

MORE POWER TO YOU

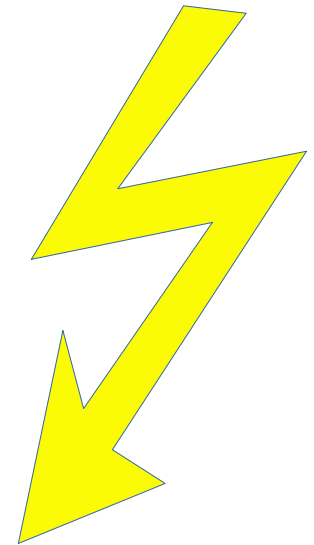
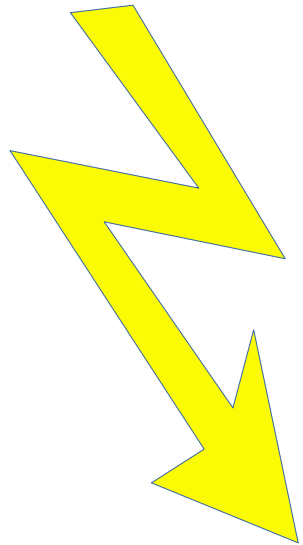
Recharging options in cars and airports

A Learn in 30 topic

For PATACS/OLLI

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FREE PUBLIC USB CHARGING PORTS NOW POSE A SECURITY RISK

Reports on the Web during May 2019 indicate that free public USB sockets may be compromised by bad apples to read personal data on your smart phone or tablet, and even to install malware on those devices.

In the past two years I have used free public USB sockets in the following airports: Atlanta, Dallas Fort Worth, El Paso, Midway, Omaha, and Salt Lake City.

Those days of using free public USB sockets are done and gone.

But I still have to charge my gear!

What are the alternatives?

- Airports also offer **AC sockets**, primarily used for recharging laptops
- You can carry a charging block and cable to plug into an AC socket for recharging your phone.
- I carry two smart phones, a tablet, a car GPS unit, a power bank, and a laptop on planes. Finding more than one AC socket is difficult. *Finding six adjacent AC sockets in an airport is impossible.*

Single charger block with multiple 2.4-amp USB sockets

- Amazon Basics 4-port charger block \$19.99 as of May 2019



12 volt charger block for automobiles

- Four 2-amp USB sockets
- Amazon's Choice Prime \$9.99 as of May 2019



LAPTOP CHARGING OPTION IN A CAR: INVERTER

- Since laptops power supplies use AC power, an **Inverter** is needed.
- An inverter plugs into a car's 12 volt DC accessory socket (formerly the cigarette lighter socket) and produce 110 volts AC output.
- Most also provide USB sockets for charging smart phones etc.
- You can use your smart phone to supply an internet connection to the laptop in a car, either by Bluetooth or by USB tether.



TWO CONSTRAINTS ON INVERTERS

1. Does the inverter draw too much 12 volt current?

If so, the inverter will ***blow the accessory circuit fuse in the car***. Each fuse is rated in Amperage (amps).

Read the manual for your car. You will see an example later in this slide deck.

TWO CONSTRAINTS ON INVERTERS

2. Does the inverter produce enough amperage (current) for the laptop power supply?

Note: Inexpensive consumer inverters produce AC square wave.
The following calculation is correct for AC square wave:

Amps = Watts / Volts

Bestek, for instance: Amps = 150 watts / 120 volts = 1.25

Read the label on your laptop power supply.

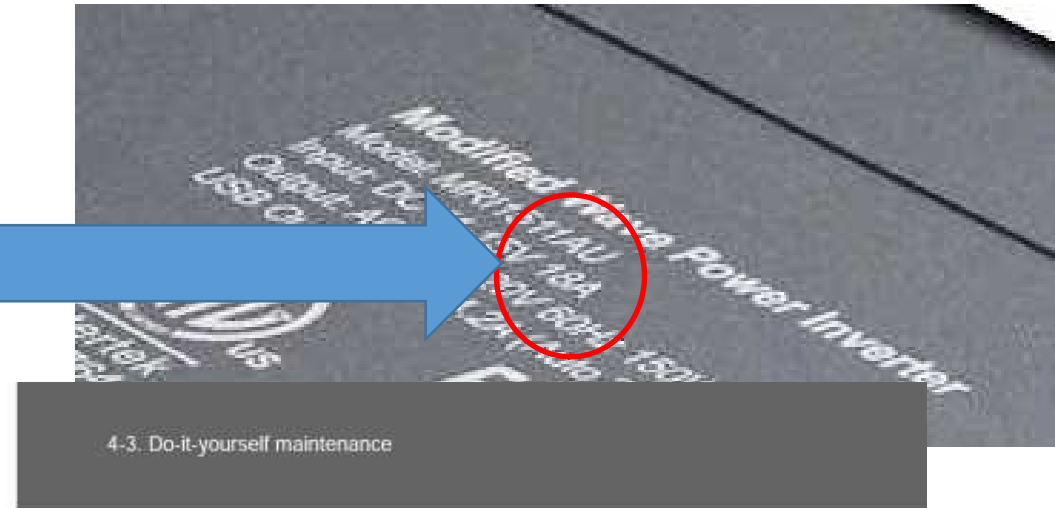
And, of course, read the label on the inverter.

Evaluation of an inverter, part 1:

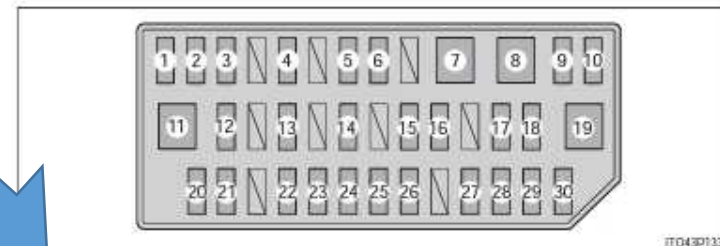
- **150 watt** Bestek inverter, \$16.99 on Amazon Prime as of May 2019
- **INPUT:** ... 18A means **18 amps**
- 2015 Prius Plug-in accessory circuit fuse is **15 amps**.

15 amp fuse < 18 amps. Yet the inverter does *not* blow the fuse. Why?

Hint: 18A is the *max* current drawn by the inverter.



■ Left side instrument panel



	FUSE	Ampere	Circuit
1	CIG	15A	Power outlets
2	ECU-ACC	10A	Multiplex communication system, outside rear view mirrors, driver support system, audio system, navigation system
3	PWR OUTLET	15A	Power outlets
4	SEAT HTR FR	10A	Seat heater
5	SEAT HTR RL	10A	Seat heater

Evaluation of an inverter, part 2:

- Personal Toshiba satellite C series laptop power supply requires **1.3 A** (amps).
1.25 amps is almost enough.
- Corporate Dell Latitude laptop power supply requires **1.7 A** (amps).
1.25 amps is not enough.

Yet the Bestek inverter charges both laptops. The reason: power supply draws less than the max amperage when laptop is not powered up.

What happens when the current is not sufficient?

If the portable device is not powered up, then the device battery will charge, though more slowly than if it were connected to adequate current.

If the portable device is powered up, then the device battery will discharge, though not as quickly as it would with no charger.

CHARGE A LAPTOP WHILE ON A PLANE?

- The old way, an easy way, was to carry a fully charged spare laptop battery. When the battery in use is depleted, simply remove it and insert the spare.
- Carry the spare in a food storage bag with a zipper seal to keep it fully charged.

Many recent laptops no longer provide an easy way to change the battery.

POWER BANK FOR A LAPTOP

- Includes a battery *and* an inverter.
- Make sure inverter wattage is equal to or greater than your laptop power supply wattage.
- Example shown is a **100 watt power bank**, **\$129.99** on Amazon Prime as of August 2019. *Approved by TSA for carryon to planes.*



A compact power strip

For recharging laptops and USB devices simultaneously in airports.

Finding two or more available AC sockets close together in a busy airport is just about *impossible*.

The compact power strip plugs into one AC socket and provides:

- Three AC sockets
- Two 2-amp USB sockets

Belkin compact power strip, \$17.99 on Amazon Price as of May 2019.



You say you need more power? Try this combination



Belkin mini power strip with 4-socket USB charger plugged into one AC socket. You get SIX 2-amp USB sockets, with two 3-prong AC sockets still available.