

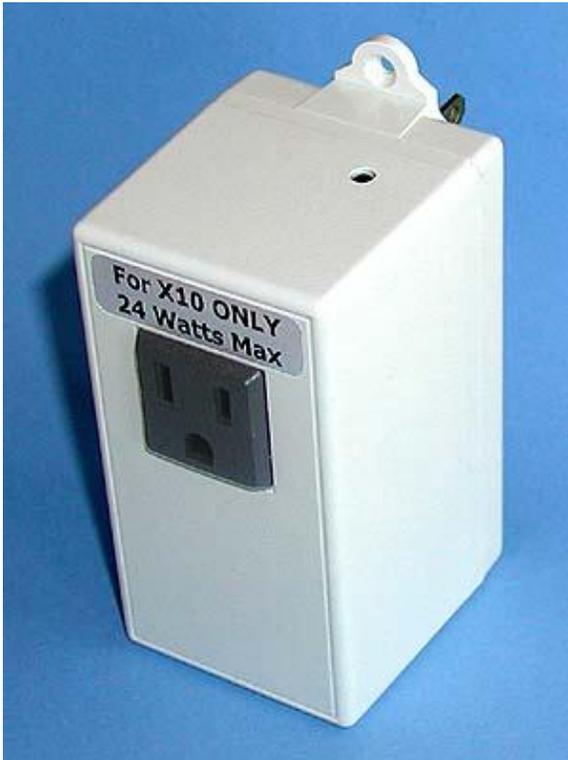
The XTB - An Alternative Approach For X10 Reliability

Jeff Volp (Links updated 4/22/2015)

If you have been reading these tutorials, you should know Pico Electronics developed the X10 protocol back in the 70's. In the decades since then our houses have become filled with various electronic devices, some of which are downright hostile to X10 powerline communications. Many people blame X10 when their system does not work perfectly. However, maybe the blame should be redirected at the manufacturers who developed these new devices without any regard for other equipment that might share the same powerline. The XTB was my attempt to give X10 systems a means to fight back.

X10 powerline control signals are sent as a series of 120KHz bursts coupled onto the powerline. Many X10 transmitters use inexpensive transformerless power supplies. While small and cheap, transformerless supplies cannot deliver much energy. Most X10 transmitters output about 5Vpp to the powerline, but that level falls off rapidly as the distance from the transmitter increases. Because most X10 transmitters cannot supply much current, any "signal suckers" on the powerline will compound the attenuation.

The normal approach to combating the effects from problem devices is to isolate them with filters. Unfortunately, many loads are dynamic, and the powerline environment is always changing. It becomes impractical and expensive to isolate all potential problem loads with filters. The XTBR and XTB-IIR provide an alternate means to deal with the multiplicity of problem loads.



The original XTB Transmit Signal Booster XTB-II 2-phase Transmit Signal Booster

The original XTB was designed to directly boost the output of any X10 transmitter that was plugged into it. It has a powerful transformer power supply that can deliver over 10 times the energy of a typical X10 transmitter. Its output of 20Vpp or more allows X10 signals to reach much further before the signal strength drops to marginal levels. Since the XTB just drives the phase it is plugged into, a good passive signal coupler should be installed when X10 devices are on both phases.

Because the simple plug-in XTB was well received, the 2-phase XTB-II was developed. It has two output coupling networks to directly drive both phases, eliminating the need for an additional passive coupler. The XTB-II added a microcontroller to generate a precision 120KHz. It also blanked the unnecessary 3-phase signal bursts to allow it to concentrate all its power into the zero crossing burst, delivering an even more powerful signal than the XTB. Soon afterward the XTBR and XTB-IIR repeater versions were developed. They can receive incoming X10 signals over the powerline, and repeat them at a much higher level. Because demand for the repeater versions eclipsed sales of the earlier versions, they were discontinued. Both the XTBR and XTB-IIR have received several firmware updates since they were introduced to incorporate additional features and resolve problems encountered with certain devices.

Perhaps the most significant change to the XTB/XTBR was the elimination of the X10 Boost input on the most recent unit. The plastic case used for the original version was discontinued as a standard product. While it is still available on special order, the volume is way above our needs. The XTBR was redesigned to provide the direct X10 Boost feature for any X10 transmitter plugged into a nearby outlet on the same circuit. It still functions as a repeater for weaker X10 signals received over the powerline.

You can read more about both units here: [XTBR description](#) and [XTB-IIR description](#)

And here is customer feedback on both units: [XTBR feedback](#) and [XTB-IIR feedback](#)

Some may think that the XTBR and XTB-IIR are expensive. Most consumer electronic devices today are made in China with cheap labor and components ordered in huge quantities. The XTBR and XTB-IIR are kitted from components bought from major US distributors, such as Mouser or Digikey. The kits are priced at the unit quantity component prices. Any savings possible by ordering in larger quantities covers shipping charges, packaging materials, time spent ordering, sorting, and packaging the components, and various fees. A nominal charge beyond the cost of the components covers the firmware development.

As you can see from the user reports, the XTBR and XTB-IIR provide a single solution to most X10 signal strength issues. The plug-in XTBR is certainly the easiest to use, but it should be paired with a good passive signal coupler for most installations. The XTB-IIR is a more capable unit that also provides TW523 emulation and a basic repeater capability. However, it should be connected to a 240V circuit near the main distribution panel for best performance. And while the XTBR or XTB-IIR will solve the majority of X10 signal strength issues, it may not solve problems caused by strong noise generators.

The XTB-ANR (Active Noise Reducer) was developed to combat overall noise problems. A pair of those, combined with the XTBR or XTB-IIR to boost signal levels, should deal with most X10 signal problems. It is possible that particularly nasty devices may still have to be individually isolated with an X10 filter.