Cryogenic Control System
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General

The control system (CS) for the cryogenic arrangement of the D0 Liquid Argon Calorimeter consists of a Texas instruments 560/565 Programmable Logical Controller (PLC), two remote bases with Remote Base Controllers and a corresponding set of input/output (I/O) modules, and a PC AST Premium 286 (IBM AT Compatible). The PLC scans a set of inputs and provides a set of outputs based on a ladder logic program and PID control loops.

The inputs are logic or analog (current, voltage) signals from equipment status switches or transducers. The outputs are logic or analog (current or voltage) signals for switching solenoids and positioning pneumatic actuators. Programming of the PLC is preformed by using the TISOFT2/560/565 package, which is installed in the PC. The PC communicates to the PLC through a serial RS232 port and provides operator interface to the cryogenic process using Xpresslink software.

Allocation: I/O points and TI/560/565 Memory

Assignment and tags of the I/O points can be seen in Table 1. Allocation of the PLC's control relays are shown in Table 2. C1 is a dummy coil for the Relay Ladder Logic (RLL). It will be used as the driven element in the ladder network, though no switching of contacts are required. C2 performs as the power switch function for the CS. If the operator turn on this switch, the CS will be transformed to "Initialization" state. C3 will turn on/off the control the control portion of the RLL program to realize the general control algorithm for the cryogenic arrangement of the D0 calorimeter. We will call this state of the CS the control state. C4 is the toggle for all loops. When it is in the off state, no loop output will be transmitted to the corresponding output point. When C4 is on loop outputs will be moved to WY outputs, if the corresponding loop toggle (C5-C68) is on. C5-C68 allows the realization of a quasi-manual mode of operation of the loops.

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Allocation: I/O points and TI/560/565 Memory (cont'd)

The reason for using the toggles is: in the "RUN" mode the loops will transmit their output to the destination point even though the operator changed the the V-flag for the loop to manual. In this case loop calculations are stopped, but the last value of the loop output is sent each sample time period to the destination point. The operator can stop this sending if he transforms the loop to the "Halt" mode. However, for the existing configuration of the PLC such action requires reloading TISOFT2/560/565, selecting "Halt" mode for the loop, and then reloading to return to Xpresslink again. A more acceptable solution is:

1. Define the loop output as a V-memory word.
2. Use a C contact in RLL as a loop toggle and move loops's output to destination WY-point if the toggle is on.
3. If the C contact toggle is off, the operator can control the position of the loop actuator from the keyboard.

A record of user memory locations are shown in Table 3. K-memory stores initial states of: valves (valve positions), digital switches (Y-relays) and loop toggles. The RLL will load these numbers as the first step of operation.

The area of V-memory, V1-V64 is used for loop V-flags. These flags contain the control and status bits and can be used for transformation of each loop to manual, auto or closed cascade mode of operation. The outputs of the loops are V-memory words (V65-V128). Information from this area of memory will be moved to the corresponding WY-output by the RLL program each memory scan, if the that toggle switch is on.

Words V129-V192 contain the current position of valves normally controlled by the PID loops (loop valves). This part of V-memory is used as a buffer for the operators input, and will be transmitted to the WY-output, when the loop's toggle, or the toggle for all the loops, is off (quasi-manual mode of operation).

Each scan the RLL program moves the loop parameters (LSP,LKC,LTD,LTS) to V200-V519. This information is then used by Xpresslink and can be viewed on the operator's screen. If the operator has to change any of the loop parameters he can do that by typing in new

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Allocation: I/O points and TI/560/565 Memory (cont'd)

numbers. Xpresslink will transmit the operators input to the PLC and allocate them in V600-V919. This memory is used as a buffer to the loops each memory scan. V-memory is used for these exchanges because it is necessary to perform scaling of the REAL values of loop parameters and to convert them to INTEGER values from the Xpresslink, and vice versa. We must use two different areas of V-memory for transmitting parameters from loop to V-memory and from operator to loop (from PC). If that is not done and the same memory used for operator input and for information from the loops, the operators input can be lost and replaced by the previous loop parameter as the RLL program moves its output from the loop to the V-memory

Control Block Diagram

The control block diagram for the RLL program is shown in Fig. 1. If C2 is OFF, the initial loop parameters, position of actuators, state of Y-outputs and loop toggles are loaded from K-memory to the corresponding V-memory location or WY-register. All V-flags for control loops will be loaded with 16384 for transforming all loops to AUTO mode of operation. These actions are preformed by the INITIAL LOADING block in the RLL program.

The operator has to turn on C2 to change loop parameters by typing in the new values. Xpresslink will show the new parameters on the screen. Transmission of the new parameters to the loops is performed by SFPGM#1 when loop calculations are executed. The same set of parameters from loop is sent to V-memory by SFPGM#3 and then used by Xpresslink. The operator can change the position of any actuator by typing in the new value, as well. Xpresslink will transmit this value to the WY-output. Note, however, the loop actuators may be manually controlled only if the loop toggle is ON, or the toggle for all loops (C4) is on (quasi manual mode) and such handling is performed through V129-V152 by MANUAL CONTROL OF LOOP ACTUATORS block.

When all parameters, the state of all switches, and the position of all actuators are correct, the operator may turn ON C3. This action transforms CS to the "control" state of operation. In this state the RLL program will be

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Control Block Diagram (cont'd)

performed in accordance with the specified algorithm for cryogenic operation. As an example, SFPGM#2 will change LKC1 as a function of the liquid head (volume) in the LN2DEWAR. Calculations of the volume of liquid in the nitrogen dewar are performed using a 3rd order equation.

Then, if the toggle for all loops (C4) and the corresponding loop toggles are on, AUTO MODE FOR CONTROL LOOPS block will transmit the loop outputs from V65-V128 to the WY-points. The same information about valve position will be moved into V129-V192 for bumpless transition to the Quasi-manual mode.

Control Block Diagram

Fig 1.

Auto Mode for Control Loop

C5: toggle for loop 1.
If C54=ON, then loop 1
output => WY25 (PV501N).
Loop 1 output => V129 for
bumpless transfer to
manual.

C28: toggle for loop 24.
If C28=ON, then loop 24
output => WY??, for
actuator ??
Loop 24 => V152 for
bumpless transfer to
manual.

Fig. 2

Manual Control for loop Actuators

Fig. 3

Initialization

Fig. 4

TABLE 1 - ALLOCATION OF I/O POINTS

TERMINAL LOCATION	TAG NAME	TERMINAL LOCATION	TAG NAME	TERMINAL LOCATION	TAG NAME
110 VAC INPUT		ANALOG OUTPUT		ANALOG INPUT	
X1		WY25	PV501N	WX49	PT501N
X2		WY26	PV548N	WX50	SPT547N
X3		WY27	PV513N	WX51	DPT562N
X4		WY28	PV615N	WX52	DPT564N
X5		WY29	PV612N	WX53	DPT665A
X6		WY30	PV601A	WX54	PT653A
X7		WY31	PV611A	WX55	PT655N
X8		WY32	PV625A	WX56	DPT637A
X9		WY33	PV638A	WX57	PT130A
X10		WY34	PV101N	WX58	PT230A
X11		WY35	PV201N	WX59	PT330A
X12		WY36	PV301N	WX60	PT110N
X13		WY37	PV102N	WX61	PT210N
X14		WY38	PV202N	WX62	PT310N
X15		WY39	PV302N	WX63	
X16		WY40	PV110N	WX64	
X17		WY41	PV210N	WX65	
X18		WY42	PV310N	WX66	
X19		WY43	PV114A	WX67	
X20		WY44	PV214A	WX68	
X21		WY45	PV314A	WX69	
X22		WY46	EH120A	WX70	
X23		WY47	EH220A	WX71	
X24		WY48	EH320A	WX72	

TABLE 1 - ALLOCATION OF I/O POINTS

TERMINAL LOCATION	TAG NAME	TERMINAL LOCATION	TAG NAME	TERMINAL LOCATION	TAG NAME
ANALOG INPUT		ANALOG INPUT			
WX73		WX97			
WX74		WX98			
WX75		WX99			
WX76		WX100			
WX77		WX101			
WX78		WX102			
WX79		WX103			
WX80		WX104			
WX81		WX105			
WX82		WX106			
WX83		WX107			
WX84		WX108			
WX85		WX109			
WX86		WX110			
WX87		WX111			
WX88		WX112			
WX89					
WX90					
WX91					
WX92					
WX93					
WX94					
WX95					
WX96					

TABLE 1 - ALLOCATION OF I/O POINTS

TERMINAL LOCATION	TAG NAME	TERMINAL LOCATION	TAG NAME	TERMINAL LOCATION	TAG NAME
110 VAC OUTPUT		110 VAC OUTPUT		110 VAC OUTPUT	
Y113	HX571N	Y137		Y161	
Y114	HX572N	Y138		Y162	
Y115	EV05	Y139		Y163	
Y116	EV119H	Y140		Y164	
Y117	EV219H	Y141		Y165	
Y118	EV319H	Y142		Y166	
Y119	AIRTACTION	Y143		Y167	
Y120		Y144		Y168	
Y121		Y145		Y169	
Y122		Y146		Y170	
Y123		Y147		Y171	
Y124		Y148		Y172	
Y125		Y149		Y173	
Y126		Y150		Y174	
Y127		Y151		Y175	
Y128		Y152		Y176	
Y129		Y153		Y177	
Y130		Y154		Y178	
Y131		Y155		Y179	
Y132		Y156		Y180	
Y133		Y157		Y181	
Y134		Y158		Y182	
Y135		Y159		Y183	
Y136		Y160		Y184	

TABLE 1 - ALLOCATION OF I/O POINTS

TERMINAL LOCATION	TAG NAME	TERMINAL LOCATION	TAG NAME	TERMINAL LOCATION	TAG NAME
Y185		Y209			
Y186		Y210			
Y187		Y211			
Y188		Y212			
Y189		Y213			
Y190		Y214			
Y191		Y215			
Y192		Y216			
Y193					
Y194					
Y195					
Y196					
Y197					
Y198					
Y199					
Y200					
Y201					
Y202					
Y203					
Y204					
Y205					
Y206					
Y207					
Y208					

TABLE 2 - ALLOCATION OF PLC CONTROL RELAYS

[illegible]

TABLE 3 - RECORD OF USER MEMORY LOCATIONS

MEMORY AREA	LOCATION #	COMMENTS
K	1	INITIAL POSITION FOR VALVE1 (IPV501N-WY25)
K	2	INITIAL POSITION FOR VALVE2 (IPV548N-WY26)
K	3	INITIAL POSITION FOR VALVE3 (IPV513N-WY27)
K	64	INITIAL POSITION FOR VALVE64
K	65	INITIAL STATE OF Y-RELAYS (Y113-Y128)
K	66	
K	67	
K	68	
K	69	
K	70	INITIAL STATE OF Y-RELAYS (Y193-Y208)
K	71	INITIAL STATE OF LOOP'S TOGGLES (C5-C20)
K	72	
K	73	
K	74	

TABLE 3 - RECORD OF USER MEMORY LOCATIONS

MEMORY AREA	LOCATION #	COMMENTS
V	1	V-FLAG FOR LOOP 1
V	64	V-FLAG FOR LOOP 64
V	65	LOOP1 OUTPUT
V	128	LOOP64 OUTPUT
V	129	POSITION OF LOOP1 ACTUATOR UNDER MANUAL CONTROL
V	130	
V	192	POSITION OF LOOP64 ACTUATOR UNDER MANUAL CONTROL
V	193	REAL VALUE FOR LKC1. THIS MEMORY LOCATION IS
V	194	USED IN SFPGM#2 AND CHANGES AS A FUNCTION OF LN2 DEWAR VOLUME
V	200	LSP1
V	201	LKC1
V	202	LTD1
V	203	LT11
V	204	LTS1
V	519	LTS64
V	600	LSP1 FROM OPERATOR
V	601	LKC1 FROM OPERATOR
V	602	LTD1 FROM OPERATOR
V	603	LT11 FROM OPERATOR
V	604	LTS1 FROM OPERATOR
V	919	LTS64 FROM OPERATOR
		NOTE: FOR K64 TO K74, THE ORDER OF BITS IS
		REVERSE ONE, I.E. MSB-BIT1, LSB-BIT16
		LSB-LEAST SIGNIFICANT BIT
		MSB-MOST SIGNIFICANT BIT

APPENDIX A

DBB - Tag List

TYPE - AI	Allocated:	20	Used:	15	
AI0	TANKA	SETPTA	TANKB	IDPT564N	TEST
IPT501N	IDPT562N	IDPT547N	IPV513N	IPV548N	IPV501N
LSP1	IPT35	IDPT16			

TYPE - AO	Allocated:	10	Used:	4
SETPTB	A01	A02	WY25	

TYPE - DI	Allocated:	10	Used:	2
HX571N	HX572N			

TYPE - DD	Allocated:	10	Used:	1
POWER				

TYPE - PI	Allocated:	5	Used:	3
AI0PI	TANKAPID	TANKBPID		

TYPE - LL	Allocated:	5	Used:	0
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TYPE - DR	Allocated:	5	Used:	0
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<F10 - Exit> <PgUp, PgDn, Home, End - Move by TYPE> <Other - next page>

DBB - Tag List

TYPE - RM	Allocated:	5	Used:	0
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TYPE - TR	Allocated:	10	Used:	7
AI0TR	TANKATR	SETPTATR	TANKBTR	SETPTBTR
LSP1TR				PT501NTR

TYPE - RB	Allocated:	10	Used:	5
RBB1	RBB2	RBB3	RBB4	OUTPUT

TYPE - DT	Allocated:	5	Used:	0
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TYPE - SS	Allocated:	10	Used:	0
-----------	------------	----	-------	---

TYPE - BB	Allocated:	5	Used:	0
-----------	------------	---	-------	---

TYPE - CA	Allocated:	15	Used:	7
PV501NCA	PV513NCA	PV548NCA	DPT547NCA	LN2VOLCA
LSP1CA				PT501NCA

TYPE - DC	Allocated:	10	Used:	0
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<F10 - Exit> <PgUp, PgDn, Home, End - Move by TYPE> <Other - next page>

DBB - Tag List

TYPE - CV	Allocated: 10	Used: 5			
CSSTATE	AIRTA CT	LONOFF	LTGGGLE1	EV05	
TYPE - RV	Allocated: 15	Used: 13			
LSP1FPLC	LKC1FPLC	LTD1FPLC	LTII1FPLC	LTS1FPLC	LSP1TPLC
LKC1TPLC	LTD1TPLC	LTII1TPLC	LTS1TPLC	MPV501N	MPV513N
MPV548N					
TYPE - BL	Allocated: 5	Used: 0			
TYPE - SD	Allocated: 5	Used: 0			
TYPE - SC	Allocated: 5	Used: 0			
TYPE - TT	Allocated: 5	Used: 0			
TYPE - PG	Allocated: 10	Used: 1			
PRG1					

End of Tag List

<F10 - Exit> <PgUp, PgDn, Home, End - Move by TYPE> <other - next page>

ANALOG INPUT

TAG.....AIO	DESC....	
DV-DEVICE.....DUMMY	-	-
HT-H/W OPTIONS.		
IO-ADDR..... 0.00		
SC-SIG COND....	LL-LO LO ALM... 10.00	NX-NEXT BLK....AIOPI
	AL-LO ALARM.... 20.00	
EL-LO EGU..... 0.00	AH-HI ALARM.... 80.00	
EH-HI EGU..... 100.00	HH-HI HI ALM... 90.00	
ET-EGU TAG.....PCT	RC-ROC ALM..... 10.00	
	DB-DEAD BAND... 10.00	
ST-SCAN TIME...1	AP-ALM PRI.....L	
SM-SMOOTHING...0	AD-ALM DEST....THF	
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE	
	CC-ALM CONTACT.	
	CM-CC ALM MODE.ANY	

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

TAG.....TANKA	DESC....	
DV-DEVICE.....DUMMY	-	-
HT-H/W OPTIONS.		
IO-ADDR..... 33.00		
SC-SIG COND....	LL-LO LO ALM... 10.00	NX-NEXT BLK....TANKATR
	AL-LO ALARM.... 20.00	
EL-LO EGU..... 0.00	AH-HI ALARM.... 80.00	
EH-HI EGU..... 100.00	HH-HI HI ALM... 90.00	
ET-EGU TAG.....PCT	RC-ROC ALM..... 10.00	
	DB-DEAD BAND... 0.00	
ST-SCAN TIME...1	AP-ALM PRI.....L	
SM-SMOOTHING...0	AD-ALM DEST....THF	
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE	
	CC-ALM CONTACT.	
	CM-CC ALM MODE.ANY	

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

TAG.....SETPTA	DESC....	
DV-DEVICE.....DUMMY		
HT-H/W OPTIONS.		
ID-ADDR..... 22.00		
SC-SIG COND....	LL-LO LO ALM... 0.00	NX-NEXT BLK....SETPTATR
	AL-LO ALARM.... 0.00	
EL-LO EGU..... 0.00	AH-HI ALARM.... 100.00	
EH-HI EGU..... 100.00	HH-HI HI ALM... 100.00	
ET-EGU TAG.....PCT	RC-ROC ALM..... 0.00	
	DB-DEAD BAND... 10.00	
ST-SCAN TIME...1	AP-ALM PRI.....L	
SM-SMOOTHING...0	AD-ALM DEST....TH	
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE	
	CC-ALM CONTACT.	
	CM-CC ALM MODE..ANY	

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

TAG.....TANKB	DESC....	
DV-DEVICE.....DUMMY		
HT-H/W OPTIONS.		
ID-ADDR..... 70.34		
SC-SIG COND....	LL-LO LO ALM... 10.00	NX-NEXT BLK....TANKBTR
	AL-LO ALARM.... 20.00	
EL-LO EGU..... 0.00	AH-HI ALARM.... 80.00	
EH-HI EGU..... 100.00	HH-HI HI ALM... 90.00	
ET-EGU TAG.....PCT	RC-ROC ALM..... 10.00	
	DB-DEAD BAND... 0.00	
ST-SCAN TIME...1	AP-ALM PRI.....L	
SM-SMOOTHING...0	AD-ALM DEST....THF	
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE	
	CC-ALM CONTACT.	
	CM-CC ALM MODE..ANY	

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

TAG.....IDPT564N	DESC....n2 consumption to cryostats.
DV-DEVICE.....565	-
HT-H/W OPTIONS.565:0:0	
ID-ADDR.....WX52	
SC-SIG COND....	LL-LO LO ALM... -6.75 NX-NEXT BLK....
	AL-LO ALARM.... -6.75
EL-LO EGU..... -6.75	AH-HI ALARM.... 27.81
EH-HI EGU..... 27.81	HH-HI HI ALM... 27.81
ET-EGU TAG.....g/s	RC-ROC ALM..... 0.00
	DB-DEAD BAND... 0.00
ST-SCAN TIME...5	AP-ALM PRI.....L
SM-SMOOTHING...0	AD-ALM DEST....H
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE
	CC-ALM CONTACT.
	CM-CC ALM MODE.ANY

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

TAG.....TEST	DESC....
DV-DEVICE.....565	-
HT-H/W OPTIONS.565:0:0	
ID-ADDR.....WX57	
SC-SIG COND....	LL-LO LO ALM... -6.75 NX-NEXT BLK....
	AL-LO ALARM.... -6.75
EL-LO EGU..... -6.75	AH-HI ALARM.... 27.81
EH-HI EGU..... 27.81	HH-HI HI ALM... 27.81
ET-EGU TAG.....psid	RC-ROC ALM..... 0.00
	DB-DEAD BAND... 3.46
ST-SCAN TIME...1	AP-ALM PRI.....L
SM-SMOOTHING...0	AD-ALM DEST....TH
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE
	CC-ALM CONTACT.
	CM-CC ALM MODE.ANY

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

TAG.....IPT501N	DESC....pressure into ln2dewar
DV-DEVICE.....565	
HT-H/W OPTIONS.565:0:0	
ID-ADDR.....WX49	
SC-SIG COND....	LL-LO LO ALM... 14.73 NX-NEXT BLK....PT501NCA
	AL-LO ALARM.... 16.00
EL-LO EGU..... -22.50	AH-HI ALARM.... 70.00
EH-HI EGU..... 92.70	HH-HI HI ALM... 90.00
ET-EGU TAG.....psia	RC-ROC ALM..... 0.00
	DB-DEAD BAND... 0.00
ST-SCAN TIME...1	AP-ALM PRI.....L
SM-SMOOTHING...0	AD-ALM DEST....TH
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE
	CC-ALM CONTACT.
	CM-CC ALM MODE.ANY

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

TAG.....IDPT562N	DESC....n2 consumption to LAr tank.
DV-DEVICE.....565	
HT-H/W OPTIONS.565:0:0	
ID-ADDR.....WX51	
SC-SIG COND....	LL-LO LO ALM... -6.75 NX-NEXT BLK....
	AL-LO ALARM.... -6.75
EL-LO EGU..... -6.75	AH-HI ALARM.... 27.81
EH-HI EGU..... 27.81	HH-HI HI ALM... 27.81
ET-EGU TAG.....g/s	RC-ROC ALM..... 0.00
	DB-DEAD BAND... 0.00
ST-SCAN TIME...5	AP-ALM PRI.....L
SM-SMOOTHING...0	AD-ALM DEST....TH
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE
	CC-ALM CONTACT.
	CM-CC ALM MODE.ANY

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

```

TAG.....IPV513N      DESC....It reads position of pv513n.
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....WY27
SC-SIG COND....      LL-LO LO ALM... -25.00    NX-NEXT BLK....PV513NCA
                        AL-LO ALARM.... -25.00
EL-LO EGU..... -25.00  AH-HI ALARM.... 103.00
EH-HI EGU..... 103.00  HH-HI HI ALM... 103.00
ET-EGU TAG..... %      RC-ROC ALM..... 0.00
                        DB-DEAD BAND... 0.00
ST-SCAN TIME...2      AP-ALM PRI.....L
SM-SMOOTHING...0      AD-ALM DEST....TH
IS-INIT SCAN...ON     AE-ALM ENABLE..ENABLE
                        CC-ALM CONTACT.
                        CM-CC ALM MODE..ANY
  
```

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

```

TAG.....IPV548N      DESC....It reads position of pv548.
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....WY26
SC-SIG COND....      LL-LO LO ALM... -25.00    NX-NEXT BLK....PV548NCA
                        AL-LO ALARM.... -25.00
EL-LO EGU..... -25.00  AH-HI ALARM.... 103.00
EH-HI EGU..... 103.00  HH-HI HI ALM... 103.00
ET-EGU TAG..... %      RC-ROC ALM..... 0.00
                        DB-DEAD BAND... 0.00
ST-SCAN TIME...2      AP-ALM PRI.....L
SM-SMOOTHING...0      AD-ALM DEST....TH
IS-INIT SCAN...ON     AE-ALM ENABLE..ENABLE
                        CC-ALM CONTACT.
                        CM-CC ALM MODE..ANY
  
```

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

GENERAL CALC

TAG.....PV501NCA

NX-NEXT BLK....

CP-COPY TO.....

EL-LO EGU..... 0.00	A - PREVIOUS BLOCK
EH-HI EGU..... 100.00	B - INPUT 2.... 0.0000
ET-EGU TAG..... %	C - INPUT 3.... 0.0000
RN-ROUND ENAB..N	D - INPUT 4.... 0.0000
	E - INPUT 5.... 0.00
	F - INPUT 6.... 0.00
	G - INPUT 7.... 0.00
	H - INPUT 8.... 0.00

THE CALCULATION: (USE A THROUGH H AS TERMS)

OUTPUT = A

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

GENERAL CALC

TAG.....PV513NCA

NX-NEXT BLK....

CP-COPY TO.....

EL-LO EGU..... 0.00	A - PREVIOUS BLOCK
EH-HI EGU..... 100.00	B - INPUT 2.... 0.0000
ET-EGU TAG..... %	C - INPUT 3.... 0.0000
RN-ROUND ENAB..N	D - INPUT 4.... 0.0000
	E - INPUT 5.... 0.00
	F - INPUT 6.... 0.00
	G - INPUT 7.... 0.00
	H - INPUT 8.... 0.00

THE CALCULATION: (USE A THROUGH H AS TERMS)

OUTPUT = A

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

GENERAL CALC

TAG.....PV548NCA

NX-NEXT BLK....

CP-COPY TO.....

EL-LO EGU..... 0.00	A - PREVIOUS BLOCK
EH-HI EGU..... 100.00	B - INPUT 2.... 0.0000
ET-EGU TAG..... :	C - INPUT 3.... 0.0000
RN-ROUND ENAB..N	D - INPUT 4.... 0.0000
	E - INPUT 5.... 0.00
	F - INPUT 6.... 0.00
	G - INPUT 7.... 0.00
	H - INPUT 8.... 0.00

THE CALCULATION: (USE A THROUGH H AS TERMS)

OUTPUT = A

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

11:36:18 IDPT547N - NEXT BLOCK MODIFIED OR DELETED

11:36:18 IDPT547N - PLACING PRIMARY BLOCK OFF SCAN

GENERAL CALC

TAG.....DPT547NCA

NX-NEXT BLK....LN2VOLCA

CP-COPY TO.....

EL-LO EGU..... 0.00	A - PREVIOUS BLOCK
EH-HI EGU..... 75.00	B - INPUT 2.... 0.0000
ET-EGU TAG.....H20	C - INPUT 3.... 0.0000
RN-ROUND ENAB..N	D - INPUT 4.... 0.0000
	E - INPUT 5.... 0.00
	F - INPUT 6.... 0.00
	G - INPUT 7.... 0.00
	H - INPUT 8.... 0.00

THE CALCULATION: (USE A THROUGH H AS TERMS)

OUTPUT = A

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

GENERAL CALC

TAG.....LN2VOLCA

NX-NEXT BLK....

CP-COPY TO.....

EL-LO EGU..... 0
EH-HI EGU..... 21027
ET-EGU TAG.....GAL
RN-ROUND ENAB..N

A - PREVIOUS BLOCK
B - INPUT 2.... 357.43
C - INPUT 3.... 107.24
D - INPUT 4.... 6.6822
E - INPUT 5.... 2.0000
F - INPUT 6.... 0.0575
G - INPUT 7.... 3.0000
H - INPUT 8.... 0.00

THE CALCULATION: (USE A THROUGH H AS TERMS)

OUTPUT = ((((-B)+(C*A)))+(D*(A^E)))-(F*(A^G)))

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

GENERAL CALC

TAG.....PT501NCA

NX-NEXT BLK....PT501NTR

CP-COPY TO.....

EL-LO EGU..... 0.00
EH-HI EGU..... 90.00
ET-EGU TAG.....psia
RN-ROUND ENAB..N

A - PREVIOUS BLOCK
B - INPUT 2.... 0.00
C - INPUT 3.... 0.00
D - INPUT 4.... 0.00
E - INPUT 5.... 0.00
F - INPUT 6.... 0.00
G - INPUT 7.... 0.00
H - INPUT 8.... 0.00

THE CALCULATION: (USE A THROUGH H AS TERMS)

OUTPUT = A

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

GENERAL CALC

TAG.....LSP1CA

NX-NEXT BLK....LSP1TR

CP-COPY TO.....

EL-LO EGU..... 0.00

A - PREVIOUS BLOCK

B - INPUT 2.... 0.00

EH-HI EGU..... 90.00

C - INPUT 3.... 0.00

ET-EGU TAG.....psia

D - INPUT 4.... 0.00

RN-ROUND ENAB..N

E - INPUT 5.... 0.00

F - INPUT 6.... 0.00

G - INPUT 7.... 0.00

H - INPUT 8.... 0.00

THE CALCULATION: (USE A THROUGH H AS TERMS)

OUTPUT = A

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

COIL VALUE

TAG.....CSSTATE
DV-DEVICE.....S65
HT-H/W OPTIONS.565:0:0
IO-ADDR.....C3
CT-CLOSE TAG... CTRL.
OT-OPEN TAG.... INIT.

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

COIL VALUE

TAG.....AIRTACTION
DV-DEVICE.....S65
HT-H/W OPTIONS.565:0:0
IO-ADDR.....Y119
CT-CLOSE TAG... ON
OT-OPEN TAG.... OFF

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

COIL VALUE

TAG.....LONOFF
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....C4
CT-CLOSE TAG... ON
OT-OPEN TAG.... OFF

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

COIL VALUE

TAG.....LTOGGLE1
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....C5
CT-CLOSE TAG... auto
OT-OPEN TAG.... manual

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

TAG.....EV05
DV-DEVICE.....S65
HT-H/W OPTIONS.S65:0:0
ID-ADDR.....Y115
CT-CLOSE TAG... on
OT-OPEN TAG.... off

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- REGISTER VALUE -----

TAG.....LSPIFPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V200
SC-SIG COND.....

EL-LO EGU..... 0.000
EH-HI EGU..... 92.157

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- REGISTER VALUE -----

TAG.....LKC1FPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V201
SC-SIG COND.....

EL-LO EGU..... 0.01
EH-HI EGU..... 103.40

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....LTD1FPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V202
SC-SIG COND....

EL-LO EGU..... 0.0
EH-HI EGU..... 1024.0

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....LTI1FPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V203
SC-SIG COND....

EL-LO EGU..... 0
EH-HI EGU..... 1024

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- REGISTER VALUE -----

TAG.....LTSIFPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V204
SC-SIG COND....

EL-LO EGU..... 0.1
EH-HI EGU..... 6710.6

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- REGISTER VALUE -----

TAG.....LSP1TPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V600
SC-SIG COND....

EL-LO EGU..... 0.000
EH-HI EGU..... 92.157

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....LTIITPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V603
SC-SIG COND....

EL-LO EGU..... 0
EH-HI EGU..... 1024

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....LTS1TPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V604
SC-SIG COND....

EL-LO EGU..... 0.1
EH-HI EGU..... 6710.6

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....LKCITPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V601
SC-SIG COND....

EL-LO EGU..... 0.01
EH-HI EGU..... 103.40

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....LTDITPLC
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....V602
SC-SIG COND....

EL-LO EGU..... 0.0
EH-HI EGU..... 1024.0

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....MPV501N
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IQ-ADDR.....V129
SC-SIG COND.....

EL-LD EGU..... -25.00
EH-HI EGU..... 103.00

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....MPV513N
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IQ-ADDR.....WY27
SC-SIG COND.....

EL-LD EGU..... -25.00
EH-HI EGU..... 103.00

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

REGISTER VALUE

TAG.....NPV548N
DV-DEVICE.....565
HI-H/W OPTIONS.565:0:0
IU-ADDR.....WY26
SC-SIG COND....

EL-LQ EGU..... -25.00
EH-HI EGU..... 103.00

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

PROGRAM BLOCK	
TAG.....PRG1	DESC....
	00 SETAUTO TANKAPID
AD-ALM DEST....TH	01 SETAUTO TANKBPID
AP-ALM PRI.....L	02 DELAY 120
	03 SETOUT SETPTA 10.00
ST-SCAN TIME...1	04 DELAY 120
IS-INIT SCAN...ON	05 SETOUT SETPTA 20.00
IA-INIT A/M....AUTO	06 DELAY 120
	07 SETOUT SETPTA 30.00
	08 DELAY 120
	09 SETOUT SETPTA 40.00
	10 DELAY 120
	11 SETOUT SETPTA 60.00
	12 DELAY 120
	13 SETOUT SETPTA 80.00
	14 DELAY 120
	15 SETOUT SETPTA 100.00
HELP - FOR MORE INFO	16 DELAY 120
EXIT - DEFINITION COMPLETE	17 SETOUT SETPTA 50.00
	18 DELAY 120
Press F1 for HELP	19 GOTO 2

SELECT ITEM:

DATE= 02-21-89

OFF LINE

MEMORY CONFIGURATION

	USER MEMORY	SYSTEM MEMORY
LADDER (L).....	0016 KBYTES	... 048 KBYTES
VARIABLE (V).....	0004 KBYTES	... 004 KBYTES
CONSTANT (K).....	0002 KBYTES	... 002 KBYTES
SPECIAL (S).....	0004 KBYTES	... 004 KBYTES
TMR/CTR	0001 K	... 005 KBYTES
DRM/EDRM	0128	... 006 KBYTES
SHIFT REG	0002 K	... 002 KBYTES
TABLE MOVE	0001 K	... 002 KBYTES
ONE SHOTS	0002 K	... 002 KBYTES
TOTAL SYSTEM MEMORY.....		512 KBYTES
AVAILABLE SYSTEM MEMORY.....		437 KBYTES

DATE= 02-21-89

OFF LINE

I/O CONFIGURATION FOR: CHANNEL 1, BASE 0
I/O POINTS

	1	2	3	4	5	6	7	8
SLOT 1	X0001	X0002	X0003	X0004	X0005	X0006	X0007	X0008

	1	2	3	4	5	6	7	8
SLOT 2	X0009	X0010	X0011	X0012	X0013	X0014	X0015	X0016

	1	2	3	4	5	6	7	8
SLOT 3	X0017	X0018	X0019	X0020	X0021	X0022	X0023	X0024

	PV	PV	PV	PV	PV	PV	PV	PV
	501N	548N	513N	615N	612N	601A	611A	625A

	1	2	3	4	5	6	7	8
SLOT 4	WY0025	WY0026	WY0027	WY0028	WY0029	WY0030	WY0031	WY0032

	PV	PV	PV	PV	PV	PV	PV	PV
	638A	101N	201N	301N	102N	202N	302N	110N

	1	2	3	4	5	6	7	8
SLOT 5	WY0033	WY0034	WY0035	WY0036	WY0037	WY0038	WY0039	WY0040

	PV	PV	PV	PV	PV	EH	EH	EH
	210N	310N	114A	214A	314A	120A	220A	320A

	1	2	3	4	5	6	7	8
SLOT 6	WY0041	WY0042	WY0043	WY0044	WY0045	WY0046	WY0047	WY0048

	PT	DPT	DPT	DPT	DPT	PT	PT	DPT
	501N	547N	562N	564N	565N	653A	655N	637A

	1	2	3	4	5	6	7	8
SLOT 7	WX0049	WX0050	WX0051	WX0052	WX0053	WX0054	WX0055	WX0056

	PT	PT	PT	PT	PT	PT	DPT16	PT35
	130A	230A	330A	110N	210N	310N		

	1	2	3	4	5	6	7	8
SLOT 8	WX0057	WX0058	WX0059	WX0060	WX0061	WX0062	WX0063	WX0064

HT36

	1	2	3	4	5	6	7	8
SLOT 9	WX0065	WX0066	WX0067	WX0068	WX0069	WX0070	WX0071	WX0072

DATE= 02-21-89

OFF LINE

	1	2	3	4	5	6	7	8
SLOT 10	WX0073	WX0074	WX0075	WX0076	WX0077	WX0078	WX0079	WX0080

	1	2	3	4	5	6	7	8
SLOT 11	WX0081	WX0082	WX0083	WX0084	WX0085	WX0086	WX0087	WX0088

	1	2	3	4	5	6	7	8
SLOT 12	WX0089	WX0090	WX0091	WX0092	WX0093	WX0094	WX0095	WX0096

	1	2	3	4	5	6	7	8
SLOT 13	WX0097	WX0098	WX0099	WX0100	WX0101	WX0102	WX0103	WX0104

	1	2	3	4	5	6	7	8
SLOT 14	WX0105	WX0106	WX0107	WX0108	WX0109	WX0110	WX0111	WX0112

SLOT 15

SLOT 16

ANALOG INPUT

TAG.....IPV501N	DESC....It reads position of pv501n.
DV-DEVICE.....565	
HT-H/W OPTIONS.565:0:0	
IO-ADDR.....WY25	
SC-SIG COND....	LL-LO LO ALM... -25.00 NX-NEXT BLK....PV501NCA
	AL-LO ALARM.... -25.00
EL-LO EGU..... -25.00	AH-HI ALARM.... 103.00
EH-HI EGU..... 103.00	HH-HI HI ALM... 103.00
ET-EGU TAG..... %	RC-ROC ALM..... 0.00
	DB-DEAD BAND... 0.00
ST-SCAN TIME...2	AP-ALM PRI.....L
SM-SMOOTHING...0	AD-ALM DEST....TH
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE
	CC-ALM CONTACT.
	CM-CC ALM MODE.ANY

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

TAG.....LSP1	DESC....setpoint for trend block.
DV-DEVICE.....565	
HT-H/W OPTIONS.565:0:0	
IO-ADDR.....V200	
SC-SIG COND....	LL-LO LO ALM... 14.729 NX-NEXT BLK....LSP1CA
	AL-LO ALARM.... 16.000
EL-LO EGU..... 0.000	AH-HI ALARM.... 70.000
EH-HI EGU..... 92.157	HH-HI HI ALM... 90.000
ET-EGU TAG.....psia	RC-ROC ALM..... 0.000
	DB-DEAD BAND... 0.000
ST-SCAN TIME...1	AP-ALM PRI.....L
SM-SMOOTHING...0	AD-ALM DEST....TH
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE
	CC-ALM CONTACT.
	CM-CC ALM MODE.ANY

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

```

TAG.....IPT35      DESC....TRANSMITS IA SYSTEM AIR PRESSURE
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....WX56
SC-SIG COND....      LL-LO LO ALM... -31.25    NX-NEXT BLK....
                        AL-LO ALARM.... -31.25
EL-LO EGU..... -31.25 AH-HI ALARM.... 128.74
EH-HI EGU..... 128.74 HH-HI HI ALM... 128.74
ET-EGU TAG.....psiq  RC-RCC ALM..... 0.00
                        DB-DEAD BAND... 16.00
ST-SCAN TIME...1     AP-ALM PRI.....L
SM-SMOOTHING...0     AD-ALM DEST....TH
IS-INIT SCAN...ON    AE-ALM ENABLE..ENABLE
                        CC-ALM CONTACT.
                        CM-CC ALM MODE.ANY

```

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

ANALOG INPUT

```

TAG.....IDPT16      DESC....TRANSMITS DIFF. PRESS. ACROSS OP. DRYER
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
IO-ADDR.....WX55
SC-SIG COND....      LL-LO LO ALM... -6.75    NX-NEXT BLK....
                        AL-LO ALARM.... -6.75
EL-LO EGU..... -6.75 AH-HI ALARM.... 27.81
EH-HI EGU..... 27.81 HH-HI HI ALM... 27.81
ET-EGU TAG.....PSID  RC-RCC ALM..... 0.00
                        DB-DEAD BAND... 3.46
ST-SCAN TIME...1     AP-ALM PRI.....L
SM-SMOOTHING...0     AD-ALM DEST....TH
IS-INIT SCAN...ON    AE-ALM ENABLE..ENABLE
                        CC-ALM CONTACT.
                        CM-CC ALM MODE.ANY

```

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- ANALOG OUTPUT -----

TAG.....SETP1B DESC....
DV-DEVICE.....DUMMY
HT-H/W OPTIONS.
IQ-ADDR.....
SC-SIG COND.... LL-LO OP LIMIT. 0.00 Nx-NEXT BLK....SETP1BTR
 LH-HI OP LIMIT. 100.00 CP-COPY TO.....
EL-LO EGU..... 0.00 LR-RATE LIMIT.. 100.00
EH-HI EGU..... 100.00
ET-EGU TAG.....PCT

OR-OUT REVERSE.N
CS-COLD START..

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- ANALOG OUTPUT -----

TAG.....A01 DESC....
DV-DEVICE.....DUMMY
HT-H/W OPTIONS.
IQ-ADDR.....
SC-SIG COND.... LL-LO OP LIMIT. 0.00 NX-NEXT BLK....
 LH-HI OP LIMIT. 100.00 CP-COPY TO.....TANKAPID
EL-LO EGU..... 0.00 LR-RATE LIMIT.. 100.00
EH-HI EGU..... 100.00
ET-EGU TAG.....PCT

OR-OUT REVERSE.N
CS-COLD START..

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- ANALOG OUTPUT -----

TAG.....A02 DESC....
DV-DEVICE.....DUMMY
HT-H/W OPTIONS.
ID-ADDR.....
SC-SIG COND.... LL-LO OP LIMIT. 0.00 NX-NEXT BLK....
 LH-HI OP LIMIT. 100.00 CP-COPY TO.....TANKBPID
EL-LO EGU..... 0.00 LR-RATE LIMIT.. 100.00
EH-HI EGU..... 100.00
ET-EGU TAG.....PCT

OR-OUT REVERSE.N
CS-COLD START..

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- ANALOG OUTPUT -----

TAG.....WY25 DESC....
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
ID-ADDR.....WY25
SC-SIG COND.... LL-LO OP LIMIT. -25 NX-NEXT BLK....
 LH-HI OP LIMIT. 103 CP-COPY TO.....
EL-LO EGU..... -25 LR-RATE LIMIT.. 128
EH-HI EGU..... 103
ET-EGU TAG.....PCT

OR-OUT REVERSE.N
CS-COLD START..

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

DIGITAL INPUT

TAG.....HX571N	DESC....HEAT EXCHANGER ON/OFF
DV-DEVICE.....565	
HT-H/W OPTIONS.565:0:0	
ID-ADDR.....Y113	
CT-CLOSE TAG...CLOSE	AT-ALM TYPE....NONE
OT-OPEN TAG....OPEN	AD-ALM DEST....TH
ST-SCAN TIME...1	AP-ALM PRI.....L
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE
II-INVERT.....N	CC-ALM CONTACT.
	CM-CC ALM MODE.ANY

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

DIGITAL INPUT

TAG.....HX572N	DESC....HEAT EXCHANGER ON/OFF
DV-DEVICE.....565	
HT-H/W OPTIONS.565:0:0	
ID-ADDR.....Y114	
CT-CLOSE TAG...CLOSE	AT-ALM TYPE....NONE
OT-OPEN TAG....OPEN	AD-ALM DEST....TH
ST-SCAN TIME...1	AP-ALM PRI.....L
IS-INIT SCAN...ON	AE-ALM ENABLE..ENABLE
II-INVERT.....N	CC-ALM CONTACT.
	CM-CC ALM MODE.ANY

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

DIGITAL OUTPUT

TAG.....POWER DESC....c2 transforms ctrl system to ctrl state.
DV-DEVICE.....565
HT-H/W OPTIONS.565:0:0
ID-ADDR.....C2
CT-CLOSE TAG... ON NX-NEXT BLK....
OT-OPEN TAG.... OFF
CS-COLD START.. ON
OI-INVERT.....N

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

```

      PID CONTROL
TAG.....AIOP1      DA-DEVIATION... 10.00  NX-NEXT BLK....AIOTR
                   DB-DEAD BAND...  0.00  CP-COPY TO.....AIO
EL-LO EGU.....  0.00
EH-HI EGU..... 100.00  PB-PROP BAND... 200.00
ET-EGU TAG.....PII      RE-RESET(M/R)..  0.100
                   RA-RATE.....  0.000
DEL-LO EGU OUT.  0.00
DEH-HI EGU OUT. 100.00

SL-SP LO CLAMP.  0.00
SH-SP HI CLAMP. 100.00

BM-BUMPLESS....YES
OR-OUTPUT REV..NO

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

```

Press <F1> for help at any time

SELECT ITEM:

```

      PID CONTROL
TAG.....TANKAPID      DA-DEVIATION... 10.00  NX-NEXT BLK....SETPTB
                   DB-DEAD BAND...  0.00  CP-COPY TO.....TANKA
EL-LO EGU.....  0.00
EH-HI EGU..... 100.00  PB-PROP BAND... 200.00
ET-EGU TAG.....PII      RE-RESET(M/R)..  0.100
                   RA-RATE.....  0.000
DEL-LO EGU OUT.  0.00
DEH-HI EGU OUT. 100.00

SL-SP LO CLAMP.  0.00
SH-SP HI CLAMP. 100.00

BM-BUMPLESS....YES
OR-OUTPUT REV..NO

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

```

Press <F1> for help at any time

SELECT ITEM:

PID CONTROL

TAG.....TANKBPID DA-DEVIATION... 5.00 NX-NEXT BLK....OUTPUT
DB-DEAD BAND... 0.00 CP-COPY TO.....TANKB
EL-LQ EGU..... 0.00
EH-HI EGU..... 100.00 PB-PROP BAND... 200.00
ET-EGU TAG.....PCT RE-RESET(M/R)... 0.100
RA-RATE..... 0.000
DEL-LQ EGU OUT. 0.00
UEH-HI EGU OUT. 100.00

SL-SP LO CLAMP. 0.00
SH-SP HI CLAMP. 100.00

BM-BUMPLESS.....YES
OR-OUTPUT REV...NO

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

TREND

TAG.....AIOIR AT-AVG/COMPRESS..1 NX-NEXT BLK....

EL-LO EGU..... 0.00
EH-HI EGU..... 100.00
ET-EGU TAG.....PCT

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

TREND

TAG.....TANKATR AT-AVG/COMPRESS..1 NX-NEXT BLK....RBB1

EL-LO EGU..... 0.00
EH-HI EGU..... 100.00
ET-EGU TAG.....PCT

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- TREND -----

TAG.....SETPTATR AT-AVG/COMPRESS..1 NX-NEXT BLK....A01

EL-LO EGU..... 0.00
EH-HI EGU..... 100.00
ET-EGU TAG.....PCT

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

----- TREND -----

TAG.....TANKBTR AT-AVG/COMPRESS..1 NX-NEXT BLK....TANKBPID

EL-LO EGU..... 0.00
EH-HI EGU..... 100.00
ET-EGU TAG.....PCT

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

```

TREND
TAG.....SETPTBTR    AT-AVG/COMPRESS..1    NX-NEXT BLK....A02

EL-LO EGU.....    0.00
EH-HI EGU..... 100.00
ET-EGU TAG.....PCT

```

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

```

TREND
TAG.....PT501NTR    AT-AVG/COMPRESS..3    NX-NEXT BLK....

EL-LO EGU.....    0
EH-HI EGU..... 100
ET-EGU TAG.....psia

```

HELP - FOR MORE INFO
EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

TAG.....LSP1TR AT-AVG/COMPRESS..3 NX-NEXT BLK....

EL-LO EGU..... 0

EH-HI EGU..... 100

ET-EGU TAG.....%

HELP - FOR MORE INFO

EXIT - LOOP DEFINITION COMPLETE

Press <F1> for help at any time

SELECT ITEM:

DATE= 02-21-89

OFF LINE

I/O CONFIGURATION FOR: CHANNEL 1, BASE 1
I/O POINTS

		HX 571N	HX 572N	EV05	EV 119H	EV 219H	EV 319H		
		1	2	3	4	5	6	7	8
SLOT	1	Y0113	Y0114	Y0115	Y0116	Y0117	Y0118	Y0119	Y0120
		1	2	3	4	5	6	7	8
SLOT	2	Y0121	Y0122	Y0123	Y0124	Y0125	Y0126	Y0127	Y0128
		1	2	3	4	5	6	7	8
SLOT	3	Y0129	Y0130	Y0131	Y0132	Y0133	Y0134	Y0135	Y0136
		1	2	3	4	5	6	7	8
SLOT	4	Y0137	Y0138	Y0139	Y0140	Y0141	Y0142	Y0143	Y0144
		1	2	3	4	5	6	7	8
SLOT	5	Y0145	Y0146	Y0147	Y0148	Y0149	Y0150	Y0151	Y0152
		1	2	3	4	5	6	7	8
SLOT	6	Y0153	Y0154	Y0155	Y0156	Y0157	Y0158	Y0159	Y0160
		1	2	3	4	5	6	7	8
SLOT	7	Y0161	Y0162	Y0163	Y0164	Y0165	Y0166	Y0167	Y0168
		1	2	3	4	5	6	7	8
SLOT	8	Y0169	Y0170	Y0171	Y0172	Y0173	Y0174	Y0175	Y0176
		1	2	3	4	5	6	7	8
SLOT	9	Y0177	Y0178	Y0179	Y0180	Y0181	Y0182	Y0183	Y0184

DATE= 02-21-89

OFF LINE

	9	10	11	12	13	14	15	16
SLOT 9	Y0185	Y0186	Y0187	Y0188	Y0189	Y0190	Y0191	Y0192

	17	18	19	20	21	22	23	24
SLOT 9	Y0193	Y0194	Y0195	Y0196	Y0197	Y0198	Y0199	Y0200

	25	26	27	28	29	30	31	32
SLOT 9	Y0201	Y0202	Y0203	Y0204	Y0205	Y0206	Y0207	Y0208

	1	2	3	4	5	6	7	8
SLOT 10	Y0209	Y0210	Y0211	Y0212	Y0213	Y0214	Y0215	Y0216

SLOT 11

SLOT 12

SLOT 13

SLOT 14

SLOT 15

DATE= 02-21-89

OFF LINE

```
PID LOOP 01          TITLE: STUDY          LOCK SETPOINT ..... N
PID ALGORITHM: ..... F          LOCK AUTO/MANUAL ..... N
LOOP FLAG ADDRESS: ..... V1      LOCK CASCADE ..... N

PROCESS VARIABLE ADDRESS: .. WX49          PV IS BIPOLAR ..... N
SQUARE ROOT OF PV ..... N          20% OFFSET ON PV ..... Y

PV RANGE: ..... HIGH = +90.0000
..... LOW = +0.00000
SAMPLE RATE(SECS)..... +0.10000

DERIVATIVE GAIN LIMITING          PERFORM DERIVATIVE
      COEFFICIENT: ... +1.00000          GAIN LIMITING ..... N

SPECIAL CALCULATION ON: .... SP
SFPGM NUMBER: ..... 0001
RAMP/SOAK FOR SP ..... N
REMOTE SETPOINT ..... N          REMOTE SETPOINT ADDRESS
CLAMP SETPOINT LIMITS:HIGH = +90.0000
      LOW = +0.00000
ERROR OPERATION: .....

LOOP OUTPUT ADDRESS: ..... V65          OUTPUT IS BIPOLAR ..... N
REVERSE ACTING ..... N          20% OFFSET ON OUTPUT .... Y
LOOP GAIN .....= +7.99983          (%/%)
RESET (INTEGRAL TIME) .....= +INF          (MIN)
RATE (DERIVATIVE TIME) .....= +0.00000          (MIN)
FREEZE BIAS IF OUTPUT IS
      OUT OF RANGE .... N

ALARM DEADBAND .....= +0.00000          (ENGR. UNITS)
PV ALARMS: ..... LOW-LOW = +0.00000          (ENGR. UNITS)
..... LOW = +0.00000          (ENGR. UNITS)
..... HIGH = +0.00000          (ENGR. UNITS)
..... HIGH-HIGH = +0.00000          (ENGR. UNITS)
MONITOR L-L/H-H ALARM ..... N          MONITOR L/H ALARM ..... N
DEVIATION ALARMS:... YELLOW = +0.00000          (ENGR. UNITS)
      .. ORANGE = +0.00000          (ENGR. UNITS)
MONITOR DEVIATION ALARMS ... N
RATE OF CHANGE ALARM: .....= +0.00000          (ENGR. UNITS/MIN)
MONITOR RATE OF CHANGE ALARM N
MONITOR BROKEN TRANSMITTER . N
```

DATE= 02-21-89

OFF LINE

SF PROGRAM 1

TITLE = SPL00PS
CONTINUE ON ERROR (Y,N): N
PROGRAM TYPE (N,P,C,R) = R
ERROR STATUS ADDR (C,Y,V,WY):
CYCLE TIME (SEC) = +0.00000

```
=====
0001 *      THIS PROGRAM SCALES PARAMETERS FOR LOOPS.
          PARAMETER IS TRANSMITTED BY OPERATOR.
0002 *      LSP1 FROM OPERATOR
0003 SCALE  BINARY INPUT: V600      RESULT: LSP1.
          BIPOLAR = N 20% OFFSET = N
          LOW LIMIT = +0.00000      HIGH LIMIT = +90.0000
0004 *      LKC1 FROM OPERATOR
0005 SCALE  BINARY INPUT: V601      RESULT: LKC1.
          BIPOLAR = N 20% OFFSET = N
          LOW LIMIT = +0.01000      HIGH LIMIT = +100.000
0006 *      LTD1 FROM OPERATOR
0007 SCALE  BINARY INPUT: V602      RESULT: LTD1.
          BIPOLAR = N 20% OFFSET = N
          LOW LIMIT = +0.00000      HIGH LIMIT = +999.990
0008 *      LTS. FROM OPERATOR
0009 SCALE  BINARY INPUT: V604      RESULT: LTS1.
          BIPOLAR = N 20% OFFSET = N
          LOW LIMIT = +0.10000      HIGH LIMIT = +6553.50
0010 UNSCALE INPUT: LSP1.      BINARY RESULT: V200
          BIPOLAR = N 20% OFFSET = N
          LOW LIMIT = +0.00000      HIGH LIMIT = +90.0000
0011 RETURN
```


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OFF LINE

SF PROGRAM 2

TITLE = CHLK01
CONTINUE ON ERROR (Y,N): N
PROGRAM TYPE (N,P,C,R) = C
ERROR STATUS ADDR (C,Y,V,WY):
CYCLE TIME (SEC) = +1.00000

```
=====
0001 *      THIS PROGRAM CALCULATES AND CHANGES LK01 AS A FUNCTION
           OF LN2 VOLUME IN NITROGEN TANK.
0002 IF      WX49 <= 12800
0003 MATH     V193. := +8.00000
0004 ELSE
0005 IF      WX49 < 25600
0006 MATH     V193. := +2.00000
0007 ELSE
0008 MATH     V193. := +1.00000
0009 ENDIF
0010 ENDIF
0011 UNSCALE INPUT: V193.      BINARY RESULT: V601
           BIPOLAR = N 20% OFFSET = N
           LOW LIMIT = +0.01000      HIGH LIMIT = +100.000
0012 RETURN
```

DATE= 02-21-89

OFF LINE

SF PROGRAM 3

TITLE = LPT00F
CONTINUE ON ERROR (Y,N): N
PROGRAM TYPE (N,P,C,R) = C
ERROR STATUS ADDR (C,Y,V,WY):
CYCLE TIME (SEC) = +1.00000

```
=====
0001 *      UNSCALING LOOP PARAMETERS FOR XLINK
0002 *      LKC1 FROM LOOP1
0003 UNSCALE INPUT: LKC1.      BINARY RESULT: V201
      BIPOLAR = N 20% OFFSET = N
      LOW LIMIT = +0.01000      HIGH LIMIT = +100.000
0004 *      LTI1 FROM LOOP1
0005 UNSCALE INPUT: LTI1.      BINARY RESULT: V203
      BIPOLAR = N 20% OFFSET = N
      LOW LIMIT = +0.01000      HIGH LIMIT = +1000.00
0006 *      LTD1 FROM LOOP1
0007 UNSCALE INPUT: LTD1.      BINARY RESULT: V202
      BIPOLAR = N 20% OFFSET = N
      LOW LIMIT = +0.00000      HIGH LIMIT = +999.990
0008 *      LTS1 FROM LOOP1
0009 UNSCALE INPUT: LTS1.      BINARY RESULT: V204
      BIPOLAR = N 20% OFFSET = N
      LOW LIMIT = +0.10000      HIGH LIMIT = +6553.50
```


DATE= 03-01-89

OFF LINE

```
34  C2  *-----*                                C1  !
    *-]/[---! MWIR2  -----( )---*
    !
    ! A:  K66
    !
    ! IR=  Y129
    !
    ! N=   16
    !
    ! *-----*
    C2  *-----*                                C1  !
40  *-]/[---! MWIR3  -----( )---*
    !
    ! A:  K67
    !
    ! IR=  Y145
    !
    ! N=   16
    !
    ! *-----*
    C2  *-----*                                C1  !
46  *-]/[---! MWIR4  -----( )---*
    !
    ! A:  K68
    !
    ! IR=  Y161
    !
    ! N=   16
    !
    ! *-----*
    C2  *-----*                                C1  !
52  *-]/[---! MWIR5  -----( )---*
    !
    ! A:  K69
    !
    ! IR=  Y177
    !
    ! N=   16
    !
    ! *-----*
    C2  *-----*                                C1  !
58  *-]/[---! MWIR6  -----( )---*
    !
    ! A:  K70
    !
    ! IR=  Y193
    !
    ! N=   16
    !
    ! *-----*
    C2  *-----*                                C1  !
64  *-]/[---! LDC1    -----( )---*
    !
    ! A:  V1
    !
    ! N=  16384
    !
    ! *-----*
```

DATE= 03-01-89

OFF LINE

```
63  ! C2  *-----*                                C1  !
    *-]/[---! LDC2  -----( )---*
    !
    ! A:  V2
    !
    ! N=  16384
    !-----*
74  ! C2  *-----*                                C1  !
    *-]/[---! MWIR7  -----( )---*
    !
    ! A:  K71
    !
    ! IR=  C5
    !
    ! N=  16
    !-----*
80  ! C2  *-----*                                C1  !
    *-]/[---! MWIR8  -----( )---*
    !
    ! A:  K72
    !
    ! IR=  C21
    !
    ! N=  16
    !-----*
86  ! C2  *-----*                                C1  !
    *-]/[---! MWIR9  -----( )---*
    !
    ! A:  K73
    !
    ! IR=  C37
    !
    ! N=  16
    !-----*
92  ! C2  *-----*                                C1  !
    *-]/[---! MWIR10 -----( )---*
    !
    ! A:  K74
    !
    ! IR=  C53
    !
    ! N=  16
    !-----*
98  ! C2  *-----*                                C1  !
    *-] [---! SFPGM3 -----( )---*
    !
    !
    !-----*
```

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OFF LINE

```
1.  ! C5      *-----*                               C1      !
    ! *-]/[-*-! MOVW5      !-----*-( )-*
    ! C4      !
    ! *-]/[-*-! A:  V129    !
    !          ! B:  WY25    !
    !          ! N=   1      !
    !          *-----*
108 ! C3      ! SKP1      !
    ! *-]/[-*-----*-( )-*
    ! C3      *-----*                               C1      !
110 ! *-]/[-*-----* SFPGM2      !-----*-( )-*
    !          !
    !          !
    !          *-----*
113 ! C70      *-----* C69      C70      !
    ! *-]/[-*-----* TMR1      ! *-]/[-*-----*-( )-*
    !          !
    !          ! P=   0015.0 !
    !          !
    ! C70      !
    ! *-]/[-*-----*
    !          *-----*
    ! C70      !
    ! *-]/[-*-----*
120 ! C70      *-----*                               C69      !
    ! *-]/[-*-----* TMR2      !-----*-( )-*
    !          !
    !          ! P=   0015.0 !
    !          !
    ! C70      !
    ! *-]/[-*-----*
    !          *-----*
125 ! C70 Y113  *-----*                               Y113      !
    ! *-]/[-*-----* CTR3      !-----*-( )-*
    !          !
    !          ! P=   2      !
    !          !
    ! C71      !
    ! *-]/[-*-----*
    !          *-----*
```

OFF LINE

[illegible]

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OFF LINE

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OFF LINE

C1
POWER

DUMMY

34

```

C2      *-----*
*-[/[--- MWIR2
      A:  K66
      IR= Y129
      N=  16
      *-----*
```

C1
()C1
POWER

DUMMY

40

```

C2      *-----*
*-[/[--- MWIR3
      A:  K67
      IR= Y145
      N=  16
      *-----*
```

C1
()C1
POWER

DUMMY

46

```

C2      *-----*
*-[/[--- MWIR4
      A:  K68
      IR= Y161
      N=  16
      *-----*
```

C1
()

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OFF LINE

	C1			DUMMY
	POWER			
52	C2	*-----*		C1
	-]/[---	MWIR5	-----	()--
		A: K69		
		IR= Y177		
		N= 16		

	C1			
	POWER			DUMMY
58	C2	*-----*		C1
	-]/[---	MWIR6	-----	()--
		A: K70		
		IR= Y193		
		N= 16		

	C1			
	POWER			DUMMY
64	C2	*-----*		C1
	-]/[---	LDC1	-----	()--
		A: V1		
		N= 16384		

OFF LINE

DUMMY :

C1
! POWER

DUMMY :

C1
: POWER

DUMMY :

[illegible]

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OFF LINE

```
      C1
! POWER                                DUMMY !
!
! C2  *-----*                        C1
86 *-]/[---! MWIR9                      ( )---*
!
!      A:  K73
!      IR=  C37
!      N=   16
!
!      *-----*
!
      C1
! POWER                                DUMMY !
!
! C2  *-----*                        C1
92 *-]/[---! MWIR10                     ( )---*
!
!      A:  K74
!      IR=  C53
!      N=   16
!
!      *-----*
!
      C1
! POWER                                DUMMY !
!
! C2  *-----*                        C1
98 *-]/[---! SFPGM3                     ( )---*
!
!
!
!
!      *-----*
```

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OFF LINE

```

C1
!ACT.
DUMMY
C5 *-----*
101 *-]/[-*-! MOVW5 ( )-*
!CONTR!
A: V129
B: WY25
C4
*-]/[-*-! N= 1
*-----*
SKP001 IF C4 IS NOT ACTIVATED GO TO LBL1
!INIT.
C3
108 *-]/[- SKP1 ( )-*
C1
!INIT.
DUMMY
C3 *-----*
110 *-] [---! SFPGM2 ( )-*
*-----*
```

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OFF LINE

113

C69 AMBIENT EXCHANGER DIVERTER VALVE, SWITCHES ONE EXCHANGER FOR
THE OTHER EACH P HOURS

120

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OFF LINE

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OFF LINE

```
138 !EV05
!Y115      *-----*      C72
*-[/[-----TMR5      *-[/[-----Y115
!          P= 0300.0
!EV05
!Y115
*-[/[-----
!EV05
!Y115
*-[/[-----*
!
C72      I/A BLOWDOWN: BLOWSDOWN THE I/A EACH TMR5 P SECONDS FOR
TMR6 P SECONDS.
!EV05
!Y115      *-----*      C72
145 *-[/[-----TMR6      *-----Y115
!          P= 0060.0
!EV05
!Y115
*-[/[-----
!
SKP001  IF C4 IS NOT ACTIVATED GO TO LBL1
!CONTR
!
! C4
150 *-[/[-----SKP1
```


OFF LINE

!ACT.

DUMMY !

[illegible]