

RSLogix Micro Project Report



Processor Information

Processor Type: Bul.1763 MicroLogix 1100 Series A

Processor Name: UNTITLED

Total Memory Used: 540 Instruction Words Used - 176 Data Table Words Used

Total Memory Left: 6116 Instruction Words Left

Program Files: 4

Data Files: 13

Program ID: a419

I/O Configuration

0	Bul.1763	MicroLogix 1100 Series A
1		
2		
3		
4		

Channel Configuration

CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex

CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex Edit Resource/Owner Timeout: 60
CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex Passthru Link ID: 1
CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex Write Protected: No
CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex Comms Servicing Selection: Yes
CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex Message Servicing Selection: Yes
CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex 1st AWA Append Character: \d
CHANNEL 0 (SYSTEM) - Driver: DF1 Full Duplex 2nd AWA Append Character: \a

Source ID: 1 (decimal)
Baud: 19200
Parity: NONE
Control Line : No Handshaking
Error Detection: CRC
Embedded Responses: Auto Detect
Duplicate Packet Detect: Yes
ACK Timeout(x20 ms): 50
NAK Retries: 3
ENQ Retries: 3

CHANNEL 1 (SYSTEM) - Driver: Ethernet

CHANNEL 1 (SYSTEM) - Driver: Ethernet Edit Resource/Owner Timeout: 60
CHANNEL 1 (SYSTEM) - Driver: Ethernet Passthru Link ID: 1
CHANNEL 1 (SYSTEM) - Driver: Ethernet Write Protected: No
CHANNEL 1 (SYSTEM) - Driver: Ethernet Comms Servicing Selection: Yes
CHANNEL 1 (SYSTEM) - Driver: Ethernet Message Servicing Selection: Yes

Hardware Address: 00:0F:73:01:72:04
IP Address: 192.168.1.112
Subnet Mask: 255.255.255.0
Gateway Address: 192.168.1.1
Msg Connection Timeout (x 1mS): 15000
Msg Reply Timeout (x mS): 3000
Inactivity Timeout (x Min): 30
Bootp Enable: No
Dhcp Enable No
SNMP Enable: No
HTTP Enable: Yes
Auto Negotiate Enable: Yes
Port Speed Enable: 10/100 Mbps Full Duplex/Half Duplex
Contact:
Location:

Program File List

Name	Number	Type	Rungs	Debug	Bytes
.					
[SYSTEM]	0	SYS	0	No	0
	1	SYS	0	No	0
MAIN	2	LADDER	6	No	216
CIRC_FIFO	3	LADDER	10	No	485

Data File List

Name	Number	Type	Scope	Debug	Words	Elements	Last
OUTPUT	0	O	Global	No	12	4	O:3
INPUT	1	I	Global	No	18	6	I:5
STATUS	2	S	Global	No	0	66	S:65
BINARY	3	B	Global	No	1	1	B3:0
TIMER	4	T	Global	No	3	1	T4:0
COUNTER	5	C	Global	No	3	1	C5:0
CONTROL	6	R	Global	No	3	1	R6:0
INTEGER	7	N	Global	No	6	6	N7:5
FLOAT	8	F	Global	No	2	1	F8:0
LINE0	252	N	Global	No	32	32	N252:31
LINE 1	253	N	Global	No	32	32	N253:31
LINE 2	254	N	Global	No	32	32	N254:31
LINE3	255	N	Global	No	32	32	N255:31

Cf. <https://www.plctalk.net/qanda/showthread.php?t=131308>

Test running multiple independent FIFO arrays, implemented as circular buffers.

- Data Files N252, N253, N254, and N255 each comprise a 16-INT array plus related FIFO data; refer to [LAD 3] for more detail

- Bits 5 and 6 of the 10kHz Free-Running Clock (FRC) are used as a proxy for an actual process that generates events to trigger adding data to each FIFO

- Bit 5 changes state every 32 counts or 3.2ms

- The rate of events is 312.5Hz overall, and 79.125Hz per FIFO

- In this test environment, the events occur for 1s (first 10000 counts out of 65536 per FRC cycle)

- Events can be manually triggered for one cycle by assigning 1 as the value of the external trigger

- That external trigger value will be reset to 0 at the end of the cycle

- Events can also be automatically and continuously triggered on every FRC cycle by manually assigning 1 to the automatic trigger

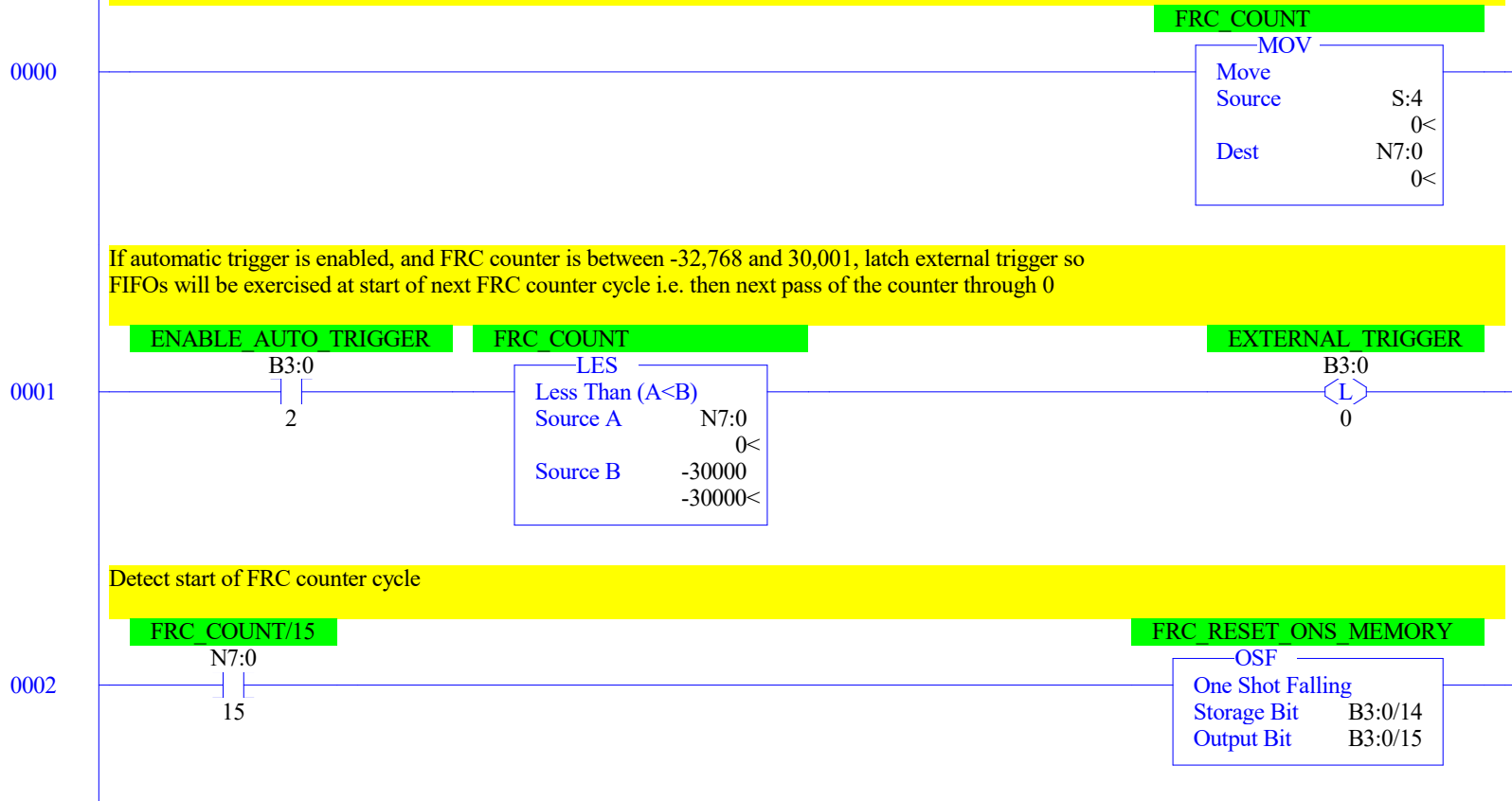
Rung 0000 - Copy current FRC counter value to local memory, so the value will not change throughout the scan

Rung 0001 - Generate automatic trigger, if requested

Rung 0002 - Detect start of FRC cycle

Rung 0003 - Determine run state, i.e. when to exercise FIFOs

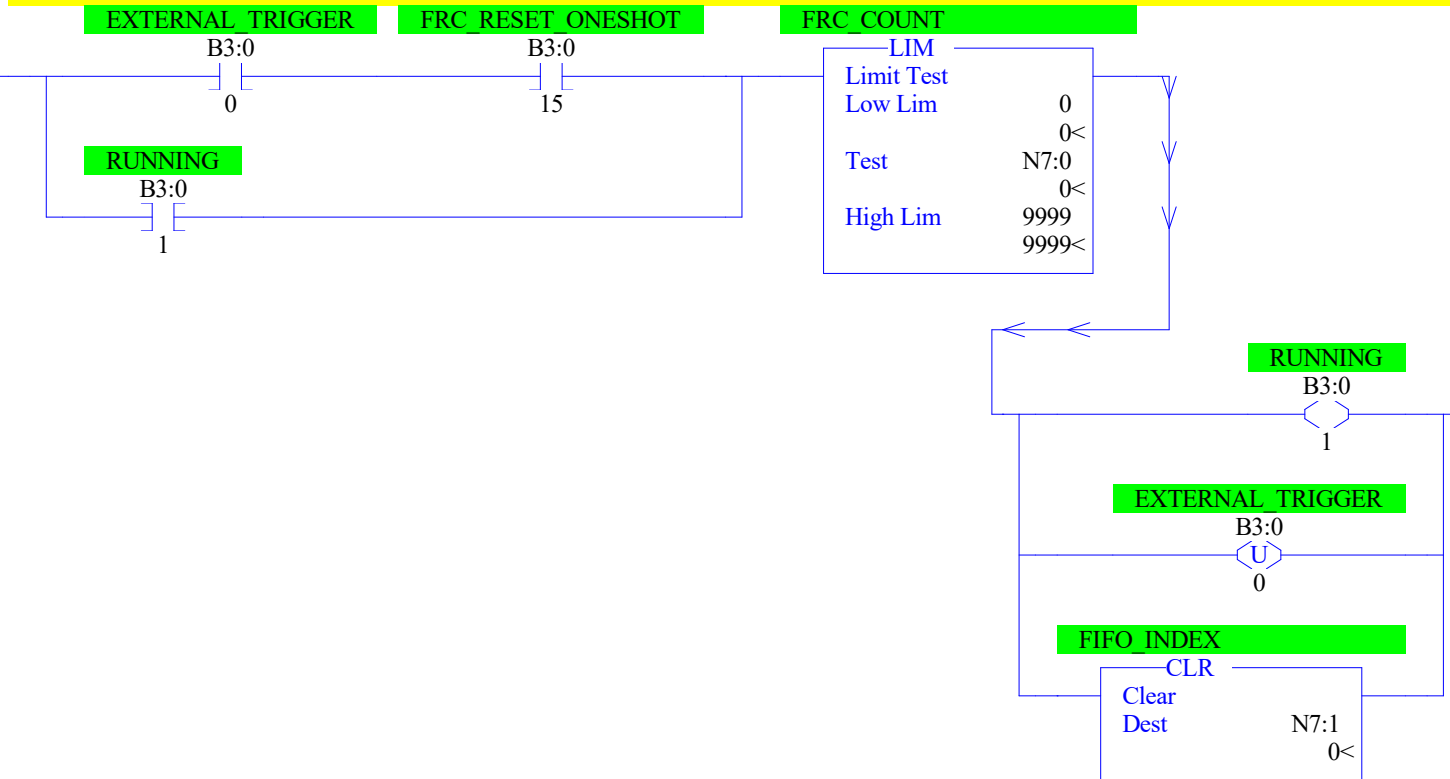
Rung 0004 - While in running state, call subroutine (LAD 3] to exercise each FIFO



Start/Stop Pattern logic to determine when to run, and keep running, exercise of FIFO for 1s

- Start: external trigger is 1 at start of FRC cycle
- Stop: exercise has run for at least 1s (10,000 counts of FRC)
- Seal-in and Run: Running bit
- Also while running:
 - Reset external trigger to 0; seal in will maintain running state
 - Clear sort line index value to 0, in preparation for loop over four FIFOs on next rung

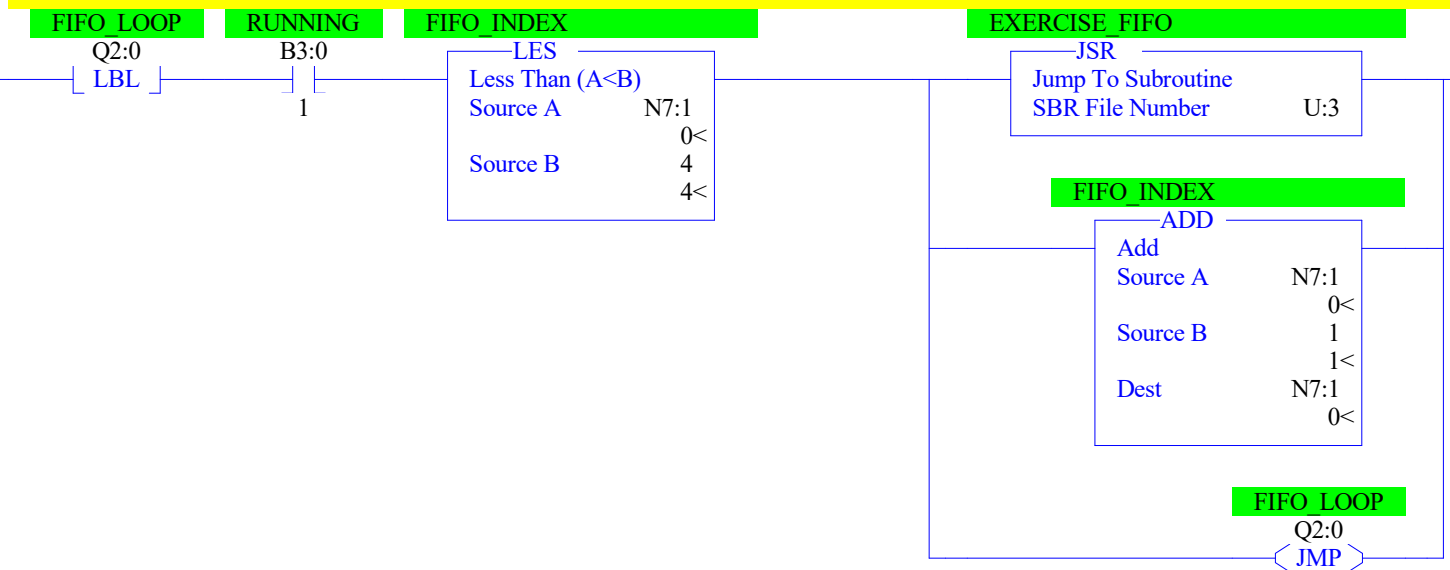
0003



One-rung loop over FIFO index values from 0 to 3 while in running state:

- Call [LAD 3] to exercise each FIFO

0004



0005

END

Exercise one FIFO, implemented as circular buffer

Subroutine to implement FIFO as static circular buffer with moving start and end indices

- This single routine services all four modeled FIFOs:

- Externally, the caller of this subroutine assigns the FIFO index a value in the range 0..3
- That FIFO index correspond to an INTegeR Data File number in the range 252..255

Rung 0000 - Convert FIFO index to number of Data File containing FIFO data and meta-data

Rung 0001 - Clear FIFO buffer and indices at start of FRC cycle

Rung 0002 - Detect rising edge of bits 5 (32; 3.2ms) and 6 of FRC counter matching this FIFO's index

Rung 0003 - Exit subroutine if there is no rising edge on this scan

Rung 0004 - Calculate new value to push onto FIFO

Rung 0005 - Copy head and tail indices from this FIFO's file

Rung 0006 - If circular buffer is full, then unload FIFO tail value and increment FIFO tail index

Rung 0007 - load FIFO head value and increment FIFO head index

Rung 0008 - Increment number of values added to FIFO

The four Data Files contain the FIFOS are N252, N253, N254, and N255, plus FIFO-related meta-data.

The Data Files are referred to here as N[N7:4], where N7:4 is the file number (252..255), which is the FIFO index (N7:1) with a range of 0..3 plus 252

Each file comprises

- :0..:15 - A 16-element circular buffer
- :[N7:3] - The head (new) element
- :[N7:3] - The tail (oldest) element
- :16 - The running count of items loaded into the head of the buffer
- :17 - The head index, where the next new value will be added; :17's head index value will be MOVED to N7:3, then incremented and put back into :17
- :18 - The tail index, where the oldest value is; if used, then :18's value will be MOVED to N7:2, the incremented and put back into :18
- :19 - The new value to be loaded (not used); this will be
- :20 - The oldest value that has been unloaded
- :21 - Bits used by the FIFO
- :21/0 - Memory for the one-shot
- :21/1 - The one-shot itself, which detects the first scan when the FRC count bits 5 and 6 match the FIFO number

IFILE

ADD

Add	
Source A	N7:1
	0<
Source B	252
	252<
Dest	N7:4
	252<

If this is the first scan of the exercise of this FIFO, fill the FIFO and its meta-date with zeros

FRC RESET ONESHOT

B3:0

15

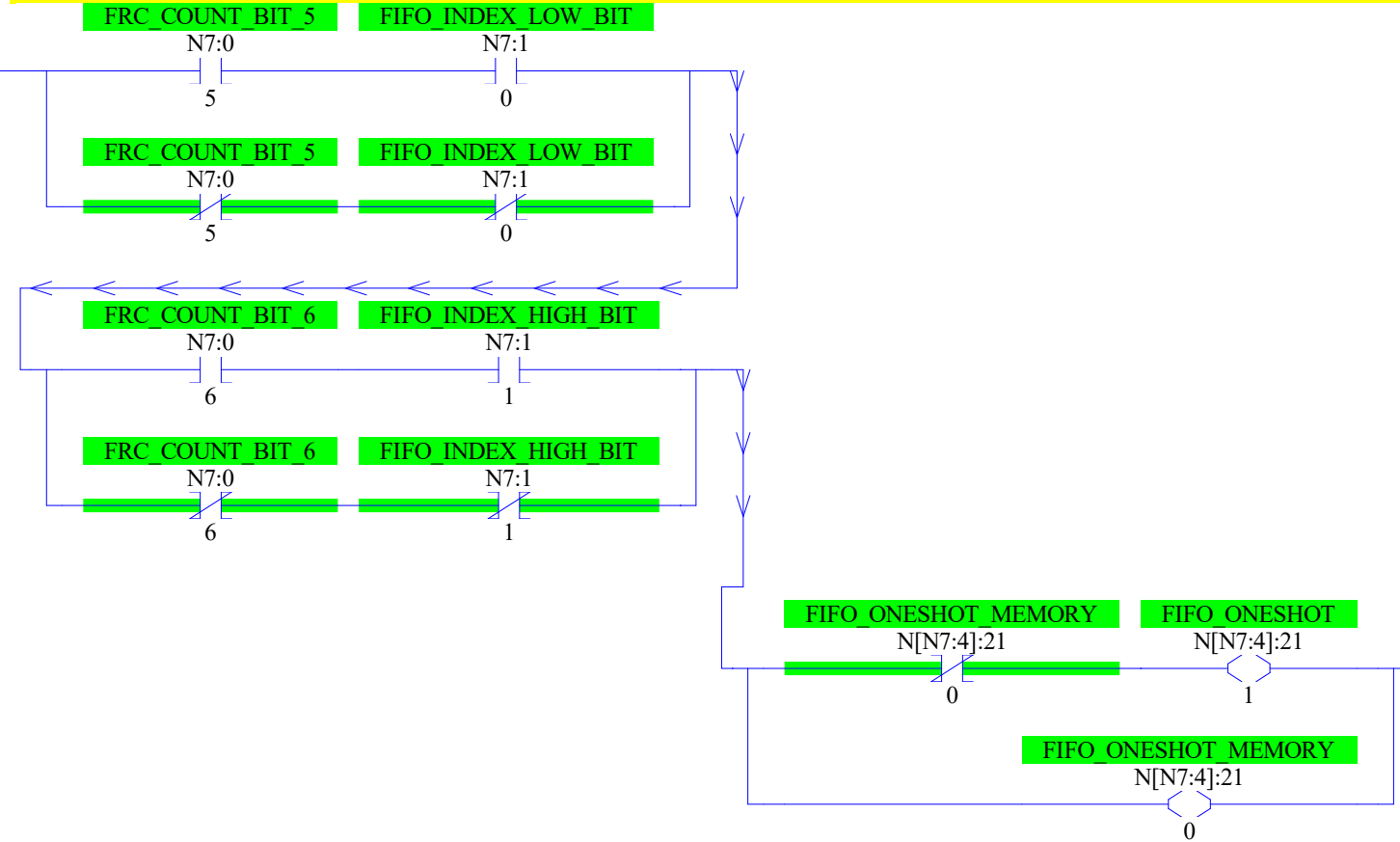
#CIRCULAR_BUFFER

FLL

Fill File	
Source	0
Dest	#N[N7:4]:0
Length	32

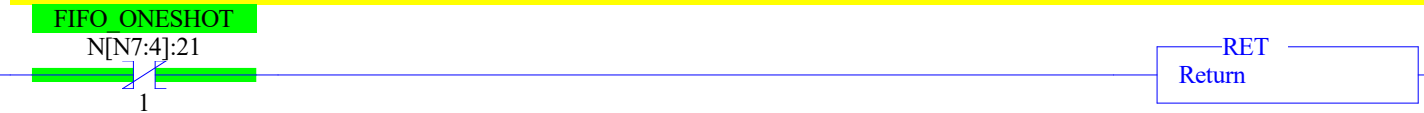
If bits 0 and 1 of the FIFO index, with range 0..3, match bits 5 and 6 of the FRC clock count, then the current FRC count applies to this FIFO, which will be indicated by the one-shot

0002



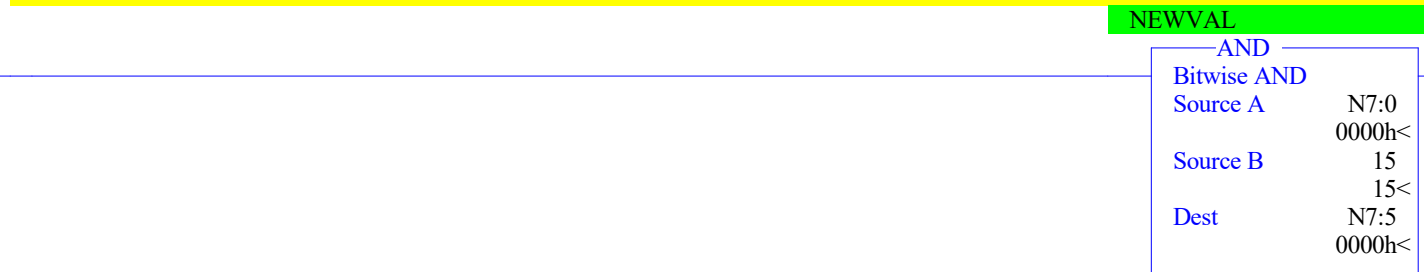
Exit this subroutine if the current FRC count has already matched the FIFO index once

0003



Extract the least-significant four bits of the FRC count as the new value to add to the head of the FIFO

0004



MOVE the FIFO head and tail indices to the N7 Data File
 - This eliminates warnings when verifying later rungs

IHEAD**MOV**

Move
 Source N[N7:4]:17
 0<
 Dest N7:2
 0<

ITAIL**MOV**

Move
 Source N[N7:4]:18
 0<
 Dest N7:3
 0<

If the tail index overlaps the head index, then
 - unload the oldest value from the FIFO tail index location
 - and increment the FIFO tail index location

FIFO_COUNT**GRT**

Greater Than (A>B)
 Source A N[N7:4]:16
 0<
 Source B 0
 0<

IHEAD**EQU**

Equal
 Source A N7:2
 0<
 Source B N7:3
 0<

FIFO_OLDVAL**MOV**

Move
 Source N[N7:4]:[N7:3]
 0<
 Dest N[N7:4]:20
 0<

ITAIL**ADD**

Add
 Source A N7:3
 0<
 Source B 1
 1<
 Dest N7:3
 0<

FIFO_TAIL**AND**

Bitwise AND
 Source A N7:3
 0000h<
 Source B 15
 15<
 Dest N[N7:4]:18
 0000h<

Load the new value into the FIFO head index location, and increment the FIFO head index

FIFO_HEAD_ELEMENT**MOV**

Move

Source N7:5
0<Dest N[N7:4]:[N7:2]
0<**IHEAD****ADD**

Add

Source A N7:2
0<Source B 1
1<Dest N7:2
0<**FIFO_HEAD****AND**

Bitwise AND

Source A N7:2
0000h<Source B 15
15<Dest N[N7:4]:17
0000h<

Increment the count of values loaded into this FIFO
- The count is not decremented for values unloaded from this FIFO

FIFO_COUNT**ADD**

Add

Source A N[N7:4]:16
0<Source B 1
1<Dest N[N7:4]:16
0<**<END>**

Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0				
O:0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix	1100	Series A
O:0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix	1100	Series A
O:0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix	1100	Series A
O:0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix	1100	Series A

Sunday, November 28, 2021 - 23:21:19

Main

Processor Mode S:1/0 - S:1/4 = Remote Run
On Power up Go To Run (Mode Behavior) S:1/12 = 0
First Pass S:1/15 = No
Free Running Clock S:4 = 0000-0000-0000-0000

Proc

OS Catalog Number S:57 = 1100 User Program Type S:63 = 8001h
OS Series S:58 = B Compiler Revision Number S:64 =
OS FRS S:59 =
Processor Catalog Number S:60 =
Processor Series S:61 = A
Processor FRN S:62 =

Scan Times

Maximum (x10 ms) S:22 = 26
Watchdog (x10 ms) S:3 (high byte) = 10
Last 100 uSec Scan Time S:35 = 7
Scan Toggle Bit S:33/9 = 0

Math

Math Overflow Selected S:2/14 = 1 Math Register (lo word) S:13 = 0
Overflow Trap S:5/0 = 0 Math Register (high word) S:14-S:13 = 0
Carry S:0/0 = 0 Math Register (32 Bit) S:14-S:13 = 0
Overflow S:0/1 = 0
Zero Bit S:0/2 = 1
Sign Bit S:0/3 = 0

Chan 0

Processor Mode S:1/0- S:1/4 = Remote Run
Node Address S:15 (low byte) = 0 Outgoing Msg Cmd Pending S:33/2 = 0
Baud Rate S:15 (high byte) = ?
Channel Mode S:33/3 = 0
Comms Active S:33/4 = 0
Incoming Cmd Pending S:33/0 = 0
Msg Reply Pending S:33/1 = 0

Debug

Suspend Code S:7 = 0
Suspend File S:8 = 0

Errors

Fault Override At Power Up S:1/8 = 0 Fault Routine S:29 = 0
Startup Protection Fault S:1/9 = 0 Major Error S:6 = 0h
Major Error Halt S:1/13 = 0
Overflow Trap S:5/0 = 0 Error Description:
Control Register Error S:5/2 = 0
Major Error Executing User Fault Rtn. S:5/3 = 0
Battery Low S:5/11 = 0
Input Filter Selection Modified S:5/13 = 0
ASCII String Manipulation error S:5/15 = 0

Protection

Deny Future Access S:1/14 = No
Data File Overwrite Protection Lost S:36/10 = True

Mem Module

Memory Module Loaded On Boot S:5/8 = 0
Password Mismatch S:5/9 = 0
Load Memory Module On Memory Error S:1/10 = 0
Load Memory Module Always S:1/11 = 0
On Power up Go To Run (Mode Behavior) S:1/12 = 0
Program Compare S:2/9 = 0
Data File Overwrite Protection Lost S:36/10 = 1

Forces

Forces Enabled S:1/5 = Yes
Forces Installed S:1/6 = No

Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	(Symbol)	Description
B3:0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

Offset	EN	TT	DN	BASE	PRE	ACC	(Symbol)	Description
T4:0	0	0	0	.001 sec	0	0		

Offset	CU	CD	DN	OV	UN	UA	PRE	ACC	(Symbol)	Description
C5:0	0	0	0	0	0	0	0	0		

Offset	EN	EU	DN	EM	ER	UL	IN	FD	LEN	POS	(Symbol)	Description
R6:0	0	0	0	1	0	0	0	0	128	0		

Data File N7 (dec) -- INTEGER

Offset	0	1	2	3	4	5	6	7	8	9
N7:0	0	0	0	0	252	0				

Data File F8 -- FLOAT

Offset	0	1	2	3	4
F8:0	0				

Data File N252 (dec) -- LINE0

Offset	0	1	2	3	4	5	6	7	8	9
N252:0	0	0	0	0	0	0	0	0	0	0
N252:10	0	0	0	0	0	0	0	0	0	0
N252:20	0	0	0	0	0	0	0	0	0	0
N252:30	0	0								

Data File N253 (dec) -- LINE 1

Offset	0	1	2	3	4	5	6	7	8	9
N253:0	0	0	0	0	0	0	0	0	0	0
N253:10	0	0	0	0	0	0	0	0	0	0
N253:20	0	0	0	0	0	0	0	0	0	0
N253:30	0	0								

Offset	0	1	2	3	4	5	6	7	8	9
N254:0	0	0	0	0	0	0	0	0	0	0
N254:10	0	0	0	0	0	0	0	0	0	0
N254:20	0	0	0	0	0	0	0	0	0	0
N254:30	0	0								

Data File N255 (dec) -- LINE3

Offset	0	1	2	3	4	5	6	7	8	9
N255:0	0	0	0	0	0	0	0	0	0	0
N255:10	0	0	0	0	0	0	0	0	0	0
N255:20	0	0	0	0	0	0	0	0	0	0
N255:30	0	0								

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev. Co
B3:0/0	EXTERNAL_TRIGGER	Global			
B3:0/1	RUNNING	Global			
B3:0/2	ENABLE_AUTO_TRIGGER	Global			
B3:0/14	FRC_RESET_ONS_MEMORY	Global			
B3:0/15	FRC_RESET_ONESHOT	Global			
C5:0.ACC	IDS_INTERVAL_COUNT	Global			
N7:0	FRC_COUNT	Global			
N7:0/5	FRC_COUNT_BIT_5	Global			
N7:0/6	FRC_COUNT_BIT_6	Global			
N7:1	FIFO_INDEX	Global			
N7:1/0	FIFO_INDEX_LOW_BIT	Global			
N7:1/1	FIFO_INDEX_HIGH_BIT	Global			
N7:2	IHEAD	Global			
N7:3	ITAIL	Global			
N7:4	IFILE	Global			
N7:5	NEWVAL	Global			
N[N7:4]:0	CIRCULAR_BUFFER	Global			
N[N7:4]:16	FIFO_COUNT	Global			
N[N7:4]:17	FIFO_HEAD	Global			
N[N7:4]:18	FIFO_TAIL	Global			
N[N7:4]:19	FIFO_NEWVAL	Global			
N[N7:4]:20	FIFO_OLDVAL	Global			
N[N7:4]:21	FIFO_BITS	Global			
N[N7:4]:21/0	FIFO_ONESHOT_MEMORY	Global			
N[N7:4]:21/1	FIFO_ONESHOT	Global			
N[N7:4]:[N7:2]	FIFO_HEAD_ELEMENT	Global			
N[N7:4]:[N7:3]	FIFO_TAIL_ELEMENT	Global			
Q2:0	FIFO_LOOP	Global			
S:0			Arithmetic Flags		
S:0/0			Processor Arithmetic Carry Flag		
S:0/1			Processor Arithmetic Underflow/ Overflow Flag		
S:0/2			Processor Arithmetic Zero Flag		
S:0/3			Processor Arithmetic Sign Flag		
S:1			Processor Mode Status/ Control		
S:1/0			Processor Mode Bit 0		
S:1/1			Processor Mode Bit 1		
S:1/2			Processor Mode Bit 2		
S:1/3			Processor Mode Bit 3		
S:1/4			Processor Mode Bit 4		
S:1/5			Forces Enabled		
S:1/6			Forces Present		
S:1/7			Comms Active		
S:1/8			Fault Override at Powerup		
S:1/9			Startup Protection Fault		
S:1/10			Load Memory Module on Memory Error		
S:1/11			Load Memory Module Always		
S:1/12			Load Memory Module and RUN		
S:1/13			Major Error Halted		
S:1/14			Access Denied		
S:1/15			First Pass		
S:2/0			STI Pending		
S:2/1			STI Enabled		
S:2/2			STI Executing		
S:2/3			Index Addressing File Range		
S:2/4			Saved with Debug Single Step		
S:2/5			DH-485 Incoming Command Pending		
S:2/6			DH-485 Message Reply Pending		
S:2/7			DH-485 Outgoing Message Command Pending		
S:2/15			Comms Servicing Selection		
S:3			Current Scan Time/ Watchdog Scan Time		
S:4			Time Base		
S:5/0			Overflow Trap		
S:5/2			Control Register Error		
S:5/3			Major Err Detected Executing UserFault Routine		
S:5/4			M0-M1 Referenced on Disabled Slot		
S:5/8			Memory Module Boot		
S:5/9			Memory Module Password Mismatch		
S:5/10			STI Overflow		
S:5/11			Battery Low		
S:6			Major Error Fault Code		
S:7			Suspend Code		
S:8			Suspend File		
S:9			Active Nodes		
S:10			Active Nodes		
S:11			I/O Slot Enables		
S:12			I/O Slot Enables		
S:13			Math Register		
S:14			Math Register		
S:15			Node Address/ Baud Rate		
S:16			Debug Single Step Rung		
S:17			Debug Single Step File		
S:18			Debug Single Step Breakpoint Rung		
S:19			Debug Single Step Breakpoint File		
S:20			Debug Fault/ Powerdown Rung		

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev. Co
S:21			Debug Fault/ Powerdown File		
S:22			Maximum Observed Scan Time		
S:23			Average Scan Time		
S:24			Index Register		
S:25			I/O Interrupt Pending		
S:26			I/O Interrupt Pending		
S:27			I/O Interrupt Enabled		
S:28			I/O Interrupt Enabled		
S:29			User Fault Routine File Number		
S:30			STI Setpoint		
S:31			STI File Number		
S:32			I/O Interrupt Executing		
S:33			Extended Proc Status Control Word		
S:33/0			Incoming Command Pending		
S:33/1			Message Reply Pending		
S:33/2			Outgoing Message Command Pending		
S:33/3			Selection Status User/DF1		
S:33/4			Communicat Active		
S:33/5			Communicat Servicing Selection		
S:33/6			Message Servicing Selection Channel 0		
S:33/7			Message Servicing Selection Channel 1		
S:33/8			Interrupt Latency Control Flag		
S:33/9			Scan Toggle Flag		
S:33/10			Discrete Input Interrupt Reconfigur Flag		
S:33/11			Online Edit Status		
S:33/12			Online Edit Status		
S:33/13			Scan Time Timebase Selection		
S:33/14			DTR Control Bit		
S:33/15			DTR Force Bit		
S:34			Pass-thru Disabled		
S:34/0			Pass-Thru Disabled Flag		
S:34/1			DH+ Active Node Table Enable Flag		
S:34/2			Floating Point Math Flag Disable,Fl		
S:35			Last 1 ms Scan Time		
S:36			Extended Minor Error Bits		
S:36/8			DII Lost		
S:36/9			STI Lost		
S:36/10			Memory Module Data File Overwrite Protection		
S:37			Clock Calendar Year		
S:38			Clock Calendar Month		
S:39			Clock Calendar Day		
S:40			Clock Calendar Hours		
S:41			Clock Calendar Minutes		
S:42			Clock Calendar Seconds		
S:43			STI Interrupt Time		
S:44			I/O Event Interrupt Time		
S:45			DII Interrupt Time		
S:46			Discrete Input Interrupt- File Number		
S:47			Discrete Input Interrupt- Slot Number		
S:48			Discrete Input Interrupt- Bit Mask		
S:49			Discrete Input Interrupt- Compare Value		
S:50			Processor Catalog Number		
S:51			Discrete Input Interrupt- Return Number		
S:52			Discrete Input Interrupt- Accumulat		
S:53			Reserved/ Clock Calendar Day of the Week		
S:55			Last DII Scan Time		
S:56			Maximum Observed DII Scan Time		
S:57			Operating System Catalog Number		
S:58			Operating System Series		
S:59			Operating System FRN		
S:61			Processor Series		
S:62			Processor Revision		
S:63			User Program Type		
S:64			User Program Functional Index		
S:65			User RAM Size		
S:66			Flash EEPROM Size		
S:67			Channel 0 Active Nodes		
S:68			Channel 0 Active Nodes		
S:69			Channel 0 Active Nodes		
S:70			Channel 0 Active Nodes		
S:71			Channel 0 Active Nodes		
S:72			Channel 0 Active Nodes		
S:73			Channel 0 Active Nodes		
S:74			Channel 0 Active Nodes		
S:75			Channel 0 Active Nodes		
S:76			Channel 0 Active Nodes		
S:77			Channel 0 Active Nodes		
S:78			Channel 0 Active Nodes		
S:79			Channel 0 Active Nodes		
S:80			Channel 0 Active Nodes		
S:81			Channel 0 Active Nodes		
S:82			Channel 0 Active Nodes		
S:83			DH+ Active Nodes		
S:84			DH+ Active Nodes		

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev. Co
S:85			DH+ Active Nodes		
S:86			DH+ Active Nodes		
U:3	EXERCISE_FIFO	Global			

Address	Instruction	Description
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Group_Name	Description
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