INSTEON

INSTEON Hub: Developer's Guide

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Revision History

Release Date	Author	Description
01-30-07	PVD	Abstracted from INSTEON Developers Guide.
02-12-07	PVD	Added daughter card sections.
02-14-07	PVD	Released for proofreading.
03-01-07	PVD	More information on the PLM, comparison to PLC.
03-27-07	PVD	Fixed bytecount in IM Command 0x62 *Send INSTEON Standard or Extended Message*.
03-28-07	PVD	Added IM Command 0x58 *ALL-Link Cleanup Status Report*.
03-29-07	PVD	Updated explanation of IM Command 0x6F *Manage ALL-Link Record*.
04-02-07	PVD	Updated explanation of IM Commands 0x61 *Send ALL-Link Command*, 0x56 *ALL-Link Cleanup Failure Report*, and 0x58 *ALL-Link Cleanup Status Report*.
04-06-07	PVD	IM Command 0x58 *ALL-Link Cleanup Status Report* also sent when IM interrupts its own Cleanup sequence.
04-17-07	PVD	Corrected <X10 Flag> value in IM Commands 0x63 *Send X10* and 0x52 *X10 Received*.
04-19-07	PVD	Added page number subscripts to links.
09-14-07	PVD	Fixed command number typo for IM Command 0x72 *RF Sleep*.
10-11-07	PVD	Rewrote explanation for IM Command 0x6F *Manage ALL-Link Record*, enumerated <ALL-Link Record Flags> in IM Command 0x57 *ALL-Link Record Response*. Renamed Powerline Modem as PowerLinc Modem.
10-12-07	PVD	Added *PowerLinc Modem (PLM) Quick Start Guide* section
1-18-08	JTL	Updated Set IM command to include that if Bit 3=1, the interface will NAK serial commands if the it is busy processing an INSTEON command.
3-16-12	BJV	Added IM commands
7-23-12	BJV	Added Hub communication

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Introduction

This *INSTEON Hub Developer's Guide* is for users of INSTEON Modem chips, such as the IN2680A Powerline Modem Interface or the IN2682A RF Modem Interface, and also for purchasers of the INSTEON PowerLinc™ Modem (PLM) module.

The information in this document is excepted from the INSTEON Developer's Guide[2], which purchasers of an INSTEON Software Development Kit may download from http://code.insteon.com.

The INSTEON Hub

The INSTEON Hub is an INSTEON-to-Ethernet Bridge module that plugs into a power outlet and also has a ethernet port that you connect to your network. It uses an IN2680A Powerline Modem chip that offers a simple set of ASCII IM Serial Commands[12] for interacting with INSTEON devices.

The Hub uses a daughter board to implement serial communications with the host. Daughter boards interface to the PLM's main board via an 8-pin connector using TTL-level serial communications.

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Other Documents Included by Reference

This *INSTEON Hub Developer's Guide* contains information abstracted from the comprehensive *INSTEON Developer's Guide, 2nd Edition*.

Although the full *INSTEON Developer's Guide* is largely self-contained, there are aspects of INSTEON technology, such as listings of INSTEON Commands, INSTEON Device Categories, and INSTEON Product Keys, that require continuous updating as developers create new INSTEON products. Accordingly, SmartLabs maintains separate documents for that kind of information.

All of the documents listed in this section are available for downloading at http://code.insteon.com.

INSTEON Developer's Guide

The book-length *INSTEON Developer's Guide, 2nd Edition* is the primary source for the information contained in this (much shorter) *INSTEON Hub Developer's Guide*. Some links in this document refer to information found there. Developers who purchase an INSTEON Software Developer's Kit may download the *INSTEON Developer's Guide* from http://code.insteon.com.

INSTEON Conformance Specification

The *INSTEON Conformance Specification* identifies those aspects of INSTEON that assure interoperability with other INSTEON products. The Conformance Spec assumes that readers have already gained familiarity with INSTEON technology by reading the *INSTEON Developer's Guide*.

INSTEON Command Tables Document

The current tables of INSTEON Commands are contained in a separate document titled *INSTEON Command Tables*, which is integral to both the *INSTEON Conformance Specification* and the *INSTEON Developer's Guide*.

The filename for that document is *INSTEON Command Tables yyyymmddx.doc*, where *yyyy* is the year, *mm* is the month, *dd* is the day, and *x* is a daily version letter beginning with *a*. Be sure to refer to the document with the latest date.

INSTEON Device Categories and Product Keys Document

The current table of INSTEON Device Categories (DevCats), Subcategories (SubCats), and INSTEON Product Keys (IPKs) is contained in a separate document titled *INSTEON Device Categories and Product Keys*, which is also integral to both the *INSTEON Conformance Specification* and the *INSTEON Developer's Guide*.

The filename for that document is *INSTEON DevCats and Product Keys yyyymmddx.doc*, where *yyyy* is the year, *mm* is the month, *dd* is the day, and *x* is a daily version letter beginning with *a*. Be sure to refer to the document with the latest date.

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INSTEON Modem Reference

Software Reference

INSTEON Modem (IM) chips and the SmartLabs Hub offer developers a simple, robust interface to an INSTEON network.

INSTEON Hubs provide a simpler interface to many of the low-level *IBIOS Serial Commands* implemented in the SmartLabs Hub described in the INSTEON Developer's Guide$_2$, but they also handle ALL-Linking, ALL-Link Database management, ALL-Link Cleanup messages, X10 powerline interfacing, and message acknowledgement. The RS232 serial interface to the host is similar to that of the PLC.

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IM Serial Communication Protocol and Settings

In This Section

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IM Serial Communication Protocol

All INSTEON Modem (IM) Serial Commands start with ASCII `0x02` (STX, Start-of-Text) followed by the Serial Command Number (see IM Serial Commands[12]). What data follows the Command depends on the Command syntax (see IM Serial Command Summary Table[13] and IM Serial Command Charts[18]).

When you send a message to the IM, it will respond with an echo of the `0x02` and the IM Command Number followed by any data that the Command returns (often just an echo of what you sent to it). The last byte it sends back will be ASCII 0x06 (ACK, Acknowledge).

(**S:** and **R:** denote serial data you **Send to** or **Receive from** the IM, respectively.)

S:	0x02 <Command Number> <parameters>
R:	0x02 <Command Number> <any returned data> 0x06 (ACK)

If the IM is not ready, it will respond with an echo of the `0x02` and the IM Command Number followed by ASCII 0x15 (NAK, Negative Acknowledge).

S:	0x02 <Command Number> <parameters>
R:	0x15 (NAK)

If you receive 0x15 (NAK), resend your Serial Command.

INSTEON HUB communication syntax and examples

Insteon Commands

(Commands to send (through the HUB and PLM) to other Insteon devices)

Control Commands

Cmd1		**Cmd2**
0x11	On	Group number or On level
0x12	Fast On	Group number or Ignored
0x13	Off	Group number or Ignored
0x14	Fast Off	Group number or Ignored
0x15	Bright	Group number or Ignored
0x16	Dim	Group number or Ignored
0x17	Start Dim/Brt	01 = bright 00 = dim
0x18	Stop Dim/Brt	Ignored

Query Commands

0x10	ID Request	Ignored
0x19	Status Request	Ignored

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Command Syntax

<ip address>/X?YYYYY=I=X

Where X is a number. All the examples show either a 0 (zero) or a 1 (one). The YYYY is the command bytes. The suffix is always this:

=
I (letter I)
=
Number

0 (zero): means a "short form" command that doesn't include a destination and flags byte,
3: the full Insteon command as you would send to the Insteon modem.

For a group: http://172.16.1.34/0?1101=I=0 where 0x11 is the command and 01 is the group. (URL is an example of intranet)

For a group: http://bobbieshome.myhouse:8000/0?13182=I=0 where 0x13 is the command and 182 is the group. (URL is an example of internet using getmyip.com to track Dynamic DNS for the hub) (Note the interesting combination of Hex and decimal numbers i.e. 13 182)

For a device: http://172.16.1.34/3?02620102030F117F=I=3 where 010203 is the device ID and 0F is the flags byte and 0x11 is the command and 7F is the on level (1/2 brightness).

Insteon Commands to send to the Hub for the PLM

0x09	Enter Linking mode	Group Number
0x0A	Enter UnLinking	Group Number
0x08	Cancels Un/Linking	Ignored

http://172.16.1.34/0?0901=I=0 where 0x09 is the command and 01 is the group.
http://172.16.1.34/0?0A239=I=0 where 0x0A is the command and 239 is the group.
http://172.16.1.34/0?08=I=0 where 0x08 is the command.

Hub Commands

http://172.16.1.34/1?XB=M=1 **Clear Insteon buffer**

Commands that will be in the INSTEON Buffer

The INSTEON buffer can be read from "/buffstatus.xml" and can hold up to 100 characters or 50 hex bytes.

http://172.16.1.34/buffstatus.xml

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Group Commands

026101110106	Echo of your Command: Turn group 1 On	
026101110115	Response if you tried to turn on an empty group	
025009316B09D682611101	Ack from a device (Clean-up)	
09316B	ID of a device in your group	
09D682	ID of the Hub	
61 Flags byte	20 = Ack + 40 = Group + 1 = Hop count	
025806	Group command completed	Ok
025815	Group command quit early	Ok

Individual Device Control Commands (Point to Point)

Example of turning on device 0E7986 to Full On

Send:

http://172.16.1.34/3?02620E79860F11FF=I=3

The Buffer will have

02620E79860F11FF0602500E798609D6822B11FF

Send and PLM Echoes back to the buffer:

0262	Pass through Command to PLM
0E7986	Device ID to Control
0F	Flags Byte (Constant)
11	CMD1 (On)
FF	CMD2 (Brightness level)

PLM Adds:

06	PLM Says got it

Once the Device responds (Could be ¼ of a second but not>3 secs)

0250	From PLM Insteon Received
0E7986	From this device
09D682	To (ID of PLM/Hub)
2B	20 = ACK + B = hop count
11	CMD1 The command the device received
FF	Cmd2 The On level it will go to

Note: The timing will be such that even if you see the 0250 in the buffer you are not guaranteed that the rest of the data is in the buffer yet.

Pretend example of a timing issue to resolve.

2:01.1	buffer has	Null (just emptied it)
2:02.2	send http://172.16.1.34/3?02620102030F117F=I=3	
2:03.0	ask for the buffer	
2:03.5	get 02620E79860F11FF0602500E7	
2:03.7	ask for the buffer again	
2:03.9	get 02620E79860F11FF0602500E798609D6822B11FF	

In a group command, the buffer will quickly wrap with the clean-ups so searching for the 0258 is a little tricky since that is also a valid Partial Insteon ID.

Linking Example:

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Send go into Linking mode group 137.

http://172.16.1.34/0?09137=I=0

The PLM echoes and adds an 06

0264018906 (0264 linking command 01 controller and group 0x89)

Press and hold the button on the new device

026401010602530101 08B6EA010195

0264010106	Left in the buffer from go into linking mode
0253	Linking completed
01	Device can be a controller (00 and FF are valid)
01	Group
08B6EA	ID of device
01	Device Category (01 = Dimmer)
01	Device SubCat (01 = SwitchLinc)
95	Firmware Version of New device

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ID Request Example:

http://172.16.1.34/3?02620E79860F1000=I=3

The buffer will have
02620E79860F10000602500E798609D6822B100002500E798601009C8B0100

0262	Pass through Command to PLM	
0E7986	Insteon ID	
0F	Flags	
10	CMD1	
00	CMD2	
06		
0250	Insteon Message	
0E7986	From	
09D682	To	
2B	Flags Byte	20 = ACK + B = Hop count
10	Echo CMD1	
00	Echo CMD2	
0250	Insteon Message	(about 1 sec later)
0E7986	From	
01	Cat	(01 = Dimmer)
00	(SubCat)	(00 = LampLinc)
9C	Firmware version	
8B	Flags Byte	80 = Broadcast + B = hop count
01	CMD1	01 = ID Request
00	CMD2	00 = Ignore

Status Request Example:

http://172.16.1.34/3?02620E79860F1900=I=3

The buffer will have
02620E79860F19000602500E798609D6822B03FF

0262	Pass Through	
0E7986	ID	
0F	Flags	
19	CMD1 Status Request	
00	CMD2	
06		
0250	Insteon Received	
0E7986	From	
09D682	To	
2B	20 = ACK + B = Hop Count	
03	03 is the Delta…gets changed every time EE is changed (Ignore)	
FF	Current On Level	could be 00 – FF

Note: Status Request returns Info in the ACK while ID request generates

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IM Power-up and Reset States

This section describes the IM Power-up Behavior$_{11}$ and the IM Factory Reset State$_{11}$.

IM Power-up Behavior

The table below shows the state of the IM when it powers up. Holding down the SET Button while powering up will cause a factory reset.

LED Indication	Meaning
LED on steadily	The IM detected an external EEPROM (up to 32 Kb) for storage of database links. Effective with product revisions 2.75 or greater, a 128Kb EEPROM is included for storage of database links
LED blinks six times	The IM did not detect an external EEPROM, so it will use the internal EEPROM in the processor chip. A maximum of 31 ALL-Links are permitted. An attempt to add a 32nd ALL-Link will result in the 31st being erased.
LED off	The user pressed and held the IM's SET button for 10 seconds while powering up, causing the IM to perform a factory reset and go into the IM Factory Reset State$_{11}$. At the conclusion of the reset, the IM's LED will give one of the two indications above. You will also receive a User Reset Detected$_{44}$ message from the IM.

IM Factory Reset State

Resetting the IM to its factory default condition by holding down the SET Button for ten seconds while powering it up or by sending it a Reset the IM$_{43}$ Command puts it into the following state:

IM Resource	Factory Reset State
ALL-Link Database	Erased (set to all zeros).
Host Device Category, Device Subcategory, Firmware Version	Set to the original DevCat (0x03), SubCat (0x05), and firmware version hard-coded into the IM's firmware at the factory.
IM Configuration Flags	Cleared (set to all zeros).

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IM Serial Commands

The IM Serial Command set is a simple but complete interface between a host application and an INSTEON network. For example, a microcontroller in a thermostat could use an INSTEON Powerline Modem chip to send and receive messages to other INSTEON or X10 devices on the home's powerline.

In this section, the IM Serial Commands are presented twice, once as a summary table, and again as a series of charts grouped by functionality.

In This Section

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IM Serial Command Summary Table

This table lists all of the Modem Serial Commands supported by INSTEON powerline or RF modem chips.

Code
Gives the hexadecimal number of the IM Serial Command. Note that IM Commands sent by an IM to the host begin at **0x50** and IM Commands sent by the host to an IM begin at **0x60**.

Command
Gives the name of the IM Serial Command as a link to the complete explanation of the Command in the IM Serial Command Charts[18].

Format
Gives the syntax of the IM Serial Command, including any parameters.

S: and **R:** denote serial data you **Send to** or **Receive from** the IM, respectively. See IM Serial Communication Protocol[6] for more information.

All IM Serial Commands start with ASCII 0x02 (STX, Start-of-Text) followed by the Serial Command Number.

All fields in this table contain only one byte, except as noted.

INSTEON Modem Serial Commands

Commands Sent from an IM to the Host		
Code	**Command**	**Format**
0x50	INSTEON Standard Message Received[22]	**R:** 0x02 **0x50** <INSTEON Standard message (9 bytes)>
0x51	INSTEON Extended Message Received[23]	**R:** 0x02 **0x51** <INSTEON Extended message (23 bytes)>
0x52	X10 Received[28]	**R:** 0x02 **0x52** <Raw X10> <X10 Flag>
0x53	ALL-Linking Completed[35]	**R:** 0x02 **0x53** <0x00 (IM is Responder) | 0x01 (IM is Controller | 0xFF Link Deleted)> <ALL-Link Group> <ID high byte> <ID middle byte> <ID low byte> <Device Category> <Device Subcategory> <0xFF | Firmware Revision>
0x54	Button Event Report[51]	**R:** 0x02 **0x54** <0x02> IM's SET Button tapped
		R: 0x02 **0x54** <0x03> IM's SET Button held
		R: 0x02 **0x54** <0x04> IM's SET Button released after hold
		R: 0x02 **0x54** <0x12> IM's Button 2 tapped
		R: 0x02 **0x54** <0x13> IM's Button 2 held
		R: 0x02 **0x54** <0x14> IM's Button 2 released after hold
		R: 0x02 **0x54** <0x22> IM's Button 3 tapped
		R: 0x02 **0x54** <0x23> IM's Button 3 held
		R: 0x02 **0x54** <0x24> IM's Button 3 released after hold
0x55	User Reset Detected[44]	**R:** 0x02 **0x55** User pushed and held IM's SET Button on power up

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0x56	ALL-Link Cleanup Failure Report[31]	**R:** 0x02 **0x56** <0x01> <ALL-Link Group> <ID high byte> <ID middle byte> <ID low byte>
0x57	ALL-Link Record Response[39]	**R:** 0x02 **0x57** <ALL-Link Record Flags> <ALL-Link Group> <ID high byte> <ID middle byte> <ID low byte> <Link Data 1> <Link Data 2> <Link Data 3>
0x58	ALL-Link Cleanup Status Report[32]	**R:** 0x02 **0x58** <0x06> ALL-Link Cleanup sequence completed
		R: 0x02 **0x58** <0x15> ALL-Link Cleanup sequence aborted due to INSTEON traffic
0x59	Database Record Found[32]	**R:** 0x02 **0x59** <Database Address high byte> <Database Address low byte (low nibble should be 0xF | 0x8)> <ALL-Link Record Flags> <ALL-Link Group> <ID high byte> <ID middle byte> <ID low byte> <Link Data 1> <Link Data 2> <Link Data 3>
	Commands Sent from the Host to an IM	
0x60	Get IM Info[48]	**S:** 0x02 **0x60**
		R: 0x02 **0x60** <ID high byte> <ID middle byte> <ID low byte> <Device Category> <Device Subcategory> <Firmware Revision> <0x06>
0x61	Send ALL-Link Command[29]	**S:** 0x02 **0x61** <ALL-Link Group> <ALL-Link Command> <0xFF | 0x00>
		R: 0x02 **0x61** <ALL-Link Group> <ALL-Link Command> <0xFF | 0x00> <0x06>
0x62	Send INSTEON Standard or Extended Message[19]	**S:** 0x02 **0x62** <INSTEON Standard message (6 bytes, excludes *From Address*) | INSTEON Extended message (20 bytes, excludes *From Address*)>
		R: 0x02 **0x62** <INSTEON Standard message (6 bytes, excludes *From Address*) | INSTEON Extended message (20 bytes, excludes *From Address*)> <0x06>
0x63	Send X10[27]	**S:** 0x02 **0x63** <Raw X10> <X10 Flag>
		R: 0x02 **0x63** <Raw X10> <X10 Flag> <0x06>
0x64	Start ALL-Linking[33]	**S:** 0x02 **0x64** <0x00 (IM is Responder) | 0x01 (IM is Controller) | 0x03 (IM is either) | 0xFF (Link Deleted) bit2 set = use Set Database Link Data for next Link> <ALL-Link Group>
		R: 0x02 **0x64** <0x00 (IM is Responder) | 0x01 (IM is Controller) | 0x03 (IM is either) | 0xFF (Link Deleted)> <ALL-Link Group> <0x06>
0x65	Cancel ALL-Linking[34]	**S:** 0x02 **0x65**
		R: 0x02 **0x65** <0x06>
0x66	Set Host Device Category[49]	**S:** 0x02 **0x66** <Device Category> <Device Subcategory> <0x00 | Firmware Revision>

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		R: 0x02 **0x66** <Device Category> <Device Subcategory> <0x00 | Firmware Revision> <0x06>
0x67	Reset the IM[43]	**S:** 0x02 **0x67**
		R: 0x02 **0x67** <0x06>
0x68	Set INSTEON ACK Message Byte[24]	**S:** 0x02 **0x68** <Command 2 Data>
		R: 0x02 **0x68** <Command 2 Data> <0x06>
0x69	Get First ALL-Link Record[36]	**S:** 0x02 **0x69**
		R: 0x02 **0x69** <0x06>
0x6A	Get Next ALL-Link Record[37]	**S:** 0x02 **0x6A**
		R: 0x02 **0x6A** <0x06>
0x6B	Set IM Configuration[46]	**S:** 0x02 **0x6B** <IM Configuration Flags>
		R: 0x02 **0x6B** <IM Configuration Flags> <0x06>
0x6C	Get ALL-Link Record for Sender[38]	**S:** 0x02 **0x6C**
		R: 0x02 **0x6C** <0x06>
0x6D	LED On[52]	**S:** 0x02 **0x6D**
		R: 0x02 **0x6D** <0x06>
0x6E	LED Off[53]	**S:** 0x02 **0x6E**
		R: 0x02 **0x6E** <0x06>
0x6F	Manage ALL-Link Record[40]	**S:** 0x02 **0x6F** <Control Flags> <ALL-Link Record Flags> <ALL-Link Group> <ID high byte> <ID middle byte> <ID low byte> <Link Data 1> <Link Data 2> <Link Data 3>
		R: 0x02 **0x6F** <Control Flags> <ALL-Link Record Flags> <ALL-Link Group> <ID high byte> <ID middle byte> <ID low byte> <Link Data 1> <Link Data 2> <Link Data 3> <0x06>
0x70	Set INSTEON NAK Message Byte[26]	**S:** 0x02 **0x70** <Command 2 Data>
		R: 0x02 **0x70** <Command 2 Data> <0x06>
0x71	Set INSTEON ACK Message Two Bytes[25]	**S:** 0x02 **0x71** <Command 1 Data> <Command 2 Data>
		R: 0x02 **0x71** <Command 1 Data> <Command 2 Data> <0x06>
0x72	RF Sleep[50]	**S:** 0x02 **0x72**
		R: 0x02 **0x72** <0x06>
0x73	Get IM Configuration[45]	**S:** 0x02 **0x73**

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	R: 0x02 **0x73** <IM Configuration Flags> <Spare 1> <Spare 2> <0x06>

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These commands added after initial release:

INSTEON Modem Serial Commands

Commands Sent from the Host to an IM		
Code	**Command**	**Format**
0x74	Cancel Cleanup[22]	**S:** 0x02 **0x74**
		R: 0x02 **0x74** <0x06>
0x75	Read 8 bytes from Database[23]	**S:** 0x02 **0x75** <Database Address high byte> <Database Address low byte (low nibble should be 0xF | 0x8)>
		R: 0x02 **0x75** <Database Address high byte> <Database Address low byte (low nibble should be 0xF | 0x8)> <0x06> <Database Record Found Response (12 bytes)>
0x76	Write 8 bytes to Database[28]	**S:** 0x02 **0x76** <Database Address high byte> <Database Address low byte (low nibble should be 0xF | 0x8)> <ALL-Link Record Flags> <ALL-Link Group> <ID high byte> <ID middle byte> <ID low byte> <Link Data 1> <Link Data 2> <Link Data 3>
		R: 0x02 **0x76** <Database Address high byte> <Database Address low byte (low nibble should be 0xF | 0x8)> <ALL-Link Record Flags> <ALL-Link Group> <ID high byte> <ID middle byte> <ID low byte> <Link Data 1> <Link Data 2> <Link Data 3> <0x06>
0x77	Beep[35]	**S:** 0x02 **0x77**
		R: 0x02 **0x77** <0x06> IM will beep
0x78	Set Status[51]	**S:** 0x02 **0x78** <Status>
		R: 0x02 **0x78** <Status> <0x06> IM will report Status in cmd2 of a direct Status Request command (0x19)

RF Modem only commands		
0x79	Set Database Link Data for next Link[44]	**S:** 0x02 **0x79** <Link Data 1> <Link Data 2> <Link Data 3> (Note: bit 2 must be set in Start All-Linking command to use Link Data)
		R: 0x02 **0x79** <Link Data 1> <Link Data 2> <Link Data 3> <0x06>
0x7A	Set Application Retries for New Links[31]	**S:** 0x02 **0x7A** <Number of Application Retries for new links>
		R: 0x02 **0x7A** <Number of Application Retries for new links> <0x06>
0x7B	Set RF Frequency Offset[39]	**S:** 0x02 **0x7B** <RF Frequency Offset (increase frequency from least offset: 0x00 up to most offset: 0x7F; decrease frequency from least offset: 0xFF down to most offset: 0x8F)>
		R: 0x02 **0x7B** <RF Frequency Offset> <0x06>
0x7C	Set Acknowledge for TempLinc command	**S:** 0x02 **0x7C** <XXXXXXXXXXXXXXXX>
		R: 0x02 **0x7C** <XXXXXXXXXXXXXXXX> <0x06>

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IM Serial Command Charts

The following charts describe the IM Commands individually in a chart format, grouped by functionality. These are the same IM Commands as in the IM Serial Command Summary Table[13], which is ordered by Command Number.

Note that IM Commands sent by an IM to the host begin at **0x50** and IM Commands sent by the host to an IM begin at **0x60**. When the host sends an IM Command to an IM, the IM will respond with a message according to the IM Serial Communication Protocol[6].

In This Section

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INSTEON Message Handling

Send INSTEON Standard or Extended Message

This Command lets you send either a Standard-length or an Extended-length INSTEON message, depending only on what kind of INSTEON message you include in the body of the Command.

Send INSTEON Standard-length Message

Send INSTEON Standard-length Message (0x62)	
What it does	Allows you to send a raw Standard-length INSTEON message.
What you send	8 bytes.
What you'll get	9 bytes.
LED indication	None.
Related Commands	IM 0x50 INSTEON Standard Message Received[22] IM 0x51 INSTEON Extended Message Received[23]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x62**	IM Command Number
3	<To Address high>	The high byte of the INSTEON ID of the message addressee.
4	<To Address middle>	The middle byte of the INSTEON ID of the message addressee.
5	<To Address low>	The low byte of the INSTEON ID of the message addressee.
6	<Message Flags>	The INSTEON message flags indicating message type and hops. Extended Message Flag (bit 4) is 0
7	<Command 1>	INSTEON Command 1 for the addressee to execute
8	<Command 2>	INSTEON Command 2 for the addressee to execute

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x62**	Echoed IM Command Number
3	<To Address high>	Echoed <To Address high>
4	<To Address middle>	Echoed <To Address middle>
5	<To Address low>	Echoed <To Address low>
6	<Message Flags>	Echoed <Message Flags> Extended Message Flag (bit 4) is 0
7	<Command 1>	Echoed <Command 1>
8	<Command 2>	Echoed <Command 2>
9	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

Notes

The *From Address* is not required because the IM will automatically insert its own INSTEON ID into the message.

For more information on INSTEON Commands and the latest Command set, please download the current INSTEON Command Tables Document[2] from http://code.insteon.com.

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Send INSTEON Extended-length Message

Send INSTEON Extended-length Message (0x62)	
What it does	Allows you to send a raw Extended-length INSTEON message.
What you send	22 bytes.
What you'll get	23 bytes.
LED indication	None.
Related Commands	IM 0x50 INSTEON Standard Message Received[22] IM 0x51 INSTEON Extended Message Received[23]

Command Sent from Host to IM

Byte	Value	Meaning
1	0x02	Start of IM Command
2	**0x62**	IM Command Number
3	<To Address high>	The high byte of the INSTEON ID of the message addressee.
4	<To Address middle>	The middle byte of the INSTEON ID of the message addressee.
5	<To Address low>	The low byte of the INSTEON ID of the message addressee.
6	<Message Flags>	The INSTEON message flags indicating message type and hops. Extended Message Flag (bit 4) is 1
7	<Command 1>	INSTEON Command 1 for the addressee to execute
8	<Command 2>	INSTEON Command 2 for the addressee to execute
9	<User Data 1>	Extended message data
10	<User Data 2>	Extended message data
11	<User Data 3>	Extended message data
12	<User Data 4>	Extended message data
13	<User Data 5>	Extended message data
14	<User Data 6>	Extended message data
15	<User Data 7>	Extended message data
16	<User Data 8>	Extended message data
17	<User Data 9>	Extended message data
18	<User Data 10>	Extended message data
19	<User Data 11>	Extended message data
20	<User Data 12>	Extended message data
21	<User Data 13>	Extended message data
22	<User Data 14>	Extended message data

Message Returned by IM to Host

Byte	Value	Meaning
1	0x02	Echoed Start of IM Command
2	**0x62**	Echoed IM Command Number
3	<To Address high>	Echoed <To Address high>
4	<To Address middle>	Echoed <To Address middle>
5	<To Address low>	Echoed <To Address low>
6	<Message Flags>	Echoed <Message Flags> Extended Message Flag (bit 4) is 1
7	<Command 1>	Echoed <Command 1>
8	<Command 2>	Echoed <Command 2>
9	<User Data 1>	Echoed Extended message data
10	<User Data 2>	Echoed Extended message data
11	<User Data 3>	Echoed Extended message data
12	<User Data 4>	Echoed Extended message data
13	<User Data 5>	Echoed Extended message data
14	<User Data 6>	Echoed Extended message data
15	<User Data 7>	Echoed Extended message data
16	<User Data 8>	Echoed Extended message data
17	<User Data 9>	Echoed Extended message data
18	<User Data 10>	Echoed Extended message data

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19	<User Data 11>	Echoed Extended message data
20	<User Data 12>	Echoed Extended message data
21	<User Data 13>	Echoed Extended message data
22	<User Data 14>	Echoed Extended message data
23	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

Notes

The *From Address* is not required because the IM will automatically insert its own INSTEON ID into the message.

For more information on INSTEON Commands and the latest Command set, please download the current INSTEON Command Tables Document$_2$ from http://code.insteon.com.

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INSTEON Standard Message Received

INSTEON Standard Message Received (0x50)	
What it does	Informs you of an incoming Standard-length INSTEON message.
When you'll get this	A Standard-length INSTEON message is received from either a Controller or Responder that you are ALL-Linked to.
What you'll get	11 bytes.
LED indication	The LED will blink during INSTEON reception.
Related Commands	IM 0x51 INSTEON Extended Message Received$_{23}$ IM 0x52 X10 Received$_{28}$

Message Sent from IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x50**	IM Command Number
3	<From Address high>	The high byte of the INSTEON ID of the message originator.
4	<From Address middle>	The middle byte of the INSTEON ID of the message originator.
5	<From Address low>	The low byte of the INSTEON ID of the message originator.
6	<To Address high>	The high byte of the INSTEON ID of the message addressee. If the message is an ALL-Link Broadcast (bits 7 and 6 of the <Message Flags> byte are set) then this will be 0.
7	<To Address middle>	The middle byte of the INSTEON ID of the message addressee. If the message is an ALL-Link Broadcast (bits 7 and 6 of the <Message Flags> byte are set) then this will be 0.
8	<To Address low>	The low byte of the INSTEON ID of the message addressee. If the message is an ALL-Link Broadcast (bits 7 and 6 of the <Message Flags> byte are set) then this will indicate the ALL-Link Group Number.
9	<Message Flags>	The INSTEON message flags indicating message type and hops.
10	<Command 1>	INSTEON *Command 1* field of the message.
11	<Command 2>	INSTEON *Command 2* field of the message. This byte contains the ALL-Link Group Number of the ALL-Link Broadcast when either bit 6 of the <Message Flags> byte is set (ALL-Link Cleanup) or bits 6 and 5 of the <Message Flags> byte are set (ALL-Link Cleanup ACK).

Notes

This is the same as IM 0x51 INSTEON Extended Message Received$_{23}$, except that there is no <User Data>.

Normally, the IM will only send the host INSTEON messages that are explicitly addressed to the IM or that are from devices that the IM is ALL-Linked to. This behavior can be modified—see the About Monitor Mode$_{46}$ note in the Set IM Configuration$_{46}$ chart for more information.

For more information on INSTEON Commands and the latest Command set, please download the current INSTEON Command Tables Document$_{2}$ from http://code.insteon.com.

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INSTEON Extended Message Received

INSTEON Extended Message Received (0x51)	
What it does	Informs you of an incoming Extended-length INSTEON message.
When you'll get this	An Extended-length INSTEON message is received from either a Controller or Responder that you are ALL-Linked to.
What you'll get	25 bytes.
LED indication	The LED will blink during INSTEON reception.
Related Commands	IM 0x50 INSTEON Standard Message Received$_{22}$ IM 0x52 X10 Received$_{28}$

Message Sent from IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x51**	IM Command Number
3	<From Address high>	The high byte of the INSTEON ID of the message originator.
4	<From Address middle>	The middle byte of the INSTEON ID of the message originator.
5	<From Address low>	The low byte of the INSTEON ID of the message originator.
6	<To Address high>	The high byte of the INSTEON ID of the message addressee. If the message is an ALL-Link Broadcast (bits 7 and 6 of the <Message Flags> byte are set) then this will be 0.
7	<To Address middle>	The middle byte of the INSTEON ID of the message addressee. If the message is an ALL-Link Broadcast (bits 7 and 6 of the <Message Flags> byte are set) then this will be 0.
8	<To Address low>	The low byte of the INSTEON ID of the message addressee. If the message is an ALL-Link Broadcast (bits 7 and 6 of the <Message Flags> byte are set) then this will indicate the ALL-Link Group Number.
9	<Message Flags>	The INSTEON message flags indicating message type and hops.
10	<Command 1>	INSTEON *Command 1* field of the message.
11	<Command 2>	INSTEON *Command 2* field of the message. This byte contains the ALL-Link Group Number of the ALL-Link Broadcast when either bit 6 of the <Message Flags> byte is set (ALL-Link Cleanup) or bits 6 and 5 of the <Message Flags> byte are set (ALL-Link Cleanup ACK).
12	<User Data 1>	Extended message data
13	<User Data 2>	Extended message data
14	<User Data 3>	Extended message data
15	<User Data 4>	Extended message data
16	<User Data 5>	Extended message data
17	<User Data 6>	Extended message data
18	<User Data 7>	Extended message data
19	<User Data 8>	Extended message data
20	<User Data 9>	Extended message data
21	<User Data 10>	Extended message data
22	<User Data 11>	Extended message data
23	<User Data 12>	Extended message data
24	<User Data 13>	Extended message data
25	<User Data 14>	Extended message data

Notes

This is the same as IM 0x50 INSTEON Standard Message Received$_{22}$, except that there are 14 bytes of <User Data>.

Normally, the IM will only send the host INSTEON messages that are explicitly addressed to the IM or that are from devices that the IM is ALL-Linked to. This behavior can be modified—see the About Monitor Mode$_{46}$ note in the Set IM Configuration$_{46}$ chart for more information.

For more information on INSTEON Commands and the latest Command set, please download the current INSTEON Command Tables Document$_{2}$ from http://code.insteon.com.

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Set INSTEON ACK Message Byte

Set INSTEON ACK Message Byte (0x68)	
What it does	Allows you to put one byte of data into the *Command 2* field of the INSTEON ACK message that the INSTEON Engine automatically sends after it receives an INSTEON Direct message.
What you send	3 bytes.
What you'll get	4 bytes.
LED indication	None.
Related Commands	IM 0x50 INSTEON Standard Message Received[22] IM 0x51 INSTEON Extended Message Received[23] IM 0x71 Set INSTEON ACK Message Two Bytes[25] IM 0x70 Set INSTEON NAK Message Byte[26]

Command Sent from Host to IM

Byte	Value	Meaning
1	0x02	Start of IM Command
2	**0x68**	IM Command Number
3	<Command 2 Data>	Data byte to place into the *Command 2* field of the ACK response.

Message Returned by IM to Host

Byte	Value	Meaning
1	0x02	Echoed Start of IM Command
2	**0x68**	Echoed IM Command Number
3	<Command 2 Data>	Echoed <Command 2 Data>
4	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred.

Notes

You have only about 15 milliseconds after the receipt of an INSTEON Direct message from the IM to send this Command to the IM. The reason is that the INSTEON Engine in the IM automatically sends Acknowledgement messages in assigned timeslots.

Use Set INSTEON ACK Message Two Bytes[25] when you need to return two bytes of data in an ACK message.

Use Set INSTEON NAK Message Byte[26] when you need to return one byte of data in a NAK message.

Certain INSTEON Direct Commands require returned data in the Acknowledgement message. For more information on INSTEON Commands and the latest Command set, please download the current INSTEON Command Tables Document[2] from http://code.insteon.com.

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Set INSTEON ACK Message Two Bytes

Set INSTEON ACK Message Two Bytes (0x71)	
What it does	Allows you to put two bytes of data into the combined *Command 1* and *Command 2* fields of the INSTEON ACK message that the INSTEON Engine automatically sends after it receives an INSTEON Direct message.
What you send	4 bytes.
What you'll get	5 bytes.
LED indication	None.
Related Commands	IM 0x50 INSTEON Standard Message Received[22] IM 0x51 INSTEON Extended Message Received[23] IM 0x68 Set INSTEON ACK Message Byte[24] IM 0x70 Set INSTEON NAK Message Byte[26]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x71**	IM Command Number
3	<Command 1 Data>	Data byte to place into the *Command 1* field 2 of the ACK response.
4	<Command 2 Data>	Data byte to place into the *Command 2* field 2 of the ACK response.

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x71**	Echoed IM Command Number
3	<Command 1 Data>	Echoed <Command 1 Data>
4	<Command 2 Data>	Echoed <Command 2 Data>
5	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred.

Notes

You have only about 15 milliseconds after the receipt of an INSTEON Direct message from the IM to send this Command to the IM. The reason is that the INSTEON Engine in the IM automatically sends Acknowledgement messages in assigned timeslots.

Use Set INSTEON ACK Message Byte[24] when you only need to return one byte of data in an ACK message.

Use Set INSTEON NAK Message Byte[26] when you need to return one byte of data in a NAK message.

Certain INSTEON Direct Commands require returned data in the Acknowledgement message. For more information on INSTEON Commands and the latest Command set, please download the current INSTEON Command Tables Document[2] from http://code.insteon.com.

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Set INSTEON NAK Message Byte

Set INSTEON NAK Message Byte (0x70)	
What it does	Allows you to change the INSTEON ACK message that the INSTEON Engine automatically sends after it receives an INSTEON Direct message into a NAK message, and to put one byte of data into the *Command 2* field of that message.
What you send	3 bytes.
What you'll get	4 bytes.
LED indication	None.
Related Commands	IM 0x50 INSTEON Standard Message Received[22] IM 0x51 INSTEON Extended Message Received[23] IM 0x68 Set INSTEON ACK Message Byte[24] IM 0x70 Set INSTEON ACK Message Two Bytes[25]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x70**	IM Command Number
3	<Command 2 Data>	Data byte to place into the *Command 2* field of the ACK response.

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x70**	Echoed IM Command Number
3	<Command 2 Data>	Echoed <Command 2 Data>
4	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred.

Notes

You have only about 15 milliseconds after the receipt of an INSTEON Direct message from the IM to send this Command to the IM. The reason is that the INSTEON Engine in the IM automatically sends Acknowledgement messages in assigned timeslots.

Use Set INSTEON ACK Message Byte[24] or Set INSTEON ACK Message Two Bytes[25] when you need to return one or two bytes of data in an ACK message.

NAK messages report certain error conditions in a receiving device. See *NAK Error Codes* in the INSTEON Developer's Guide[2] for more information.

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X10 Message Handling

Send X10

Send X10 (0x63)	
What it does	Allows you to send a raw X10 Address or X10 Command.
What you send	4 bytes.
What you'll get	5 bytes.
LED indication	None.
Related Commands	IM 0x52 X10 Received[28]

Command Sent from Host to IM

Byte	Value	Meaning
1	0x02	Start of IM Command
2	**0x63**	IM Command Number
3	<Raw X10>	The four most significant bits contain the X10 House Code. The four least significant bits contain the X10 Key Code.
4	<X10 Flag>	0x00 indicates that the X10 Key Code is an X10 Unit Code. 0x80 indicates that the X10 Key Code is an X10 Command.

Message Returned by IM to Host

Byte	Value	Meaning
1	0x02	Echoed Start of IM Command
2	**0x63**	Echoed IM Command Number
3	<Raw X10>	Echoed <Raw X10>
4	<X10 Flag>	Echoed <X10 Flag>
5	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

X10 Translation Table

	4 MSBs of <Raw X10>	4 LSBs of <Raw X10>	
4-bit Code	**X10 House Code**	**X10 Unit Code <X10 Flag> = 0x00**	**X10 Command <X10 Flag> = 0x80**
0x6	A	1	All Lights Off
0xE	B	2	Status = Off
0x2	C	3	On
0xA	D	4	Preset Dim
0x1	E	5	All Lights On
0x9	F	6	Hail Acknowledge
0x5	G	7	Bright
0xD	H	8	Status = On
0x7	I	9	Extended Code
0xF	J	10	Status Request
0x3	K	11	Off
0xB	L	12	Preset Dim
0x0	M	13	All Units Off
0x8	N	14	Hail Request
0x4	O	15	Dim
0xC	P	16	Extended Data (analog)

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X10 Received

X10 Received (0x52)	
What it does	Informs you of an X10 byte detected on the powerline.
When you'll get this	Any X10 traffic is detected on the powerline.
What you'll get	4 bytes.
LED indication	The LED will blink during X10 reception.
Related Commands	IM 0x63 Send X10[27] IM 0x50 INSTEON Standard Message Received[22] IM 0x51 INSTEON Extended Message Received[23]

Message Sent from IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x52**	IM Command Number
3	<Raw X10>	The four most significant bits contain the X10 House Code. The four least significant bits contain the X10 Key Code.
4	<X10 Flag>	0x00 indicates that the X10 Key Code is an X10 Unit Code. 0x80 indicates that the X10 Key Code is an X10 Command.

X10 Translation Table			
	4 MSBs of <Raw X10>	**4 LSBs of <Raw X10>**	
4-bit Code	**X10 House Code**	**X10 Unit Code <X10 Flag> = 0x00**	**X10 Command <X10 Flag> = 0x80**
0x6	A	1	All Lights Off
0xE	B	2	Status = Off
0x2	C	3	On
0xA	D	4	Preset Dim
0x1	E	5	All Lights On
0x9	F	6	Hail Acknowledge
0x5	G	7	Bright
0xD	H	8	Status = On
0x7	I	9	Extended Code
0xF	J	10	Status Request
0x3	K	11	Off
0xB	L	12	Preset Dim
0x0	M	13	All Units Off
0x8	N	14	Hail Request
0x4	O	15	Dim
0xC	P	16	Extended Data (analog)

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INSTEON ALL-Link Commands

Send ALL-Link Command

Send ALL-Link Command (0x61)	
What it does	Sends an ALL-Link Command to an ALL-Link Group of one or more Responders that the IM is ALL-Linked to.
What you send	5 bytes.
What you'll get	6 bytes for the echo of the Command and then an additional 11 bytes in an INSTEON Standard Message Received$_{22}$ message for each device in the group that acknowledges ALL-Link Cleanup, or 7 bytes in an ALL-Link Cleanup Failure Report$_{31}$ message for each device in the group that does not acknowledge ALL-Link Cleanup.
LED indication	None.
Related Commands	IM 0x50 INSTEON Standard Message Received$_{22}$ IM 0x56 ALL-Link Cleanup Failure Report$_{31}$ IM 0x58 ALL-Link Cleanup Status Report$_{32}$

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x61**	IM Command Number
3	<ALL-Link Group>	ALL-Link Group Number that the ALL-Link Command is sent to
4	<ALL-Link Command>	ALL-Link Command
5	<Broadcast Command 2>	Sent in the *Command 2* field of the ALL-Link Broadcast message only. *Command 2* will always contain the ALL-Link Group Number for the ALL-Link Cleanup messages that follow.

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x61**	Echoed IM Command Number
3	<ALL-Link Group>	Echoed <ALL-Link Group>
4	<ALL-Link Command>	Echoed <ALL-Link Command>
5	<Broadcast Command 2>	Echoed <Broadcast Command 2>
6	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred or the group does not exist

Notes

The IM automatically sends ALL-Link Cleanup messages to each member of an ALL-Link Group following an ALL-Link Broadcast message. If the IM detects other INSTEON traffic during this process, it will abort the ALL-Link Cleanup sequence and send you an ALL-Link Cleanup Status Report$_{32}$ with a Status Byte of 0x15 (NAK). The Cleanup sequence proceeds in the order in which the devices in the ALL-Link Group were added to the ALL-Link Database. If the IM finishes sending all of the Cleanup messages, it will send you an ALL-Link Cleanup Status Report$_{32}$ with a Status Byte of 0x06 (ACK).

For each ALL-Link Cleanup message that the IM sends, you will either receive an INSTEON Standard Message Received$_{22}$ when the Responder answers with a Cleanup acknowledgement message, or else you will receive an ALL-Link Cleanup Failure Report$_{31}$ if the Responder fails to answer with a Cleanup acknowledgement message. The IM will send you an ALL-Link Cleanup Status Report$_{32}$ whether or not every ALL-Link Group member acknowledges the Cleanup Command that the IM sends to it.

You can cause the IM to cancel its own Cleanup sequence by sending it a new Send ALL-Link Command$_{29}$ or Send INSTEON Standard or Extended Message$_{19}$ during the time that it is sending a Cleanup sequence (i.e. after it has finished sending an ALL-Link Broadcast message). The IM will send you an ALL-Link Cleanup Status Report$_{32}$ in those cases.

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The IM first sends an ALL-Link Broadcast message with Max Hops set to 3. When it sends the ensuing ALL-Link Cleanup messages, it sets Max Hops to 1. If the IM's INSTEON Engine needs to retry a Cleanup message, it will automatically increment Max Hops for each retry, up to a maximum of value of 3.

The IM sends the ALL-Link Broadcast message immediately if there is no other INSTEON traffic. If there is other INSTEON traffic, the IM will wait for one silent powerline zero crossing following a completed INSTEON message. The IM will send the first ALL-Link Cleanup message after a delay of 7 zero crossings. Subsequent Cleanups will go out with a delay of 2 zero crossings.

Do not use this command to control light levels with the Light Start Manual Change INSTEON Command SA 0x17. Use Send INSTEON Standard-length Message$_{19}$ to send INSTEON Command SD 0x17 instead.

For more information on INSTEON Commands and the latest Command set, please download the current INSTEON Command Tables Document$_{2}$ from http://code.insteon.com.

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ALL-Link Cleanup Failure Report

ALL-Link Cleanup Failure Report (0x56)	
What it does	Reports that an ALL-Link Group member did not acknowledge an ALL-Link Cleanup Command.
When you'll get this	An ALL-Link Group member that you are trying to control did not acknowledge the ALL-Link Cleanup Command sent by the IM.
What you'll get	7 bytes.
LED indication	None.
Related Commands	IM 0x58 ALL-Link Cleanup Status Report$_{32}$

Message Sent from IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x56**	IM Command Number
3	0x01	Indicates that this ALL-Link Group member did not acknowledge an ALL-Link Cleanup Command.
4	<ALL-Link Group>	Indicates the ALL-Link Group Number that was sent in the ALL-Link Cleanup Command.
5	<ID high byte>	The high byte of the INSTEON ID of the device that did not respond.
6	<ID middle byte>	The middle byte of the INSTEON ID of the device that did not respond.
7	<ID low byte>	The low byte of the INSTEON ID of the device that did not respond.

Notes

The IM automatically sends ALL-Link Cleanup messages to each member of an ALL-Link Group following an ALL-Link Broadcast message. If the IM detects other INSTEON traffic during this process, it will abort the ALL-Link Cleanup sequence. If the Cleanup sequence is aborted, you will not receive this message nor will you receive a Cleanup acknowldgement message for any subsequent devices in the ALL-Link Group. The Cleanup sequence proceeds in the order in which the devices in the ALL-Link Group were added to the ALL-Link Database.

For each ALL-Link Cleanup message the IM sends, you will either receive an INSTEON Standard Message Received$_{22}$ when the Responder sends you an ACK, or you will receive this message. However, it can take awhile before you receive this message. Worst case, if the IM has to wait for a clear line and then retries the Cleanup message for the maximum of five times, the wait will be 2.150 seconds after sending the ALL-Link Broadcast message, or 1.550 seconds after receiving the first Cleanup acknowledgement or this message. If the Cleanup sequence was aborted due to other INSTEON traffic, you will not get this message even then. However, you will receive ALL-Link Cleanup Status Report$_{32}$ with a *Status Byte* of 0x15 (NAK) indicating that the Cleanup sequence was aborted.

It is possible that this ALL-Link Group member did in fact properly receive the ALL-Link Broadcast message that preceded the ALL-Link Cleanup message.

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ALL-Link Cleanup Status Report

ALL-Link Cleanup Status Report (0x58)	
What it does	Notifies you if a *Send ALL-Link Command*$_{29}$ completed with all Cleanup messages sent, or else if Cleanups were interrupted due to other INSTEON traffic.
When you'll get this	After you issue a *Send ALL-Link Command*$_{29}$ and the IM finishes sending Cleanups to all members of the ALL-Link Group, or else when the Cleanup sequence is aborted due to other INSTEON traffic.
What you'll get	3 bytes.
LED indication	None.
Related Commands	IM 0x61 Send ALL-Link Command$_{29}$ IM 0x56 ALL-Link Cleanup Failure Report$_{31}$

Message Sent from IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x58**	IM Command Number
3	<Status Byte>	<0x06> (ASCII ACK) The ALL-Link Command sequence initiated previously using *Send ALL-Link Command*$_{29}$ completed. The IM first sent an ALL-Link Broadcast message, followed by ALL-Link Cleanup messages sent to all members of the specified ALL-Link Group. If any member of the ALL-Link Group does not return a Cleanup acknowledgement, you will receive an *ALL-Link Cleanup Failure Report*$_{31}$ from that member.
		<0x15> (ASCII NAK) The ALL-Link Command sequence initiated previously using *Send ALL-Link Command*$_{29}$ terminated before the IM sent ALL-Link Cleanup messages to all members of the specified ALL-Link Group. This is normal behavior when the IM detects INSTEON traffic from other devices.

Notes

The IM automatically sends ALL-Link Cleanup messages to each member of an ALL-Link Group following an ALL-Link Broadcast message. If the IM detects other INSTEON traffic during this process, it will abort the ALL-Link Cleanup sequence and send you this message with a *Status Byte* of 0x15 (NAK). The Cleanup sequence proceeds in the order in which the devices in the ALL-Link Group were added to the ALL-Link Database. If the IM finishes sending *all* of the Cleanup messages, it will send you this message with a *Status Byte of* 0x06 (ACK).

For *each* ALL-Link Cleanup message that the IM sends, you will either receive an INSTEON Standard Message Received$_{22}$ when the Responder answers with a Cleanup acknowledgement message, or else you will receive an ALL-Link Cleanup Failure Report$_{31}$ if the Responder fails to answer with a Cleanup acknowledgement message. The IM will send you *this* message whether or not every ALL-Link Group member acknowledges the Cleanup Command that the IM sends to it.

You can cause the IM to cancel its own Cleanup sequence by sending it a new Send ALL-Link Command$_{29}$ or Send INSTEON Standard or Extended Message$_{19}$ during the time that it is sending a Cleanup sequence (i.e. *after* it has finished sending an ALL-Link Broadcast message). The IM *will* send you this message in those cases.

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ALL-Linking Session Management

Start ALL-Linking

Start ALL-Linking (0x64)	
What it does	Puts the IM into ALL-Linking mode without using the SET Button.
What you send	4 bytes.
What you'll get	5 bytes for this Command response and then an additional 10 bytes in an *ALL-Linking Completed*[35] message once a successful ALL-Link has been established.
LED indication	The LED will blink continuously at a rate of ½ second on and ½ second off until the ALL-Link is completed or canceled.
Related Commands	IM 0x53 ALL-Linking Completed[35] IM 0x65 Cancel ALL-Linking[34]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x64**	IM Command Number
3	<Link Code>	The type of ALL-Link to establish.
		0x00 ALL-Links the IM as a Responder (slave).
		0x01 ALL-Links the IM as a Controller (master).
		0x03 ALL-Links the IM as a Controller when the IM initiates ALL-Linking, or as a Responder when another device initiates ALL-Linking.
		0xFF Deletes the ALL-Link.
4	<ALL-Link Group>	The ALL-Link Group Number to be linked to or deleted.

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x64**	Echoed IM Command Number
3	<Code>	Echoed <Code>
4	<ALL-Link Group>	Echoed <ALL-Link Group>
5	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

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Cancel ALL-Linking

Cancel ALL-Linking (0x65)	
What it does	Cancels the ALL-Linking process that was started either by holding down the IM's SET Button or by sending a *Start ALL-Linking*[33] Command to the IM.
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	The LED will stop blinking.
Related Commands	IM 0x64 Start ALL-Linking[33] IM 0x54 Button Event Report[51]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x65**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x65**	Echoed IM Command Number
3	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

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ALL-Linking Completed

ALL-Linking Completed (0x53)	
What it does	Informs you of a successful ALL-Linking procedure.
When you'll get this	An ALL-Linking procedure has been completed between the IM and either a Controller or Responder.
What you'll get	10 bytes.
LED indication	None.
Related Commands	IM 0x64 Start ALL-Linking[33] IM 0x65 Cancel ALL-Linking[34]

Message Sent from IM to Host

Byte	Value	Meaning
1	0x02	Start of IM Command
2	**0x53**	IM Command Number
3	<Link Code>	Indicates the type of link made. 0x00 means the IM is a Responder (slave) to this device 0x01 means the IM is a Controller (master) of this device 0xFF means the ALL-Link to the device was deleted If done manually (by pushing the SET Button) the Controller / Responder relationship between the IM and the device is determined automatically. You can assign the Controller / Responder relationship unconditionally by using the *Start ALL-Linking*[33] Command.
4	<ALL-Link Group>	Indicates the ALL-Link Group Number that was assigned to this link. If done manually (by pushing the SET Button) the ALL-Link Group Number is automatically assigned by the IM. You can assign ALL-Link Group Numbers unconditionally by using the *Start ALL-Linking*[33] Command.
5	<ID high byte>	The high byte of the INSTEON ID of the device that was ALL-Linked.
6	<ID middle byte>	The middle byte of the INSTEON ID of the device that was ALL-Linked.
7	<ID low byte>	The low byte of the INSTEON ID of the device that was ALL-Linked.
8	<Device Category>	The Device Category (DevCat) of the Responder device that was ALL-Linked. (Only valid when the IM is a Controller)
9	<Device Subcategory>	The Device Subcategory (SubCat) of the Responder device that was ALL-Linked. (Only valid when the IM is a Controller)
10	<0xFF | Firmware Version>	0xFF for newer devices. For legacy devices this is the firmware version of the Responder device that was ALL-Linked. (Only valid when the IM is a Controller)

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ALL-Link Database Management

Get First ALL-Link Record

Get First ALL-Link Record (0x69)	
What it does	Returns the first record in the IM's ALL-Link Database. The data will follow in an ALL-Link Record Response[39] message.
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	None.
Related Commands	IM 0x57 ALL-Link Record Response[39] IM 0x6A Get Next ALL-Link Record[37] IM 0x6C Get ALL-Link Record for Sender[38]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x69**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x69**	Echoed IM Command Number
3	<ACK/NAK>	0x06 (ACK) if an ALL-Link Record Response[39] follows 0x15 (NAK) if the database is empty.

Note

Use this to begin scanning the IM's ALL-Link Database. Follow up with Get Next ALL-Link Record[37] Commands until you receive a NAK.

In the IM Factory Reset State[11] the ALL-Link Database will be cleared, so you will receive a NAK.

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Get Next ALL-Link Record

Get Next ALL-Link Record (0x6A)	
What it does	Returns the next record in the IM's ALL-Link Database. The data will follow in an ALL-Link Record Response[39] message.
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	None.
Related Commands	IM 0x57 ALL-Link Record Response[39] IM 0x69 Get First ALL-Link Record[36] IM 0x6C Get ALL-Link Record for Sender[38]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x6A**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x6A**	Echoed IM Command Number
3	<ACK/NAK>	0x06 (ACK) if an ALL-Link Record Response[39] follows 0x15 (NAK) if there are no more records.

Note

Use this to continue scanning the IM's ALL-Link Database until you receive a NAK. Begin the scan up with a Get First ALL-Link Record[36] Command.

In the IM Factory Reset State[11] the ALL-Link Database will be cleared, so you will receive a NAK.

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Get ALL-Link Record for Sender

Get ALL-Link Record for Sender (0x6C)	
What it does	This gets the record from the IM's ALL-Link Database for the last INSTEON message received from an INSTEON device that is in the IM's ALL-Link Database. The data will follow in an ALL-Link Record Response$_{39}$ message.
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	None.
Related Commands	IM 0x57 ALL-Link Record Response$_{39}$ IM 0x69 Get First ALL-Link Record$_{36}$ IM 0x6A Get Next ALL-Link Record$_{37}$

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x6C**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x6C**	Echoed IM Command Number
3	<ACK/NAK>	0x06 (ACK) if an ALL-Link Record Response$_{39}$ follows 0x15 (NAK) if the last INSTEON message received had a *From Address* not in the IM's ALL-Link Database.

Note

If you send this after receiving an INSTEON message from an INSTEON device that is not in the IM's ALL-Link Database, you will receive a NAK in response.

Sending a Get Next ALL-Link Record$_{37}$ Command after this will return the ALL-Link Record that follows this one, but your actual position within the ALL-Link Database will be unknown (unless you are at the end).

In the IM Factory Reset State$_{11}$ the ALL-Link Database will be cleared, so you will receive a NAK.

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ALL-Link Record Response

ALL-Link Record Response (0x57)	
What it does	Provides a record from the IM's ALL-Link Database.
When you'll get this	You get this when you have requested it, in response to a Get First ALL-Link Record[36] a Get Next ALL-Link Record[37] , or a Get ALL-Link Record for Sender[38] Command.
What you'll get	10 bytes.
LED indication	None.
Related Commands	IM 0x69 Get First ALL-Link Record[36] IM 0x6A Get Next ALL-Link Record[37] IM 0x6C Get ALL-Link Record for Sender[38]

Message Sent from IM to Host

Byte	Value	Meaning	
1	0x02	Start of IM Command	
2	**0x57**	IM Command Number	
3	<ALL-Link Record Flags>	ALL-Link Database control flags for this ALL-Link Record	
		Bit 7	1 = Record is in use 0 = Record is available Note: This bit will always be set to 1.
		Bit 6	1 = IM is a Controller (master) of the device with <ID> given in bytes 5 – 7 below, 0 = IM is a Responder (slave) to the device with <ID> given in bytes 5 – 7 below
		Bit 5	Product dependent
		Bit 4	Product dependent
		Bit 3	Reserved (set to 0)
		Bit 2	Reserved (set to 0)
		Bit 1	1 = Record has been used before 0 = 'High-water Mark' Note: This bit will always be set to 1.
		Bit 0	Reserved (set to 0)
4	<ALL-Link Group>	ALL-Link Group Number for this ALL-Link Record	
5	<ID high byte>	INSTEON ID high byte for device ALL-Linked to	
6	<ID middle byte>	INSTEON ID middle byte for device ALL-Linked to	
7	<ID low byte>	INSTEON ID low byte for device ALL-Linked to	
8	<Link Data 1>	Link Information (varies by device ALL-Linked to)	
9	<Link Data 2>	Link Information (varies by device ALL-Linked to)	
10	<Link Data 3>	Link Information (varies by device ALL-Linked to)	

Note

See the section *INSTEON All-Link Database* in the INSTEON Developer's Guide[2] for details about the contents of an ALL-Link Record.

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Manage ALL-Link Record

Manage ALL-Link Record (0x6F)	
What it does	Updates the IM's ALL-Link Database (ALDB) with the ALL-Link Record information you send. Use caution with this Command—the IM does not check the validity of the data.
What you send	11 bytes.
What you'll get	12 bytes.
LED indication	None.
Related Commands	IM 0x57 ALL-Link Record Response[39]

Command Sent from Host to IM

Byte	Value	Meaning	
1	0x02	Start of IM Command	
2	**0x6F**	IM Command Number	
3	<Control Code>	What to do with the ALL-Link Record	
		0x00	**Find First** Starting at the top of the ALDB, search for the first ALL-Link Record matching the <ALL-Link Group> and <ID> in bytes 5 – 8. The search ignores byte 4, <ALL-Link Record Flags>. You will receive an ACK at the end of the returned message if such an ALL-Link Record exists, or else a NAK if it doesn't. If the record exists, the IM will return it in an ALL-Link Record Response[39] message.
		0x01	**Find Next** Search for the next ALL-Link Record following the one found using <Control Code> 0x00 above. This allows you to find both Controller and Responder records for a given <ALL-Link Group> and <ID>. Be sure to use the same <ALL-Link Group> and <ID> (bytes 5 – 8) as you used for <Control Code> 0x00. You will receive an ACK at the end of the returned message if another matching ALL-Link Record exists, or else a NAK if it doesn't. If the record exists, the IM will return it in an ALL-Link Record Response[39] message.
		0x20	**Modify First Found or Add** Modify an existing or else add a new ALL-Link Record for either a Controller or Responder. Starting at the top of the ALDB, search for the first ALL-Link Record matching the <ALL-Link Group> and <ID> in bytes 5 – 8. The search ignores byte 4, <ALL-Link Record Flags>. If such an ALL-Link Record exists, overwrite it with the data in bytes 4 – 11; otherwise, create a *new* ALL-Link Record using bytes 4 – 11. Note that the IM will copy <ALL-Link Record Flags> you supplied in byte 4 below directly into the <ALL-Link Record Flags> byte of the ALL-Link Record in an ALDB-L (linear) database. Use caution, because you can damage an ALDB-L if you misuse this Command. For instance, if you zero the <ALL-Link Record Flags> byte in the first ALL-Link Record, the IM's ALDB-L database will then appear empty.
		0x40	**Modify First Controller Found or Add** Modify an existing or else add a new Controller (master) ALL-Link Record. Starting at the top of the ALDB, search for the first ALL-Link Controller Record matching the <ALL-Link Group> and <ID> in bytes 5 – 8. An ALL-Link Controller Record has bit 6 of its <ALL-Link Record Flags> byte set to 1. If such a Controller ALL-Link Record exists, overwrite it with the data in bytes 5 – 11; otherwise, create a *new* ALL-Link Record using bytes 5 – 11. In either case, the IM will set bit 6 of the <ALL-Link Record Flags> byte in the ALL-Link Record to 1 to indicate that the record is for a Controller.
		0x41	**Modify First Responder Found or Add** Modify an existing or else add a new Responder (slave) ALL-Link Record. Starting at the top of the ALDB, search for the first ALL-Link Responder Record matching the <ALL-Link Group> and <ID> in bytes 5 – 8. An ALL-Link Responder Record has bit 6 of its <ALL-Link Record Flags> byte cleared to 0. If such a Responder ALL-Link Record exists, overwrite it with the data in bytes 5 – 11; otherwise, create a *new* ALL-Link Record using bytes 5 – 11. In either case, The IM will clear bit 6 of the <ALL-Link Record Flags> byte in the ALL-Link Record to 0 to indicate that the record is for a Responder.

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		0x80	**Delete First Found** Delete an ALL-Link Record. Starting at the top of the ALDB, search for the first ALL-Link Record matching the <ALL-Link Group> and <ID> in bytes 5 – 8. The search ignores byte 4, <ALL-Link Record Flags>. You will receive an ACK at the end of the returned message if such an ALL-Link Record existed and was deleted, or else a NAK no such record exists.
4	<ALL-Link Record Flags>	ALL-Link Database control flags for this ALL-Link Record	
		Bit 7	1 = Record is in use 0 = Record is available Note: This bit is only settable for ALDB-L (linear) databases using <Control Code> 0x20. It is handled automatically by ALDB-T (threaded) databases.
		Bit 6	1 = IM is a Controller (master) of the device with <ID> given in bytes 6 – 8 below, 0 = IM is a Responder (slave) to the device with <ID> given in bytes 6 – 8 below
		Bit 5	Product dependent
		Bit 4	Product dependent
		Bit 3	Reserved (set to 0)
		Bit 2	Reserved (set to 0)
		Bit 1	1 = Record has been used before 0 = 'High-water Mark' Note: This bit is only settable for ALDB-L (linear) databases using <Control Code> 0x20. It is handled automatically by ALDB-T (threaded) databases.
		Bit 0	Reserved (set to 0)
5	<ALL-Link Group>	ALL-Link Group Number for this ALL-Link Record	
6	<ID high byte>	INSTEON ID high byte for device ALL-Linked to	
7	<ID middle byte>	INSTEON ID middle byte for device ALL-Linked to	
8	<ID low byte>	INSTEON ID low byte for device ALL-Linked to	
9	<Link Data 1>	Link Information: varies by device ALL-Linked to	
10	<Link Data 2>	Link Information: varies by device ALL-Linked to	
11	<Link Data 3>	Link Information: varies by device ALL-Linked to	

Message Returned by IM to Host

Byte	Value	Meaning
1	0x02	Echoed Start of IM Command
2	**0x6F**	Echoed IM Command Number
3	<Control Code>	Echoed <Control Code>
4	<ALL-Link Record Flags>	Echoed <ALL-Link Record Flags>
5	<ALL-Link Group>	Echoed <ALL-Link group>
6	<ID high byte>	Echoed <ID high byte>
7	<ID middle byte>	Echoed <ID middle byte>
8	<ID low byte>	Echoed <ID low byte>
9	<Link Data 1>	Echoed <Link Data 1>
10	<Link Data 2>	Echoed <Link Data 2>
11	<Link Data 3>	Echoed <Link Data 3>
12	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred or the ALL-Link Record doesn't exist.

Notes

See the section *INSTEON All-Link Database* in the INSTEON Developer's Guide$_2$ for details about the contents of an ALL-Link Record.

Note that except for **Find Next**, all ALDB searches begin at the top of the ALDB, which means that the IM will *always* perform modify or delete operations on the *first* matching record that it finds in its ALDB. You must therefore use caution when deleting records because an ALDB may contain multiple Controller and Responder records matching a given <ALL-Link Group> and <ID>. If you want to delete

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only one of the matching records, then you should:

1. Use **Find First** and **Find Next** to find and buffer *all* of the records matching the <ALL-Link Group> and <ID>,
2. Use **Delete First Found** enough times to delete *all* of the matching records,
3. Put back the records you did *not* want to delete using **Modify First Controller Found or Add** or **Modify First Responder Found or Add**.

Please be aware that you can damage an ALDB-L (linear) database if you misuse the **Modify First Found or Add** operation, <Control Code> 0x20. For instance, if you zero bit 1 of the <ALL-Link Record Flags> byte in the first record in an ALDB-L, the ALDB-L will then appear *empty*. Or, if you zero bit 7 of the <ALL-Link Record Flags> byte in an ALDB-L record, then that record will appear *deleted*. In an ALDB-T (threaded) database, the IM handles those bits for you automatically, so the **Modify First Found or Add** operation is not so risky. Nevertheless, it is always preferable to use **Modify First Controller Found or Add** or **Modify First Responder Found or Add** instead, because with **Modify First Found or Add** you cannot be sure if you are modifying a record for a Controller or Responder.

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IM Status Management

Reset the IM

Reset the IM (0x67)	
What it does	Puts the IM into the IM Factory Reset State[11], which clears the entire ALL-Link Database.
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	While the reset procedure is being processed, the Status LED will turn off. At the conclusion of the reset procedure, the Status LED will illuminate steadily.
Related Commands	IM 0x55 User Reset Detected[44]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x67**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x67**	Echoed IM Command Number
3	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

Notes

The IM will send the <ACK/NAK> byte after it erases the EEPROM.

~20 seconds for models with external EEPROM (for product revisions less than 2.4 or firmware verisons 52 or earlier.

~2 seconds for models with no external EEPROM

Effective with product revisions 2.5 or greater, the reset time is reduced to ~3 seconds.

See the IM Factory Reset State[11] section for complete information on the state of the IM after sending this Command.

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User Reset Detected

User Reset Detected (0x55)	
What it does	Reports that the user manually put the IM into the IM Factory Reset State$_{11}$.
When you'll get this	The user held down the IM's SET Button for at least 10 seconds when power was first applied.
What you'll get	2 bytes (not until about 20 seconds after applying power to the IM with the SET Button held down).
LED indication	The LED will turn off for about 20 seconds. Once the LED turns back on the reset is complete.
Related Commands	IM 0x67 Reset the IM$_{43}$

Message Sent from IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x55**	IM Command Number

Notes

The IM will send this message after it erases the EEPROM.

~20 seconds for models with external EEPROM (for product revisions less than 2.4 or firmware verisons 52 or earlier.

~2 seconds for models with no external EEPROM

Effective with product revisions 2.5 or greater, the reset time is reduced to ~3 seconds.

See the IM Factory Reset State$_{11}$ section for complete information on the state of the IM after receiving this message.

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Get IM Configuration

Get IM Configuration (0x73)	
What it does	Returns the IM's Configuration Flags byte. Also returns two spare bytes of data reserved for future use.
What you send	2 bytes.
What you'll get	6 bytes.
LED indication	None.
Related Commands	IM 0x6B Set IM Configuration$_{46}$

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x73**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x73**	Echoed IM Command Number
3	<IM Configuration Flags>	IM's Configuration Flags. See Set IM Configuration$_{46}$ for bit definitions.
4	<Spare 1>	0x00, reserved for future use
5	<Spare 2>	0x00, reserved for future use
6	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

Note

Because Set IM Configuration$_{46}$ sets all of the <IM Configuration Flags> at once, to change an individual bit, first use this Command to determine the current state of all of the <IM Configuration Flags>.

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Set IM Configuration

Set IM Configuration (0x6B)	
What it does	Allows you change operating parameters of the IM.
What you send	3 bytes.
What you'll get	4 bytes.
LED indication	None.
Related Commands	IM 0x73 Get IM Configuration$_{45}$ IM 0x54 Button Event Report$_{51}$ IM 0x50 INSTEON Standard Message Received$_{22}$ IM 0x51 INSTEON Extended Message Received$_{23}$ IM 0x6D LED On$_{52}$ IM 0x6E LED Off$_{53}$

Command Sent from Host to IM

Byte	Value	Meaning	
1	0x02	Start of IM Command	
2	**0x6B**	IM Command Number	
3	<IM Configuration Flags>	Flag byte containing Configuration Flags that affect IM operation. These all default to 0.	
		Bit 7 = 1	Disables automatic linking when the user pushes and holds the SET Button (see Button Event Report$_{51}$).
		Bit 6 = 1	Puts the IM into *Monitor Mode* (see About Monitor Mode$_{46}$ in the **Notes** below).
		Bit 5 = 1	Disables automatic LED operation by the IM. The host must now control the IM's LED using LED On$_{52}$ and LED Off$_{53}$.
		Bit 4 = 1	Disable host communications *Deadman* feature (i.e. allow host to delay more than 240 milliseconds between sending bytes to the IM).
		Bit 3 = 1	Serial commands to the interface will NAK if it is busy processing an INSTEON command.
		Bits 2 - 0	Reserved for internal use. **Set these bits to 0.**

Message Returned by IM to Host

Byte	Value	Meaning
1	0x02	Echoed Start of IM Command
2	**0x6B**	Echoed IM Command Number
3	<IM Configuration Flags>	Echoed <IM Configuration Flags>
4	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred.

Notes

When the IM is in the IM Factory Reset State$_{11}$, the <IM Configuration Flags> will all be set to zero.

This Command sets all of the <IM Configuration Flags> at once. To change an individual bit, first use Get IM Configuration$_{45}$ to determine the current state of all of the <IM Configuration Flags>.

About Monitor Mode

Normally, the IM will only send the host an INSTEON Standard Message Received$_{22}$ or INSTEON Extended Message Received$_{23}$ notification when it receives an INSTEON messages directed specifically to the IM. There are three possibilities:

1. The IM received a Direct message with a *To Address* matching the IM's INSTEON ID,
2. The IM received an ALL-Link Broadcast message sent to an ALL-Link Group that the IM belongs to as a Responder (i.e. the message's *From Address* and ALL-Link Group Number match a Responder entry in the IM's ALL-Link Database), or
3. The IM received an ALL-Link Cleanup message with a *To Address* matching the IM's INSTEON ID and the message's *From Address* and ALL-Link Group Number match a

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Responder entry in the IM's ALL-Link Database.

In *Monitor Mode*, the IM will also notify the host of received INSTEON messages that contain a *From Address* matching *any* INSTEON ID in the IM's ALL-Link Database, even if the *To Address* does not match the IM's INSTEON ID or the IM does not belong to an ALL-Link Group associated with the message. In other words, if the message originator is in the IM's ALL-Link Database as either a Controller or Responder, the IM will pass the message to the host even if it is not specifically directed to the IM. In this way you can monitor messages between other INSTEON devices as long as the sender is in the IM's ALL-Link Database.

Please be aware that the IM may not always detect this traffic. If the message originator and addressee are close to one another and the IM is farther away, the message originator may not cause the message to hop enough times for the IM to hear it. To know for sure what an INSTEON device's status is, you can usually query it directly using an appropriate INSTEON Direct Command. For more information on INSTEON Commands and the latest Command set, please download the current INSTEON Command Tables Document$_2$ from http://code.insteon.com.

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Get IM Info

Get IM Info (0x60)	
What it does	Identifies the IM's 3 byte INSTEON ID, Device Category (DevCat), Device Subcategory (SubCat), and firmware version.
What you send	2 bytes.
What you'll get	9 bytes.
LED indication	None.
Related Commands	IM 0x66 Set Host Device Category[49] IM 0x73 Get IM Configuration[45] IM 0x6B Set IM Configuration[46]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x60**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x60**	Echoed IM Command Number
3	<ID high byte>	IM's INSTEON ID high byte
4	<ID middle byte>	IM's INSTEON ID middle byte
5	<ID low byte>	IM's INSTEON ID low byte
6	<Device Category>	IM's Device Category
7	<Device Subcategory>	IM's Device Subcategory
8	<Firmware Version>	IM's Firmware Version
9	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

Note

Using the Set Host Device Category[49] Command to change the host's DevCat and SubCat will only affect the data transmitted by the IM to other INSTEON devices during ALL-Linking.

When the host sends this Command to the IM, the IM will return the original DevCat, SubCat and firmware version hard-coded into the IM's firmware at the factory.

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Set Host Device Category

Set Host Device Category (0x66)	
What it does	Lets you set the Device Category (DevCat) and Device Subcategory (SubCat) of the host device connected to the IM.
What you send	5 bytes.
What you'll get	6 bytes.
LED indication	None.
Related Commands	IM 0x60 Get IM Info$_{48}$

Command Sent from Host to IM

Byte	Value	Meaning
1	0x02	Start of IM Command
2	**0x66**	IM Command Number
3	<Device Category>	INSTEON Device Category (DevCat) of the host device connected to the IM.
4	<Device Subcategory>	INSTEON Device Subcategory (SubCat) of the host device connected to the IM.
5	<0xFF | Firmware Version>	0xFF In legacy devices this byte represented a BCD-encoded firmware version. The high nibble (4 bits) gave the major revision number and the low nibble gave the minor revision. In current devices use the INSTEON *Product Data Request* and *Product Data Response* Commands to retrieve the firmware version as user-defined data.

Message Returned by IM to Host

Byte	Value	Meaning
1	0x02	Echoed Start of IM Command
2	**0x66**	Echoed IM Command Number
3	<Device Category>	Echoed <Device Category>
4	<Device Subcategory>	Echoed <Device Subcategory>
5	<0xFF | Firmware Version>	Echoed <0xFF> or <Firmware Version>
6	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly 0x15 (NAK) if an error occurred

Notes

For INSTEON compliance, you must obtain an approved DevCat and SubCat assignment for your host product from SmartLabs.

The IM stores these values in EEPROM so they will not be erased if power is lost.

When the IM is in the IM Factory Reset State$_{11}$, these values will be set to those hard-coded into the IM's firmware at the factory.

Using this Command to change the host's DevCat and SubCat will only affect the data transmitted by the IM to other INSTEON devices during ALL-Linking.

When the host sends a Get IM Info$_{48}$ Command to the IM, the IM will return the original DevCat, SubCat and firmware version hard-coded into the IM's firmware at the factory.

For the latest list of assigned INSTEON DevCats, please download the INSTEON Device Categories and Product Keys Document$_2$ from http://code.insteon.com.

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RF Sleep

RF Sleep (0x72)	
What it does	Directs an RF IM to go into power saving sleep mode. To wake up the RF IM, send it one byte of serial data.
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	None.
Related Commands	None.

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x72**	IM Command Number
3	<Command 1 Data>	Data byte to place into the *Command 1* field 2 of the ACK response.
4	<Command 2 Data>	Data byte to place into the *Command 2* field 2 of the ACK response.

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x72**	Echoed IM Command Number
3	<Command 1 Data>	Echoed <Command 1 Data>
4	<Command 2 Data>	Echoed <Command 2 Data>
5	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred.

Notes

It does not matter what byte you send serially to wake up the RF IM.

When the RF IM wakes up, it will reinitialize, but memory will not be altered as it would be in the IM Factory Reset State[11]. Wait a minimum of 40 milliseconds before sending any further IM Serial Commands.

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IM Input/Output

Button Event Report

Button Event Report (0x54)	
What it does	Reports user SET Button events.
When you'll get this	The user operates the SET Button, or if they exist, Button 2 or Button 3.
What you'll get	3 bytes.
LED indication	If the event is *SET Button Press and Hold* the IM will automatically go into ALL-Linking mode which will cause the LED to blink continuously at a rate of ½ second on and ½ second off. Automatic linking may be turned off by setting *IM Configuration Flags* bit 7 (see Set IM Configuration[46]).
Related Commands	IM 0x53 ALL-Linking Completed[35] IM 0x64 Start ALL-Linking[33] IM 0x65 Cancel ALL-Linking[34]

Message Sent from IM to Host

Byte	Value	Meaning	
1	0x02	Start of IM Command	
2	**0x54**	IM Command Number	
3	<Button Event>	Indicates the type of SET Button event that occurred.	
		0x02	The SET Button was *Tapped*
		0x03	There was a SET Button *Press and Hold* for more than three seconds. This automatically puts the IM into ALL-Linking mode unless *IM Configuration Flags* bit 7 is set.
		0x04	The SET Button was released after a SET Button *Press and Hold* event was recorded.
		0x12	Button 2 was *Tapped*
		0x13	There was a Button 2 *Press and Hold* for more than three seconds.
		0x14	Button 2 was released after a Button 2 *Press and Hold* event was recorded.
		0x22	Button 3 was *Tapped*
		0x23	There was a Button 3 *Press and Hold* for more than three seconds.
		0x24	Button 3 was released after a Button 3 *Press and Hold* event was recorded.

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LED On

LED On (0x6D)	
What it does	Turns on the IM's LED if *IM Configuration Flags* bit 5 = 1.
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	The LED will go on.
Related Commands	IM 0x6B Set IM Configuration[46] IM 0x6E LED Off[53]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x6D**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x6D**	Echoed IM Command Number
3	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred or *IM Configuration Flags* bit 5 = 0.

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LED Off

LED Off (0x6E)	
What it does	Turns off the IM's LED if *IM Configuration Flags* bit 5 = 1.
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	The LED will go off.
Related Commands	IM 0x6B Set IM Configuration[46] IM 0x6D LED On[52]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x6E**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x6E**	Echoed IM Command Number
3	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred or *IM Configuration Flags* bit 5 = 0.

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Cancel Cleanup

Cancel Cleanup (0x74)	
What it does	Cancels cleanup from ALL-Link Command
What you send	2 bytes.
What you'll get	3 bytes.
LED indication	None.
Related Commands	IM 0x61 Send ALL-Link Command[29]

Command Sent from Host to IM		
Byte	**Value**	**Meaning**
1	0x02	Start of IM Command
2	**0x74**	IM Command Number

Message Returned by IM to Host		
Byte	**Value**	**Meaning**
1	0x02	Echoed Start of IM Command
2	**0x74**	Echoed IM Command Number
3	<ACK/NAK>	0x06 (ACK) if the IM executed the Command correctly. 0x15 (NAK) if an error occurred.

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