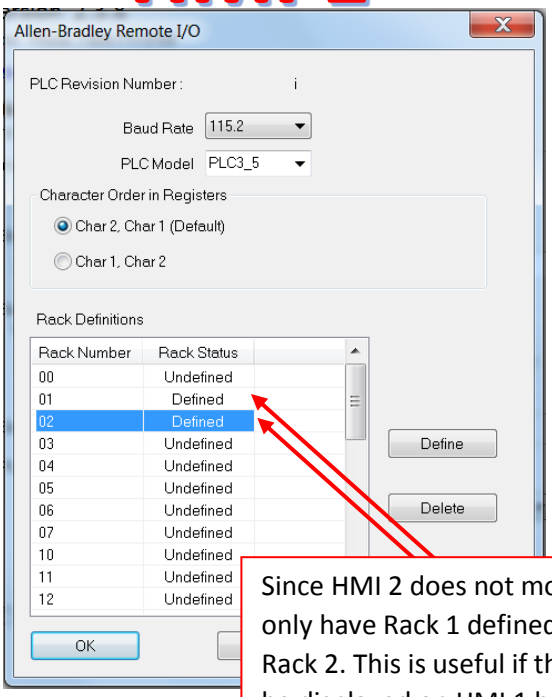


We have setup these HMIs and PLC with the following setup:

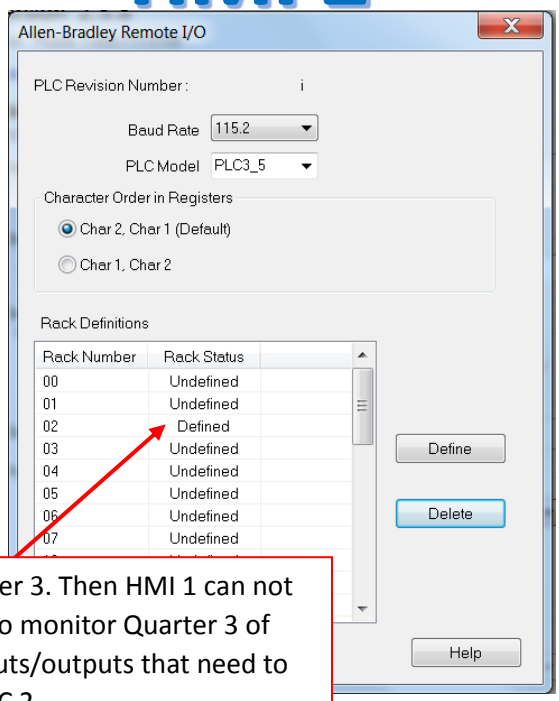
- HMI 1 has BTR and BTW communication with PLC 1 Quarters 0, 1, 2, 3 (AB Words [UT Groups] 0, 1, 2, 3, 4, 5, 6, 7).
- HMI 2 has BTR and BTW communication with PLC 2 Quarters 0, 1, 2 (AB Words [UT Groups] 0, 1, 2, 3, 4, 5).

Now suppose that PLC 2 (Rack 2) has some inputs and outputs that HMI 1 needs to display. Since in this setup HMI 2 does not need monitor Quarter 3. Therefore Inputs and Outputs can be setup to use AB Word [UT Group] 6 or 7. Example address is I:026 or O:027.

HMI 1



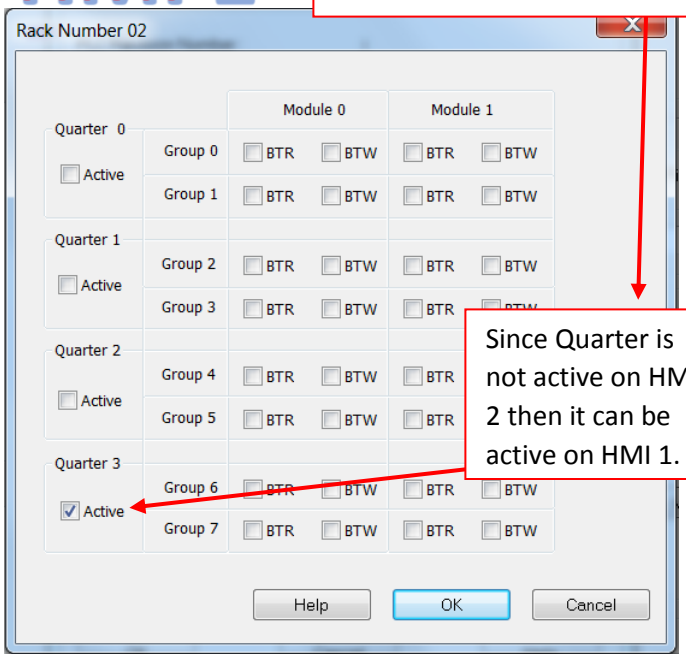
HMI 2



Since HMI 2 does not monitor Quarter 3. Then HMI 1 can not only have Rack 1 defined but can also monitor Quarter 3 of Rack 2. This is useful if there are inputs/outputs that need to be displayed on HMI 1 but are on PLC 2.

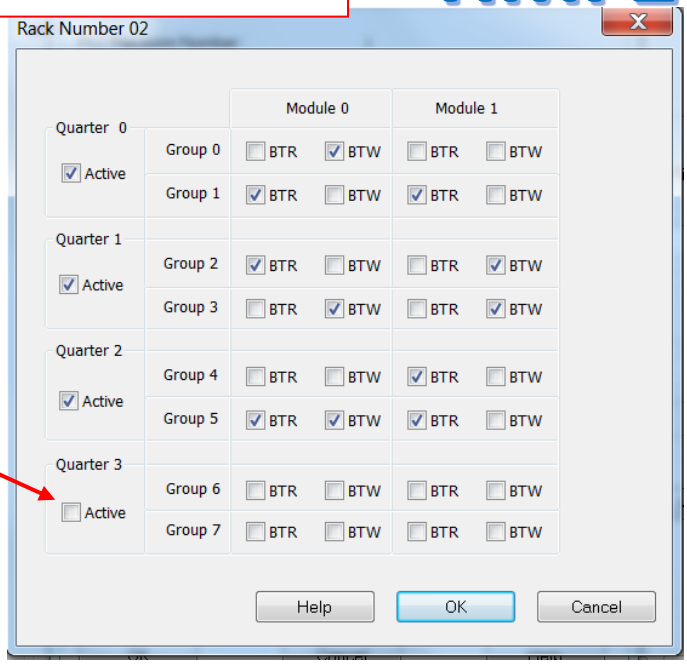
DO NOT Activate the same Quarter on more than 1 HMI. This will cause errors.

HMI 1



Since Quarter is not active on HMI 2 then it can be active on HMI 1.

HMI 2



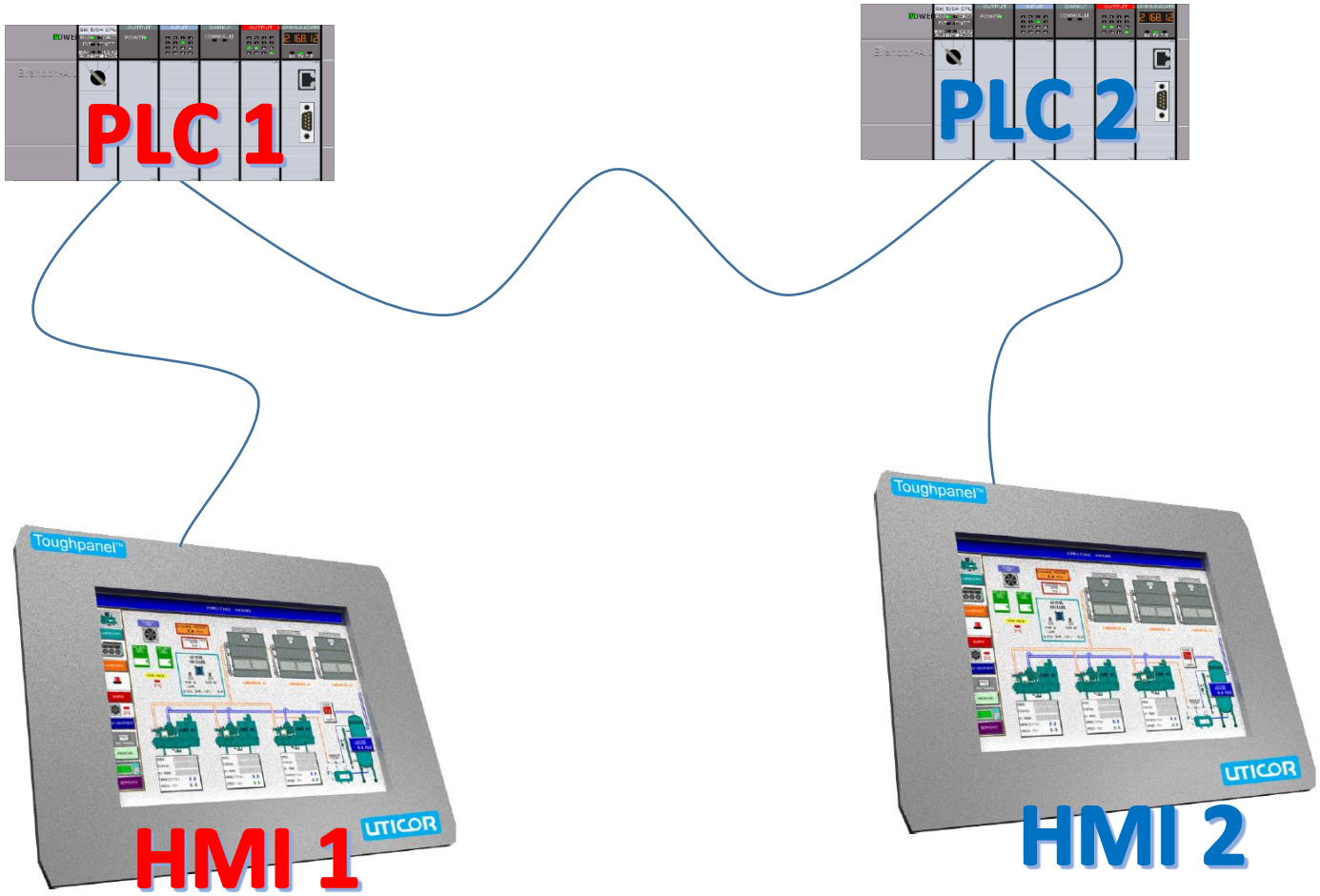
Mirroring an Input/Output

Setup:

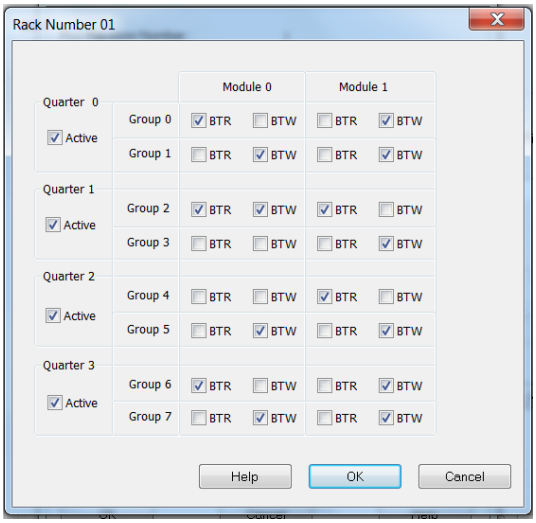
- 2 Uticor HMIs with Remote IO
- 2 Allen-Bradley PLCs with Remote IO (Rack 1 and 2)

Both HMIs are monitoring all the quarters on their respective PLC. Therefore in the PLC ladder logic instead of the HMIs monitoring the input/output of the other PLC. Instead PLC 1 needs to monitor PLC 2 input/output and map it to one of its own inputs/outputs. Thereby being able to display it on HMI 1 if the input/output changes on PLC 2.

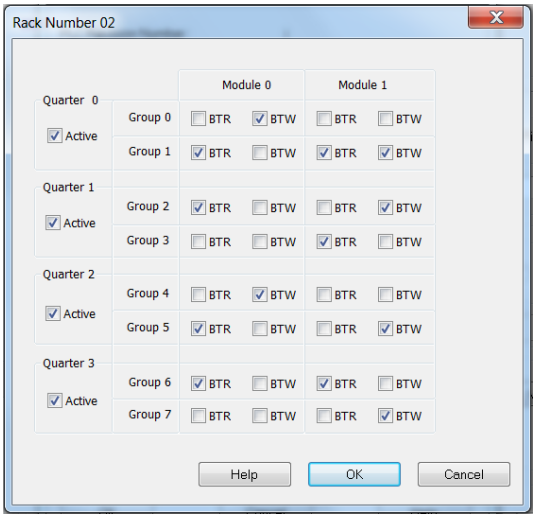
More detailed instructions on following pages.



HMI 1



HMI 2



Since both HMI 1 and HMI 2 are using all 4 quarters (0, 1, 2, 3) therefore neither HMI can monitor the other PLC (Rack) at all. Therefore what needs to happen is the inputs/outputs that HMI 1 is supposed to display from PLC 2 (Rack 2) need to be first mapped to PLC 1 (Rack 1).

Example:

1. Start with the current setup for PLCs.

Inputs/Outputs

Inputs/Outputs

I:026/5, I:027/8

O:023/10, O:024/4

2. Since all the Quarters on PLC 2 are monitored by HMI 2. None of the example inputs/outputs could be monitored currently by HMI 1. Therefore PLC 1 needs to monitor PLC 2 and the inputs/outputs need to map to some of its own inputs/outputs.

Inputs/Outputs

I:016/5, I:015/4

O:012/5, O:014/4

I:026/5	->	I:016/5
I:027/8	->	I:015/4
O:023/10	->	O:012/5
O:024/4	->	O:014/4

Inputs/Outputs

I:026/5, I:027/8

O:023/10, O:024/4

3. Now the current inputs/outputs on PLC 1 can be monitored by HMI 1. And since they mirror PLC 2 they are really the inputs/outputs of PLC 2.