

The definite Guide to Power connectors, Charging, and other Power related questions for the #11 Keychain Camera



The same questions are being asked over and over again. I hope that this guide will clarify things once and for all. It is long, but most probably you will find the answer to your question.

Versions

The first two versions (V1 and V2) are almost identical. The only visible difference is a number stamped on the CMOS module cable inside the casing.

Version 3 (V3) appeared at the end of May 2011 and has a slightly different printed circuit board design. At the same time, a completely different #11 design appeared on the market. Functionally, these "Jumbo #11" cameras operate in the same manner as the #11 V3 keychain cameras but have an extended recording length of up to 120 minutes due to the larger internal battery.

Around April/May 2011 a new firmware (Rel. 2) was introduced. Cameras with Rel. 2 firmware **cannot be downgraded** to Rel. 1. **It is only possible to upgrade firmware versions.** A downgrade is not possible - low quality video would be the result if you attempted the downgrade.

Description

A standard #11 camera will run about 40-45 minutes. The Jumbo #11 cameras will run on the internal battery for up to 120 minutes. Brand new keychain cameras may run up to 50 minutes, from a **new** fully charged internal battery. Recording in cold weather will drastically reduce the recording time.

After about 50 hours of use both my cameras will only record about 36 minutes of video.

The keychain batteries are of low quality and will soon only retain power for about 10 minutes or less.

Description (cont.)

Since you can't turn the battery off (it runs in standby mode), the battery will always drain in order to keep the clock running. I don't know how long it will take to completely drain the battery, maybe a few months or so?

For V1 and V2 cameras (cameras produced before or in May 2011) I highly recommend that you update to a Release 2 firmware version instead of the original 20 min. Stop/Save/Continue Firmware.

You can download the firmware here:

<http://www.rcgroups.com/forums/showpost.php?p=18166806&postcount=3531>

With the original (Release 1, manufactured up to May 2011) 20 min.

Stop/Save/Continue Firmware, it is most likely that you will lose the last, partial, 20 minute clip when the battery can't supply enough voltage. Rel. 2 Firmware versions do not have this problem. Once updated to Rel. 2 firmware, it is no longer possible to revert back to Rel. 1 firmware. All cameras delivered after May 2011 come with Rel. 2 software installed.

Unfortunately, the 4GB Stop/Save/Continue firmware has been discontinued in Release 2. In its place is a 50 min. or 70 min. Stop/Save/Continue firmware. These versions should automatically restart a new video when the 50 min. or 70 min. recording time is reached. Unfortunately, once again, some of these versions are still buggy and either don't create a new clip after the recording time has been reached (serious BUG), or continue correctly until the full capacity of the card has been reached but never automatically turn off. Every 50 or 70 minutes they will then create a meaningless 1KB file.

Please consult the firmware link above for the latest versions and bug descriptions. It is possible that one or both of the above mentioned versions will be discontinued or replaced in the future. Some versions only exist with a timestamp.

When the Stop/Save/Continue functions correctly, the firmware will automatically save the recording when it reaches the time limit. It will then automatically create a new file and record up to the given time limit once again. This procedure will be repeated until the battery reaches a given threshold (runs out of power) or the flash card is full. There is a 3-5 second gap (missed video) between the different clips.

Internal battery

The internal battery is a lithium polymer cell (LIPO), which, when fully charged, has a capacity of 4.2V. The battery is charged by either connecting a standard USB cable with +5V connected to pin #1 or a special USB cable with +5V connected to pin #4. These two cables are described below. Since the external power supply will in almost all cases be able to supply more power than the camera functions require, the internal LIPO will be charged even when using the camera. e.g. Webcam mode when the standard cable is connected, or recording when the special cable is connected.

It is also possible to use the recording functions with a disconnected or defective (but not shorted) internal battery as long as the special cable is used. Webcam mode will not work when using the special cable.

There are two types of USB cables

The #11 comes with a **standard** USB 1.0 cable which can also be used with other USB 1.0 devices. Of course, you can also use standard USB 2.0 or standard USB 3.0 cables with the #11 camera because these are backward compatible.

A **standard** USB cable or a *special* USB cable can be used to charge and/or run the #11 camera, but there are subtle differences. I will try and explain these differences in this guide.

Note that you cannot use the *special* cable for connecting the camera as a removable disk because internally only two wires are connected.

All information is taken from the following RC thread or from my own experience:

<http://www.rcgroups.com/forums/showthread.php?t=1362692&pp=100>

The #11 camera has three LED states: Off, Red and Yellow. On the circuit board there are two LEDs, but normally only one LED is lit at the same time. Both LEDs share the same "hole" in the casing.

The yellow LED indicates the "Ready" state. The Red LED normally indicates if the device is "Charging". Since this guide is about power and charging, the yellow LED is of no interest and I will only refer to the Red LED.

Charging only, using a **standard USB charger**

When charging, the **red LED** will be on.

When fully charged, the **red LED** will be off.

The camera can be *charged* by any standard *USB source. This includes:

- USB mains adapters, e.g. mobile phone chargers, navigation chargers, USB chargers, etc.
- USB standard car battery chargers.
- USB backup batteries designed to power/charge mobile phones, navigation devices, etc.
- USB computer connection.

* Not all USB devices can supply enough current to charge the internal battery. Most mobile phones etc. will NOT be able to charge the battery. Surprisingly, even an iPad cannot charge or connect to the camera.

Charging only, using the supplied, *special*, adapters

The camera can be *charged* by using the *optional* emergency battery charger or the *supplied* car charger.

*When connected to these special adapters all cameras bought before June 2011 (V1 and V2) show no indication of charging (the **Red LED is always off on these early cameras**). All cameras bought in June 2011 and later (V3 and above) have additional hardware circuitry to enable the Red LED to work normally, i.e. with the special cable connected, the Red LED is on while charging and off when fully charged.*

Simultaneous Charging and Recording using [standard cables/adapters](#)

It is possible to *charge and record* at the same time using standard cables/adapters, but there are limitations:

- With the standard Stop/Save/Continue firmware (with or without timestamp), the recording must be started before connecting the USB. The recording will stop as soon as the current 20 minute file is complete.
- With the Continuous Recording Firmware you can use standard USB cables as long as you start the recording before attaching the USB cable.

You will get approx. 80 minutes of video (4GB file).

The recording will always stop as soon as the current file size reaches 4GB, so the actual recording time depends on the actual recording data rate (10 Mb/s or 7 Mb/s). On some cameras you can switch from 10 Mb/s to 7 Mb/s by taking a picture immediately before starting a video recording. It has, however, been determined that the resulting video is of slightly inferior quality. If your camera automatically records with 7 Mb/s, it is not possible to switch to 10 Mb/s.

I don't know if this "functionality" is due to different hardware or depends on the speed of the micro SD card.

Simultaneous Charging and Recording using a special cable

The special USB-Male to USB-mini cable required for simultaneous recording and charging is not advertised for sale on it's own. However, if you ask one of the #11 sellers nicely, they will most probably sell you the cable.

The new style of battery charger sold after July/August 2011 comes with a pluggable special cable. You can use this special cable with *any* other external power supply which has a standard USB socket.

If you require a special length of "special" cable, you will have to make it yourself.

The cable can be connected to *any* USB power source as long as the power source can supply 5 Volts.

Note: Some USB hubs do not supply enough voltage. If the USB hub can't supply 5 Volts the camera will run on the internal battery until it is flat! It will not be charged!

If you want to make long, continuous recordings, then your only option is to use the special cable. Together with a 32GB micro SD card and the "continuous firmware" you can expect up to 10 hours of recording using a suitable external USB power supply and recording at 7 Mb/s. I highly recommend the Just Mobile Gum Pro PP-08 (see picture below), but any other USB high power external battery power packs will also work. The "continuous firmware" will record a 4GB clip and then repeat the process until the battery reaches a given threshold (runs out of power) or the flash card is full. There is a 3-5 second gap (missed video) between the different clips. I have deliberately repeated this to make it absolutely clear.

Simultaneous Charging and Recording using a special cable (cont.)

You can adapt the *supplied* car charger or the *supplied* emergency battery charger by soldering a standard USB male connector on the opposite end to the mini USB connector. Obviously, you will have to cut the original cable.

I have added other modifications possible with these chargers after the Pinouts diagram below.

- Or, you can use the supplied car charger.
- Or, you can use the emergency battery charger, but the recording times are disappointing.

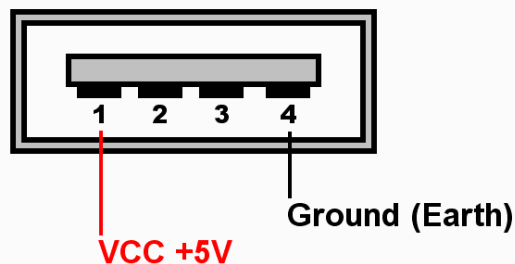
Below, I'm including the Wiring Diagram (Pinout) for the special cable
Standard USB Male, Pin #1 (red) connects to Mini USB Male, Pin #4 (+5V)
Standard USB Male, Pin #4 (black) connects to Mini USB Male, Pin #5 (Ground / Earth)

A word of WARNING

Never, ever connect any external Power Source using the USB plug with voltages exceeding 5V. Doing so will destroy the camera.

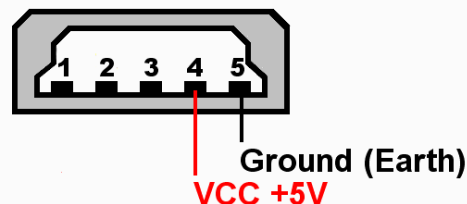
Pinout for Special Cable to Charge and Record the #11 Camera

USB A



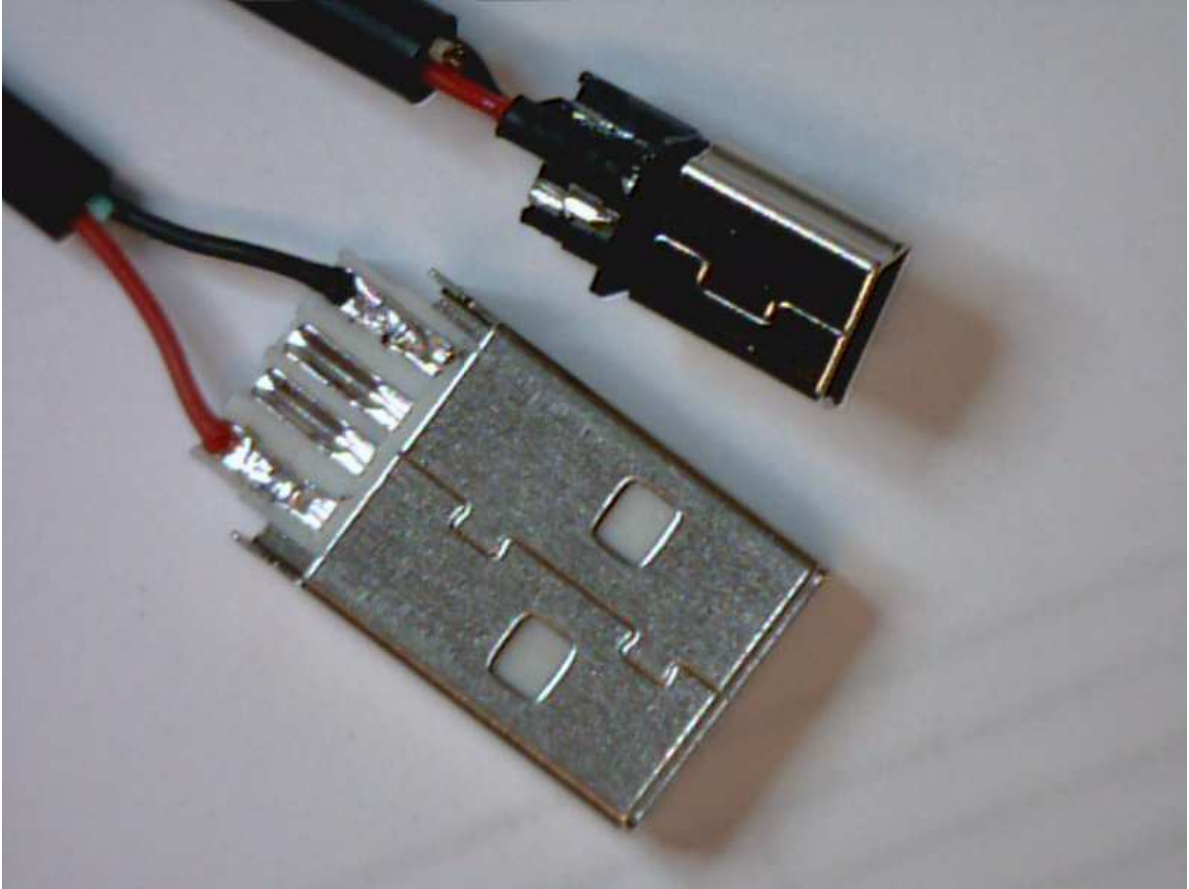
View from socket end

USB mini



View from socket end

Below is how the pinout looks in real life. Note that I have covered part of the +5V red cable with heat-shrink tubing. This is a safety precaution, which I recommend.



Here are some commercial external USB battery powered chargers. You **must** use the special cable (above) for continuous recording. You cannot use a battery box with only 3 AAA / 3 AA batteries unless it incorporates step-up electronics to output 5V. 3 Batteries can only supply about 3.6V, but the camera requires a minimum of approx. 4.7V constant voltage. It will not charge or record when the voltage falls below approx. 4.3V.

This is the cheapest, about \$4-\$5 on eBay

At first, I was not at all satisfied with the results using AAA rechargeables. I could only record up to 68 minutes using 1000 mAh batteries.

In my battery case there was a reverse-protection diode. After removing the diode I obtained much better results.

Further investigation, or better said, more testing, showed that after each test I could record for longer periods! It turns out that it is necessary to fully charge and then completely discharge the new batteries about 10 times using a good quality charger.

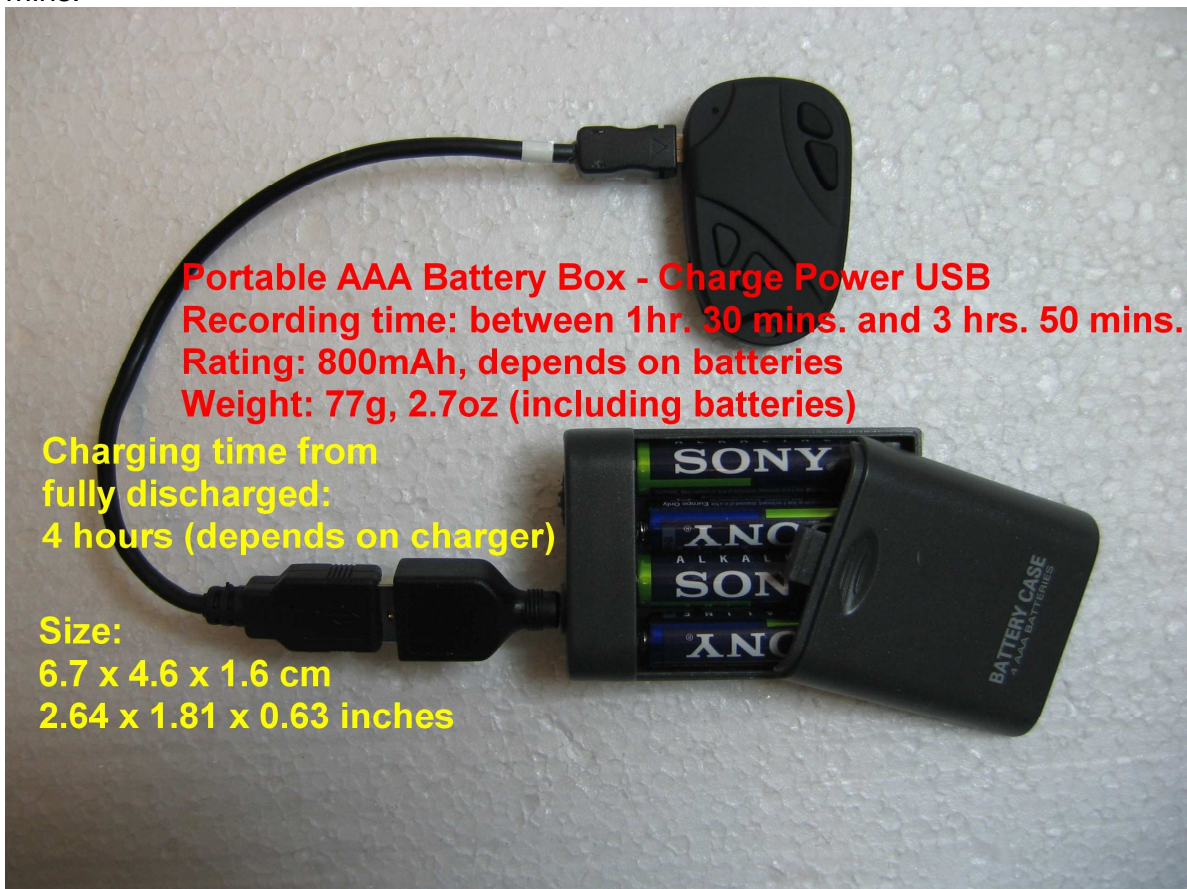
My charger indicates the voltage of each cell as well as the percentage of charge. I believe a visual display is important. My other chargers do not have this.

Also, the total recording time appears to depend on the size of the memory card.

Four fully charged and conditioned AAA 800 mAh cells should be capable of providing a total recording time from between 1hr. 30mins. up to 3hrs. 50mins, where 2hrs. 30mins. seems to be a good average.

My charger takes just over 4 hours to fully charge the depleted cells. Faster chargers are available.

It is **very important that you remove the reverse protection diode**, if one is installed. Failing to do so will decrease the total recording time drastically to max. 68 mins.



Portable AAA Battery Box - Charge Power USB
Recording time: between 1hr. 30 mins. and 3 hrs. 50 mins.
Rating: 800mAh, depends on batteries
Weight: 77g, 2.7oz (including batteries)

**Charging time from
fully discharged:
4 hours (depends on charger)**

**Size:
6.7 x 4.6 x 1.6 cm
2.64 x 1.81 x 0.63 inches**

Cost about \$30 in 2009 on eBay



Expensive, but by far the best. Costs more than \$45. Can also be found on eBay. A real power horse!



Special Car Charger (supplied)

The *supplied* car charger converts 12V DC into 5V DC. The center pin is the +5V and one of the connectors on the side is Ground (Earth). The 2nd side connector has no connection. The cable from the car charger terminates in a mini USB plug which has the #11 special wiring (see pinout diagram above). It can only power the #11. **It will not power any other USB device.**

The car charger can be opened by first unscrewing the black cap which surrounds the center pin. There is a fuse inside. Using a special tool or an old credit card, the casing can now carefully be wedged apart.

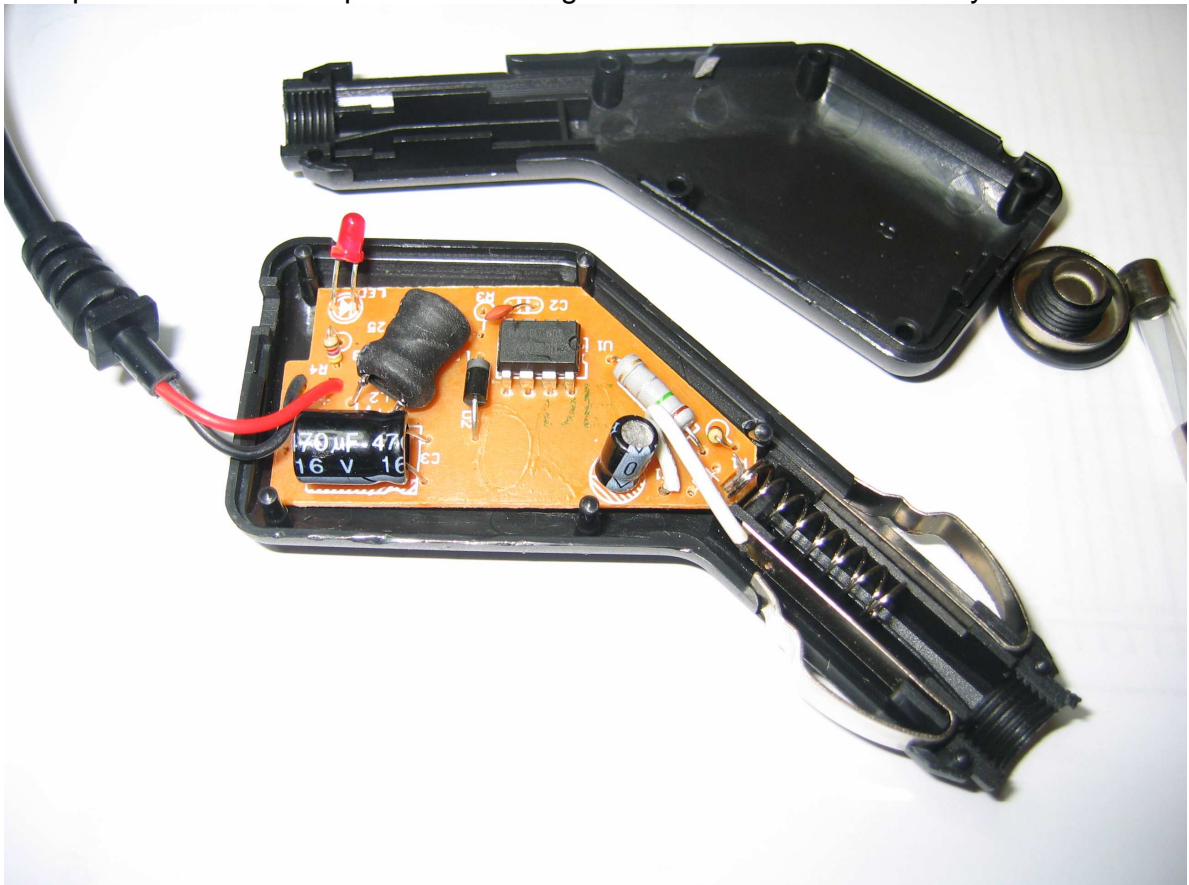
The electronics are simple but functional. There is no miniaturization, which is good. If the car charger electronics are used with or without the casing to power the camera from a different 12V power source (external 3S lipo packs, for example), then the circuit will work well, but is probably too large to be practical.

Any 12V - 15V DC sources which need to be converted to 5V must go thru the car charger electronics. You must NEVER bypass these electronics or apply 12V directly to the camera - doing so will destroy the camera.

When connected to a camera produced before June 2011 (V1 or V2), **the red LED on the camera will NEVER be on.** Cameras produced in June 2011 and later (V3 and above) have additional hardware circuitry to enable the Red LED to work normally, i.e. with the special cable connected, the Red LED is on while charging and off when fully charged.

The red LED on the car charger will ALWAYS be on when connected to the power supply.

This picture shows the Special Car Charger which was sold before July 2011.



New (July 2011) Special Car Charger (supplied)

The wiring of this new charger is exactly the same as the original car charger (see above). The cable is a two-wire cable.

The picture below shows the new style car battery charger (marked "Charging Cable") together with a standard USB cable (marked "USB Cable") and the new "Jumbo" #11 which is 100% compatible (same firmware, same functionality) with the #11 Keychain. The only difference is the larger internal battery which allows recording 100 - 120 minutes using the internal battery.

When the Car Charger is connected to a camera produced before June 2011 (V1 or V2), **the red LED on the camera will NEVER be on**. Cameras produced in June 2011 and later (V3 and above) have additional hardware circuitry to enable the Red LED to work normally, i.e. with the special cable connected, the Red LED is on while charging and off when fully charged.

There is a red LED on the car charger which will ALWAYS be on when connected to the power supply.



Emergency Battery Charger

The supplied Emergency Battery Charger comes without a battery. It takes any standard AA battery (NiMH, NiCad, alkaline battery etc.).

The battery **MUST** be inserted the correct way round. There is no protection circuitry for reversed polarity. If you inadvertently insert the battery in the wrong direction, you will destroy the charger! The battery is inserted with the plus (+) end first. It must be inserted from the rear metal cap end.

NEVER remove the transparent front plastic to insert/remove the battery. It is fragile and can break under the spring pressure if the battery is already in the casing.

The battery must **ALWAYS** be inserted from the rear (metal cap end).



There is an LED in the plastic casing. This should be lit when the 2.5mm plug is inserted and the charger is connected to the camera. The red LED on the camera will always be OFF, because it is being powered by the "special" cable.

Many chargers are assumed dud because the rear spring (negative) does not make proper contact to the casing. The blue casing is non-conductive, meaning that the rear spring MUST make contact to the shiny end of the body under the cap. It is often necessary to bend the larger end of the spring outwards, towards the body. If the LED in the transparent casing doesn't turn on when a battery is inserted and the charger is connected to the camera, then it is almost certainly a spring-body-contact problem.

Because the voltage from the AA battery needs to be stepped up by a factor of 4 in order to output 5V, the current of the original AA battery is likewise decreased by a factor of 4. Since the conversion cannot be 100% efficient, current is also lost as heat. A 2000 mAh battery will end up as a theoretical max. 500 mAh battery (2000 / 4) and that's without taking efficiency loss into account. The result is a very weak charger which will run and charge a fully charged camera for approx. 1 hour using a 2500 mAh rechargeable battery. Talking practically, this gives us a 150 mAh battery at most. This is disappointing, to say the least!

Best results are obtained by using the 4GB Stop/Save/Continue firmware which can be downloaded from

<http://www.rcgroups.com/forums/showpost.php?p=17549218&postcount=2025> instead of the 20 min Stop/Save/Continue Firmware, since a partial clip will not normally be lost. This firmware only exists without the timestamp. The 20 min S/S/C Firmware will always "lose" the last partial clip.

In my opinion, the Emergency Battery Charger is not reliable. Sometimes it works, sometimes it doesn't. Used solely as a battery charger, it's use can be justified. It will charge the camera's internal LIPO to about half capacity (20 minutes recording time).

The supplied Emergency Battery Charger will only work with the #11 camera. It will NOT work with other devices unless you make a (standard) cable yourself.

The supplied Emergency Battery Charger is great for one thing - it's cable!

On one end of the cable is a mini USB plug. On the other end is a 2.5mm Mono plug. The end of the Mono plug is +5V which is connected to pin #4 on the mini USB plug. The Mono plug makes it easy to use the supplied cable with any other 5V DC power supplies (e.g. 4 hard cell battery pack, UBEC/ESC BEC, etc.). All that is needed is to terminate the cable from the 5V DC power source with a 2.5mm female mono socket which will mate with the Emergency Battery Charger 2.5mm plug. Also possible is a cable with a servo plug at one end, and a 2.5mm female mono socket at the other. Innumerable combinations are possible.

At first I didn't have a 5-pin mini USB plug on hand, so I cut a standard USB cable and soldered a Mono female 2.5mm socket to the opposite end. And voila, in next to no time I had built a temporary "special cable". see picture below the charger.

Tom Frank made his own 4 cell AAA External Battery Pack using the Emergency Battery Charger cable. He added an LED to a standard battery holder. You can view his post here:

<http://www.rcgroups.com/forums/showpost.php?p=17598375&postcount=2161>

Here's a real quicky using 4 AA cells. The author used the special battery charger cable which has the same wiring as the Emergency Battery Charger.
<http://www.rcgroups.com/forums/attachment.php?attachmentid=3840200>

The dismantled Emergency Battery Charger



A simple special USB adapter cable using the Emergency Charger Cable



Compiled by Isoprop on 17th May 2011 based on the following thread:
<http://www.rcgroups.com/forums/editpost.php?do=updatepost&p=17574069>

Last modified: 12 September 2011.
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