Developer Notes for KeypadLinc Line

Version 003
April 16, 2013

Revision History

Rev	Date	Comments
001	1/11/13	Initial Release
002	1/22/13	Update Commands
003	4/16/13	Updated Commands

Table of Contents

1 KeypadLinc List

1.1 KeypadLinc Dimmer[2486DWH6]

Devcat:0x01
Subcat:0x1B
Firmware:0x41+

1.2 KeypadLinc Dimmer[2334-222]

Devcat:0x01
Subcat:0x41
Firmware:Any

1.3 KeypadLinc Dimmer[2334-232]

Devcat:0x01
Subcat:0x42
Firmware:Any

1.4 KeypadLinc Dimmer[2486DWH8]

Devcat:0x01
Subcat:0x1C
Firmware:0x41+

1.5 KeypadLinc On/Off[2486SWH6]

Devcat:0x02
Subcat:0x0F
Firmware:0x41+

1.6 KeypadLinc On/Off (Dual-Band)[2487S]

Devcat:0x02
Subcat:0x1E
Firmware:0x41+

1.7 KeypadLinc On/Off (Dual-Band, 50/60 Hz)[2487S]

Devcat:0x02
Subcat:0x2C
Firmware:0x41+

2 Firmware Description

2.1 INSTEON Commands Supported

2.1.1 Standard length common INSTEON commands:

Assign to ALL-Link Group Command

Description: Sent when holding down the SET Button for 3 seconds on the device. Blinks the LED green for 4 minutes or until linked to another device.

Example (Hex): AA BB CC XX YY ZZ CF 01 DD (where AA.BB.CC is the Device's ID)

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Assign to ALL-Link Group	From Device	Device's ID	0xXX (DevCat), 0xYY (SubCat), 0xZZ (firmware revision)	Broadcast	0x01	0xDD (hardware revision)	Sent when holding down SET Button for 3 seconds. Group number for 277V Keypad load is 0x01

Delete from ALL-Link Group Command

Description: Sent when holding down the SET Button for 3 seconds on the device, then pressing and holding the set button for 3 seconds. Blinks the LED red for 4 minutes or until unlinked from another device.

Example (Hex): AA BB CC XX YY ZZ CF 02 DD (where AA.BB.CC is the Device's ID)

Delete from ALL-Link Group	From Device	Device's ID	0xXX (DevCat), 0xYY (SubCat), 0xZZ (firmware revision)	Broadcast	0x02	0xDD (hardware revision)	Group number for 277V Keypad load is 0x01

Enter Linking Mode Command

Description: Same as holding down the SET Button for 3 seconds on the device. Blinks the LED red for 4 minutes or until unlinked from another device.

Example (Hex): AA BB CC DD EE FF 0F 09 01 (where AA.BB.CC is the Device's ID, DD.EE.FF is the Sender's Id)

Enter Linking Mode	To device	Sender's ID	Device's ID	Direct	0x09	0x00 -> 0xFF (Don't Care Value; Always enter group 0x01 linking)	
	Response	Device's ID	Sender's ID	Ack	0x09	Same as sent	
	Sent from Device	Device's ID	0xXX (DevCat), 0xYY (SubCat), 0xZZ (firmware revision)	Broadcast	0x01	0xDD (hardware revision)	Same as holding down SET Button for 3 seconds

Ping Command
Description: Same as holding down the SET Button for 3 seconds on the device, then pressing and holding the set button for 3 seconds. Blinks the LED red for 4 minutes or until unlinked from another device.
Example (Hex): AA BB CC DD EE FF 0F 0A 01 (where AA.BB.CC is the Device's ID, DD.EE.FF is the Sender's Id)

Ping	To device	Sender's ID	Device's ID	Direct	0x0F	0x00 -> 0xFF (Don't Care Value)	
	Response	Device's ID	Sender's ID	Ack	0x0F	Same as sent	

ID Request Command
Description: Same as holding down the SET Button for 3 seconds on the device, then pressing and holding the set button for 3 seconds. Blinks the LED red for 4 minutes or until unlinked from another device.
Example (Hex): AA BB CC DD EE FF 0F 0A 01 (where AA.BB.CC is the Device's ID, DD.EE.FF is the Sender's Id)

ID Request	To device	Sender's ID	Device's ID	Direct	0x10	0x00 -> 0xFF (Don't Care Value)	
	Response	Device's ID	Sender's ID	Ack	0x10	Same as sent	
	Sent from Device	Device's ID	0xXX (DevCat), 0xYY (SubCat), 0xZZ (firmware revision)	Broadcast	0x01	0xDD (hardware revision)	Same as holding down SET Button for 3 seconds, but device not in linking mode

2.1.1 Standard length Keypad INSTEON commands:

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Light ON	To device	Sender's ID	Device's ID	Direct	0x11	0x00 -> 0xFF (on level)	Go to On-Level
	Response	Device's ID	Sender's ID	Ack	0x11	Same as sent	

Light ON Fast	To device	Sender's ID	Device's ID	Direct	0x12	0x00 -> 0xFF (on level)	Go to On-Level instantly
	Response	Device's ID	Sender's ID	Ack	0x12	Same as sent	

Light OFF	To device	Sender's ID	Device's ID	Direct	0x13	0x00 -> 0xFF (on level)	Go to Off at saved Ramp Rate
	Response	Device's ID	Sender's ID	Ack	0x13	Same as sent	

Light OFF Fast	To device	Sender's ID	Device's ID	Direct	0x14	0x00 -> 0xFF (Don't Care Value)	Go to Off instantly
	Response	Device's ID	Sender's ID	Ack	0x14	Same as sent	

Incremental Bright	To device	Sender's ID	Device's ID	Direct	0x15	0x00 -> 0xFF (Don't Care Value)	Brighten one step. There are 32 steps from off to full brightness
	Acknowledge	Device's ID	Sender's ID	Ack	0x15	Same as sent	

Incremental Dim	To device	Sender's ID	Device's ID	Direct	0x16	0x00 -> 0xFF (Don't Care Value)	Dim one step. There are 32 steps from off to full brightness
	Response	Device's ID	Sender's ID	Ack	0x16	Same as sent	

Start Manual Change	To device	Sender's ID	Device's ID	Direct	0x17	Direction 0x00 Down 0x01 Up 0x02 -> 0xFF Unused	Begin changing On-Level
	Response	Device's ID	Sender's ID	Ack	0x17	Same as sent	

Stop Manual Change	To device	Sender's ID	Device's ID	Direct	0x18	0x00 -> 0xFF (Don't Care Value)	Stop changing On-Level
	Response	Device's ID	Sender's ID	Ack	0x18	Same as sent	

SD	**Message**	**From**	**To**	**Message**	**Cmd1**	**Cmd2**	**Notes**

Command	Direction	Address (3 bytes)	Address (3 bytes)	type	(1 byte)	(1 byte)	
Status Request	To device	Sender's ID	Device's ID	Direct	0x19	Operating Flags Command	See Status Request Table
	Response	Device's ID	Sender's ID	Ack	0x19	Same as sent	

Status Request Table	
0	ACK of this command has Cmd1=Database Delta and Cmd2=On Level
1	ACK of this command has Cmd1=Database Delta and Cmd2=LED On Level
2	ACK of this command has Cmd2=On Level Moving To or At If Not Moving
3	50/60 Hz Count

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Instant On/Off	To device	Sender's ID	Device's ID	Direct	0x21	0x00 -> 0xFF (on level)	Uses instant Ramp Rate
	Response	Device's ID	Sender's ID	Ack	0x21	Same as sent	

RR On	To device	Sender's ID	Device's ID	Direct	0x2E	On level = 16*On + 0F RR = 2*RR+1	
	Response	Device's ID	Sender's ID	Ack	0x2E	Same as sent	

RR Off	To device	Sender's ID	Device's ID	Direct	0x2F	On level = 00 RR = 2*RR+1	
	Response	Device's ID	Sender's ID	Ack	0x2F	Same as sent	

Beep	To device	Sender's ID	Device's ID	Direct	0x30	0x00 -> 0xFF (Don't care value)	Beeps for standard duration (same as Set Button Pressed)
	Response	Device's ID	Sender's ID	Ack	0x30	Same as sent	

2.1.2 Extended length KeypadLinc INSTEON commands

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Read Operating Flags	To device	Sender's ID	Device's ID	Direct	0x1F	Operating Flags Command	See Read Operating Flags Table
	Response	Device's ID	Sender's ID	Ack	0x1F	Same as sent	

Read Operating Flags Table	
0	bit 0 = Plock bit 1 = LED on TX bit 2 = Resume Dim bit bit 3 = N/A bit 4 = LED OFF bit 5 = KeyBeep bit 6 = RF Disable bit 7 = Powerline Disable
1	Data Base Delta flag….gets incremented with any change in the Database
2	CRC Error Count
3	s/n failure count
5	bit 0 = TenD bit 1 = NX10Flag bit 2 = blinkonError bit 3 = CleanupReport 0 = off 1 = On bit 4 = N/A bit 5 = Detach Load bit 6 = Smart Hops bit 7 = N/A

SD Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Notes
Set Operating Flags	To device	Sender's ID	Device's ID	Direct	0x20	Operating Flags Command	See Set Operating Flags Table below
	Response	Device's ID	Sender's ID	Ack	0x20	Same as sent	

Set Operating Flags Table	
0	Programming lock On
1	**Programming lock off**
2	LED on with Insteon TX (LED in Light pipe disabled so this command has no effect)
3	**LED off with Insteon TX**
4	Resume Dim On
5	**Resume Dim Off**
6	8 key for Keypad Loadsense off for OutletD
7	**6 key for Keypad or Loadsense On for OUtletD**
8	Led Backlight Off
9	**Led Backlight On**
0A	KeyBeep On
0B	**KeyBeep Off**
0C	Rf Off…as an originator, will still hop messages
0D	**Rf On**
0E	Insteon Off
0F	**Insteon On….will go back to on every power cycle**

10	TenDflag On turns on App retries read out of database and cu error report
11	**TenDflag Off**
12	X10Offflag On Disables all X10 rx and tx
13	**X10Offflag Off**
14	**Error Blink Off**
15	Error Blink On
16	**Cleanup Report is Off**
17	Cleanup Report is On
…	
1A	**Detach Load Off**
1B	Detach Load (See Detach Load Notes Below)
1C	**Start Hops of last Rx ACK (SmartHops)**
1D	Start Hops of 1

Detach Load Notes:

- Detach Load is only supported through software. It cannot be turned on/off from the device.
- When Detach Load is turned On, the load will then be moved/controlled by Group 9
    - Link to Group 9 using the SET Button.
    - Link to Group 1 by using the ON or OFF Button.
    - Link to Buttons A-H using the A-H buttons.
- Control of the LEDs when Detach Load is enabled
    - To control the Group 1 LEDs, simply send the Keypad a Group 1 On/Off command
    - To control the other LEDs, use the Extended 2E Set LED Bit Mask command to set those LEDs
- Getting The Status of Groups 1-9
    - To get the Status of the 8 LEDs (Group 1-8), use the Read Data 2E command and the Data 11 byte contains the LED State information.
    - To get the Status of Group 9 (The Load), use the Standard status request command Cmd1=19 Cmd2=00

Extended length 277V Keypad INSTEON commands:

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Get for Group/ Button	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00 -> 0xFF (Group/ Button)	0x00
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A
	From device	Device's ID	Sender's ID	Extended Direct	0x2E	0x00	Same as sent	See Returned Extended Get Message Info

Returned Extended Get Message Info						
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**
0x01	On Mask	Off Mask	X10 House code (0x20 = none)	X10 Unit	Ramp Rate	On-Level

Data 9	Data 10	Data 11	Data 12	Data 13	Data 14
LED Brightness	Non-Toggle Mask	LED Bit Mask	X10 All Bit Mask	On/ Off Bit Mask	Trigger Group Bit Mask

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set On Mask for Group/Button	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00 -> 0xFF (Group/Button)	See Set On Mask Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set On Mask Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x02	0x00 -> 0xFF (Bit mask. Follows when Group/Button is On.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set Off Mask for Group/Button	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00 -> 0xFF (Group/Button)	See Set Off Mask Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set Off Mask Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x03	0x00 -> 0xFF (Bit Mask. Always Off for grouping.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd 1 (1 byte)	Cmd 2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set X10 Address for Group/Button	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00 -> 0xFF (Group/Button)	See Set X10 Address Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set X10 Address Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x04	0x00 -> 0xFF (House Code, 0x20 for none)	0x00 -> 0xFF (Unit Code)	N/A	N/A	N/A	N/A	N/A	N/A	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set Ramp Rate for Group/Button	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00 -> 0xFF (Group/Button)	See Set Ramp Rate Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set Ramp Rate Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x05	0x00 -> 0x1F (Ramp Rate, 8 minutes to .1 seconds 0x00 = 2 seconds)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set On-Level for Group/Button	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x00 -> 0xFF (Group/Button)	See Set On-Level Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set On-Level Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x06	0x00 -> 0xFF (On-level Off to full bright.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set LED Brightness	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x01	See Set LED Brightness Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set LED Brightness Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x07	0x11 -> 0x7F (for brightness)	0x00	0x00	0x00	0x00	0x00	0x00	0x00…	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set Non Toggle Mask	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x01	See Set Non Toggle Mask Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set Non Toggle Mask Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x08	Bit0 = 1:button1 non toggle,… Bit7 = button8 non toggle	0x00	0x00	0x00	0x00	0x00	0x00	0x00…	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set LED bit Mask	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x01	See Set LED bit Mask Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set LED Bit Mask Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x09	Bit0 = Button 1 LED … Bit7 = Button 8 LED (1 = on)	0x00	0x00	0x00	0x00	0x00	0x00	0x00…	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set X10 All bit Mask	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x01	See Set X10 All bit Mask Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set X10 All Bit Mask Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x0A	Bit0 = 1:button1 will send All on/off instead of on/off	0x00	0x00	0x00	0x00	0x00	0x00	0x00…	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set Trigger group bit Mask	To device	Sender's ID	Device's ID	Extended Direct	0x2E	0x00	0x01	See Set Trigger group bit Mask Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2E	0x00	N/A	N/A

Set Trigger Group Bit Mask Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 14**
0x0C	Bit0 = 1:button1 trigger button…	0x00	0x00	0x00	0x00	0x00	0x00	0x00…	Checksum

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Get Database	To device	Sender's ID	Device's ID	Extended Direct	0x2F	0x00	0x00 -> 0xFF (Don't Care Value)	See Get Database Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2F	0x00	N/A	N/A
	From device	Device's ID	Sender's ID	Extended Direct	0x2E	0x00	Same as sent	See Returned Extended Get Database Info

Get Database Info									
Data 2 (1 byte)	**Data 3**	**Data 4**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**Data 10**	**Data 11**
0x00	0x00 -> 0xFF (Hi Byte Address)	0x00 -> 0xFF (Lo Byte Address)	0x00 -> 0xFF (# of Records, 0x00 dumps all records	N/A	N/A	N/A	N/A	N/A	N/a

Returned Extended Get Database Info (will continue to be sent until # of records is sent or until the first never been used record is sent)									
Data 2 (1 byte)	**Data 3**	**Data 4 (1 byte)**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 13**
0x01	0x00 -> 0xFF (Hi Byte Address)	0x00 -> 0xFF (Lo Byte Address)	0x00	Byte 1 of record	Byte 2 of record	Byte 3 of record	Byte 4 of record		Byte 8 of record

Extended Command	Message Direction	From Address (3 bytes)	To Address (3 bytes)	Message type	Cmd1 (1 byte)	Cmd2 (1 byte)	Data 1 (1 byte)	Data 2 (1 byte)
Set Database	To device	Sender's ID	Device's ID	Extended Direct	0x2F	0x00	0x00 -> 0xFF (Don't Care Value)	See Set Database Info
	Response	Device's ID	Sender's ID	Standard Ack	0x2F	0x00	N/A	N/A

Set Database Info									
Data 2 (1 byte)	**Data 3**	**Data 4 (1 byte)**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 13**
0x02	0x00 -> 0xFF (Hi Byte Address)	0x00 -> 0xFF (Lo Byte Address)	0x01 -> 0x08 (# of bytes to write, over 0x08 is an error and ignored)	Byte 1 of data	Byte 2 of data	Byte 3 of data	Byte 4 of data		Byte 8 of data

Extended Command	**Message Direction**	**From Address (3 bytes)**	**To Address (3 bytes)**	**Message type**	**Cmd1 (1 byte)**	**Cmd2 (1 byte)**	**Data 1 (1 byte)**	**Data 2 (1 byte)**
Trigger Group	To device	Sender's ID	Device's ID	Extended Direct	0x30	0x00	0x00 -> 0xFF (Group/Button)	See Trigger Group Info
	Response	Device's ID	Sender's ID	Standard Ack	0x30	0x00	N/A	N/A

Trigger Group Info									
Data 2 (1 byte)	**Data 3**	**Data 4 (1 byte)**	**Data 5**	**Data 6**	**Data 7**	**Data 8**	**Data 9**	**…**	**Data 13**
0x00 = use local On-Level, 0x01 = use Data 3 Level (Note: The Command to the group is not parsed, so if you want the local load to go off, you must set data2 to 1 and data3 to 0)	0x00 -> 0xFF (On-Level if data2 = 0x01)	Cmd1	Cmd2	0x00 = local Ramp Rate, 0x01 = instant Ramp Rate	N/A	N/A	N/A		N/A

2.2 Checksum Information

Data14 will contain a 2s compliment of cmd1 through 2nd to last data record in the last data record.

Example of Checksum:

01 02 03 04 05 06 1F 2F 00 01 02 0F FF 08 E2 01 08 B6 EA 00 1B 01 11
From 01.02.03 to 04.05.06
a record at 0FFF (A valid boundary)
08 bytes a record that 04.05.06 will control
Group 1 the responder is 08.B6.EA (00 1B 01 DNC)
11 is the check sum

Int	Hex	
47	2F	
0	00	
1	01	
2	02	
15	0F	
255	FF	
8	08	
226	E2	
1	01	
8	08	
182	B6	
234	EA	
0	00	
27	1B	
1	01	
1007	3EF	Sum
	10	Compliment (Last byte)
	11	Add 1

3 Memory Map

3.1.1 All-Link Database (AL /L) Overview

The AL /L starts at the top of external (serial) EEPROM and grows downward. In the Thermostat, top of memory is 0x0FFF. Each AL /L Record is 8 bytes long, so the first record starts at 0x0FF8, the second record starts at 0x0FF0, and so on down to 0x0300 for a total of 416 links. In what follows, the 3-byte INSTEON Address contained in a record is called the *Device ID* or sometimes just the *ID*. The high byte (MSB) of the Device ID is *ID2*, the middle byte is *ID1*, and the low byte (LSB) is *ID0*.

3.1.2 Thermostat External EEPROM Structure Overview

Location		**Comments**
0x0FF8	0xA2 01 AA BB CC FF FE 01	All-Link Database Record
0x0FF0		
0x0FD8		
……		
0x0300		Last Record, 416 total links allowed
0x02XX	N/A	Addressing below 0x0300 is ignored by database

3.1.3 AL /L Record Format

Thermostat AL Record Format

Database entries with Record Control Bit 6: 0 = Responder and Group 1 will control the local load.

Linear ALL-Link Database (AL /L) Record Format		
Field	**Length (bytes)**	**Description**
Record Control	1	Record Control Flag Bits: Bit 7: 1 = Record is in use, 0 = Record is available Bit 6: 1 = Controller (Master) of Device ID, 0 = Responder to (Slave of) Device ID Bit 5: Not used Bit 4: Not used Bit 3: Not used Bit 2: Not used Bit 1: 1 = Record has been used before, 0 = 'High-water Mark' Bit 0: Not used
Group	1	ALL-Link Group Number this Device ID belongs to
ID	3	Device ID (ID2, ID1, ID0 in that order)
Data 1	1	On level
Data 2	1	Ramp Rate (0x00 -> 0xFE)
Data 3	1	Button Number (0x01->0x08)

To add a record to an AL /L, you search for an existing record that is marked available. (Available means the same as empty, unused or deleted.) If none is available, you create a new record at the end of the AL /L.

An unused record will have bit 7 of the *Record Control* byte set to zero. The last record in an AL /L will have bit 1 of the *Record Control* byte set to zero.

3.1.4 Overwriting an Empty AL /L Record

If you found an empty record, you simply overwrite it with your new record data.

Change bit 7 of the *Record Control* byte from zero to one to show that the record is now in use.

Set bit 6 of the *Record Control* byte to one if the device containing the AL /L is an INSTEON Controller of the INSTEON Responder Device whose *ID* is in the record. If instead the device containing the AL /L is an INSTEON Responder to the INSTEON Controller Device whose *ID* is in the record, then clear bit 6 of the *Record Control* byte to zero. In other words, within an AL /L, setting bit 6 means "I'm a Controller," and clearing bit 6 means "I'm a Responder."

Put the ALL-Link Group number in the *Group* field, and put the *Device ID* in the *ID* field. Finally, set the *Data 1*, *Data 2*, and *Data 3* fields appropriately for the *Record Class* you are storing.

3.1.5 Creating a New AL /L Record

To create a new record at the end of the AL /T, find the record with bit 1 of the *Record Control* byte set to zero, indicating that it is the last record in the AL /L. Flip that bit to one.

4 Button Map

4.1 Group Layout

4.1.1 6 Button Mode

Group 1 On	
Group 3	Group 4
Group 5	Group 6
Group 1 Off	

4.1.2 8 Button Mode

Group 1	Group 2
Group 3	Group 4
Group 5	Group 6
Group 7	Group 8

4.2 Bit Mask Layout

Bit 0	Bit 1
Bit 2	Bit 3
Bit 4	Bit 5
Bit 6	Bit 7