

XTB-XM 2413S X10 Emulator for Smartenit Harmony

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The XTB-XM is a high-power X10 powerline interface that emulates the X10 subset of commands used by the 2413S Insteon Modem (IM). Since Insteon products are no longer in production, the XTB-XM is an alternative for those who are using the Smartenit Harmony to control their X10 systems. The XTB-XM uses the XTB-232 hardware with new firmware and a minor modification to support the higher baud rate. The XTB-XM ONLY supports the X10 powerline protocol, and will ignore any Insteon commands.



Inside view of the XTB-XM with the XTB-232 Firmware

Many of you are familiar with the XTB and XTB-IIR X10 Transmit Boosters that have been available since 2006. Like the other XTB units, the XTB-XM outputs a much stronger signal than other X10 transmitters. While not quite as powerful as the XTB-IIR, it can still output over 20Vpp onto the powerline. When combined with a good tuned-circuit passive coupler like the XPCP, the XTB-XM located near the distribution panel can provide adequate signals throughout an average home.

The XTB-XM contains a "polite" transmitter, and will delay its transmission as long as necessary while waiting for a clear line if there is already X10 activity on the powerline. It will also immediately abort a transmission if it senses a collision, and will automatically retransmit that command after the powerline has cleared. An "ACK" acknowledgement is issued after the command has been successfully transmitted. The "NAK" acknowledgement is issued if the command could not be transmitted because excessive powerline noise or other X10 traffic on the powerline.

While the XTB-232 supported receiving and transmitting extended commands, the IM protocol does not include that capability. But the XTB-XM does include the ability to expand a pre-set dim command to an extended command. Unfortunately, it appears that the Smartenit Harmony does not currently support the ability to transmit pre-set dim commands. But should this feature be desired, just open up the unit and install a jumper between pins 4 and 5 of the header adjacent to the microcontroller. Be careful that the LED slips into the lens when reattaching the cover.

The LED indicator provides feedback on the state of the unit. It should glow dim green whenever it is active and monitoring the powerline. A bright green flash indicates it is receiving a potential X10 command, and an orange flash indicates it is transmitting. Red flashes indicate various errors, as explained in detail in the section on LED Status Indications.

ELECTRICAL CONNECTION

The XTB-XM can be plugged into any standard 120V 60Hz AC receptacle. The closer that receptacle is to the distribution panel, the stronger signals will be throughout the home. A good tuned-circuit passive coupler like the XPCP should be installed near the electrical panel to propagate the strong X10 signal to the opposite phase when X10 devices are on both phases. An active coupler/repeater like the XPCR will not do that.

The XTB-XM has an opto-isolated RS232 interface provided with isolated power, so there is complete electrical isolation between the powerline and the computer serial link. Since the XTB-XM is based on the XTB-232 hardware, the X10 CM11A serial-port cable must be used to connect to the XTB-XM. And a USB to serial port interface must be used to connect to the Smartenit Harmony. It has been tested with several converters, and one was found not to transmit properly at the 19.2KHz baud rate. All other USB converters worked fine.

XTB-XM OPERATION

The XTB-XM responds to the "Get Version" command, and returns the hexadecimal string 02 60 0E D9 4B 03 05 72 06 that was captured from an actual 2413S Insteon Modem. The Smartenit Harmony uses that to identify when it is connected to a device that can transmit X10 commands. After that link is initialized, the XTB-XM should then process any X10 communication between the Harmony and the powerline.

The X10 transmitter in the XTB-XM auto tunes itself to 120KHz using the powerline as a reference. This may be a something to consider when using the XTB-XM in an installation powered by a generator.

To conserve energy, the XTB-XM only transmits the X10 signal burst following each 60Hz zero crossing. Because of this, it is intended for use in homes with a standard 120V/240V split-phase electrical system. It must be paired with a 3-phase repeater when used in a 3-phase electrical system.

A message sent from the Harmony to the XTB-XM is comprised of a burst of 2 to 4 words completed in 1 or 2 milliseconds. Should something interrupt that process, a serial communication error will be indicated if the complete message is not received within 2 seconds, and the portion of the message received will be purged.

The XTB-XM XM accepts the "Get Version", "Reset", "Send X10", and "Get/Set IM Configuration" commands defined in the Insteon Modem Developers Guide. Receiving any other commands will cause a serial communication error indication, and the message will immediately be purged.

Note that some USB interfaces may cause a serial communication error

XTB-XM LED STATUS INDICATIONS:

Dim green: The unit is powered up and monitoring the powerline.
Bright green: A command is being received.
Orange flicker: A command is being transmitted.
3 red flashes: A receiving error occurred due to noise or a weak signal.
4 red flashes: A transmission error occurred due to noise or a collision.
5 red flashes: An error occurred in the RS232 serial communication link.

Cable connections:

Signal	DB9	RJ11	
SIN	Pin 2	Pin 1	Serial input to PC (output from the interface)
SOUT	Pin 3	Pin 3	Serial output from PC (input to the interface)
GND	Pin 5	Pin 4	Signal ground
RI	Pin 9	Pin 2	Ring signal for CM11A (not used in the XM)