AL808 Communication Protocol

1. Overview

Digital Communication allows the controller to communicate with a PC or a networked computer system.

The RS232 standard allows a single instrument to be connected to a PC, a Programmable Logic Controller, or a similar devices using a cable length of less than 15M.

The RS485 standard allows one or more instruments to be connected(multi-dropped) using a two wire connection, with cable length of less than 1200M. 31 Instruments and one "Master" may be connected in this way.

RS485 is recommended for plant installation.

2. Data Format

1 start bit
7 data bits
even parity bit
1 stop bit

3. Baud Rate(bps)

300, 600, 1200, 2400, 4800, 9600, and 19.2 k.

4. Control Characters

ASCII-HEX	Control Sign	Comments	ASCII-HEX	Control sign	Comments
02	<STX>	Start of text	30	0	
03	<ETX>	End of text	31	1	
04	<EOT>	End of transmission	32	2	
05	<ENQ>	Enquiry	33	3	
06	<ACK>	Positive acknowledge	34	4	
15	<NAK>	Negative acknowledge	35	5	
20		Space	36	6	
2D	-	Minus sign	37	7	
2E	.	Decimal point	38	8	
3E	>	Greater than	39	9	

5. Reading Data from the AL808 Controller

To read data, a 'poll' message is issued to the instrument. This message takes the following format:

[EOT](ADR_H)(ADR_H)(ADR_L)(ADR_L)(C1)(C2)[ENQ]

Each item in the above description represents a single ASCII character. The items in hold type and square brackets are control characters used to frame the message, whose values may be determined by reference to the table on the previous page. The bracketed item in normal type have the following significance:

ADR_H The first digit of the instrument address, the ADR_H is sent twice, as a validation mechanism.
e.g. '1'(31 HEX) for instrument address 12.
'0'(30 HEX) for instrument address 01.

ADR_L The second digit of the instrument address, the ADR_H is sent twice, as a validation mechanism.
e.g. '2'(32 HEX) for instrument address 12.
'1'(31 HEX) for instrument address 01.

C1 The first character of the mnemonic for the parameter being accessed, e.g. 'P' for Process Variable.

C2 The first character of the mnemonic for the parameter being accessed, e.g. 'V' for Process Variable.

If the instrument receives the message correctly and the mnemonic is valid it will reply with:

[STX](C1)(C2)<DATA>[EXT](BCC)

C1, C2 Echo of the mnemonic from the poll message.

DATA The value of the parameter in a given display format.
e.g. 99.9,1.2, -999, >1234 etc.

BCC This is a block checksum that is generated for data validation. It is computed by XORing(exclusive or) all the characters after and **excluding** the STX, and **including** the ETX. Note that it may take the value of 'EOT' and care must be take when writing a protocol driver to ensure that this is not seen as an 'End of Transmission' sequence.

Example of a Parameter Read

For example, when reading PV from instrument at address 53, the following sequence of character will be sent and received:

Master:

ASCII:	EOT	5	5	3	3	P	V	ENQ
HEX:	04	35	35	33	33	50	56	05

Instrument:

ASCII:	STX	P	V	2	4	.	ETX	BCC
HEX:	02	50	56	32	34	2E	03	2D

6. Writing Data to The Al808 Controller

To write data, a 'select' message is issued to the instrument. This message takes the following format:

[EOT](ADR_H)(ADR_H)(ADR_L)(ADR_L)[STX](C1) (C2)<DATA>[ETX](BCC)

Each item in the above description represents a single ASCII character. The items in hold type and square brackets are control characters used to frame the message, whose values may be determined by reference to the table on Page 1. The bracketed item in normal type have the following significance:

ADR_H

The first digit of the instrument address, the ADR_H is sent twice, as a validation mechanism.
e.g. '1'(31 HEX) for instrument address 12.
'0'(30 HEX) for instrument address 01.

ADR_L

The second digit of the instrument address, the ADR_L is sent twice, as a validation mechanism.
e.g. '2'(32 HEX) for instrument address 12.
'1'(31 HEX) for instrument address 01.

C1 The first character of the mnemonic for the parameter being accessed, e.g. 'P' for Process Variable.

C2 The second character of the mnemonic for the parameter being accessed, e.g. 'V' for Process Variable.

DATA The value of the parameter in a given display format. e.g. 99.9,1.2, -999, >1234 etc.

BCC This is a block checksum that is generated for data validation. It is computed by XORing(exclusive or) all the characters after and **excluding** the STX, and **including** the ETX.

If a parity or a address format error is detected, the instrument will not reply. Otherwise, the instrument will reply with either:

[NAK] Failed to write:BCC is incorrect, or Parameter not available or not configured, or Parameter is read only, or attempt has been made to read a parameter that is outside limits.
OR
[ACK] Parameter write was successful.

Example of a Parameter Write
For example, when writing a value of 450 to the setpoint to an instrument at address 43, the following sequence of character will be sent and received:

Master:

ASCII:	EOT	4	4	3	3	STX	S	L	4	5	0	ETX	BCC
HEX:	04	34	34	33	33	02	53	4C	34	35	30	03	2D

Instrument:

ASCII:	ACK
HEX:	06

Communication Parameters List

Order	ASCII/HEX	Mnemonic	Parameter
PV	50 56		Last measured value read only
OP	4F 50		Output power in auto read only
SP	53 50		Setpoint read only
SL	53 4C	SP	Local setpoint 1
HA	48 41	Hi AL	High alarm setpoint
LA	4C 41	LoAL	Low alarm setpoint
DA	44 41	dAL	Deviation alarm setpoint
XP	58 50	ProP	Proportional band
TI	54 49	Int.t	Integral time
TD	54 44	dEr.t	Derivative time
HB	48 42	Hcb	High cutback
LB	4C 42	Lcb	Lower cutback
CH	43 48	Hc.t	Cycle time 1(output 1-heat)
CC	43 43	cc.t	Cycle time 2(output 2-cool)
RG	52 47	rEL.c	Relative cooling gain 1
HS	48 53	SPH	Setpoint high limit
LS	4C 53	SPL	Setpoint low limit
BP	42 50	SnbP	Sensor break power
HO	48 4F	HPL	Heat(output 1) output limit
SR	53 52	SPrr	Ramp-to-setpoint ramp rate
HB	48 62	Hb	Holdback
LC	4C 63	Lc	Loop counter
r1	72 31	r1	Ramp rate 1
l1	6C 31	L1	Level 1
t1	74 31	d1	Dwell 1
r2	72 32	r2	Ramp rate 2
l2	6C 32	L2	Level 2
t2	74 32	d2	Dwell 2
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SW	53 57		Status word hexadecimal
XS	58 53		Extended status word
OS	4F 53		Optional status word

SW (data format ≥ABCD)

Word	Bit	Function	Description	0/1
D	0	Data format	Read/write	Free/fixed
D	1	Input fault	Read only	No/yes
D	2	Barring key operation	Read/write	No/yes
D	3	----	----	----
C	4	----	----	----
C	5	Modifying parameters by keys	Read/write	No/yes
C	6	Deviation alarm status	Read only	No/yes
C	7	Deviation alarm condition	Read only	No/yes
B	8	Lower limit alarm status	Read only	No/yes
B	9	Lower limit alarm condition	Read only	No/yes
B	10	Upper limit alarm status	Read only	No/yes
B	11	Upper limit alarm condition	Read only	No/yes
A	12	Alarm output	Read only	No/yes
A	13	----	----	----
A	14	----	----	----
A	15	Auto/manual	Read only	Auto/manual

XS (data format = >ABCD) (read/write)
XS = >0000 turn off self-tuning
XS = >0001 turn on self-tuning
OS (data format XS = >ABCD) (read/write)
OS = >0000 stop program
OS = >0002 run program
OS = >0003 hold program

Appendix ASCII Table

MSD LSD	0	1	2	3	4	5	6	7
0	NUL	DLE	SPACE	0	@	P	`	p
1	SOH	XON	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	XOFF	#	3	C	S	c	s
4	EOT	DC4	$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	S1	US	/	?	O	_	o	DEL