

# DC to DC Boost Converter

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I participate in the ARRL's 10Gig and Up contest which places me and my equipment on hilltops or other remote locations. Since it is not practical to carry a portable generator, I needed some way to power my laptop off of the available 12 volt battery. I checked a number of sources for a suitable converter and decided \$60.00 and up was a little too much so I went looking around for a suitable solution. While the Linear Technologies LT1070 is not new, its technology is new to me. My goal was to build something using only my scrap parts bin and the purchase of the LT1070 for \$10.00. The following design is based on Figure 18 in Linear Technologies Application note AN-19 page 17.

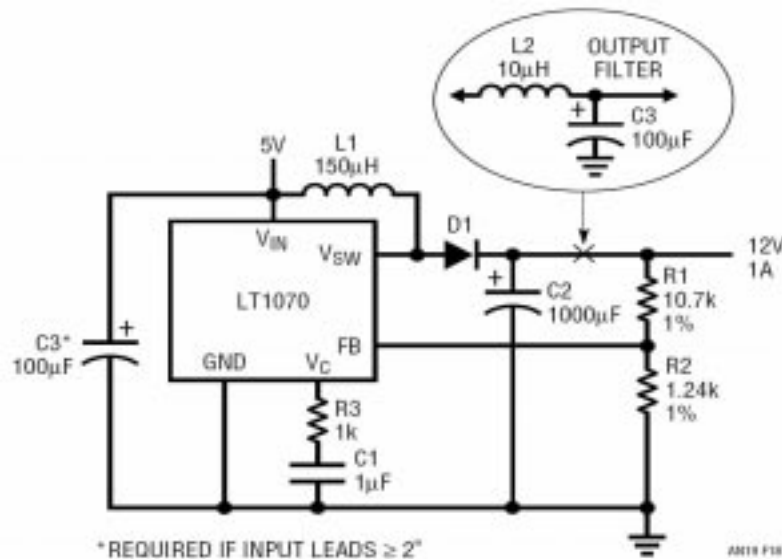


Figure 18. Boost Converter

I came upon the idea of using the parts from a scrap PC power supply or two to provide me with the necessary components since they were switching supplies to begin with. After pulling a couple of them apart, I found what looked like a suitable toroid core with 14 gauge wire. The size of the core is 1.1" outside dia., 0.85" inside dia. with a cross section of .25 by .45 inches. I have no idea of the makeup of the core so the permeability is unknown. Since this is coming from a switching supply, I assumed the core was close to being proper for the application and with the original supply being capable of 200 watts, the core should not saturate. The core had two 14 gauge windings on it each 10 turns. I put the two windings in series so the inductance would add. There were 4 other smaller gauge windings which I removed. This provided me with the inductor for L2 in the schematic. I suppose I could make an RL circuit to measure the inductance but in any case, the target inductance is 150uh for those who have either the measuring capability or a known core. You should plan on 2 amps of current at 12v for this application.

The diode I removed from the scrap supply was a dual diode TO-220 case style mounted on a heat sink. The input capacitor I used came from the power supply and is probably a bit large in capacitance but it was available. The Linear Tech app note calls for 1000 uf capaci-

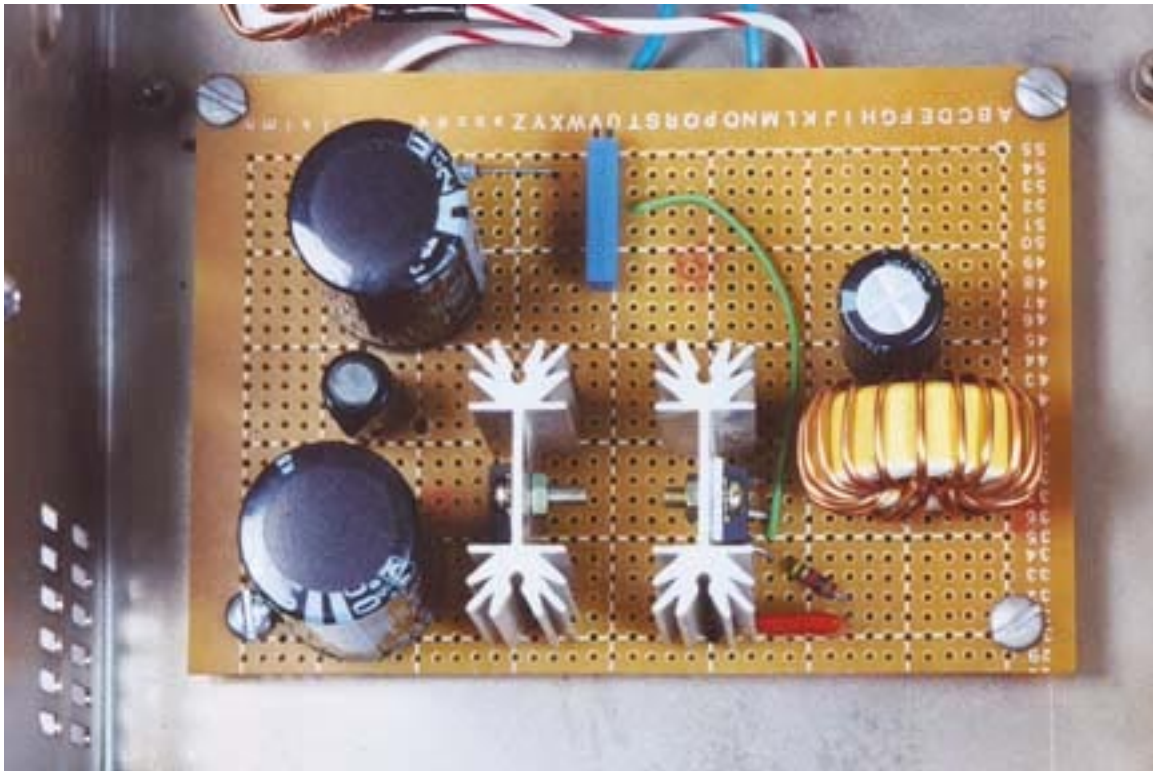


Photo 1 - Circuit board

tance on the output so I used a pair of 470uf caps rated at 200v. The output should never get above 25v so anything greater than 50v would suffice.

I decided to place a small inductor between the two caps to provide some spike filtering so I grabbed another core from a supply. It is a 1/4" dia rod by 1" in length and is wrapped with 15 turns of 14 gauge wire.. This is used as L3. The application note calls for an inductance of 10uh.

I also used another heat sink from the scrap supply for the LT1070 device. I found a 1uf cap for the timing RC circuit and had a 1K resistor on hand.

The next step was to contain the new supply in a box which should provide some shielding. For the time being, I used the steel box the scrap supply came from. I cut out the area the AC power input/output connectors were and mounted a small aluminum plate with a Cinch Jones strip for connectors. I also decided to connect both the input and output through a set of common mode filters. The two inductors L1 and L4 were found in the scrap supplies. They each have a pair of windings of 18 gauge wire wrapped on each side of the toroid (see photo). I decided not to connect the neg side of the power supply to the case. The only way the circuit is connected to the case is via bypass capacitors from each leg of the input and output lines.

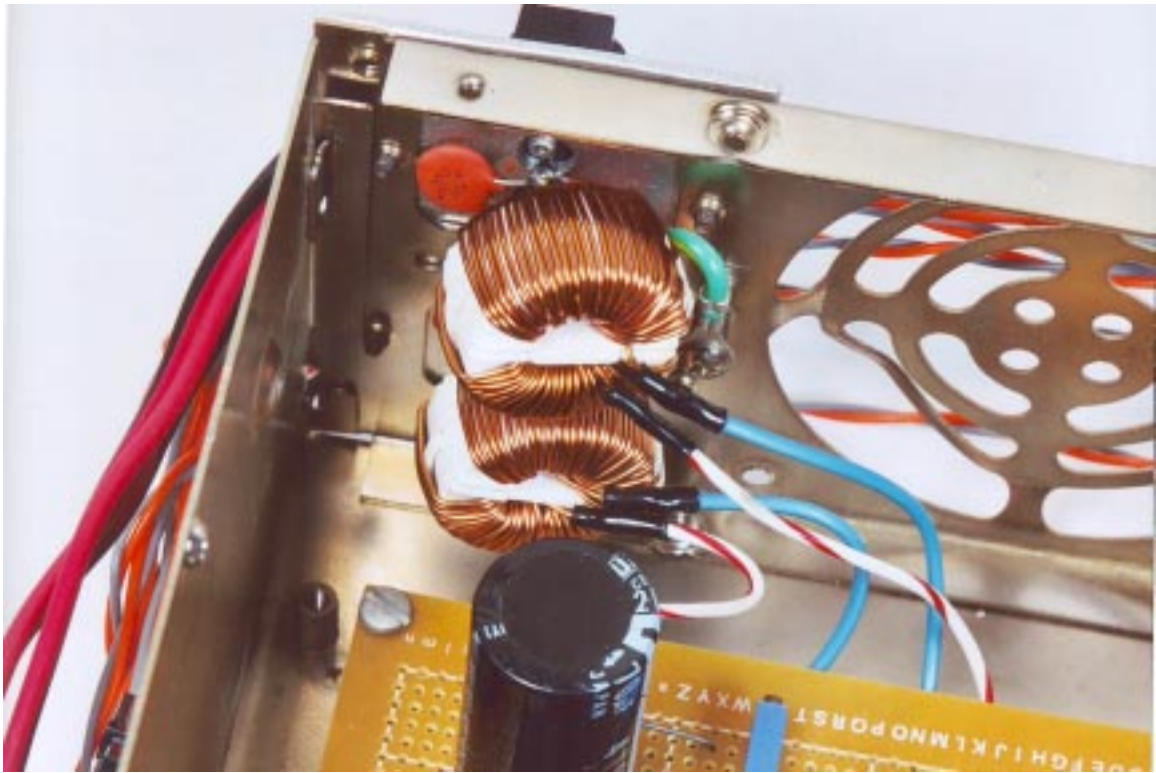


Photo 2 - Common mode filters

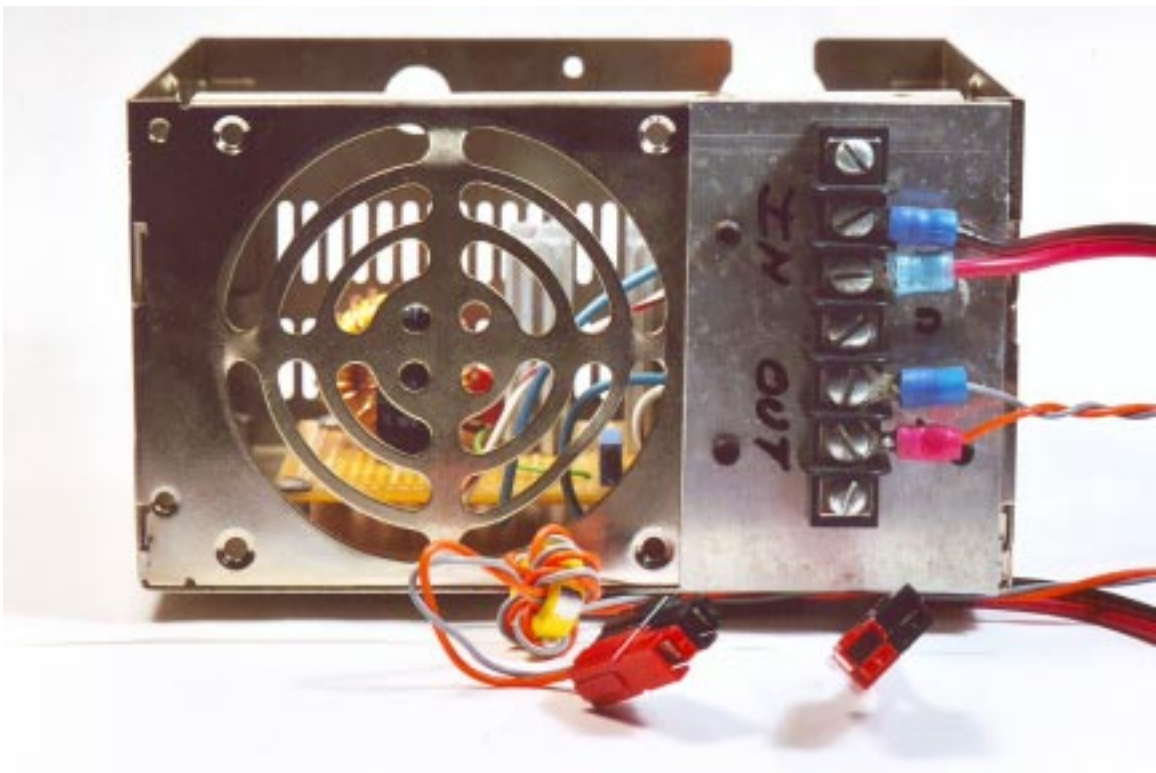
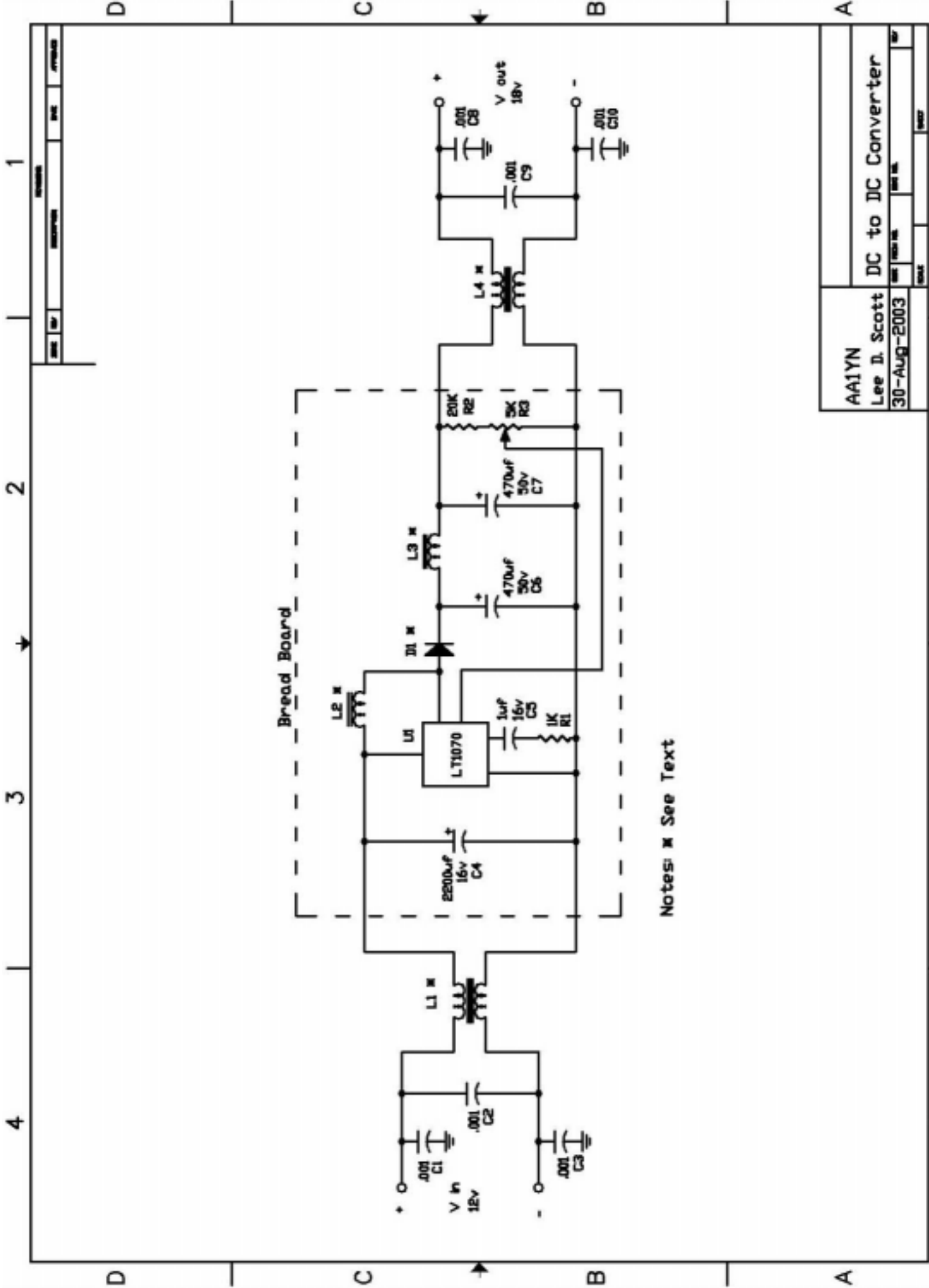


Photo 3 - Front case



Notes: \* See Text

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