5.1 PURPOSE

This section discusses the 584 R.I.O. and how to interpret R.I.O. and 584 indicators and register locations to verify and troubleshoot R.I.O. systems.

5.2 LOCATION STATUS INDICATORS

5.2.1 J200

The J200 has four, front panel, indicator lights; a definition of their functions follows:

COMM ERROR - Blinks if a communications error exists between the J200 and an R.I.O. channel. If no system degradation is noticed but this light comes on, channels may be configured but not used. If this light comes on in a correctly configured system, the fault is either the media or a remote I/O drop.

RCVR ACTIVE - Blinks when receiving data. The duration of the light pulse depends on the amount of R.I.O. information received by the J200. Therefore, this LED may appear brighter in some systems than in others.

XMTR ACTIVE - Blinks when J200 is sending data to R.I.O. channels. The "brightness" of this light will vary between systems for the reasons explained at "RCVR ACTIVE."

POWER OK - Lit when J200 is receiving power from the 584. If the system is operational, this lamp should be on.

5.2.2 P451

Indicator Name	Location	Meaning
AC INPUT	front of unit, above terminal for AC connection	AC input of the correct voltage is being received.
I/O POWER ON	front of unit, just below Type F Connector	Power of the correct voltage is being supplied to the adjacent channel of I/O. This indicator will come on approx. 1/2 second after "A.C. Input" LED.
READY	front center panel	P451 power supply is ready to communicate with the 584 PC (via the J200 interface).
COMM ACTIVE	front center panel	Data is being received from the J200 interface.
S200 ERROR	front center panel	Communication is unsuccessful between the P451 power supply and one or more of the attached I/O modules. If this light is on and no operational problem is noticed, an I/O module is probably configured but not installed. If this light is on in a correctly configured system, the problem can be I/O module, housing (most likely), or the P451 (less likely).

Indicator Name	Location	Meaning
COMM ERRORS	front center panel	A communications error has occurred between the 584 PC (via the J200 interface) and the P451 power supply.

If an error occurs during the power-up sequence or after the P451 power supply has been reset (see paragraph 4.2.2.1), the error will be identified by the indicator lights. A specific set of lights will flash on and off at about one second intervals. The patterns are given in Table 5-1.

NOTE

The "AC Input" Indicator (Modicon P.N. 56-9000-000) and "I/O Power On" L.E.D. (56-0009-000) are field replaceable.

Table 5-1. P451 LED Error Patterns

1 = ON 0 = OFF				
READY	COMM ACTIVE	S200 ERROR	COMM ERROR	
0	0	0	0	Not used
0	0	0	1	CPU error
0	0	1	0	Parallel port error
0	0	1	1	Lamp error
0	1	0	0	Time 0 error
0	1	0	1	Communications bus error (Maintenance Mode)
0	1	1	0	Communications bus/modem error
0	1	1	1	ROM error
1	0	1	0	Jabber error
1	1	0	0	RAM error

5.2.3 P453

5.2.3.1 Chassis

Power On

Power of the correct voltage is being supplied to the adjacent channel of I/O. This indicator will come on approximately 1/2 second after "AC Input" LED.

5.2.3.2 S200 Card

Interface Error

Communication unsuccessful between the P453 power supply and one or more of the attached I/O modules. If this light is on and no operational problem is noticed, an I/O module is probably configured but not installed. If this light is on in a correctly configured system the problem can be I/O module, housing (most likely), or the P453 (less likely).

The P453 has three, front panel indicator lights; a definition of their functions follows:

COMM ERROR

A communications error has occurred between the 584 PC (via the J200 interface) and the P453 power supply.

COMM ACTIVE

Data is being received from the J200 interface.

READY

P453 power supply is ready to communicate with the 584 PC (via the J200 interface).

If an error occurs during the power-up sequence or during operation, the error will be identified by the indicator lights. A specific set of lights will flash on and off at about one second interfaces. The patterns are given in Table 5-2.

Table 5-2. P453 S200 I/O Board Error Codes

P453 S200 I/O BOARD ERROR CODES

INTERFACE ERROR LED	COMM ERROR LED	COMM ACTIVE LED	READY LED	FAILING TEST OR RUN-TIME TASK
		POWER-UP FAILURES		
0	0	0	1	PROM test
0	0	1	0	RAM test
0	0	1	1	HDLC digital test
0	1	0	0	modem loopback test
0	1	0	1	S200 channel 0 test
0	1	1	0	S200 channel 1 test
		RUN-TIME FAILURES		
0	1	1	1	RAM test
1	0	0	0	PROM test
1	0	0	1	switch test
1	0	1	0	modem watchdog timer

1 = flashing

NOTES

1. To utilize the test position, it is necessary to activate the test position switch (ON) and have a legal address on the address switches. If the unit has one or two ASCII boards, the boards must be put in test together or, if it just has the S200 I/O board, it will function in test alone. If the unit has one ASCII board and an S200 I/O board, both must be placed in test for the tests to function correctly.

2. A good system will show the ASCII board Ready LED blink-pause-blink-pause. If it is not happening in this manner, there is an error.

3. The S200 I/o board will blink the four LEDs in succession on a good board. An error condition will halt on an error.

4. During the completion of a successful test on an S200, when the Ready LED blinks, the Carrier LED on the MODEM board will flash once.

5.2.3.3 ASCII Card

READY

Indicates that power is applied to the card. This LED should be lit if the card is properly installed and the P453 chassis "Power ON" LED is lit. This lamp will also blink a prescribed number of times (see Table 5-3 if a failure has been detected.

Other Indicators

Rev. A software does not support the COMM ACTIVE INTERFACE ERROR or COMM ERROR indicators on the ASCII card.

Table 5-3. READY Light Diagnostic Codes

Number of Blinks	Test Failed
2	Checksum PROM Test
3	Ram Test
4	HDLC Loopback Test
5	HDLC/MODEM Loopback Test
6	Serial Port Test (Port 0)
7	Interrupt Test (Port 0)
8	Serial Port Test (Port 1)
9	Interrupt Test (Port 1)
10	Timer Test (Port 0)
11	Timer Test (Port 1)

5.2.3.4 Modem Card

CARRIER DETECT

LED on continuously with 200 series I/O communications or flashing whenever ASCII messages occur (if only ASCII boards are installed in P453). Illuminated carrier detect LED signifies presence of a signal in the 1.5 MHz (of harmonic 1.5 MHz) range. This lamp should be lit if the P453 is addressed properly.

CHANNEL A

Signifies proper power is applied to the card. This lamp should be on if the modem is properly installed and the P453 chassis "Power ON" LED is lit.

CHANNEL B

Unused.

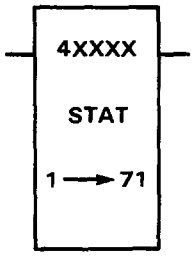
5.3 SYSTEM STATUS INDICATORS

Overall system health is best described by interpretation of the 584 status words.

5.3.1 584 Status

(See Table 5-4 below and Table 5-5 on the following page.)

Table 5-4. 584 Status Table



WORD #		RAP ADDRESS
1	MACHINE STATUS	300101
2	UNASSIGNED	300102
3	MACHINE STATUS	300103
4	J200 STATUS	300104
5	MACHINE STOP STATES	300105
6	# SEGMENTS IN MACHINE	300106
7 8 9 10 11	584 INTERNAL USE	300111
12	CHAN 1 INPUT / CHAN 2 INPUT CHAN 3 INPUT / CHAN 4 INPUT	347128
27	CHAN 31 INPUT / CHAN 32 INPUT	347143
28	CHAN 1 INPUT / CHAN 2 INPUT CHAN 3 INPUT / CHAN 4 INPUT	347160
43	CHAN 31 INPUT / CHAN 32 INPUT	347175
44 45	P451 #1 STATUS	347628 347629
46 47	P451 #2 STATUS	347630 347631
71	P451 #14 STATUS	347654 347655

Table 5-5. Get Stat Words

RAP ADDRESS	WORD	BIT	BIT SET STATES CONDITION BELOW
300101		15 (MSB)	Peripheral port 1 set up
		14	Peripheral port 2 set up
		13	Port 1 address set
		12	Port 2 address set
		11	Future
		10	Enable constant sweep option
		9	Enable single sweep delay mode
		8	2048 addressing (16 bit machine)
		7	Power OK
		6	Run light off
		5	Memory protect key is off
		4	Backup battery needs replacing
		3	Future
		2	Future
		1	Future
		0	Future
300102			Future
300103		15 (MSB)	Set on first scan only
		14	System
		13	Constant sweep time exceeded. Valid only when bit 10 of word 1 is set.
		3 2 1 0	Number of single sweeps executed. Machine executes indicated number of sweeps before returning to STOP state. Do not change any other bits in this word via RAP panel.

5.3.2 J200 Status

(See Tables 5-6 and 5-7 below.)

Table 5-6. J200 Status Word Definition

J200 STATUS RAP ADDRESS	WORD	BIT	BIT SET STATES CONDITION BELOW
300104	4	15 (MSB)	J200 bad
		14	J200 time-out
		13	J200 loopback failure > See Table 5-7.
		12	J200 memory failure
		11 - 3	Future
		2	
		1	
		0	

Table 5-7. J200 Status Code Definition

J200 SYNOPSIS	CODE	DESCRIPTION
300104 (RAP)	0000	Good J200
	8000	Bad J200 - no communications on 584 power-up
	A001	Not full response on test C
	8802	Future
	0003	Time-out on response to S200 send
	0004	Time-out on transmit sent to J200

"GET STAT" register assignment for each I/O channel

"GET STAT" bit assignment for each slot within channel

5.3.3 Input/Output Module Status

(See Table 5-8 below.)

Table 5-8. I/O Module Status Word Definition

CHANNELS	INPUT MOD. STATUS	OUTPUT MOD. STATUS
1, 2	12	28
3, 4	13	29
5, 6	14	30
7, 8	15	31
9,10	16	32
11,12	17	33
13,14	18	34
15,16	19	35
17,18	20	36
19,20	21	37
21,22	22	38
23,24	23	39
25,26	24	40
27,28	25	41
29,30	26	42
31,32	27	43

BIT	ODD CHANNEL	SLOT
15 (MSB)	"	1
14	"	2
13	"	3
12	"	4
11	"	5
10	"	6
9	"	7
8	"	8
7	EVEN CHANNEL	1
6	"	2
5	"	3
4	"	4
3	"	5
2	"	6
1	"	7
0	"	8

A 'one' in any position of an I/O module active status word means:

> The 'Traffic Cop' is enabled for that module <u>but</u> the module is not 'working.'

A 'zero' in any position of an I/O module active status word means:

> Module is working OK <u>or</u> I/O is inhibited.

5.3.4 R.I.O. Status (P451 and/or P453)

(See Tables 5-9, 5-10, and 5-11.)

Table 5-9. R.I.O. Status Words

584 CH. #	UNIT #	WORD	ORDER	RAP REF.	P190
* 1 and 2	1	72	1st Word	347624	F3A08
		73	2nd Word	347625	F3A09
* 3 and 4	2	74	1st Word	347626	F3A0A
		75	2nd Word	347627	F3A0B
5 and 6	3	44	1st Word	347628	F3A0C
		45	2nd Word	347629	F3A0D
7 and 8	4	46	1st Word	347630	F3A0E
		47	2nd Word	347631	F3A0F
9 and 10	5	48	1st Word	347632	F3A10
		49	2nd Word	347633	F3A11
11 and 12	6	50	1st Word	347634	F3A12
		51	2nd Word	347635	F3A13
13 and 14	7	52	1st Word	347636	F3A14
		53	2nd Word	347637	F3A15
15 and 16	8	54	1st Word	347638	F3A16
		55	2nd Word	347639	F3A17
17 and 18	9	56	1st Word	347640	F3A18
		57	2nd Word	347641	F3A19
19 and 20	10	58	1st Word	347642	F3A1A
		59	2nd Word	347643	F3A1B
21 and 22	11	60	1st Word	347644	F3A1C
		61	2nd Word	347645	F3A1D

Table 5-9. R.I.O. Status Words (cont)

584 CH. #	UNIT #	WORD	ORDER	RAP REF.	P190
23 and 24	12	62	1st Word	347646	F3A1E
		63	2nd Word	347647	F3A1F
25 and 26	13	64	1st Word	347648	F3A20
		65	2nd Word	347649	F3A21
27 and 28	14	66	1st Word	347650	F3A22
		67	2nd Word	347651	F3A23
29 and 30	15	68	1st Word	347652	F3A24
		69	2nd Word	347653	F3A25
31 and 32	16	70	1st Word	347654	F3A26
		71	2nd Word	347655	F3A27

*only accessible via 584L and P453 models XX2

NOTE

The RAP or P190 reference in the above table will yield the first (or second) word in hexadecimal notation. Conversion of these words to binary (16-bit) format on the P190 is required before Tables 5-10 and 5-11 can be utilized.

Table 5-10. R.I.O. WORD 1 STATUS

Bit Assignment	Label	Definition
0	Busy 1	The current 584 message has been queued for processing by the drop addressed.
1-3	N (s)	The send sequence number indicates the number (module 8) of the current information frame that is being sent to the addressed drop.
4	CABLE	Identifies the cable to be used by the J200 to communicate with the addressed drop. (0 = Cable 0, 1 = Cable 1.)
5-7	N (r)	The receive sequence number indicates the number (module 8) of the next information frame that is expected to be received from the addressed drop.
8	BUSY 0	The current 584 message has not been accepted by the addressed drop.
9	SPARE	-----
10	CRNS	The current message response received by the 584 from the addressed drop is not supported.
11	BCUN	Byte Count underrun. The internal drop response message byte count is incompatible with the J200 transmitted byte count. Byte count in data message.
12	S#ER	Sequence number (N(r)/N(s)) received on response from the addressed drop is different from the expected value.

Table 5-10. R.I.O. WORD 1 STATUS (cont)

Bit Assignment	Label	Definition
13-15	FCN	This field identifies the type of processing scheduled to be performed by the 584 for the addressed drop. The following functions are defined: 000 - Normal I/O 001 - Restart Phase I (Comm Reset) 010 - Restart Phase II (Appl. Reset) 011 - Unassigned (INHIBIT P451) 100 - INHIBIT 101 - Unassigned (INHIBIT P451) 110 - Unassigned (INHIBIT P451) 111 - Unassigned (INHIBIT P451)

Table 5-11. R.I.O. Word 2 Status

Bit Assignment	Label	Definition
0-7	*RETRY COUNT	This field counts the number of retries attempted by the 584 to the addressed drop. The maximum value is 255 (see below).
8	LR-CNS	Link reject response issued by the addressed drop indicates the current command is not being supported by the drop.
9	LR-SNR	Link reject response issued by the addressed P451 indicates the current message has an incompatible sequence number.
10	LR-PUP	Link reject response issued by the addressed P451 indicates that the drop has just gone through its power-up sequence.
11	SPARE	-----
12	TO	The addressed drop did not respond to the latest 584 command message.
13	CE	The J200 sensed a communications error from the addressed drop. A communications error is a CRC failure; receives abort or residual bit count error.
14	CVR	The J200 sensed a character overrun error from the addressed drop.
15	SPARE	-----

NOTE

The retry counter is a troubleshooting aid. If a drop is experiencing problems the retry counter can be examined (for that drop) by the user, who can use the retry counter to monitor the progress of his troubleshooting by watching the count rate. The retry counter can be cleared by either recycling power or stopping and starting the 584.

No particular number of retries, in themselves, consititute a bad system. In fact, 11 retries in a row (in one scan) are required to cause a Comm Error. Moreover, one Comm Error will not always cause an I/O drop out. Modicon Customer Service Department does not consider a retry to be an error.

5.3.5 "STAT" Block Applications Programs

Refer to Appendix G (in conjunction with the tables outlined in Section 5.3.3) for example programs which may be incorporated by users to monitor and/or test R.I.O. system integrity using the "STAT" block in the 584 controller.