3100/3150 - YRK
York Chiller
Master Module

Revision 1.0

USER MANUAL

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ProSoft Technology, Inc.
9801 Camino Media
Suite 105
Bakersfield, CA 93311
prosoft@prosoft-technology.com

Please Read This Notice

Successful application of the YRK card requires a reasonable working knowledge of the Allen-Bradley PLC or SLC hardware and the application in which the combination is to be used. For this reason, it is important that those responsible for implementing the YRK satisfy themselves that the combination will meet the needs of the application without exposing personnel or equipment to unsafe or inappropriate working conditions.

This manual is provided to assist the user. Every attempt has been made to assure that the information provided is accurate and a true reflection of the product's installation requirements. In order to assure a complete understanding of the operation of the product, the user should read all applicable Allen-Bradley documentation on the operation of the A-B hardware.

Under no conditions will ProSoft Technology, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of the YRK product.

Information in this manual is subject to change without notice and does not represent a commitment on the part of ProSoft Technology, Inc. Improvements and/or changes in this manual or the product may be made at any time. These changes will be made periodically to correct technical inaccuracies or typographical errors.

Product Revision History

04/9/97 Revision 1.0
Initial release of product

Implementation Guide

Integration of the YRK module into a PLC or SLC application is easier the first time if a series of steps are followed. In order to assist the first time users of our products in getting the YRK operational quickly, we have come up with this step-by-step implementation guide.

a) Starting with one of the ladder logic programs provided on disk with the YRK complete the following steps:

PLC 5	YRK5
SLC 5/03	YRK503

b) Edit the ladder logic provided on disk as needed for the application
   - Verify rack and slot location in program
   - Modify ladder instruction addresses as needed
   - Reference Appendix for tips in the SLC platform

c) Setup the Communication Configuration parameters (See Section 2)
   - Determine the configuration requirements:
     - Baud Rate, Number of slaves, page map requirements, etc.

d) Identify the jumper requirements (See Appendix)

e) Make up the communication cables (See Section 5)

f) Place processor into the run mode

g) Monitor the data table Error Status values (See Section 2)

Table of Contents

1 Product Specifications

The 3100/3150-YRK ("York Master Module") product family allows Allen-Bradley 1771 and 1746 I/O compatible processors to easily interface as a host with up to 15 York Chillers per port.

The YRK product includes the following standard features:

General Specifications

- Support for up to 14 York chillers per port
- RS-232 or RS-485 communications (jumper selectable)
- Software configuration (From processor ladder logic)
  - Baud Rate : 1,200 TO 38,400
  - Message Response Timeout
  - Number of active slaves : 1 to 15 per port
  - Prioritized Page Polling List : Up to 90 entries
  - Active Slave Table
- Response time
  The protocol drivers are written in Assembly and in a compiled higher level language. As such, the interrupt capabilities of the hardware are fully utilized to minimize delays, and to optimize the product's performance

Hardware Specifications

- Backplane Current Load :
  - 3100 : 0.65 A
  - 3150 : 0.15 A at 5 V
    0.04 A at 24 V
- Operating Temperature : 0 to 60 °C
- Storage Temperature : -40 to 85 °C
- Connections :
  - 3100 : 2 - DB25 Female Connectors
  - 3150 : 2 - DB9 Male Connectors

2 YRK Theoretical Operation

Data transfers between the processor and the ProSoft Technology module occur using the Block Transfer commands, in the case of the PLC, and M0/M1 data transfer commands, in the case of the SLC. These commands transfer up to 64 physical registers per transfer. The logical data length changes depending on the data transfer function.

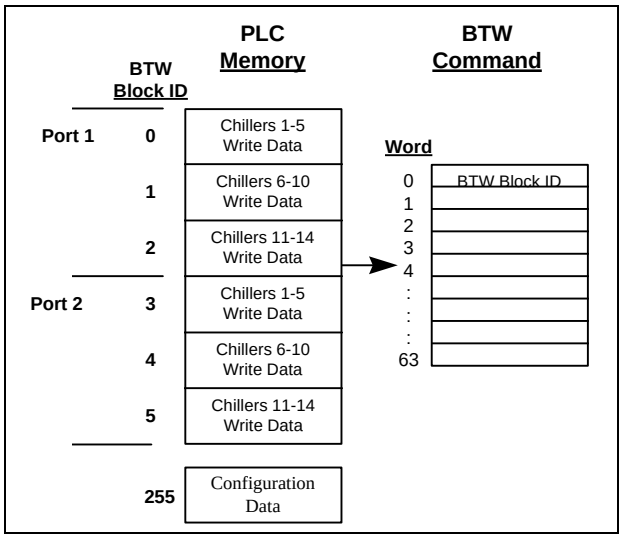
The following discussion details the data structures used to transfer the different types of data between the ProSoft Technology module and the processor. The term 'Block Transfer' is used generically in the following discussion to depict the transfer of data blocks between the processor and the ProSoft Technology module. Although a true Block Transfer function does not exist in the SLC, we have implemented a pseudo-block transfer command in order to assure data integrity at the block level. Examples of the PLC and SLC ladder logic are included in Appendix A.

> In order for the ProSoft Technology module to function, the PLC must be in the RUN mode, or in the REM RUN mode. If in any other mode (Fault/PGM), the block transfers between the PLC and the module will stop, and communications will halt until block transfers resume.

2.1 Block Transferring Data to the Module

Data transfer to the module from the processor is executed through the Block Transfer Write function. The different types of data which are transferred require slightly different data block structures, but the basic data structure is:

Word	Name	Description
0	BTW Block ID	A block page identifier code. This code is used by the ProSoft module to determine what to do with the data block. Valid codes are: **BTW Code** — **Description** 0-2 Port 1 Write Enable and Data 3-5 Port 2 Write Enable and Data 80-81 Page Polling List (Prioritized) 255 Module Communication Configuration
1 to 63	Data	The data to be written to the module. The structure of the data is dependent on the Block ID code. The following sections provide details on the different structures.



Although the full physical 64 words of the data buffer may not be used, the BTW and M0 lengths must be configured for 64 words otherwise module operation will be unpredictable.

2.1.1 Communications Configuration [BTW Block ID 255]

The ProSoft Technology module communication parameters must be configured at least once when the card is first powered up, and any time thereafter when the parameters must be changed.

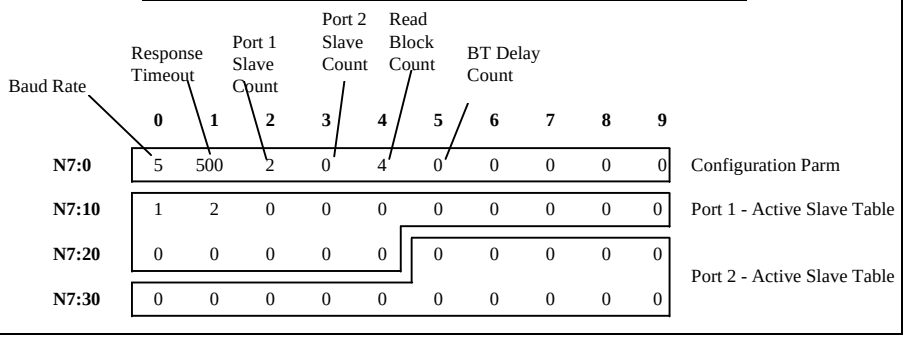
On power up, the module enters into a logical loop waiting to receive configuration data from the processor. While waiting, the module sets the second word of the BTR buffer to 255, telling the processor that the module must be configured before anything else will be done. The module will continuously perform block transfers until the communications configuration parameters block is received. Upon receipt, the module will begin execution of the command list if present, or begin looking for the command list from the processor.

Transferring the Communications Configuration Parameters to the module will force a reset of the communication ports

The configuration data block structure which must be transferred from the processor to the module is as follows:

BTW Buffer	Data Word	Description
0		Block ID Header = 255
Configuration Parameters		
1	N[ ]:0	Baud Rate
2	N[ ]:1	Response Timeout
3	N[ ]:2	Port 1 - Max Number of Slaves
4	N[ ]:3	Port 2 - Max Number of Slaves
5	N[ ]:4	Read Block Count
6	N[ ]:5	Block Transfer Delay Count
7	N[ ]:6	Last State on Comm Fail
8-10	N[ ]:7-9	Spare
Active Slave Table		
11-24	N[ ]:10-24	Port 1 - Slave Addresses(Up to 15 slaves)
25-39	N[ ]:25-39	Port 2 - Slave Addresses(Up to 15 slaves)

Configuration Memory map for Example Application



Name	Description
Baud Rate	The baud rate at which the port is to operate. The available configurations are as follows: Value — Baud Rate 2 — 1200 Baud 3 — 2400 Baud 4 — 4800 Baud 5 — 9600 Baud * 6 — 19200 Baud 7 — 38400 Baud * York Field Unit Factory Default Setting
Message Response Timeout	This register represents the message response timeout period in 1 ms increments. This is the time which a port configured as a Master will wait before re-transmitting a command if no response is received from the addressed slave. The value is set depending on the expected slave response times. The module has been hardcoded with a minimum value of 20000 (20 seconds) in order to assure that the unit works when a chiller is down. Therefore a value of 0 may normally be entered in this register.
Port 1 - Max Number of Slaves Port 2 - Max Number of Slaves	This value is used by the module to optimize the number of data blocks returned to the PLC data table as well as several of the internal logic routines. The value entered here can range from 1 to 15.
Read Data Block Count	This value represents the number of 50 word data blocks which are to be transferred from the YRK Module to the processor. The blocks returned from the module start at block 0 and increment from there. The maximum block count is 80. Two blocks per active slave should be requested. As an example, if there are 2 active slaves on port 1, a value of 4 should be requested to return module registers 0 to 199. If a value of 0 is entered the YRK module uses the Number of Slaves configuration value to determine the Read Block Count value.
Block Transfer Delay Counter	This is an empirical value used by the module to balance the amount of time the module spends block transferring and the amount spent handling port communications. The value entered is used as a loop counter in the module, where each time through the loop the count is incremented. When the count equals the Block Transfer Delay Counter a Block Transfer sequence is initiated. A value of zero (0) is suggested unless directed differently by the factory. Example : In Master Mode applications with the module in a remote rack, the frequency of command execution can be improved by entering a value of 75-150. The value must be determined empirically.
Port 1 – Active Slave Table Port 2 - Active Slave Table	These 15 words allow the user to configure the specific slaves addresses which are active on a network. The intent of this table is to allow the user to selectively enable slave addresses and therefore not having to have sequential slave addressing.

2.1.2 Write Page Data Command Blocks [BTW Block ID Code 0 to 5]

A YRK Master port establishes communications and performs various communications functions based on the data which the user has placed in the Command Blocks. The Command Blocks are 50 word data blocks containing bit mapped 'Enable Bits' and actual write data. The actual command which is executed by the module is determined by the user setting the correct 'Enable Bit' to a 1.

All commands are one-shoted by the module (ie., the module must see a 1 to 0 transition before the command can be re-enabled with a 0 to 1 transition). The user may use the 'Cmd Done Bit' (See next section) to clear the command or any other means appropriate. This command data, entered into the processor Data Table, is transferred to the module's memory using Block IDs 0 through 5, depending on the command to be executed.

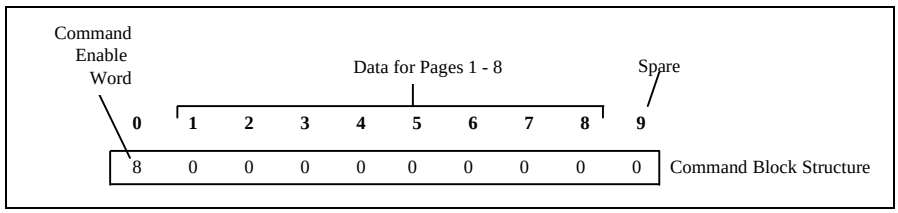
The structure of the data for each slave position is broken down as follows:

Important Note

For the 8 available pages that can be written to (Page 1 to 8), the module is coded to assume the following data types for the pages:

Pages 1 to 4 : Analog
Pages 5 to 8 : Discrete

Word	Name	Description
0	Command Enable	This is a bit mapped word which contains the individual page write command enables. This bit is one-shoted by the module to assure that the write command is only written once. This bit can be cleared in ladder logic using the Done bit returned from the module. **Bit** — **Description** 0 — Cmd Enable - Page Number 1 1 — Cmd Enable - Page Number 2 2 — Cmd Enable - Page Number 3 3 — Cmd Enable - Page Number 4 4 — Cmd Enable - Page Number 5 5 — Cmd Enable - Page Number 6 6 — Cmd Enable - Page Number 7 7 — Cmd Enable - Page Number 8
1-8	Write Data	These values are the actual data values (x10) to be written to the slave. Example: 121 will write a value of 12.1 to the chiller
9	Spare	Not Used



Port 1 Command Blocks

Word	Description
0	BTW Block ID Code (= 0)
1 to 10	Slave Position #1 - Enable and Data
11 to 20	Slave Position #2 - Enable and Data
21 to 30	Slave Position #3 - Enable and Data
31 to 40	Slave Position #4 - Enable and Data
41 to 50	Slave Position #5 - Enable and Data

Word	Description
0	BTW Block ID Code (= 1)
1 to 10	Slave Position #6 - Enable and Data
11 to 20	Slave Position #7 - Enable and Data
21 to 30	Slave Position #8 - Enable and Data
31 to 40	Slave Position #9 - Enable and Data
41 to 50	Slave Position #10 - Enable and Data

Word	Description
0	BTW Block ID Code (= 2)
1 to 10	Slave Position #11 - Enable and Data
11 to 20	Slave Position #12 - Enable and Data
21 to 30	Slave Position #13 - Enable and Data
31 to 40	Slave Position #14 - Enable and Data
41 to 50	Slave Position #15 - Enable and Data

Port 2 Command Blocks

Word	Description
0	BTW Block ID Code (= 3)
1 to 10	Slave Position #1 - Enable and Data
11 to 20	Slave Position #2 - Enable and Data
21 to 30	Slave Position #3 - Enable and Data
31 to 40	Slave Position #4 - Enable and Data
41 to 50	Slave Position #5 - Enable and Data

Word	Description
0	BTW Block ID Code (= 4)
1 to 10	Slave Position #6 - Enable and Data
11 to 20	Slave Position #7 - Enable and Data
21 to 30	Slave Position #8 - Enable and Data
31 to 40	Slave Position #9 - Enable and Data
41 to 50	Slave Position #10 - Enable and Data

Word	Description
0	BTW Block ID Code (= 5)
1 to 10	Slave Position #11 - Enable and Data
11 to 20	Slave Position #12 - Enable and Data
21 to 30	Slave Position #13 - Enable and Data
31 to 40	Slave Position #14 - Enable and Data
41 to 50	Slave Position #15 - Enable and Data

Command Blocks

Port #1

Block ID 0

	0	1	2	3	4	5	6	7	8	9	
N10:0	0	0	0	0	0	0	0	0	0	0	Slave Position #1
N10:10	0	0	0	0	0	0	0	0	0	0	Slave Position #2
N10:20	0	0	0	0	0	0	0	0	0	0	Slave Position #3
N10:30	0	0	0	0	0	0	0	0	0	0	Slave Position #4
N10:40	0	0	0	0	0	0	0	0	0	0	Slave Position #5

Block ID 1

N10:50	0	0	0	0	0	0	0	0	0	0	Slave Position #6
N10:60	1	0	0	0	0	0	0	0	0	0	Slave Position #7
N10:70	0	0	0	0	0	0	0	0	0	0	Slave Position #8
N10:80	0	0	0	0	0	0	0	0	0	0	Slave Position #9
N10:90	0	0	0	0	0	0	0	0	0	0	Slave Position #10

Block ID 2

N10:100	0	0	0	0	0	0	0	0	0	0	Slave Position #11
N10:110	0	0	0	0	0	0	0	0	0	0	Slave Position #12
N10:120	1	0	0	0	0	0	0	0	0	0	Slave Position #13
N10:130	0	0	0	0	0	0	0	0	0	0	Slave Position #14
N10:140	0	0	0	0	0	0	0	0	0	0	Slave Position #15

Port #2

Block ID 3

	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
N11:0	0	0	0	0	0	0	0	0	0	0	Slave Position #1
N11:10	0	0	0	0	0	0	0	0	0	0	Slave Position #2
N11:20	0	0	0	0	0	0	0	0	0	0	Slave Position #3
N11:30	0	0	0	0	0	0	0	0	0	0	Slave Position #4
N11:40	0	0	0	0	0	0	0	0	0	0	Slave Position #5

Block ID 4

N11:50	0	0	0	0	0	0	0	0	0	0	Slave Position #6
N11:60	1	0	0	0	0	0	0	0	0	0	Slave Position #7
N11:70	0	0	0	0	0	0	0	0	0	0	Slave Position #8
N11:80	0	0	0	0	0	0	0	0	0	0	Slave Position #9
N11:90	0	0	0	0	0	0	0	0	0	0	Slave Position #10

+

Block ID 5

N11:100	0	0	0	0	0	0	0	0	0	0	Slave Position #11
N11:110	0	0	0	0	0	0	0	0	0	0	Slave Position #12
N11:120	1	0	0	0	0	0	0	0	0	0	Slave Position #13
N11:130	0	0	0	0	0	0	0	0	0	0	Slave Position #14
N11:140	0	0	0	0	0	0	0	0	0	0	Slave Position #15

2.1.3 Page Polling List [BTW Block ID Code 80 and 81]

An YRK Master port collects data from the Chiller slaves based on Page numbers. The Page Polling List allows the user to configure which pages will be read from the slaves. The key thing to remember is that the Page Polling List applies to all active slaves.

On power up or after module configuration (255 block) the module will set the second word of the BTR buffer to 80 and then 81, telling the processor that the module is expecting to receive the Page Polling List. The ladder logic, if active, must respond at this point with the appropriate BTW Block ID value (80/81 respectively).

The structure of the Page Polling List is as follows:

BTW Buffer	Data Word	Description
0		Block ID Header = 80
1-10	N[ ]:0-9	High Priority Page Numbers (10)
11-20	N[ ]:10-19	Medium Priority Page Numbers(10)
21-50	N[ ]:20-49	Low Priority Page Numbers(30)
0		Block ID Header = 81
1-40	N[ ]:0-39	Low Priority Page Numbers(40)

Note that the following polling frequency is followed based on priority type:

High Priority	Every Scan
Med Priority	Every 5th Scan
Low Priority	Every 13th Scan

Floating Point Values

Up to three floating point values can be returned from a York Chiller to the PLC. If a value is to be read and returned as a Float, the upper byte of the Page Number entry is used to identify this fact and also to locate the value in the three available floating point data positions.
The possible values of the upper byte are as follows:

Values	Description
0	Integer value returned
1	Float value returned. This value will be located in Floating Point Position #1 of the data returned from the module
2	Float value returned. This value will be located in Floating Point Position #2 of the data returned from the module
3	Float value returned. This value will be located in Floating Point Position #3 of the data returned from the module

Block ID 80

	0	1	2	3	4	5	6	7	8	9	
N12:0	5	9	10	56	57	0	0	0	0	0	High Priority Pages
N12:10	1	2	14	15	58	69	70	71	72	74	Medium Priority pages
N12:20	11	12	13	23	24	286	77	0	0	0	
N12:30	0	0	0	0	0	0	0	0	0	0	Low Priority Pages (30 pages)
N12:40	0	0	0	0	0	0	0	0	0	0	

Block ID 81

	0	1	2	3	4	5	6	7	8	9	
N12:50	1	0	0	0	0	0	0	0	0	0	
N12:60	0	0	0	0	0	0	0	0	0	0	Low Priority Pages (40 pages)
N12:70	0	0	0	0	0	0	0	0	0	0	
N12:80	0	0	0	0	0	0	0	0	0	0	

2.2 Transferring data from the module [BTR Block ID 0 to 59]

When the YRK Master port driver reads data from a slave the resulting data is placed into the ProSoft module's data space (Addresses 0 to 2999). The structure of each set of slave data is predetermined and programmed into the module (see below). The position of each slave's data structure is a function of the position of the slave in the Port Active Slave List (See Configuration Section 2.1.1).

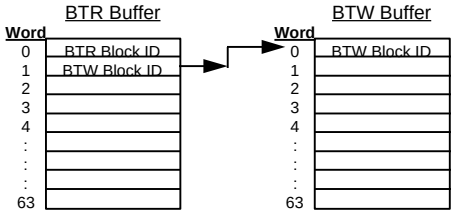
The transfer of data from the ProSoft Technology module to the processor is executed through the Block Transfer Read function. The following sections detail the handling of the read data.

> Although the full physical 64 words of the data buffer may not be used, the BTR and M1 lengths must be configured for a length of 64 words, otherwise module operation will be unpredictable

The ladder logic must be programmed to look at the BTR buffer, decode several words, and then take action.

2.2.1 The Read Data Block Structure

The BTR buffer definition is:

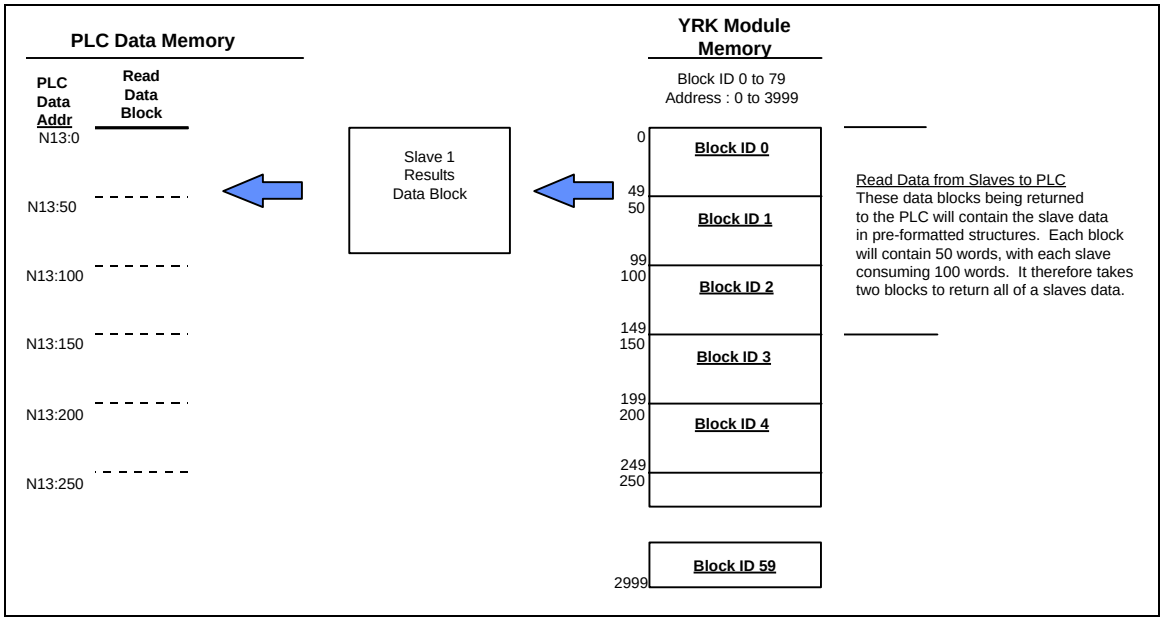
Word	Name	Description
0	BTR Block ID	The ladder logic uses this value to determine the contents of the data portion of the BTR buffer. With some conditional testing in ladder logic, the data from the module can be placed into the PLC/SLC data table. The relationship between the BTR Block ID number and the register table can be put into an equation: Starting Register Address = Block ID Number * 50 Valid codes are between 0 and 79.
1	BTW Block ID	The module returns this value to the processor to be used to enable the movement of and command data blocks to the module. 
2 to 51 (50 words)	Data	The contents of the module's Register Data space (0 - 3999). The data will contain the slave data structure for up to 5 slaves. The structure is outlined below.
52 to 61 (10 words)	Command Done Bits	These 10 words contain bit mapped Command Done Bits which correspond to the slave address (ie., bit 0 of the block corresponds to slave #1, etc). These bits are intended to be used to unlatch the Cmd Enable bits through ladder logic.

2.2.2 Moving the data from the module to the processor

The data register table is transferred from the module to the ladder logic through a paging mechanism designed to overcome the 64 physical word limit of the BTR instruction. The paging mechanism is outlined in the discussion above, but the important thing to understand is the relationship between the

page numbers (BTR Block ID numbers) and the register addresses in the module.

The diagram also shows the layout for an example application. Note the number of blocks returned from the module to the ladder logic is determined by the value entered in the module's configuration 'Max Number of Slaves' register, or if non-zero, the value in 'Read Block Count'. In this example we have assumed a 'Max Slave Count' value of 15, allowing three (3) data blocks to be returned from the module.



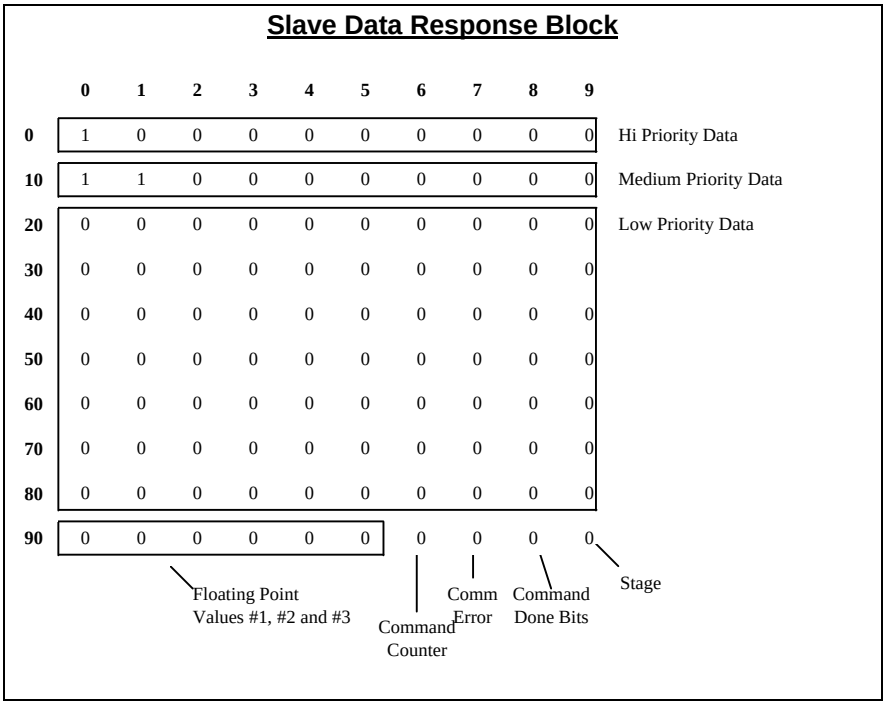
Read Data Blocks being returned from the YRK module to the PLC data table. The actual number of data blocks returned from the module is determined by the Read Block Count value entered during module configuration (2 blocks required per active slave).

2.2.3 Slave Data Results

The data values returned from each of the active slaves are placed in the module's data table and then transferred over to the PLC data table for handling by the ladder logic. Several important points to understand include:

1. The position of each slave's data in the module is determined by the position of the slave in the Port Active Slave Table.
2. A maximum of 30 slaves worth of data can be gathered from the module, up to 15 slaves per port
3. Each slave position, whether activated in the Active Slave Table or not, has space reserved in the module
4. Non-contiguous slaves in the Active Slave Table will result in holes in the data table being returned from the module. Although not normally a problem, caution should be exercised when selecting slave positions to minimize these hole (ie., reduce the number of Block Transfers needed to read back the data)

The structure of the 100 word Slave Data block when reading data from the module is as follows:



Slave Data response structure. Each slave position has 100 words reserved in the module in the structure shown in the diagram.

where:

Slave #x Response : The structure of each slaves read data and communication status data is as follows:

Position	Name	Description
0-9	Hi Priority Read Data	Data read from York Chiller based on Page Numbers entered in the Hi Priority Poll list. Please note that all data values are returned with an implied decimal point of 1 (ie., a chiller value of 10.0 will be returned to the PLC as 100). These value are read every scan of the page list.
10-19	Medium Priority Read Data	Data read from York Chiller based on Page Numbers entered in the Medium Priority Poll list. Please note that all data values are returned with an implied decimal point of 1 (ie., a chiller value of 10.0 will be returned to the PLC as 100). These values are read every 5th scan of the page list.
20-89	Lo Priority Read Data	Data read from York Chiller based on Page Numbers entered in the Low Priority Poll list. Please note that all data values are returned with an implied decimal point of 1 (ie., a chiller value of 10.0 will be returned to the PLC as 100). These values are read every 13th scan of the page list.

90-91 92-93 94-95	Floating Point Value #1, #2, and #3	Floating point image of data read back from the York Chiller. These 32-bits must be COPied into a float file location to read them in the PLC/SLC. These values are returned to the PLC in the same form as received from the chiller.
96	Communication Counter	The is a roll over counter (0 to 32767) which increments upon completion of every successful communication transaction with a slave. This counter will increment on poll (read) commands as well as write commands
97	Communication Status Code	See Trouble Shooting Section
98	Command Done Bits	These are bits returned as a result of executing a write command. See Section 2.12 for executing commands. See Section 2.2.4 for details on Command Done Bits.
99	Stage	This is a status register indicating the operational state of the communications driver. The values are as follows: **Value** — **Description** 0 — Issue Login Command 1 — Sending Password (Fixed at 1) 2 — Send Open 0,ss Command 3 — Send 'e1e' to gain access 4 — Polling for data 5 — Writing Data 6 — Sending Close Link Command 10 — Unknown State (powerup only)

2.2.4 Command Done Bits

The YRK Module returns 'Command Done' bits to the ladder logic. A Done bit is returned per Page Write Command per slave address, allowing ladder logic to be used to clear the Command Enable bits. The following important points should be noted about the Command Done bits:

1. There is only one bit returned per slave address, not one bit per command per slave. The implication of this is that one Done bit must be used to clear all possible Enable bits for one slave address. Example logic is provided in the Appendix demonstrating this
2. The Command Done bit is a positive indication that the module executed the command. It is not an indication of the command's success. A Done bit is returned to the ladder logic whether the command was completed without error or not. This allows all commands to be unlatched the same way. To determine if there is a communication problem with a slave, verify the Port Comm Status bits in the slave Status field.
3. The Done bit data registers in the module are cleared and then updated prior to each backplane transfer sequence. This is done to assure that the ladder logic receives the quickest possible acknowledgment of a commands execution.

The structure of the Command Done bits in the BTR buffer when reading data from the module is as follows:

Word	Bit	Description
98	0	Cmd Done - Page Number 1
	1	Cmd Done - Page Number 2
	2	Cmd Done - Page Number 3
	3	Cmd Done - Page Number 4
	4	Cmd Done - Page Number 5
	5	Cmd Done - Page Number 6
	6	Cmd Done - Page Number 7
	7	Cmd Done - Page Number 8

2.2.5 Module Information Table

The YRK Module provides product data to the ladder logic during power up through the BTR data buffer whenever the BTW Block ID is set to 255. This data is useful for determining revision information and can be useful should support be necessary from the factory. This 10 word block of data is returned in the BTR data fields.

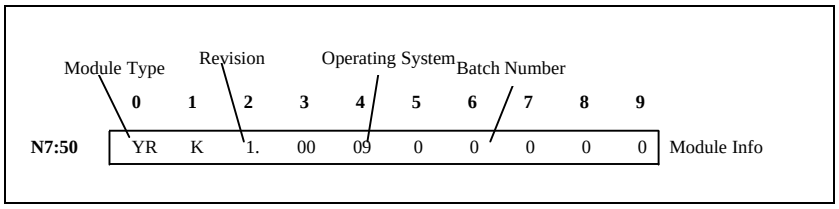
Word	Description
0	BTR Block ID Code
1	BTW Block ID(=255)
2-3	Product Name (ASCII)
4-5	Revision (ASCII)
6-7	Operating System Rev(ASCII)
8-9	Production Run Number (ASCII)
10-11	Spare

Product Name: These two words represent the product name of the module in an ASCII representation. In the case of the YRK product, the letters ' YRK ' should be displayed when placing the programming software in the ASCII data representation mode.

Revision : These two words represent the product revision level of the firmware in an ASCII representation. An example of the data displayed would be '1.01' when placing the programming software in the ASCII data representation mode.

Operating System Revision : These two words represent the module's internal operating system revision level in an ASCII representation.

Production Run Number: This number represents the 'batch' number that your particular chip belongs to in an ASCII representation.



3 Protocol Commands

The ProSoft Technology YRK module Master module is pre-programmed to support a subset of the Modbus protocol. The commands are all hard coded into the module and have been selected to implement specific functionality. The commands which have been programmed are documented in the following table. For a more complete discussion on these and other commands for the York actuators, please reference the York Terminal Manual, available from York International Inc. Talk XL.

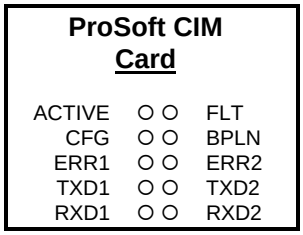
Command	Description
Open 0,ss	Open link to station ss on network 0
close link	Close link to secondary station
logon/login	Change user
logoff/logout	End session
list or r	List all pages of current option
Password	Hardcoded to a valued of 1
f02s01pxx	Read page command, where xx is page number
e1e	Gain access rights after Open 0,ss Send Make/Start Command
e0e	Send Stop/Open Command
exx.xe	Send setpoint value

4 Diagnostics and Troubleshooting

Several hardware diagnostics capabilities have been implemented using the LED indicator lights on the front of the module. The following sections explain the meaning of the individual LEDs for both the PLC and the SLC platforms.

4.1 3100-YRK PLC Platform LED Indicators

The PLC platform YRK product is based on the ProSoft CIM hardware platform. The following table documents the LEDs on the 3100-YRK hardware and explains the operation of the LEDs.

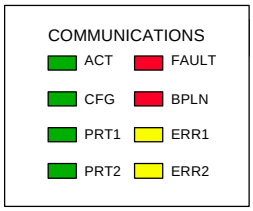


ProSoft CIM	Color	Status	Indication
ACT	Green	Blink (Fast)	Normal state : The module is operating normally and successfully Block Transferring with the PLC
		On	The module is receiving power from the backplane, but there may be some other problem
		Off	The module is attempting to Block Transfer with the PLC and has failed. The PLC may be in the PGM mode or may be faulted
FLT	Red	Off	Normal State : No system problems are detected during background diagnostics
		On	A system problem was detected during background diagnostics. Please contact factory for technical support
CFG	Green	Off	Normal state : No configuration related activity is occurring at this time
		Blink	This light blinks every time a Module Configuration block (ID = 255) is received from the processor ladder logic
		On	The light is on continuously whenever a configuration error is detected. The error could be in the Port Configuration data or in the System Configuration data
BPLN	Red	Off	Normal State : When this light is off and the ACT light is blinking quickly, the module is actively Block Transferring data with the PLC
		On	Indicates that Block Transfers between the PLC and the module have failed.(Not activated in the initial release of the product)

ERR1 ERR2	Amber	Off	Normal State : When the error LED is off and the related port is actively transferring data, there are no communication errors
		Blink	Periodic communication errors are occurring during data communications.
		On	This LED will stay on under several conditions: • CTS input is not being satisfied • Port Configuration Error • System Configuration Error • Unsuccessful comm on YRK slave • Recurring error condition on YRK master
Tx1 Tx2	Green	Blink	The port is transmitting data.
Rx1 Rx2	Green	Blink	The port is receiving data

4.2 3150-YRK SLC Platform LED Indicators

The following table documents the LEDs on the 3150-YRK hardware and explains the operation of the LEDs.



LED Name	Color	Status	Indication
ACT	Green	Blink (Fast)	Normal state : The module is operating normally and successfully Block Transferring with the SLC
		On	The module is receiving power from the backplane, but there may be some other problem
		Off	The module is attempting to Block Transfer with the SLC and has failed. The SLC may be in the PGM mode or may be faulted
FLT	Red	Off	Normal State : No system problems are detected during background diagnostics
		On	A system problem was detected during background diagnostics. Please contact factory for technical support
CFG	Green	Off	Normal state : No configuration related activity is occurring at this time
		Blink	This light blinks every time a Module Configuration block (ID = 255) is received from the processor ladder logic
		On	The light is on continuously whenever a configuration error is detected. The error could be in the Port Configuration data or in the System Configuration data. See Section 4 for details
BPLN	Red	Off	Normal State : When this light is off and the ACT light is blinking quickly, the module is actively Block Transferring data with the SLC
		On	Indicates that Block Transfers between the SLC and the module have failed
ERR1 ERR2	Amber	Off	Normal State : When the error LED is off and the related port is actively transferring data, there are no communication errors
		Blink	Periodic communication errors are occurring during data communications. See Section 4 to determine the error condition

		On	This LED will stay on under several conditions: • CTS input is not being satisfied • Port Configuration Error • System Configuration Error • Unsuccessful comm on YRK slave • Recurring error condition on YRK master
PRT1 PRT2	Green	Blink	The port is communicating, either transmitting or receiving data

4.3 Troubleshooting - General

In order to assist in the troubleshooting of the module, the following tables have been put together to assist you. Please use the following to help in using the module, but if you have additional questions or problems please do not hesitate to contact us.

The entries in this section have been placed in the order in which the problems would most likely occur after powering up the module.

Problem Description	**Steps to take**
BPLN light is on (SLC)	The BPLN light comes on when the module does not think that the SLC is in the run mode (ie., SLC is in PGM or is Faulted). If the SLC is running then verify the following: • Verify the SLC Status File to be sure the slot is enabed • The Transfer Enable/Done Bits (I/O Bits 0 for the slot with the module) must be controlled by the ladder logic. See Section 2.x for details or the example ladder logic in the Appendix. • If the ladder logic for the module is in a subroutine file verify that there is a JSR command calling the SBR
CFG light does not clear after power up	If the BPLN light has been cleared, then several of the Port and System configuration values are value checked by the module to be sure that legal entries have been entered in the data table. Verify the Error Status Table for an indication of a configuration error.
Module is not transmitting	Presuming that the processor is in run, verify the following: • • Check Error Status codes for 255 code. If so see next problem If all the ladder logic is block transferring with the module (Active LED is toggles)
Error Code 255 in Status Table	This is caused by only one thing, a missing CTS input on the port. If a cable is connected to the port, then verify that a jumper has been installed between the RTS and CTS pins. If so then there may be a hardware problem.
ERR light flashing periodically	Intermittent communication error. Check slave error status values and the Port A/B Status bits for each slave to determine where there may be a communication problem
New configuration values are not being accepted by the module	In order for new values to be moved to the module a Block Transfer Write with a Block ID of 255 must be transmitted to the module. The 'User Config Bit' in the example logic accomplishes this. In the example logic the bit must either be set in the data table manually or the module must be powered down/reset. In order to download the configuration upon transitioning from PGM to RUN, simply add a run to set the 'User Config Bit' based on the First Scan Status Bit (S1:1/15)

4.4 Communication Error Codes

The Error Codes returned from the module represent the outcome of the commands and responses executed by the module. Note that in all cases, if a zero is returned, there was not an error. Valid Error Status Codes are as follows:

> **NOTE**
> The York Talk XL will return error codes which are specific to the York equipment. Please review the York documentation for a full list of these error codes.

Code	Name	Description
0	All ok	The module is operating as desired
8	Timeout Error	Communications with the addressed slave have been unsuccessful due to a lack of response from the slave. The Master port will attempt a command three times before moving onto the next command.
10	Buffer Overflow	The receive buffer has overflowed and reset the character count to 0. If this condition occurs try reading fewer parameters at one time
16	Port Configuration Error	If this value is returned from the module, one or both of the serial ports have been misconfigured. To determine the exact source of the problem, verify the following: - Baud Rate Configuration
100 to 199	York Talk Error Codes	Error codes values which are returned from the York hardware are incremented by 100 before being returned to the PLC. See the York documentation for error codes.
43	Timeout in communications between York Talk XL and Chiller	This is an error response returned when the York Talk XL cannot communicate with a chiller panel.
255	TX Hardware Timeout	A transmit timeout condition has occurred indicating that the module was not able to transmit the command. Verify that the RTS-CTS jumper on the port is still connected

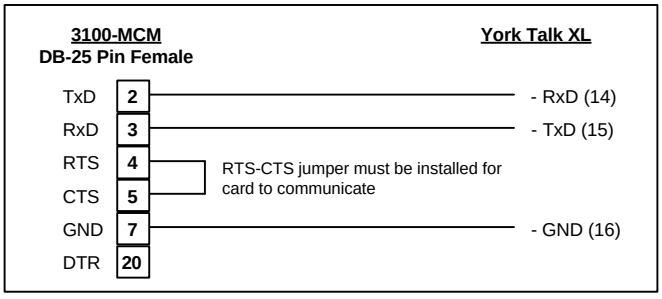
5 Cable Connection

The following diagrams show the connection requirements for the ports on the 3100 and 3150 modules.

3100-YRK Module

RS-232 Connection

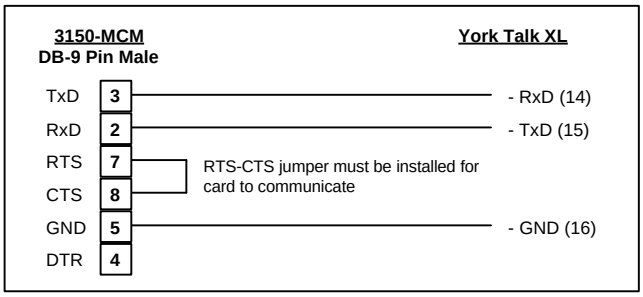
The port configuration jumper on the module must be set in the RS-232 position



3150-YRK Module

RS-232 Connection

The port configuration jumper on the module must be set in the RS-232 position



Support, Service and Warranty

Technical Support

ProSoft Technology survives on its ability to provide meaningful support to its customers. Should any questions or problems arise, please feel free to contact us at:

Factory/Technical Support
ProSoft Technology, Inc.
9801 Camino Media, Suite 105
Bakersfield, CA 93311
(661) 664-7208
(800) 326-7066
(661) 664-7233 (fax)
http://www.prosoft-technology.com
E-mail address: prosoft@prosoft-technology.com

Before calling for support, please prepare yourself for the call. In order to provide the best and quickest support possible, we will most likely ask for the following information (you may wish to fax it to us prior to calling):

1. Product Version Number
2. Configuration Information
   - Communication Configuration
   - Jumper positions
3. System hierarchy
4. Physical connection information
   - Cable configuration
5. Module Operation
   - Block Transfers operation
   - LED patterns

An after-hours answering system (on the Bakersfield number) allows pager access to one of our technical and/or application support engineers at all times to answer the questions that are important to you.

Module Service and Repair

The YRK card is an electronic product, designed and manufactured to function under somewhat adverse conditions. As with any product, through age, misapplication, or any one of many possible problems, the card may require repair.

When purchased from ProSoft Technology, the module has a one year parts and labor warranty according to the limits specified in the warranty. Replacement and/or returns should be directed to the distributor from whom the product was purchased. If you need to return the card for repair, it is first necessary to obtain an RMA number from ProSoft Technology. Please call the factory for this number and display the number prominently on the outside of the shipping carton used to return the card.

General Warranty Policy

ProSoft Technology, Inc. (Hereinafter referred to as ProSoft) warrants that the Product shall conform to and perform in accordance with published technical specifications and the accompanying written materials, and shall be free of defects in materials and workmanship, for the period of time herein indicated, such warranty period commencing upon receipt of the Product.

This warranty is limited to the repair and/or replacement, at ProSoft's election, of defective or non-conforming Product, and ProSoft shall not be responsible for the failure of the Product to perform specified functions, or any other non-conformance caused by or attributable to: (a) any misapplication of misuse of the Product; (b) failure of Customer to adhere to any of ProSoft's specifications or instructions; (c) neglect of, abuse of, or

accident to, the Product; or (d) any associated or complementary equipment or software not furnished by ProSoft.

Limited warranty service may be obtained by delivering the Product to ProSoft and providing proof of purchase or receipt date. Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to ProSoft, and to use the original shipping container or equivalent. Contact ProSoft Customer Service for further information.

Limitation of Liability

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Where directed by State Law, some of the above exclusions or limitations may not be applicable in some states. This warranty provides specific legal rights; other rights that vary from state to state may also exist. This warranty shall not be applicable to the extent that any provisions of this warranty is prohibited by any Federal, State or Municipal Law that cannot be preempted.

Hardware Product Warranty Details

Warranty Period : ProSoft warranties hardware product for a period of one (1) year.

Warranty Procedure : Upon return of the hardware Product ProSoft will, at its option, repair or replace Product at no additional charge, freight prepaid, except as set forth below. Repair parts and replacement Product will be furnished on an exchange basis and will be either reconditioned or new. All replaced Product and parts become the property of ProSoft. If ProSoft determines that the Product is not under warranty, it will, at the Customer's option, repair the Product using current ProSoft standard rates for parts and labor, and return the Product freight collect.

Jumper Configurations

Hardware Overview

When purchasing the YRK product, there are two available configurations. These choices are as follows:

	ProSoft Cat Num	
Description	**PLC**	**SLC**
Module provided by ProSoft	3100	3150

When purchasing the module from ProSoft Technology, the jumper configurations will have been factory set to default positions for testing prior to shipment..

Module Jumper Configurations

The following section details the available jumper configurations for the 1771 and 1746 platform solutions. As needed, differences between the module based solutions and the firmware based solutions are highlighted.

3100 for the 1771 Platform

Following are the jumper positions for the ProSoft Technology 3100-YRK module:

Jumper	3100
JW1	N/A
JW2	N/A
JW3	N/A
JW4	Flash Pgm/Run Mode
JW5	8 Pt
JW6	Not Used
JW7	Enabled
JW8	Port 2 RS232/422/485 config
JW9	Port 1 RS232/422/485 config

JW4 Flash Pgm/Run Mode Select **Run Position**

The position of this jumper should only be changed if needing to reprogram the YRK FLASH memory. This will only need to be done if the module is to be upgraded in the field to a later version of firmware.

JW5 Backplane 8/16 point **8 Point**

The module should be operated in the 8 point configuration unless specifically directed otherwise by the factory.

JW7 Battery Enable / Disable **Enabled**

This jumper should be placed in the Enabled position when the module is powered up. Although not critical to the operation of the module, this will back up some data registers in the module during a power failure or reset.

JW8/9 RS Configuration for Port 1 and 2 **RS-232**

The default from factory is RS-232, but all options are supported by the YRK firmware

3150 for the 1746 Platform

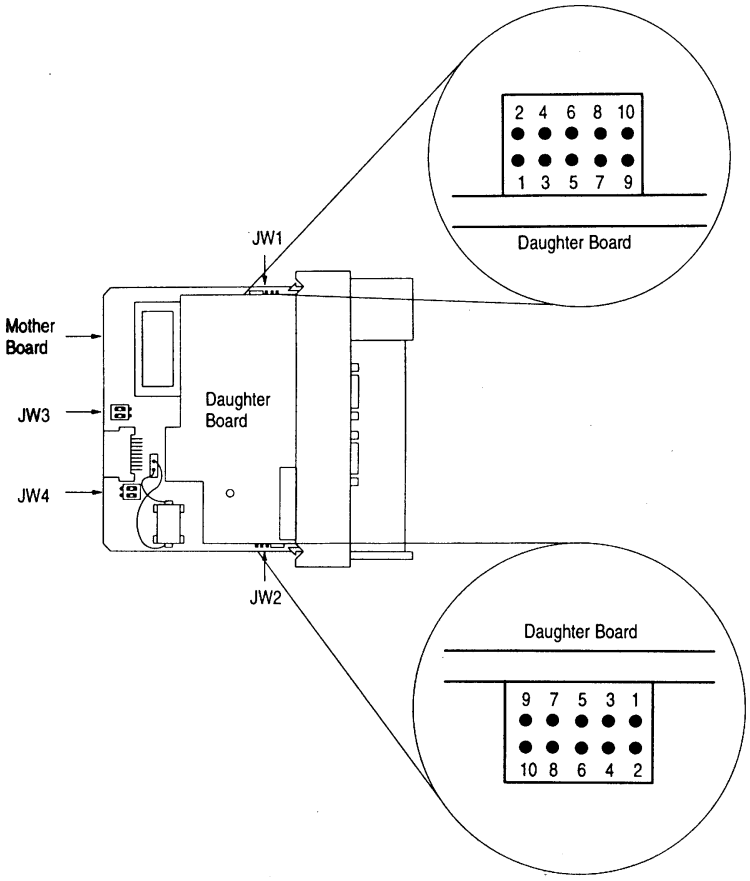
Following are the jumper positions for the 3150-YRK module :

Jumper	3150-YRK
JW1	As Needed
JW2	As Needed
JW3	N/A
JW4	N/A

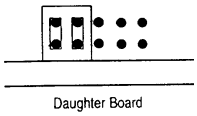
JW1/2 RS configuration for port 1 and 2 **RS-485 Position**

The default from factory is RS-232.

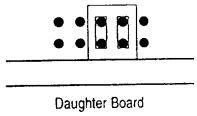
Communication Port
Jumper Settings for 3150 Modules - JW1 & JW2



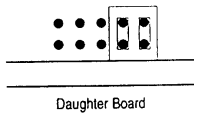
Jumper JW1 Settings



RS-232

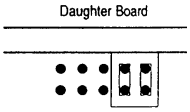


RS-422
4-wire

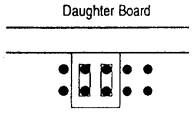


RS-485
2-wire

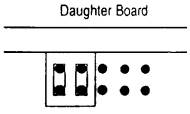
Jumper JW2 Settings



RS-232



RS-422
4-wire



RS-485
2-wire

Jumper Configurations

SLC Programming Considerations

The 3150-YRK is also very easy to get operational.

In order to implement the sample logic, the user must make sure that the correct processor and rack size match up. Also, should it be necessary to re-locate the YRK module, the user should be certain to configure the correct slot as a 1746-BAS 5/02 Configuration.

When initially setting up the SLC program file, or when moving the module from one slot to another, the user must configure the slot to accept the YRK module.

It is important that the slot containing the ProSoft module be configured as follows:

- 1746-BAS module or enter 13106 for the module code
- Configure the M0/M1 files for 64 words
- Configure I/O for 8 words

The following is a step by step on how to configure these files using Allen-Bradley APS software. ICOM software users should follow similar steps.

From the Main Menu:

1) Select the correct processor program and F3 for Offline programming
2) F1 for Processor Functions
3) F1 for Change Processor
   Modify the processor here if necessary (Note the YRK will only work with 5/02 or greater processors
4) F5 for Configure I/O
   Select 1746-BAS module for SLC 5/02 or greater, or enter 13106 for module code
5) F9 for SPIO Config when the correct slot is highlighted
6) F5 Advanced Setup
7) F5 for M0 file length - type in 64 and Enter
8) F6 for M1 file length - type in 64 and Enter

Esc out and save configuration

Example PLC and SLC Ladder Logic

Overview

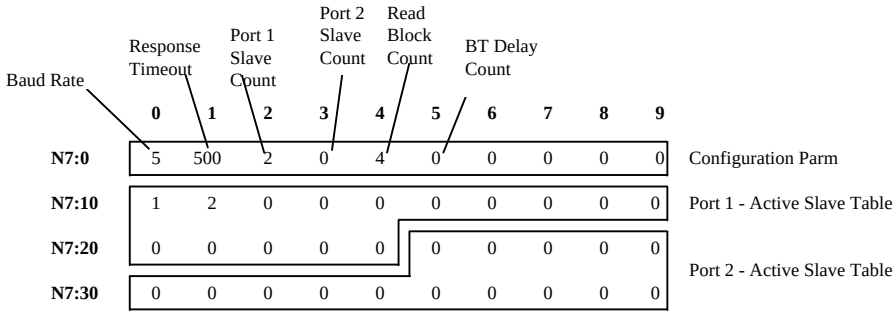
The following ladder logic provides an example for the ladder logic necessary to integrate the 3100-YRK and the 3150-YRK modules into their respective processor platforms. This logic can be incorporated directly as is, or if desired modified as needed for the application.

Data Files

The examples use the same memory map for both of the platforms, with the exception of the actual block transfer data and control files.

The memory map for the example application has been detailed in the attached data table listing. Please reference the right hand side of the data table listing for details.

Communication Configuration



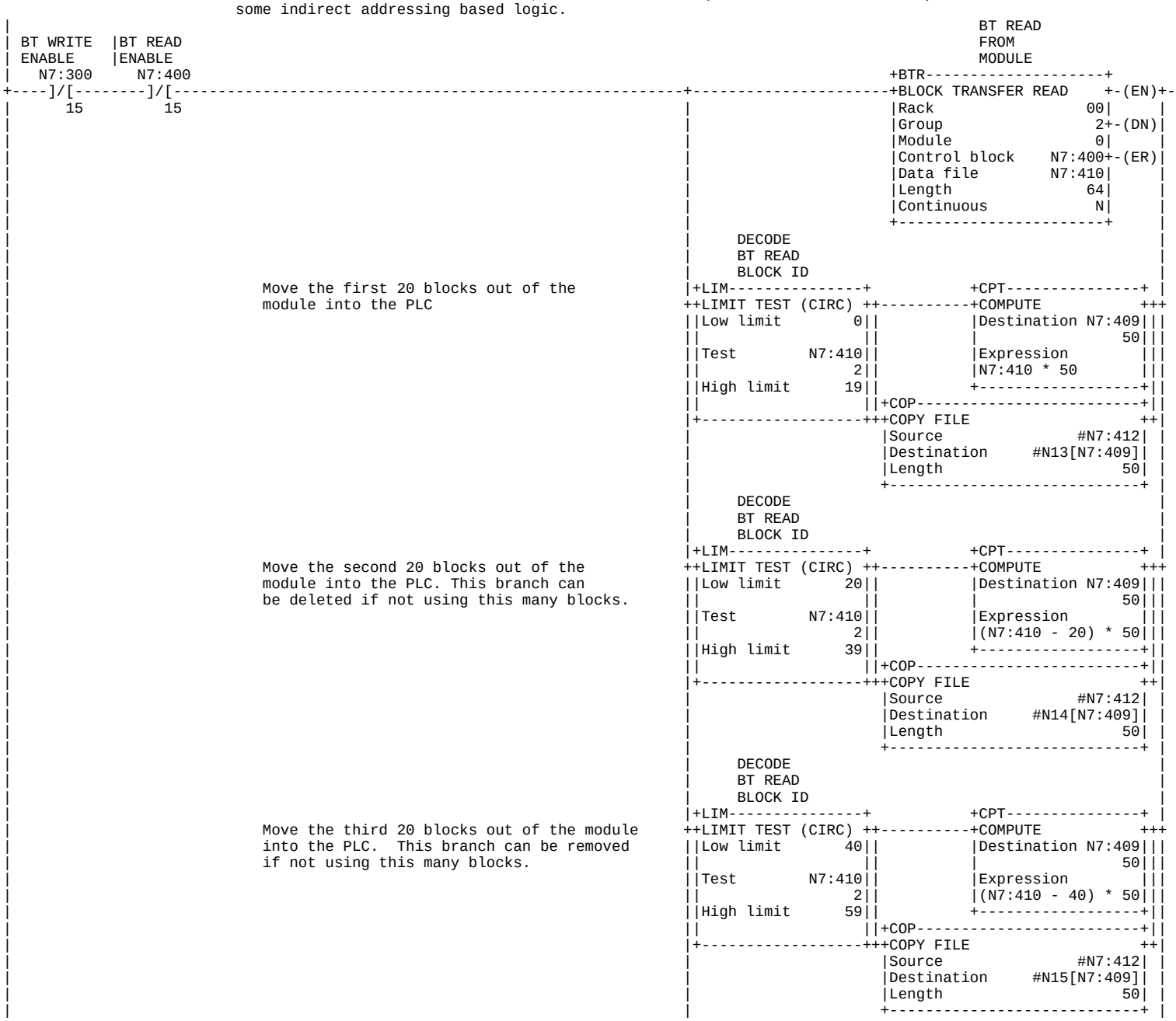
	0	1	2	3	4	5	6	7	8	9	
N7:0	5	500	2	0	4	0	0	0	0	0	Configuration Parm
N7:10	1	2	0	0	0	0	0	0	0	0	Port 1 - Active Slave Table
N7:20	0	0	0	0	0	0	0	0	0	0	Port 2 - Active Slave Table
N7:30	0	0	0	0	0	0	0	0	0	0	

Page Poll List Configuration

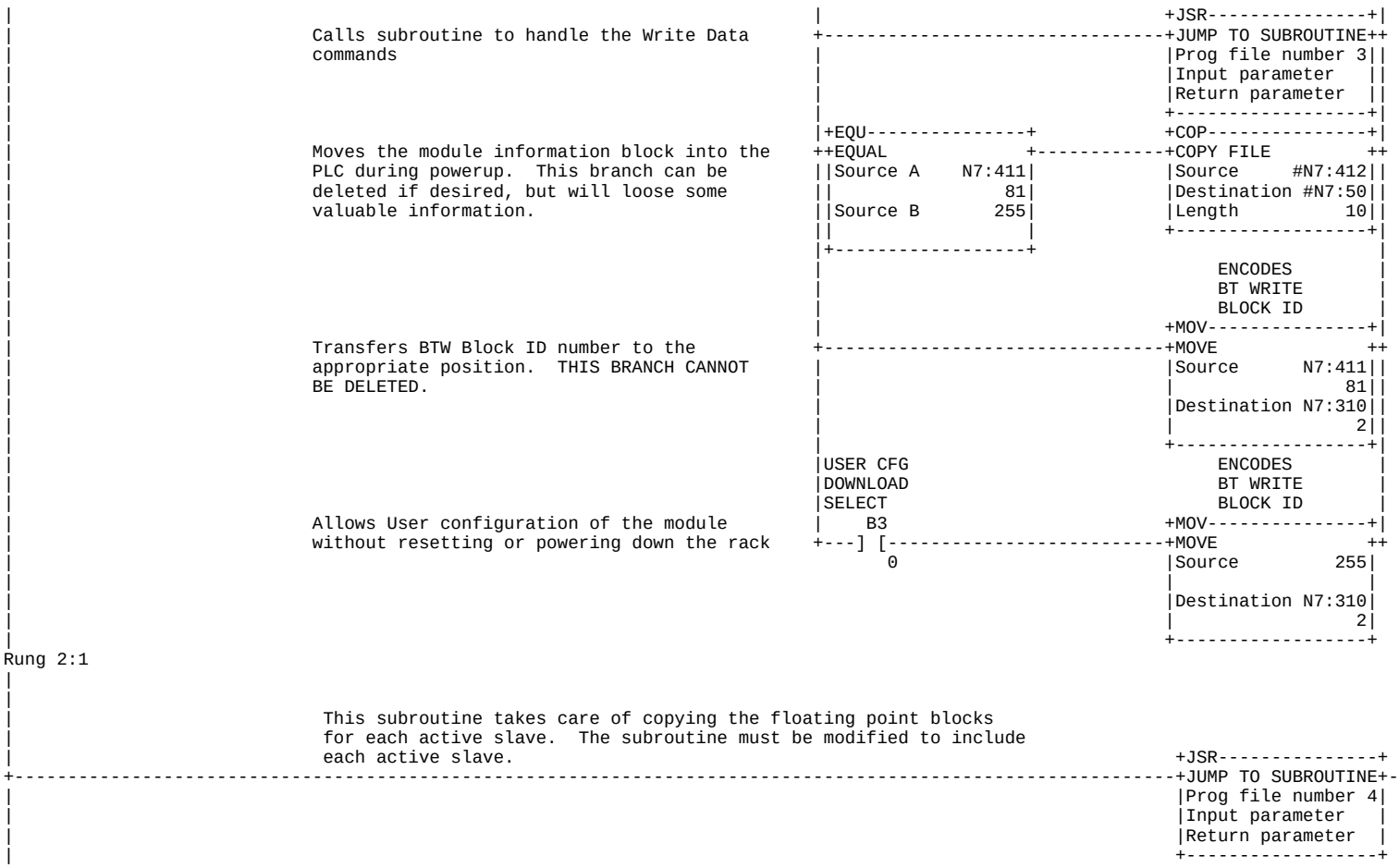
	0	1	2	3	4	5	6	7	8	9	
N12:0	5	9	10	56	57	0	0	0	0	0	High Priority Pages
N12:10	1	2	14	15	58	69	70	71	72	74	Medium Priority pages
N12:20	11	12	13	23	24	30	0	0	0	0	
N12:30	0	0	0	0	0	0	0	0	0	0	Low Priority Pages (30 pages)
N12:40	0	0	0	0	0	0	0	0	0	0	

Rung 2:0

BT READ AND REGISTER TRANSFER FROM MODULE DECODING
This rung transfers the results for up to 15 valves from the module to the ladder. To add additional valves, either add more EQU/COP branches or develop some indirect addressing based logic.

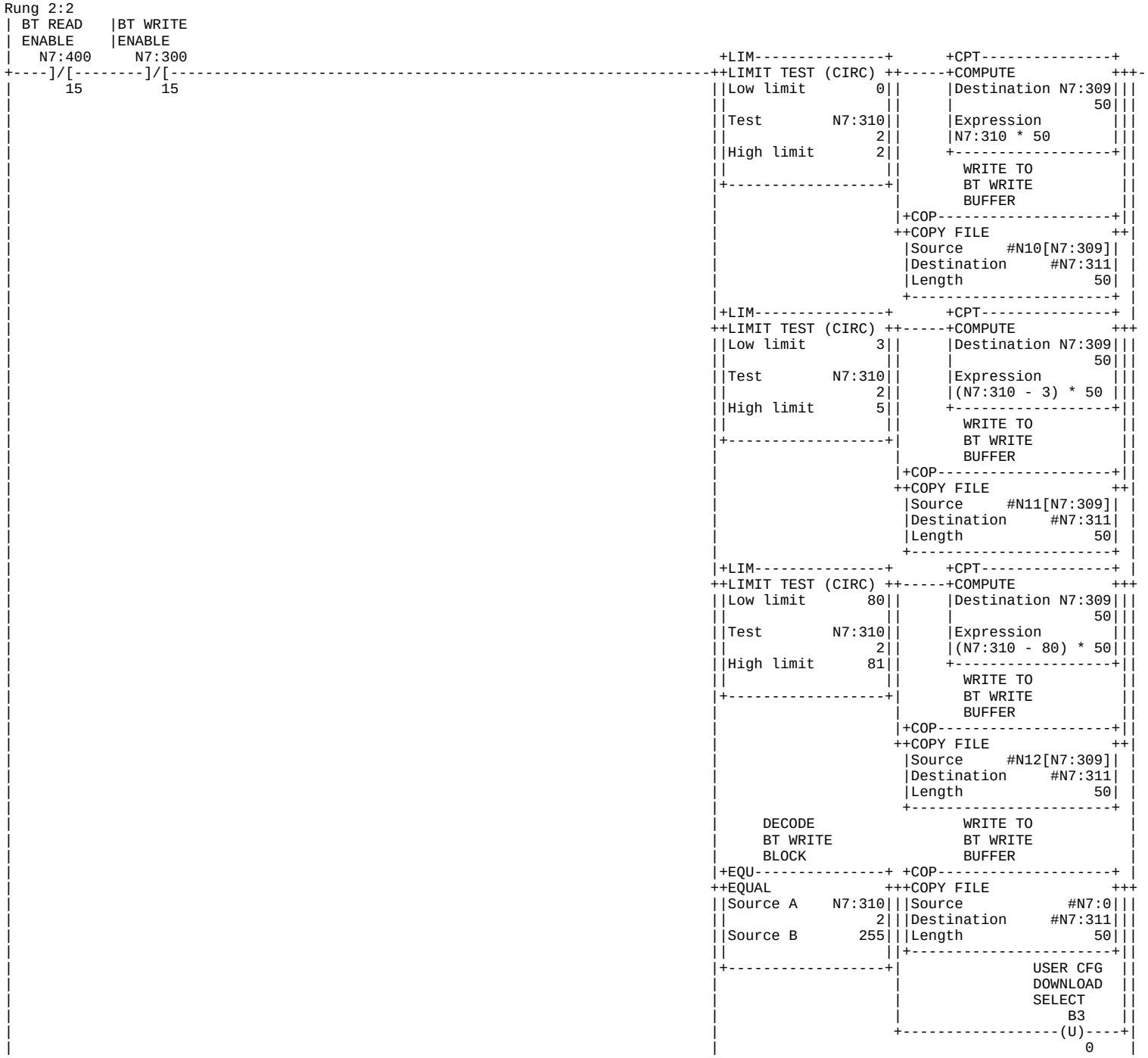


Example Ladder Logic



Rung 2:1

This subroutine takes care of copying the floating point blocks for each active slave. The subroutine must be modified to include each active slave.



Example Ladder Logic

```
|                                                                               |                         BT WRITE           |
|                                                                               |                         TO MODULE          |
|                                                                               |                 +BTW--------------------+      |
|                                                                               +-----------------+BLOCK TRANSFER WRITE   +-(EN)+
|                                                                                                 |Rack                 00|
|                                                                                                 |Group                 2+-(DN)
|                                                                                                 |Module                0|
|                                                                                                 |Control block    N7:300+-(ER)
|                                                                                                 |Data file        N7:310|
|                                                                                                 |Length               64|
|                                                                                                 |Continuous            N|
|                                                                                                 +-----------------------+
Rung 2:3
|
+-----------------------------------------------------------------------------------[END OF FILE]---------------------------------
|
```

SUBROUTINE 3 : This file takes care of clearing the enable bits based on the done bits coming back from the module.

```
Rung 3:0
|                                                                                                     +CPT--------------------+
+----------------------------------------------------------------------------------------------------++COMPUTE                ++-
|                                                                                                    ||Destination       N10:0||
|                                                                                                    ||                      0||
|                                                                                                    ||Expression              ||
|                                                                                                    ||N10:0 AND (NOT N13:98) ||
|                                                                                                    |+-----------------------+|
|                                                                                                    |     +CPT---------------+|
|                                                                                                    +-----+COMPUTE           ++
|                                                                                                          |Destination N10:10|
|                                                                                                          |                 0|
|                                                                                                          |Expression        |
|                                                                                                          |N10:10 AND (NOT   |
|                                                                                                          |N13:198)          |
|                                                                                                          +------------------+
Rung 3:1
|
+-----------------------------------------------------------------------------------[END OF FILE]---------------------------------
|
```

SUBROUTINE 4 : This logic takes care of transferring the floating point image from the integer file into the floating point file.

```
Rung 4:0
|                                                                                                          +COP---------------+
+---------------------------------------------------------------------------------------------------------++COPY FILE         ++-
|                                                                                                         ||Source    #N14:590||
|                                                                                                         ||Destination #F16:0||
|                                                                                                         ||Length           3||
|                                                                                                         |+------------------+|
|                                                                                                         |+COP---------------+|
|                                                                                                         ++COPY FILE         ++
|                                                                                                          |Source    #N14:690|
|                                                                                                          |Destination #F16:3|
|                                                                                                          |Length           3|
|                                                                                                          +------------------+
```