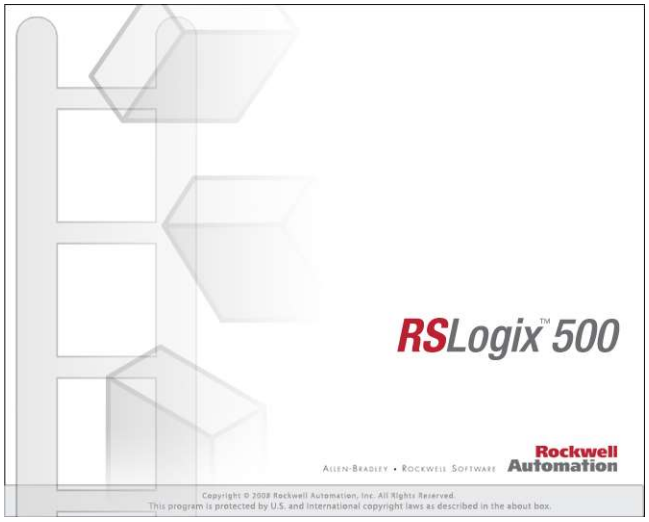
RSLogix Micro Project Report



Processor Information

Processor Type: Bul.1763 MicroLogix 1100 Series B

Processor Name: UNTITLED

Total Memory Used: 318 Instruction Words Used - 579 Data Table Words Used

Total Memory Left: 6338 Instruction Words Left

Program Files: 3

Data Files: 13

Program ID: 27a0

I/O Configuration

0	Bul.1763	MicroLogix 1100 Series B
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): 10
   Bootp Enable: No
   Dhcp Enable Yes
   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
	2	LADDER	5	No	583

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	3	3	N7:2
FLOAT	8	F	Global	No	16	8	F8:7
SCAN_RSLTS	10	F	Global	No	130	65	F10:64
SCAN_CHCKS	11	F	Global	No	130	65	F11:64
SCAN_LVLS	12	F	Global	No	130	65	F12:64
SCAN_SCANS	13	F	Global	No	130	65	F13:64

Horizontal drum liquid cross-sectional area as a function of level

Cf. https://www.plctalk.net/qanda/showthread.php?t=112685

Tank radius is 32.0 (arbtrary length units)
Each scan calculates the cross-sectional area of liquid for one level
Levels increments by 1 over 65 scans, from -32.0 (tank full) to +32.0 (tank empty)

==========

Rung 0000: Save last scan's duration, MicroLogix 1100 free-running clock's 100-microsecond ticks to ms

SCAN_DURATION_MS

0000

DIV
Divide
Source A S:35
133<
Source B 10.0
10.0<
Dest F13:[N7:1]
0.0<

Initialize values for this scan (ISCAN; N7:0) and level of algorithm loop
- R: tank radius = 32.0
- L0: tank level [-32.0:+32.0]
  - Linear with ISCAN range [0:64]
  - When level = -32.0, tank is full
  - When level = +32.0, tank is empty
- L': loop parameter; intialize to tank level L0
- A: cumulative area; initialize to 0.0
- 2**N: per-loop scale factor; initialize to 1.0

0001

Tank Radius
R

MOV
Move
Source 32.0
32.0<
Dest F8:2
32.0<

Tank Level
-Radius = Tank full
+Radius = Tank empty
L0

SUB
Subtract
Source A N7:0
0<
Source B F8:2
32.0<
Dest F8:0
5.0<

L'
L

MOV
Move
Source F8:0
5.0<
Dest F8:7
0.0<

Segment area
A

MOV
Move
Source 0.0
0.0<
Dest F8:1
0.0<

2**N
2_N

MOV
Move
Source 1.0
1.0<
Dest F8:6
0.0<

Algorithm loop
- Limit to 20 loop passes per scan, with 2**N doubled each time, so 2**N < 2**20 = 1M
  - Short-circuit to exit loop when L' = R
    - DELTA_AREA will be 0,
    - and L' will not change on subsequent loops
- For each loop pass:
  - Calculate RL_DIFF (R-L') and RL_SUM (R+L')
  - Calculate DELTA_AREA (incremental area) = 2**N * SQR((R-L')**3 * (R+L))
  - Increment cumulative Area (A): A = A + DELTA_AREA
  - Advance L' parameter for next loop pass: L' = SQR(R * (R+L') / 2)
  - Double 2**N factor
  - Repeat loop

0002

Loop 20
Q2:0
LBL

2**N
2__N

LES
Less Than (A<B)
Source A F8:6 0.0<
Source B 1048576.0 1048576.0<

L'
L

LES
Less Than (A<B)
Source A F8:7 0.0<
Source B F8:2 32.0<

Radius - Level
RL_DIFF

SUB
Subtract
Source A F8:2 32.0<
Source B F8:7 0.0<
Dest F8:3 0.0<

Radius + Level
RL_SUM

ADD
Add
Source A F8:2 32.0<
Source B F8:7 0.0<
Dest F8:4 0.0<

Delta area
DELTA_AREA

MUL
Multiply
Source A F8:3 0.0<
Source B F8:3 0.0<
Dest F8:5 0.0<

Delta area
DELTA_AREA

MUL
Multiply
Source A F8:5 0.0<
Source B F8:3 0.0<
Dest F8:5 0.0<

Delta area
DELTA_AREA

MUL
Multiply
Source A F8:5
0.0<
Source B F8:4
0.0<
Dest F8:5
0.0<

Delta area
DELTA_AREA

SQR
Square Root
Source F8:5
0.0<
Dest F8:5
0.0<

Delta area
DELTA_AREA

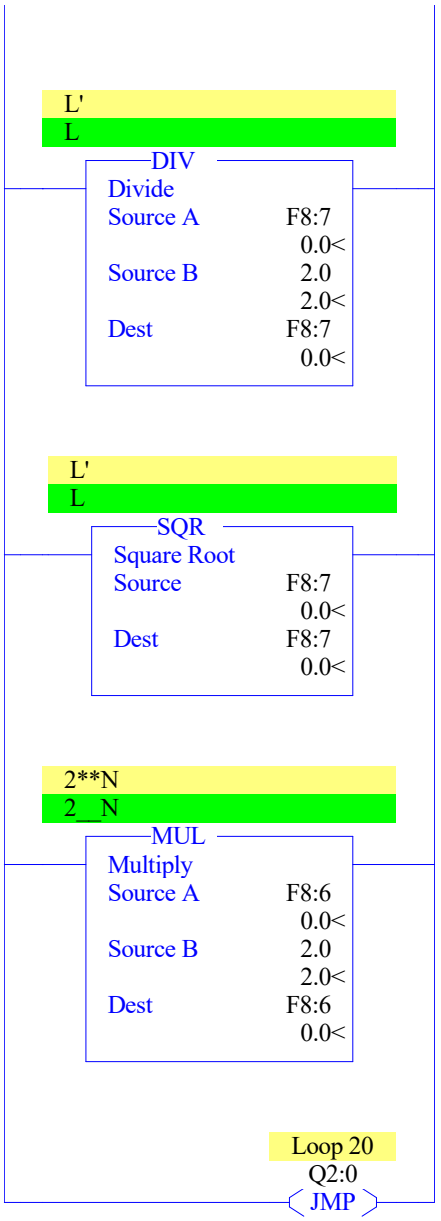
MUL
Multiply
Source A F8:5
0.0<
Source B F8:6
0.0<
Dest F8:5
0.0<

Segment area
A

ADD
Add
Source A F8:1
0.0<
Source B F8:5
0.0<
Dest F8:1
0.0<

L'
L

MUL
Multiply
Source A F8:2
32.0<
Source B F8:4
0.0<
Dest F8:7
0.0<


L'
L
DIV
Divide
Source A F8:7
0.0<
Source B 2.0
2.0<
Dest F8:7
0.0<
L'
L
SQR
Square Root
Source F8:7
0.0<
Dest F8:7
0.0<
2**N
2__N
MUL
Multiply
Source A F8:6
0.0<
Source B 2.0
2.0<
Dest F8:6
0.0<
Loop 20
Q2:0
JMP

End of scan housekeeping, ISCAN = N7:0 = [0:64]
- Save normalized level [-1.0:+1.0]
- Save normailzed area [0.0:PI]
- Calculate check: The sum (AREA[ISCAN] + AREA[64-ISCAN]) should be PI
- Save scan number for saving scan time in Rung 0000
- Increment ISCAN [0:64] with wraparound

0003

NORMALIZED_SCAN_LVL

DIV

Divide	
Source A	F8:0
	5.0<
Source B	32.0
	32.0<
Dest	F12:[N7:0]
	0.0<

NORMALIZED_SCAN_AREA

DIV

Divide	
Source A	F8:1
	0.0<
Source B	1024.0
	1024.0<
Dest	F10:[N7:0]
	0.0<

Symmetric scan index

SYMM_SCAN

SUB

Subtract	
Source A	64
	64<
Source B	N7:0
	0<
Dest	N7:2
	0<

SYMMETRIC_AREA_CHECK

ADD

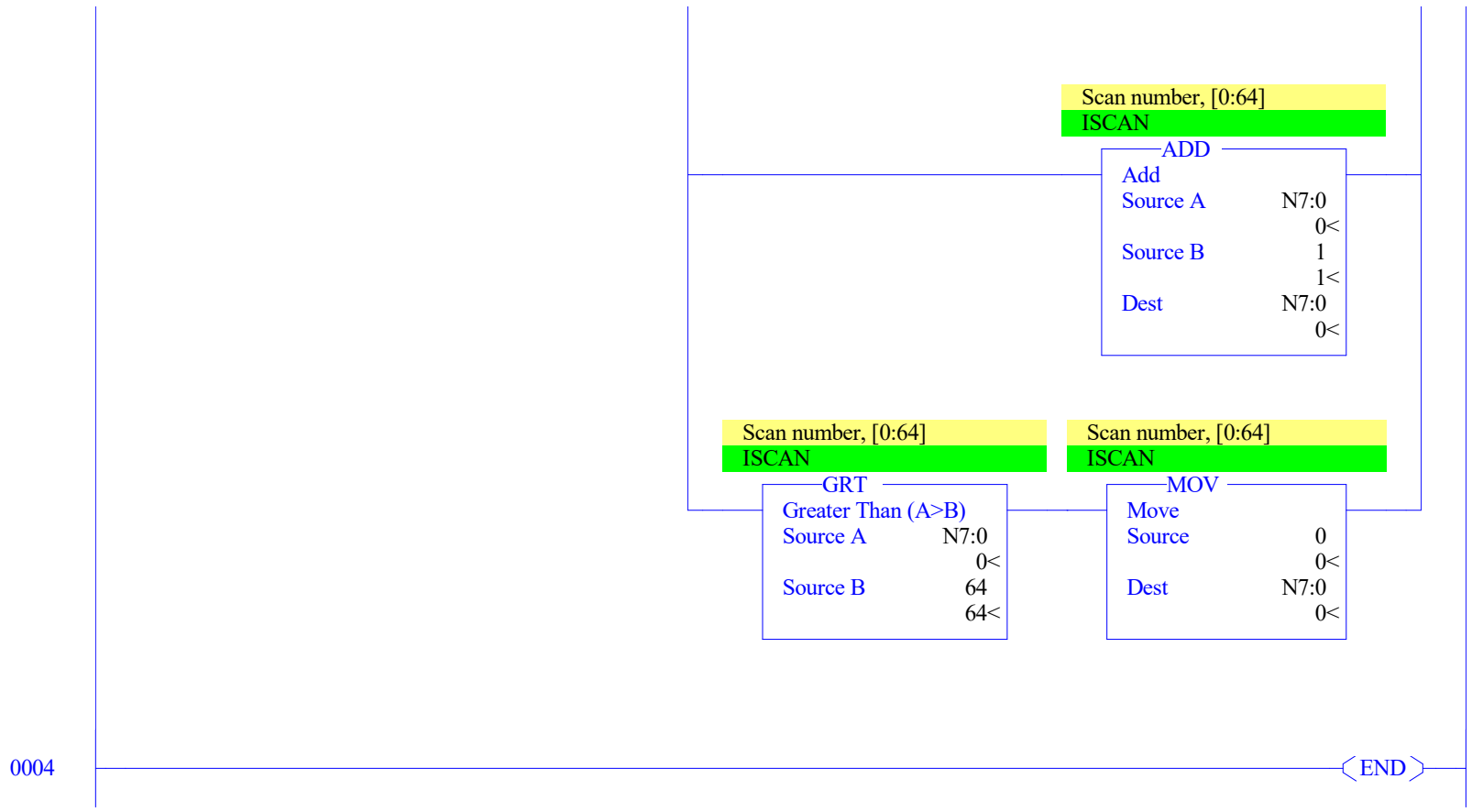
Add	
Source A	F10:[N7:0]
	0.0<
Source B	F10:[N7:2]
	0.0<
Dest	F11:[N7:0]
	0.0<

Last scan number

LAST_ISCAN

MOV

Move	
Source	N7:0
	0<
Dest	N7:1
	0<


Scan number, [0:64]
ISCAN
ADD
Add
Source A N7:0
0<
Source B 1
1<
Dest N7:0
0<
Scan number, [0:64]
ISCAN
GRT
Greater Than (A>B)
Source A N7:0
0<
Source B 64
64<
Scan number, [0:64]
ISCAN
MOV
Move
Source 0
0<
Dest N7:0
0<
0004
END

Data File O0 (bin) -- OUTPUT

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 B
O:0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix 1100 Series B
O:0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix 1100 Series B
O:0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix 1100 Series B

Data File I1 (bin) -- INPUT

Offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
I:0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix 1100 Series B
I:0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix 1100 Series B
I:0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix 1100 Series B
I:0.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Bul.1763	MicroLogix 1100 Series B
I:0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	Bul.1763	MicroLogix 1100 Series B-Analog
I:0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	Bul.1763	MicroLogix 1100 Series B-Analog

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 = 0110-0100-0110-0111

Proc

OS Catalog Number S:57 = 1100
OS Series S:58 = B
OS FRS S:59 =
Processor Catalog Number S:60 =
Processor Series S:61 = A
Processor FRN S:62 =
User Program Type S:63 = 8108h
Compiler Revision Number S:64 =

Scan Times

Maximum (x10 ms) S:22 = 158
Watchdog (x10 ms) S:3 (high byte) = 10
Last 100 uSec Scan Time S:35 = 133
Scan Toggle Bit S:33/9 = 0

Math

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

Chan 0

Processor Mode S:1/0- S:1/4 = Remote Run
Node Address S:15 (low byte) = 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
Outgoing Msg Cmd Pending S:33/2 = 0

Debug

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

Errors

Fault Override At Power Up S:1/8 = 0
Startup Protection Fault S:1/9 = 0
Major Error Halt S:1/13 = 0
Overflow Trap S:5/0 = 0
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
Fault Routine S:29 = 0
Major Error S:6 = 0h
Error Description:

Protection

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

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 = 0

Forces

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

Data File B3 (bin) -- BINARY

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	

Data File T4 -- TIMER

Offset	EN	TT	DN	BASE	PRE	ACC	(Symbol)	Description
T4:0	0	0	0	.01 sec	0	0		

Data File C5 -- COUNTER

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

Data File R6 -- CONTROL

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

Data File N7 (dec) -- INTEGER

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

Data File F8 -- FLOAT

Offset	0	1	2	3	4
F8:0	5	0	32	0	0
F8:5	0	0	0		

Data File F10 -- SCAN_RSLTS -- pass_areas

Offset	0	1	2	3	4
F10:0	0	0	0	0	0
F10:5	0	0	0	0	0
F10:10	0	0	0	0	0
F10:15	0	0	0	0	0
F10:20	0	0	0	0	0
F10:25	0	0	0	0	0
F10:30	0	0	0	0	0
F10:35	0	0	0	0	0
F10:40	0	0	0	0	0
F10:45	0	0	0	0	0
F10:50	0	0	0	0	0
F10:55	0	0	0	0	0
F10:60	0	0	0	0	0

Data File F11 -- SCAN_CHCKS

Offset	0	1	2	3	4
F11:0	0	0	0	0	0
F11:5	0	0	0	0	0
F11:10	0	0	0	0	0
F11:15	0	0	0	0	0
F11:20	0	0	0	0	0
F11:25	0	0	0	0	0
F11:30	0	0	0	0	0
F11:35	0	0	0	0	0
F11:40	0	0	0	0	0
F11:45	0	0	0	0	0
F11:50	0	0	0	0	0
F11:55	0	0	0	0	0
F11:60	0	0	0	0	0

Data File F12 -- SCAN_LVLS

Offset	0	1	2	3	4
F12:0	0	0	0	0	0
F12:5	0	0	0	0	0
F12:10	0	0	0	0	0
F12:15	0	0	0	0	0
F12:20	0	0	0	0	0
F12:25	0	0	0	0	0
F12:30	0	0	0	0	0
F12:35	0	0	0	0	0
F12:40	0	0	0	0	0
F12:45	0	0	0	0	0
F12:50	0	0	0	0	0
F12:55	0	0	0	0	0
F12:60	0	0	0	0	0

Data File F13 -- SCAN_SCANS

Offset	0	1	2	3	4
F13:0	0	0	0	0	0
F13:5	0	0	0	0	0
F13:10	0	0	0	0	0
F13:15	0	0	0	0	0
F13:20	0	0	0	0	0
F13:25	0	0	0	0	0
F13:30	0	0	0	0	0
F13:35	0	0	0	0	0
F13:40	0	0	0	0	0
F13:45	0	0	0	0	0
F13:50	0	0	0	0	0
F13:55	0	0	0	0	0
F13:60	0	0	0	0	0

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev. Code
F8:0	L0	Global	Tank Level -Radius = Tank full +Radius = Tank empty		
F8:1	A	Global	Segment area		
F8:2	R	Global	Tank Radius		
F8:3	RL_DIFF	Global	Radius - Level		
F8:4	RL_SUM	Global	Radius + Level		
F8:5	DELTA_AREA	Global	Delta area		
F8:6	2__N	Global	2**N		
F8:7	L'	Global	L'		
F10:[N7:0]	NORMALIZED_SCAN_AREA	Global			
F10:[N7:1]	NORMALIZED_SYMM_AREA	Global			
F10:[N7:2]	SYMMETRIC_SCAN_AREA	Global			
F11:[N7:0]	SYMMETRIC_AREA_CHECK	Global			
F12:[N7:0]	NORMALIZED_SCAN_LVL	Global			
F13:[N7:1]	SCAN_DURATION_MS	Global			
N7:0	ISCAN	Global	Scan number, [0:64]		
N7:1	LAST_ISCAN	Global	Last scan number		
N7:2	SYMM_SCAN	Global	Symmetric scan index		
N9:[N7:1]			Last scan's duration		
Q2:0			Loop 20		
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		
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		

Address/Symbol Database

Address	Symbol	Scope	Description	Sym Group	Dev. Code
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		
S:85			DH+ Active Nodes		
S:86			DH+ Active Nodes		

Instruction Comment Database

Address	Instruction	Description

Symbol Group Database

Group_Name Description