PLI - SERIAL INTERFACE ADAPTOR FOR PL CONTROLLERS

The PLI is a device to allow the PL series solar controllers to communicate with a computer. It converts the signals from the PL into a form that a computer can recognise. It also converts signals from the computer to suit the PL controller.

Description

The PLI implements the most common form of computer serial interface, which is called RS232. Almost all computer or modem serial ports use the RS232 interface. It allows serial communication at speeds of 300, 1200, 2400 and 9600 baud. The speed (baud rate) is selected by two jumpers on the circuit board. The computer (or modem) baud rate must be the same as the baud rate selected on the PLI for communication to occur. Select the fastest speed that the connection will support. Start at 9600 baud and if it does not work or has too many errors, then reduce the speed until the link works reliably.

To prevent problems due to ground potential differences, the PLI uses optical coupling. This means that there is no electrical connection between the computer side and the PL side. The energy to operate the PL side is drawn from the battery bank connection of the PL controller. The energy required to operate the computer side is drawn from the computer serial port connection. A small amount of power will be drawn from the computers TX, RTS and DTR lines. The interface can be powered from the TX line only (i.e. with RTS and DTR not connected to the PLI) if there is a shortage of connecting wires available. In this case, the on board DC/DC converter needs some assistance to start up. This is done by sending a short burst of data on the transmit line (for about 100 msec – send a byte with mostly zeros in it). After it starts up, it will remain running until the computer serial port powers down. The software supplied will automatically send a transmission burst until the PLI powers up and answers the computer back. The minimum connection to the computer required is three wires – TX, RX and Signal Ground. The computer connection is via a 9-pin female D connector. It is set up as a null modem style connection. RTS (pin 7) is connected to CTS (pin 8). DTR (pin 4) is connected to DSR (pin 6) and CD (pin 1). On the PLI, pin 3 is data input from the computer (i.e. TX at the computer end) and pin 2 is data output to the computer (i.e. RX at the computer end). The PLI can be connected to a computer with a standard IBM style serial cable.

Connect to the PL with the lead supplied (‘WY’ cable for PL20/40, ‘WZ’ cable for PL60).
The PL20/40 connection is under the plastic lid. Push the 8-pin socket onto the 8-pin header to the left of the push button. One pin of the socket is blocked up. This aligns with the pin on the header which is cut off. Take the tail beside the display and out the cut-out tab in the lid on the top left side.
PL60 connection is via the RJ11 socket (under cover, bottom left of unit).

Specifications

PL side current drain	9mA
Input impedance RX	4.7K during transition
Current drawn RX input	1mA typical (5mA Max)
Output impedance TX	300 ohm
Output voltage levels	+/- 6.5V typical.
Short circuit current	5mA max.

Software

A Win98/ME/2k/XP program (PLCOM) to communicate with the PL controller can be downloaded from our web site www.plasmatronics.com.au

For those who need to write their own interface, the following information is necessary.

Protocol

The PL controller does not send data to the computer unless requested. The computer is the master and the PL is the slave. The computer can send commands to the PL. Some of these commands will result in the PL sending a byte of data back to the computer. There is also a loopback command which is replied to by the PLI, not by the PL controller. There is approximately a 70msec delay between the end of transmission of a command and the start of transmission of a reply.

NOTE:

Every 6 minutes the PL takes a copy of the settings values in the EEPROM and copies these across to the working RAM (thus overwriting anything that you have written to the RAM).

If you don't mind this 6 minute delay in updating the 'working' RAM copy, then just write to the EEPROM any time you need to change settings.

If you want to make sure both copies of the settings are updated at the same time, you will need to write the new settings to the EEPROM first, and then the RAM.

Commands

The following commands are available:

	Action	Comment
a.	read processor location	Read any of the processor data ram locations from 0 to 255.
b.	read e2prom location	Read any of the non-volatile memory locations from 0 to 255.
c.	write to processor location	Write a data byte to any processor data ram location (0 to 255).
d.	write to e2prom location	Write a data byte to any non-volatile memory location (0-255).*
e.	loopback test	Send a known byte back to allow the link to be tested
f.	button push commands	Send a ***long push*** or ***short push*** to the device

Command Format

A command consists of four bytes:

1st byte	is the command code.
2nd byte	is the 8 bit address to be read or written to.
3rd byte	is the data to be written (send 0 if it is a read operation).
4th byte	is a 1s complement of byte 1 as a check byte.

Data format

8 bit, No parity, 1 stop bit

Command codes

Dec	Hex	Action	Check	Hex
20	14	read processor location (RAM)	235	EB
72	48	read non volatile memory (e2prom) location	183	B7
152	98	write to processor location (RAM)	103	67
202	CA	write to non volatile memory (e2prom) location *	53	35
187	BB	loopback test / site number configuration **	68	44
87	57	short push command (address 1) or long push command (address 2)	168	A8

Reply Format

There are two reply formats – single byte and double byte.

Single byte response (site selectable PLI loopback) is:

n	site number

Single byte responses (error codes) are:

Dec	Hex	Response
5	5	No comms or corrupt comms (site mode only?). Make sure R46 (10k) change is done.
128	80	Loopback response code.
129	81	Timeout Error.
130	82	Checksum error in PLI receive data.
131	83	Command received by PLI is not recognised.
132	84	<not used> {or could be returning PL40 version!}
133	85	Processor did not receive a reply to request.
134	86	Error in reply from PL.
135	87	<not used>
136	88	<not used>

Double byte responses are given if data is sent back from the PL

Dec	Hex	Data
200	C8	<data byte>

The first byte is always 200 decimal (C8 hex). The second byte is the data

Note:

*Each 'write to non volatile memory' command must be preceded by an 'unlock' command: data 1 sent to RAM location 226 (hex E2)

** Except for use with a Site Selectable PLI, any value may be used in the Address and Data positions of the Loopback command. The value of the address byte is 101 for the Site Number Configuration command of a Site Selectable PLI.

Examples

To read data ram location 0 (This will return the PL software version number):

Send 20 0 0 235

Reply 200 1 ***which indicates that it is a PL20 version 1.***

To send a Loopback request:

Send 187 0 0 68

Reply 128 ***which is the correct response to a loopback request***

To write 150 (15.0V) to non volatile memory location 35 (EMAX):

Send 152 226 1 103 ***(set EEPROM write protection bit before <u>EVERY</u> EEPROM write)***

Send 202 35 15 53 ***(set EMAX to 15.0V)***

Send 72 35 0 183 ***(read back setting)***

Reply 200 15 ***correct read back value indicates that the setting succeeded***

To send a 'short push' command (just the same as doing a short push on the regulator button)

send 87 1 0 168

To send a 'long push' command (just the same as doing a long push on the regulator button)

send 87 2 0 168

Note:

Turn around time for each string is about 100 - 200mS depending on how much other activity there is on the bus. You should flush your RX and TX buffers before every transmission. Although there is no reply to a correct "write" command, the device will send an error byte in response to an incorrect transmission.

Data RAM location list:

Note: All stored voltages are scaled relative to 12V
eg. voltages stored for a 24V system are the real voltages divided by 2,
and voltages stored for a 48V system are the real voltages divided by 4.

Variable Name:	Address (Dec)	Address (Hex)	Comments:
	0	0	Software version number.
			The following applies (subject to change without notice):
			Version 0-127 = PL20
			Version 128-191 = PL40
			Version 192-210 = PL60
			Version 215-255 = PL80
vdiv	32	20	voltage divider control file
bcals	33	21	msbs of bcal gains and offsets
bcal12	34	22	gain (lower nib) and offset (upper nib) for 12V batv
bcal24	35	23	gain (lower nib) and offset (upper nib) for 24V batv
bcal48	36	24	gain (lower nib) and offset (upper nib) for 48V batv
night	37	25	counter for night indicator
gendel	38	26	generator delay counter
dutycyc	39	27	provides average ton/ton+toff i.e. average duty cycle
lcount	40	28	counter for load disconnect
dtime	41	29	display timeout counter
			Write 0 to wake up the display, and write decimal 16 to turn display off.
			Hint: See Example 5
sec	46	2E	2 seconds file, inc at 2 sec intervals
min	47	2F	Minutes file (Value range = 0-5). Used for 6 minute timer
hour	48	30	Current time (in 0.1 hrs steps ie. 6 minute intervals)
			Values = 0-23.9
			Eg. 0=midnight, 100=10.0 hrs (10am), 145=14.5 hrs (2:30pm)
day	49	31	dayfile
batv	50	32	Battery voltage in 0.1V steps scaled relative to 12V.
			eg. 128=12.8V, for 24V system 128*2=25.6V, for 48V system 128*4=51.2V
battemp	52	34	battery temp msb
solv	53	35	solar voltage msb
~~Batva~~	54	36	~~raw batv without temp or b- comp.~~
Prot			30 sec counter for load over-current protection (PL60)
sercon	55	37	serial control byte
linkcnt	56	38	link detect counter
pos1	62	3E	screen position counter for history
bstday	63	3F	counter for days since boost

Data RAM location list continued:

(settings copied from non-volatile memory)

Variable Name:	Address (Dec)	Address (Hex)	Comments:
gon	64	40	generator turn on voltage/Ah
goff	65	41	generator turn off voltage
gdel	66	42	generator delay time/gen over charge Ah
gexf	67	43	generator exercise frequency
grun	68	44	generator run time
loff	69	45	load disconnect voltage
lon	70	46	load reconnect voltage
ldel	71	47	delay before disconnect
aset	72	48	alarm setting value
bstfreq	73	49	days between boost cycles
atim	74	4A	time spent in absorption mode
hyst	75	4B	hysteresis
bret	76	4C	boost return voltage
curlim	77	4D	charge current limit
bat2	78	4E	regulation voltage for the second battery
eset1	79	4F	event control settings 1-3
eset2	80	50	
eset3	81	51	
eqfreq	82	52	days between equalisations
etim	83	53	length of equalisation cycle
absv	84	54	absorption voltage
emax	85	55	equalisation voltage
fltv	86	56	float voltage
bmax	87	57	boost voltage
lgset	88	58	current use of load switch (lsn) & gen output
pwme	89	59	Upper nibble is the BSET setting under the MODE menu. Lower nibble is the PWM setting under the MODE menu (current regulation).
sstop	90	5A	current start(lsn)and stop modes
etmod	91	5B	current enable modes (emod lsn)
gmod	92	5C	generator control mode/tcmp(upper nib)
volt	93	5D	msn= Prog number (0-4), lsn=system voltage (0-4) System voltage… 0=12V, 1=24V, 2=32V, 3=36V, 4=48V Eg. 00110001 = 24V system running Prog 3.
bcap	94	5E	battery capacity in 20/100 Ah chunks

Data RAM location list continued:

(counters and control bytes)

Variable Name:	Address (Dec)	Address (Hex)	Comments:
eqcnt	95	5F	counter for days since equ
genexd	96	60	days since last generator exercise/gen run time
extmout	97	61	time out counter for expansion board
econ	98	62	event control file
rmtmout	99	63	time out for remote control
rcount	100	64	reg state change counter
rstate	101	65	regulator state Mask out the low 2 bits b1 b0 State: 0 0 boost 0 1 equalise 1 0 absorption 1 1 float
dstate	102	66	state of display. See Example 5
rmode	104	68	state file for charge and load regup routine
vreg	105	69	current voltage for charge switch to regulate to
erunc	108	6C	event control run timer
ereptc	109	6D	event control repeat time counter
setcnt	111	6F	counter for refresh of setup
ahbalh	113	71	gen amp hour balance high byte
conout	115	73	7-pwm active,6-charge,5-shunt,4-alarm,3-bat2, 2-event,1-gen,0-load dis
update	126	7E	7-setf 128 setting refresh flag bit 6-evdf 64 event display flag bit 5-dpinv 32 decimal point invert flag bit 4-soldisf 16 solar disconnect flag bit 3-event up 8 event update flag bit 2-screen up 4 screen template update flag bit 1-dispup 2 display update flag bit 0-2secup 1 2-second cycle update flag bit

Data RAM location list continued:

(output from control routines to extension & outputs)

Variable Name:	Address (Dec)	Address (Hex)	Comments:
bminl	124	7C	lower byte of battery min voltage scaled to 12V
bmaxl	125	7D	lower byte of battery max voltage scaled to 12V
dtemp	180	B4	current external temperature
dsoc	181	B5	SOC (day data state of charge)
dvmax	182	B6	Current day voltage Vmax scaled relative to 12V
dvmin	183	B7	Current day voltage Vmin scaled relative to 12V
dfltim	184	B8	Time that regulator went into float (in 0.1 hrs steps ie. 6 minute intervals) Eg. 0=midnight, 100=10.0 hrs (10am), 145=14.5 hrs (2:30pm)
ciacc1	185	B9	Internal charge ah accumulator lsb
ciacc2	186	BA	Internal charge ah accumulator
ciacc3	187	BB	Internal charge ah accumulator msb
ciahl	188	BC	Internal charge ah low byte
ciahh	189	BD	Internal charge ah high byte
ceacc1	190	BE	External charge ah accumulator lsb
ceacc2	191	BF	External charge ah accumulator
ceacc3	192	C0	External charge ah accumulator msb
ceahl	193	C1	External charge ah low byte
ceahh	194	C2	External charge ah high byte
liacc1	195	C3	Internal load ah accumulator lsb
liacc2	196	C4	Internal load ah accumulator
liacc3	197	C5	Internal load ah accumulator msb
liahl	198	C6	Internal load ah low byte
liahh	199	C7	Internal load ah high byte
leacc1	200	C8	External load ah accumulator lsb
leacc2	201	C7	External load ah accumulator
leacc3	202	CA	External load ah accumulator msb
leahl	203	CB	External load ah low byte
leahh	204	CC	External load ah high byte
cext	205	CD	external charge input (NOTE: First read ‘extf’ to check validity and scaling)
lext	206	CE	external load input (NOTE: First read ‘extf’ to check validity and scaling)
extf	207	CF	external flag and scale file Bit 3, Enable of LEXT. Bit 2, Enable for CEXT Bit 1, 1=1A/step for LEXT (times 10), 0=0.1A/step for LEXT Bit 0, 1=1A/step for CEXT (times 10), 0=0.1A/step for CEXT
vext	208	D0	external voltage reading 0-255 volt 1V steps
ahball	211	D3	prescaler for genah ah balance counter

Data RAM location list continued:

(output from control routines to extension & outputs continued)

Variable Name:	Address (Dec)	Address (Hex)	Comments:
chargl	212	D4	internal charge current filter lsb
cint	213	D5	Internal (solar) charge current: 0.1A steps for PL20 (eg. 10=1.0 Amp solar charge) 0.2A steps for PL40 (eg. 10=2.0 Amps solar charge) 0.4A steps for PL60 (eg. 10=4.0 Amps solar charge) internal charge filter msb
chargg	215	D7	charge gain
loadl	216	D8	internal load current filter lsb
lint	217	D9	Internal LOAD- current: 0.1A steps for PL20/PL40 (eg. 10=1.0A), 0.2A steps for PL60 (eg. 10=2.0A) internal load current filter msb
loadg	219	DB	load gain
batvl	220	DC	battery voltage lsb
vbat	221	DD	battery voltage msb
batvg	223	DF	bat volts gain
brdteml	224	E0	board temp lsb
tbrd	225	E1	board temp msb
	226	E2	EEPROM write protection bit (set this to '1' before <u>each</u> EEPROM write). Automatically cleared to '0' after each EEPROM write command. Resets to 0 whenever 6 minute timer (RAM 47dec) expires (count >5).
brdtemg	227	E3	board temp gain
batteml	228	E4	battery temp lsb
tbat	229	E5	battery temp msb
battemg	231	E7	battery temp gain
solvl	232	E8	solar voltage lsb
vsol	233	E9	solar voltage msb
solvg	235	EB	solar voltage gain
batsenl	236	EC	bat- sense input lsb
vsen	237	ED	sense voltage msb
batseng	239	EF	sense voltage gain

Non volatile memory (EEPROM) location list:

Note: All stored voltages are scaled relative to 12V
eg. voltages stored for a 24V system are the real voltages divided by 2,
and voltages stored for a 48V system are the real voltages divided by 4.

(Calibration values)

Variable Name:	Address (Dec)	Address (Hex)	Comments:	
bcals	0	0	msbs of voltage cal values (MSB is adjust lockout bit – CDF)	
bcal12	1	1	lsb of 12V gain and offset	
bcal24	2	2	lsb of 24V gain and offset	
bcal48	3	3	lsb of 48V gain and offset	
charge offset	4	4		
charge gain	5	5		
load offset	6	6		
load gain	7	7		
bat tmp offset	8	8		
bat tmp gain	9	9		
solar offset	10	A	Offset	EEPROM
			-2	254
			-1	255
			0	0
			1	1
			2	2
solar gain	11	B	Gain	EEPROM
			-2	30
			-1	31
			0	32
			1	33
			2	34
batsen offset	12	C		
batsen gain	13	D		

Non volatile memory (EEPROM) location list continued:

(Settings)

Variable Name:	Address (Dec)	Address (Hex)	Comments:
gon	14	E	generator turn on voltage/Ah
goff	15	F	generator turn off voltage
gdel	16	10	generator delay time/gen over charge Ah
gexf	17	11	generator exercise frequency
grun	18	12	generator run time
loff	19	13	load disconnect voltage
lon	20	14	load reconnect voltage
ldel	21	15	delay before disconnect (minutes)
aset	22	16	alarm setting value
bstfreq	23	17	days between boost cycles
atim	24	18	time spent in absorption mode
hyst	25	19	hysteresis
bret	26	1A	boost return voltage
curlim	27	1B	charge current limit
bat2	28	1C	regulation voltage for the second battery
eset1	29	1D	event control settings 1-3
eset2	30	1E	
eset3	31	1F	
eqfreq	32	20	days between equalisations
etim	33	21	length of equalisation cycle
absv	34	22	absorption voltage
emax	35	23	equalization voltage
fltv	36	24	float voltage
bmax	37	25	boost voltage (0.1V steps, scaled to 12V)
lgset	38	26	current use of load switch (lsn) & gen output
pwme	39	27	Upper nibble is the BSET setting under the MODE menu. Lower nibble is the PWM setting under the MODE menu (current regulation).
sstop	40	28	current start(lsn)and stop modes
etmod	41	29	current enable modes (emod lsn)
gmod	42	2A	generator control mode/tcmp(upper nib)
volt	43	2B	msn= Prog number (0-4), lsn=system voltage (0-4) System voltage… 0=12V, 1=24V, 2=32V, 3=36V, 4=48V Eg. 00110001 = 24V system running Prog 3.
bcap	44	2C	Battery capacity (Value = 20Ah-20,000Ah) 20-1,000Ah in 20Ah steps. 1,100Ah-20,000Ah in 100Ah steps. Eg. 49 = 980Ah = 49*20Ah. 240 = 20,000Ah = ((240-50)*100Ah)+(50*20Ah)
	45	2D	History data pointer. Points to Day 1 data (ie. Yesterday).
	46	2E	Byte 1 (first byte) of Day 1 history [see example 1 and 2]
	…	…	[see example 1 and 2]
	255	FF	Byte 7 (last byte) of Day 30 history [see example 1 and 2]

Screen Numbers:

#	Screen
0	batv
1	bost
2	equl
3	absb
4	flot
5	chrg
6	cint
7	cext
8	gset toggle
9	gmod
10	g on V
11	g on Ah%
12	goff V
13	gdel
14	goff Ah%
15	g ah Ah%
16	gexd
17	grun
18	gday
19	gtim
20	load
21	lint
22	lext
23	lset toggle
24	loff

#	Screen
25	l on
26	ldel
27	Ah in
28	Ah chrg int
29	Ah chrg ext
30	Ah out
31	Ah load int
32	Ah load ext
33	data
34	vmax
35	vmin
36	ftim
37	soc
38	temp
39	solv
40	hist
41	day
42	hist In
43	hist Out
44	hist vmax
45	hist vmin
46	hist ftim
47	hist soc
48	next
49	back

#	Screen
50	exit
51	set
52	time
53	volt
54	prog
55	reg
56	bmax
57	emax
58	etim
59	efrq
60	absv
61	atim
62	fltv
63	hyst
64	brtn
65	curlim
66	bfrq
67	tcmp
68	mode
69	lset
70	gset
71	bset
72	bat2
73	pwm
74	bcap

#	Screen
75	alrm
76	rset
77	evnt
78	strt
79	set1 solv
80	set1 vext
81	set1 time
82	set1 rate.m
83	stop
84	set2 solv
85	set2 vext
86	set2 time
87	set2 run .m
88	emod
89	tmod
90	set3 temp
91	set3 vext
92	set3 time
93	eoff

To move to a particular screen write the number of the screen (0-93) to the dstate register (102 decimal), then write 4 to the update register (126 decimal) to force a refresh of the screen image.

See Example 4, 5 and 6 for use of screen numbers.

Example 1 -> History Data Information:

History pointer – location 0x2D (45) points to byte 1 of Day 1 of history data.
(Day 1 is last day written to history, Day 2 = day before day 1, Day 3 is day before day 2, etc)

Data is stored in a buffer from 0x2E – 0xFF (46 – 255)

History pointer has a value from 0x00 – 0x1D (0 – 29)

Pointer value of 0 means that Day 1 starts at 0x2E + (7*0)
Pointer value of 1 means that Day 1 starts at 0x2E + (7*1)
Pointer value of n means that Day 1 starts at 0x2E + (7*n)

Subsequent days are stored in descending memory locations, until 0x2E (46) is reached, when wraparound to 0xF9 (249) occurs.

History record format:

Byte 1	Vmax
Byte 2	Vmin
Byte 3	FTime
Byte 4	SOC
Byte 5	AH IN LSB (Charge AH)
Byte 6	AH OUT LSB (Load AH)
Byte 7	AH MSB (Charge and Load) (low nibble = MSB of Charge AH, high nibble = MSB of Load AH)

Example:
Pointer = 0x02

Day 1 Vmax will be at location 0x3C (60) calculated by (0x2E + (7*2))
Day 1 Vmin will be at location 0x3D
Day 1 Ftime will be at location 0x3E
Day 1 SOC will be at location 0x3F
Day 1 AH IN will be at location 0x40
Day 1 AH OUT will be at location 0x41
Day 1 AH MSB will be at location 0x42

Day 2 Vmax will be at location 0x35 (0x2E + (7*1))

Day 3 Vmax will be at location 0x2E (0x2E + (7*0))
Day 3 AH MSB will be at location 0x34

Day 4 Vmax will be at location 0xF9 (wraparound to top of history buffer)
Day 4 AH MSB will be at location 0xFF

Day 30 Vmax will be at location 0x43
Day 30 Vmin will be at location 0x44

Formulae

Pointer at location 0x2D (45) contains n

p = starting location for Day 1
    p = 0x2E + (7*n)
q = starting location for Day m
    a = p – (7*(m-1))
if a >= 0x2E:
    q = a
else:
    q = (p + 0xD2) – (7*(m-1))

Example 2 -> Calculation of Charge and Load AH in history

Example: byte 5 = 0x1B (27)
byte 6 = 0x40 (64)
byte 7 = 0x21 (33)

First, split byte 7 into 2 nibbles:
Low nibble = 0x01 = MSB of charge AH (0x100)
High nibble = 0x02 = MSB of load AH (0x200)

Therefore:
Charge AH = 0x1B + 0x100 = 0x11B (283)
Load AH = 0x40 + 0x200 = 0x240 (576)

Formulae

Charge Ah = (byte 5) + (((byte 7) && 0x0F) * 0x100)

Load Ah = (byte 6) + (((byte 7) && 0xF0) * 0x100)

Example 3 -> Reading current battery voltage

Read data ram location 50 (This will return the battery voltage)

Send 4 bytes(decimal)   20, 50, 0, 235

Reply will be 2 bytes   200, bbb

Where bbb is the battery voltage scaled to 12V in 0.1V steps.
e.g. if 137 is returned, then the battery voltage is 13.7V if the volt setting is 12V.

It is 27.4V if the volt setting is 24V etc.

Example 4 -> Toggle the current load state (and power cycle of connected load)

To toggle the current load terminal state:

(All numbers in decimal)

Write 23 to location 102 (sets the dstate register to point to screen 23 - LSET screen):

to do this send   152 102 23 103

Wait 100ms, then read the dstate register to check that serial communication succeeded:
send 20 102 0 225

reply should be 200 23

Then send a ‘long push’ command:

send   87 2 0 168

this will toggle the load.

To ‘Power Cycle’ the attached load:

[NOTE: Minimum cycle ‘off’ time = 1 minute.]

Set LOAD->LON= say 10.0 volts (for a 12V system)
(or higher if you want to have some low battery disconnection protection).

Set LOAD->LDEL=1 minute (it's minimum value).

Then…
Send the toggle load command (above) and as long as the battery voltage is above LON value, then the load will come back up after LDEL minutes (eg. 1 minute if you set it to it's minimum setting).

Example 5 -> Read SOLV voltage

Notes:

Wait 100ms and clear the serial buffers between each read or write.
Unless there is an error, there should be no response code for the write commands.
The SOLV value will not be correct unless the display is enabled before the value is read.
The display template will not be correct unless the display is updated.

<clear serial input and output buffers to discard error messages and unflushed transmissions>

- Write 0 to ***dtime*** location (decimal 41) which will turn display on.
  152 41 0 103
  <wait 100ms for device to process message>
  <optional> wait 1 second for timeout error
  <optional> check serial reply for error code

<clear serial input and output buffers to discard error messages and unflushed transmissions>

- Read ***dtime*** location to check that serial communication is working.
  20 41 0 235
  200 0 ***dtime is a counter. Any value less than 16 is acceptable***

- Write 39 decimal to ***dstate*** location (decimal 102) which will force the controller to open circuit the charge input and measure SOLV.
  152 102 39 103
  <wait 100ms for device to process message>
  <optional> check serial reply for error code

- Read ***dstate*** location (decimal 102) to check that the write command succeeded.
  20 102 0 235
  200 39

- ***<optional>*** Write 4 to ***update*** location (decimal 126) which will update the display
  152 126 4 103

- Wait a couple of seconds for the Solar Voltage value to stabilise.

<optional> check serial reply for error code
<clear serial input and output buffers to discard error messages and unflushed transmissions>

- Read ***SOLV*** location (decimal 53) solar voltage.
  Note: SOLV is scaled to display as 0-99.5 in 0.5V steps (ie. 0.5V/bit). For example, SOLV of 44 indicates 22V.
  20 53 0 235
  200 44 ***example value. data byte is scaled solar voltage***

- To reconnect the charge input, write 0 to ***dstate*** location (decimal 102).
  152 102 0 103
  <wait 100ms for device to process message>
  <optional> check serial reply for error code

continued on next page

Example 5 -> Read SOLV voltage (continued)

<clear serial input and output buffers to discard error messages and unflushed transmissions>

- Read ***dstate*** location to check that the write command succeeded.

  20 102 0 235
  200 0

- ***<optional>*** Write 4 to ***update*** location (decimal 126) to update the display

  152 126 4 103

  <wait 100ms for device to process message>
  <optional> check serial reply for error code

  <clear serial input and output buffers to discard error messages and unflushed transmissions>

- ***<optional>*** Write 16 to ***dtime*** location (decimal 41) if you want the display to go off again rather than waiting for it to time out.

  152 41 16 103

Example 6 -> Move to a particular screen and update display

To move to a particular screen write the number of the screen (0-93) to the dstate reg (102 decimal), then write 4 to the update register (126 decimal) to force a refresh of the screen image.

<clear serial input and output buffers to discard error messages and unflushed transmissions>

- Go to the ***SOC*** screen:

  152 102 37 103

  <wait 100ms for device to process message>

  <optional> check serial reply for error code

- Read the ***dstate*** value to check the screen number:

  20 102 0 235

  200 37 reply is that device is on screen 37

- Send a Long Push to the SOC screen to reset the state of charge to 100%.

  87 2 0 168

  <wait 100ms for device to process message>

  <optional> check serial reply for error code

- Write 4 to the update register to correct the screen image.

  152 126 4 103

Appendix A -> Reading PL settings with a PLI

The following table lists the PL settings as seen on the screen and describes how to read these settings directly from a PL controller using a PLI. This is already done in the PLCom software available on our website. However, this information is provided to allow direct access to the controller settings.

- The byte addresses given (in decimal) are for the ram in the PL.
- The same values are also stored in the e2prom at the address given-50.
- Where setting voltages are given, they are the 12V system settings scaled as 0.1V per bit.
- The actual values are scaled by the VOLT setting.

Basic:

Setting	**PL Ram Address**	**Interpretation**
VOLT	93, low nibble	System Voltage 0-12V,1-24V...4-48V
PROG	93, high nibble	Program setting see Ref Man 7.3
TIME	48	Time of day in 0.1hr steps e.g.137 = 1:42 pm

Generator:

Setting	**PL Ram Address**	**Interpretation**
GMOD	88, top nibble	0-6 generator mode see Ref Man 2.0
GON	64	Generator start voltage (0.1V steps) or Gen. start SOC (1% steps) if GMOD=1,2,5,6
GOFF	65	Generator turn off voltage
GDEL	66	Delay before change in minutes -see Ref p10. Overcharge SOC % if GMOD=1,2,5,6
GEXD	67	Days before automatic generator exercise
GRUN	68	Generator exercise run time 0.1hr steps.

Load:

LOFF	69	load disconnect voltage see Ref man 3.0
LON	70	load reconnect voltage
LDEL	71	delay before disconnect, 1 minute steps

Regulation: (Ref Man p19)

BMAX	87	Maximum boost voltage
EMAX	85	Equalisation voltage
ETIM	83	Length of equalisation cycle 0.1 hr steps
EFRQ	82	Days between equalisations
ABSV	84	Absorption voltage
ATIM	74	Time spent in absorption mode 0.1 hr steps
FLTV	86	Float voltage
HYST	75	Voltage Hysteresis 0.1V steps
BRTN	76	Boost return voltage
CHRG	77	Charge current limit
BFRQ	73	Days between boost cycles
TCMP	92, high nibble	Temperature compensation setting Ref. Man 7.4.3

Mode: (See Ref man. 7.5)

LSET	88, low nibble	Current use of load switch
GSET	88, high nibble	Current use of 'G' output
BSET	89, high nibble	B- input use
BAT2	78	Regulation voltage for the second battery
PWM	89,low nibble	PWM use on charge and load switches
BCAP	94	Battery capacity setting 20A/100A per step 20A steps until 1000Ah, 100Ah steps >1000Ah
ALRM	72	Alarm voltage setting

Event: (See Ref man. 7.6)

STRT	90,low nibble	Event start condition
Setting 1	79	Setting for start condition see table Ref Man p30
STOP	90,	high nibble Event stop condition
Setting 2	80	Setting for stop condition see table Ref Man p30
EMOD	91,low nibble	Extra event conditions see table Ref Man p31

TMOD	91, high nibble	Extra event conditions see table Ref Man p31
Setting 3	81	Setting for TMOD condition see table Ref Man p31

Appendix B -> PLA/Site Selectable PLI Protocol

Commands to a PLA (PL Alarm/Synchronisation device), or to a Site Selectable PLI, are preceded by the site number byte, and the final check byte is replaced with a checksum byte.

PLA site number prefix byte

Site	
1..3	Connected PL Site number
4	PLA device

Site Selectable PLI site number prefix byte

Site	
0	Configuration site number
1..240	Site number

More information about the site-selectable / PLA protocol is in the documents "Site.Selectable.PLI.Protocol.Info" and "PLA.info"