XTBR MODE PROGRAMMABLE OPTIONS

Revised 11/01/2013 for firmware version 1.1+

The XTBR is a high power repeater that includes the ability to directly boost the output of an X10 transmitter. Several mode options have been added in this new version. There are now pre and post X10 window AGC sample points that are individually controllable, and the detection threshold can be read as a pre-set dim command. It is also possible to disable repeating selected housecodes.

Programming the Mode Options in the XTBR requires a sequence of X10 commands to be sent using a Maxi Controller plugged into a nearby AC outlet. Each key should be pressed for about a second, and the gap between each key press must be less than 4 seconds. XTBR only accepts commands on the selected housecode (default is P). The one exception is masking housecodes, where the OFF/ON must be sent on the housecode that is being enabled or disabled. All programming begins with the key sequence 9-8-2 on the selected housecode, followed by the **single key** for the mode to change, and then either ON or OFF. For example, the key sequence 9-8-2-14-ON enables transmit on all 3-phases. The LED will flash for about a second after the ON or OFF key is released if the command is accepted.

In this version it is possible to check a mode status through the LED. After the mode is selected, the LED will either blank or brighten for 2 seconds to indicate the mode status. As before, the mode number, and its Status_ON or Status_OFF is transmitted over the powerline so the entry can be logged. The LED will flash 5 times if either an incorrect key sequence is entered or too much time elapsed between key presses.

The mode configuration can be checked over the powerline by substituting the STATUS_REQUEST command for the mode programming ON or OFF commands. The XTBR will respond with Status_ON or Status_Off, corresponding to the state of that mode option.

XTBR can be reset to the "factory default" configuration by pressing the ALL OFF key on a Mini or Maxi Controller plugged into a nearby AC outlet while power is applied after being off at least 5 seconds. The ALL OFF key should be held for about 1 second after the LED illuminates. The LED will flash again after the key is released if the default reset is accepted. Normally the XTBR transmits "P Status ON" when power is applied, and the LED will flash briefly.

The user programmable mode options are as follows (Default settings are in parentheses):

> **16 (on) Repeater Enable**
> **15 (on) Real-time Boost Enable for direct X10 boost of nearby transmitter**
> **14 (off) Enable 3-Phase Transmit (converts single phase to 3-phase)**
> **13 (off) Delay Transmit Burst to reduce flashing of nearby dimmers**
> **12 (off) Reduced Transmit Power**
> **11 (off) Auto Retransmit of repeat following collision**
> **10 (off) Abort Transmission on collision**
> **9 (on) Smart Bright/Dim Repeat for sequential commands**
> **8 (off) Only One Repeat for each command to prevent repeater ping-pong**
> **7 (off) High Command Storm Threshold 30/min. (OFF allows 20/min)**
> **6 (on) Not used**
> **5 (off) High AGC threshold (increase threshold by factor of 1.5)**
> **4 (on) Enable post X10 window AGC sample point**
> **3 (on) Enable pre X10 window AGC sample point**
> **2 (P) Housecode for Mode Programming after ALL OFF reset (9-8-2-2-ON)**
> **2 DIM Read detection threshold as pre-set dim command**
> **2 OFF Unlock the housecode disable non-volatile memory**
> **2 ALL_OFF Disable repeating commands on the ALL_OFF housecode**
> **2 ALL_ON Enable repeating commands on the ALL_ON housecode**
> **1 (off) Not used**

16 (ON) Repeater Enable: This option enables the XTBR repeater. Like other repeaters, this outputs a high-power transmission in bit-sync with the second half of a received command. The LED flashes bright green while receiving the first half of the command, and then bright red as the XTBR is transmitting. See Mode 14 about using the repeater for 3-phase systems.

15 (ON) Real-time Boost Enable: Since the new XTBR no longer contains the X10 Boost input on the cover, this option enables it to provide the same function for a transmitter plugged into a nearby AC outlet. The LED flashes bright red during the entire command during real-time boost to differentiate this function from the normal repeater operation. Since bits are boosted as they are received, no error checking is performed. While this function uses a much higher threshold than the repeater, it may have to be disabled if there is a very powerful noise source plugged into a nearby outlet.

14 (OFF) 3-Phase Enable: The XTBR normally only transmits the zero-crossing X10 signal burst. This enables the 3-phase transmission. Because of the extra load, output power is reduced when this mode is enabled. When enabled, all X10 transmitters must be on the same phase as the XTBR to avoid signal overlap on the other phases. If that is not possible, the repeater function must be disabled, and only the Real-time Boost function used.

13 (OFF) Delay Transmit Burst: This reduces the potential for dimmer flicker. It delays the zero-crossing transmit burst until just before the X10 reception window. The strong XTBR signal can induce flicker in some dimmers during transmissions. Delaying the transmit burst appears to reduce or eliminate this effect. This option generates a shorter signal burst, and it should only be used if dimmer flicker becomes a problem. Note: This option must be turned off to obtain an accurate measurement when using the XTBM to check the XTBR transmit frequency.

12 (OFF) Reduced Transmit Power: The XTBR may deliver too much signal for some applications, and this option allows the transmit power to be reduced about 40%. Depending on the load, the actual transmitted voltage may not decrease that much. This option is automatically enabled when 3-phase transmission is enabled to prevent excessive power supply drain.

11 (OFF) Auto Retransmit: This option enables automatic retransmit of a repeated command that was aborted due to a collision. Auto retransmit only works if the first half of the command was not corrupted. It is not possible to decode the command if the first half was corrupted. So while this option may recover some commands, it cannot guarantee all commands will be repeated when there are powerline collisions. Also, for this function to work, there must be a gap following the command that was corrupted.

10 (OFF) Abort Transmission on Collision: A collision is identified by a signal burst appearing in the timeslot when no burst is being transmitted. When this option is enabled, the XTBR will immediately cease transmission of the current command whenever a collision is identified. When a command is being repeated there is an option to re-transmit that command after the line has cleared. Note that some types of powerline noise can be recognized as collisions.

9 (ON) Smart Bright/Dim Repeat: Bright and Dim commands deviate from normal X10 protocol because they can be strung together without gaps separating the commands. Dimmer modules interpret bright and dim commands differently, depending on how the commands are strung together. Most repeaters only transmit the second half of each bright or dim command, which can cause them to be interpreted incorrectly. With this option enabled, the XTBR will repeat every bright or dim command in a sequence after the first half of the first command. The transmission ends in sync with the last received bright or dim command so that the XTBR transmission will not conflict with another command closely following that sequence.

8 (OFF) Only One Repeat: When a repeater is used in an installation that has another repeater or certain two-way modules, it is possible for a command to be echoed back and forth continuously. This option prevents that ping-pong effect in those special situations. For example when this option is enabled, only A-1, A-ON will be repeated for the sequence A-1, A-ON, A-ON, A-ON. But A-1 A-ON, A-1, A-ON will be

repeated completely. Because bright and dim commands are a special case, they will all continue be repeated if the Smart Bright/Dim Repeat option is selected. This allows the XTBR to continue handling those commands properly while preventing the ping-pong effect with other commands. This option should only be used if necessary.

7 (OFF) High Command Storm Threshold: The XTBR will shut off its transmitter when it detects continuous X10 traffic on the powerline. The XTBR will normally pass a burst of about 120 X10 commands, or 20 per minute continuous. Choosing the High Threshold increases this to a burst of about 200 commands, or 30 per minute continuous. The lower limit should be adequate for most installations. Either turning power off for 10 seconds or 10 seconds of clear line will recover from a command storm shutdown. If a second shutdown occurs soon after recovery, it may take over a minute for operation to be restored to allow the transmitter to cool.

6 (Not Used)

5 (OFF) High AGC Threshold: This option increases the detection threshold by a factor of 1.5 above the background noise level. This is recommended for noisy environments when incoming X10 signals are strong. This mode option was enabled by default in prior firmware versions, but the improved AGC action in this version should be sufficient to deal with most powerline noise with this option disabled.

4 (ON) Post X10 window AGC sample: This mode option controls the AGC sample after the end of the X10 transmission window. It should normally be turned on, but can be turned off if the XTBR sensitivity is being reduced by a nearby noise source

3 (ON) Pre X10 window AGC sample: This mode option controls the AGC sample just before the AC powerline zero crossing. While this sample point normally has about the same noise profile as the X10 window just after the zero crossing, it is also the beginning of the Insteon transmission window. Since Insteon commands appear as noise bursts to the XTBR, turning off this AGC sample will eliminate the brief decreases in sensitivity following Insteon transmissions in a combined X10/Insteon system.

2 (P) Housecode Select: A 9-8-2-2-ON sequence sent IMMEDIATELY after an ALL OFF power-up default reset will set the selected housecode to that used for the 9-8-2-2-ON sequence. The window to accept the housecode select is only open for 4 seconds after the default reset. If the housecode is not changed within that window, the XTBR will only accept the default "P" housecode for programming mode commands.

2 AGC Query: This new version adds the ability to read the XTBR detection threshold by sending the sequence 9-8-2-2-DIM. The XTBR will output the detection threshold as a pre-set dim command ranging from 1 to 31. This feature allows a controller to monitor the background noise level. The resolution up to pre-set dim value 24 is 30mV per step, and above 24 it increases to a 0.6V range per step. You must subtract 24 from numbers above 24 to calculate the threshold. For example, 25 = .6V to 1.2V, 26 = 1.2V to 1.8V, and so on… (The exact threshold is within that range.)

Note that these threshold values are after the signal passes through the input bandpass amplifier, and they do not represent the actual background noise level on the powerline, which is about a factor of 4 lower.

2 Housecode Disable: This new version adds the ability to prevent repeating selected housecodes when two X10 systems share the same utility transformer. The disable is held in non-volatile memory that must first be unlocked with the sequence 9-8-2-2-OFF. That is immediately followed with the sequence 9-8-2-2-ALL_OFF. The numbers must be sent on the normal mode programming housecode, and the ALL_OFF sent on the housecode to be disabled. Use ALL_ON instead to enable the housecode. Any other command (ON, OFF, etc.) will lock the memory again. The LED will flash twice when a command is received on the disabled housecode. The disable can be checked with a Status_Request instead of ALL_OFF.

1 (Not Used)