

Building a Boombox

By Janis Alnis 2014

In summer young people like to spend time outside playing basketball, practicing in a skatepark or hanging out on a beach. Listening to a music seems to be a very important issue. Mobile phone speaker can play music, but it is not very loud. A solution is a BOOMBOX. Building it stimulates young people to get acquainted with some electronics.

A Simple boombox

Use a PC speaker with a built-in amplifier (may be just carry around one speaker). These amplifiers usually run fine with voltages 8-14 V and provide ca 3W to speaker. If the PC speakers have mains plug, they internally have a transformer to get ca 10V. You can solder a connector socket to the electrolytic filter capacitor and supply 12 V from outside.



Put the speaker and the battery in a backpack and you are ready to go. Connect via audio cable and play songs from a mobile phone or a mp3 player.

Rechargeable batteries

You can use a rechargeable battery pack from a radio-controlled toy or electric drill that you can charge at home. NiCd and NiMH batteries were most popular previously.



1x 8.4V NiMH 3800mAh Super
Power Rechargeable Battery Pack
For RC Tank Airsoft

From Hong Kong

Top-rated seller

\$17.61

Buy It Now

Free shipping

23 Watchers

LiPos are lightweight, but require more serious charging as every cell needs to be balanced. Without being balanced they can catch fire during charging. I is not recommended to charge a home built device unattended or overnight.



Newly Listed Turnigy 2200mAh 3S
20C Lipo Pack

From Israel

\$24.80

Buy It Now

Free shipping



Pro B3 2S/3S LiPo Battery Balance
Charger with AC EU Adapter B3AC

From Hong Kong

Top-rated seller

\$11.29

Buy It Now

Free shipping

More heavy 12V lead batteries (2-8Ah) are used in toy electric scooters, UPS power supplies, alarms. Lead batteries can be charged by a car battery charger (probably it would produce too much current). One can order in Ebay lead charger:



12V 1250mA Volt Sealed Lead Acid
Rechargeable Battery Charger F/
Car Motor Truck

From Hong Kong

\$5.72

Buy It Now

Free shipping


On a sunny day you can drive the boombox from a 10W solar panel via a 12 V regulator. Solar energy could be used for recharging the battery, but solar panel is somewhat bulky and easy to break.

More advanced boombox


You could get a suitable size speaker box from an old music center or build yourself from plywood.

Paper membrane speakers are easier to drive – they need less current to be loud. Better quality one can get from car speaker. Car speakers usually have in the center a small high-frequency speaker. I got a pair of 4 ohm car speakers labeled as 200W “Boschmann” for ca 20 EUR.. Actual power is factor of 10 less than written on it.

2-Wege Koaxial-Einbaulautsprecher 200 W Boschmann G-4532 S



Best.-Nr.: 378210 - 62



★★★★★ (14)
Lieferung in 2 bis 3 Tagen

€ 22,09

inkl. MwSt., zzgl. Versand

<http://www.conrad.de/>

Recently became available T-class audio amplifiers working as pulse width modulators (PWM) at MHz switching frequency. Amazingly 2x15W can be obtained from a single chip without a heatsink (highly efficient 81%) and at very low distortion 0.1%. This amplifier works in bridge configuration. Assembled board on Ebay:



DIY class T TA2024 digital amplifier amp mini board 2*15W
From China

\$12.95
Buy It Now
Free shipping

You can integrate the battery inside the speaker.

Next step would be to integrate also a charger inside the speaker. LiPo balancer, when connected to cells permanently, might draw some little current and discharge them when not in use for long time.

Maybe one could use a LiPo cell with battery management circuit BMC inside each cell like used in mobile phones. See the photo below.



New! Limited 4x UltraFire 18650
4000mAh 3.7V Rechargeable
Protected Li-ion Battery Flashlight
From Hong Kong

\$8.42
Buy It Now
Free shipping

Battery voltage measurement

The biggest problem is that children listen to music until battery is completely empty. And that damages battery capacity a lot. A way to measure is LED voltmeter bought on Ebay consuming current 15-20 mA.



DC 0-30V 3 Wire Red LED Display
Digital Voltage Voltmeter Panel
Motor Motorcycle

From China

👑 Top-rated seller

\$1.69

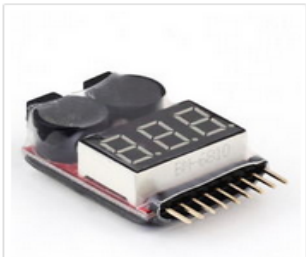
Buy It Now

Free shipping

🔥 260 Watchers

LCD voltmeter would use less current, but I could not find one presently for a reasonable price. Please write in comments if you know a good offer for LCD voltmeter.

Another circuit checks the voltage of every LiPo cell and beeps loudly when any cell voltage reaches 3.3V.



1-8S Lipo/Li-Ion/Fe Batterie Tester
2IN1 Checker Niedrige Spannung
Alarm T5

From China

\$1.36

Buy It Now

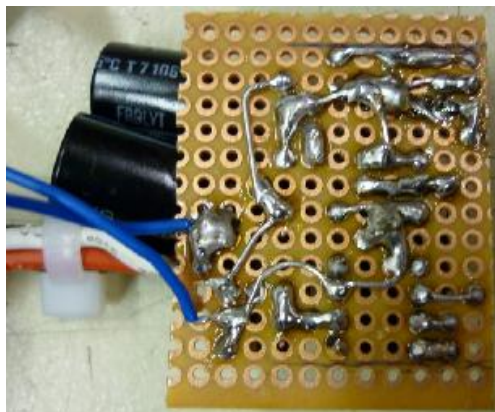
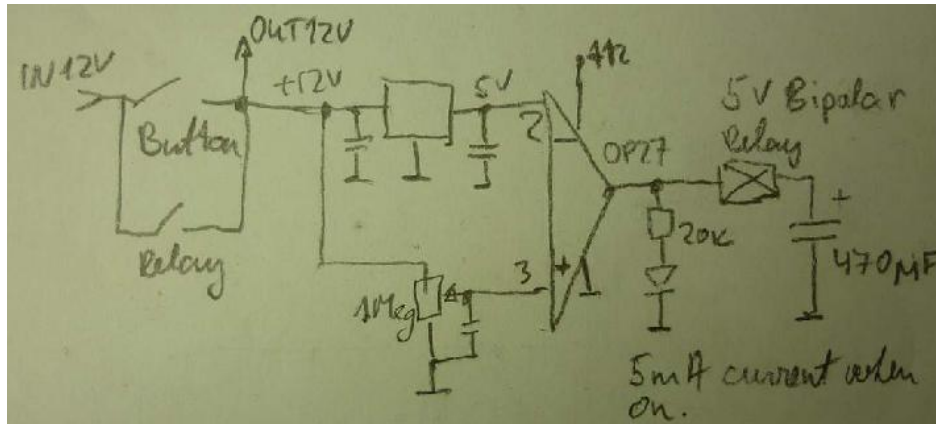
+ \$0.64

shipping

🔥 56 Watchers

Automatic shutdown on low battery voltage

Best solution would be to disconnect the battery on low voltage. Below is my circuit used to protect 12V lead battery. A relay is driven from an opamp comparing attenuated battery voltage with a 5V voltage reference. Circuit is started by a pushbutton and consumes no current after shutdown.



Bluetooth boombox

After caring the boombox several weeks in a backpack , the plug-in audio cable to a mobile phone broke down. So a better solution is a wireless Bluetooth audio transmission . In Ebay is available a tiny reasonably priced universal audio module with LED display, volume control, line input, Bluetooth and FM radio.



led display 12v Bluetooth mp3 Audio decoder board

\$10.95

SD/mmc ... (290939755004)

Free shipping

Sale date: 05/30/14

Tracking number: --

Estimated Delivery: Thu. Jun. 19 - Wed. Jul. 16

I used this module for my boombox. It works good and consumes less than 100 mA. LiPo pack is inside and its voltage is displayed by LED voltmeter.



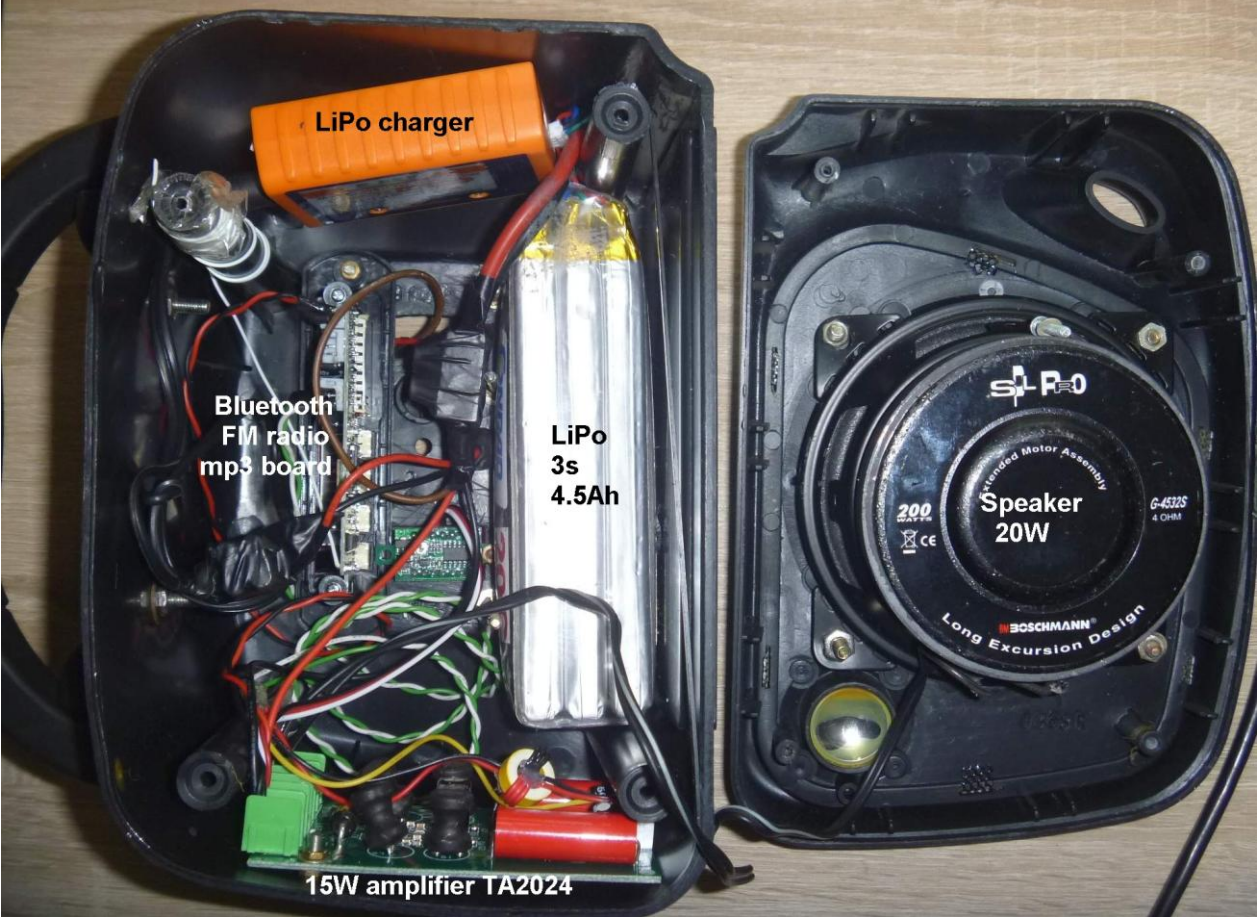
Enable bluetooth on smartphone, search for devices and connect. Music will be transmitted to Bluetooth receiver. It works immediately with most phones. Range is 5 ... 10 m. It is very convenient as boombox can be placed somewhere and songs are chosen remotely on a phone.

One could hack Bluetooth earplug and connect audio power amplifier instead of earphone.

As an ultimate solution one could integrate a cheap smartphone into the boombox to upload music to it via Bluetooth.

One could also think of 5V output from the boombox for charging a mobile phone.

It is good idea to assemble several boomboxes and to compare sound quality between them.



LiPo charger

Bluetooth
FM radio
mp3 board

LiPo
3s
4.5Ah

15W amplifier TA2024

S-P-O
Extended Motor Assembly
200
Speaker
20W
G-4532S
4 OHM
BOSCHMANN
Long Excursion Design