

# Time-Lapse Package

## User's Guide



Zoom in for details...

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Time-Lapse Package  
Revision D

*Overview* ..... 3  
*Quick Start* ..... 3  
    **Items included:** ..... 3  
*Configuring the DigiSnap* ..... 4  
    **Connecting to a terminal** ..... 4  
    **Configuring for Advanced Time-Lapse** ..... 4  
*System Components* ..... 5  
    **Digital Camera** ..... 5  
    **Enclosure** ..... 7  
    **Mount Assembly**..... 7  
    **Mechanical Package**..... 8  
    **Battery pack** ..... 8  
    **Camera Mount** ..... 9  
    **Time-Lapse Controller** ..... 9  
    **Solar Panel**..... 9  
    **Solar Charger** ..... 10  
    **Battery Converter** ..... 10  
    **Tools and Accessories** ..... 10  
    **Base Package** ..... 11  
    **Pentax Package**..... 11  
    **Standard Package** ..... 12  
*Battery Life Estimates* ..... 12  
*Battery Life Estimates* ..... 13  
*Specifications* ..... 14  
*Service / Warranty*..... 14



## Overview

The Time-Lapse Package is a complete system for documenting construction projects, animal behavior monitoring, analyzing environmental changes, or other long-term outdoor photographic tasks.

## Quick Start

1. Reconnect the two-pin Red and Black power cable to the Battery converter (intentionally disconnected for shipping). This will apply power to the camera and the controller. You might check other cable connections as well!
2. Once the power is connected, the DigiSnap should immediately blink yellow/orange, and then a few seconds later will blink green four times to indicate that it's ready to go. If you don't see any blinking on the LED, then check the cables again...
3. Turn the camera on, using the rotating power switch on the top of the camera.
4. Press the \* button on the DigiSnap, and the camera should take a picture!
5. Let's try a Simple Time-Lapse (STL) test. Press and hold the time-lapse button on the DigiSnap. After two seconds it will start to blink yellow/orange. Count 5 blinks (5 seconds), and then release. This has told the DigiSnap to set the time-lapse interval to 5 seconds, and take an infinite number of pictures. Press the time-lapse button again, briefly. After a few seconds, the camera should take a picture, and then again every 5 seconds, until the batteries give out or memory card fills. If you press it again briefly, it should stop taking pictures.

## Items included:

Fiberglass Housing, glass window.  
High capacity internal battery pack.  
5 Watt Solar Panel.  
Harbortronics Solar Charger.  
Harbortronics Battery Converter.

Harbortronics DigiSnap 2100.  
Pentax K110D Digital SLR.  
A pair of 2 GB memory cards.  
All required tools, cables, manuals and accessories.

Here are all of the parts, before we assemble them!



## Configuring the DigiSnap

Now that you've verified that things are working, you may want to configure the DigiSnap for your particular application. The first time you do this can be trying, but once you've gone through the process once, it'll be easy the next time. If you get stuck, give us a call!

If we shipped the housing with a camera installed, or if you told us the camera you are planning to use, the DigiSnap should already be configured properly for that camera model. All you should need to configure are the time-lapse settings.

Take a look at the DigiSnap 2000 manual, which is on the CD Rom supplied with the equipment. This should help you to understand how the DigiSnap works with a terminal window, and what sort of operations the DigiSnap can perform.

### **Connecting to a terminal**

If you have a desktop PC, you probably have a serial port on the back of your computer. This is most likely COM1, which is ideal. Use the supplied beige cable (labeled Null-Modem), to connect the DigiSnap to your serial port.

If you have a newer laptop or a Mac, you may need to buy a USB to Serial converter, and get it working first. These are available at any computer store from \$15 and up. When you connect it, and install any required drivers, your computer will assign some number COM port. Most of the time, it will use some higher number, like COM5. This can be frustrating, as your computer may not even tell you which port it's using. It's really nice to switch this to COM1, using your computer's operating system, but not essential.

You now need to run a program to open up a terminal window. If you are running Linux, you already know how to do this! If you have a windows PC and are using COM1, you can use the DigiSnap\_Terminal.exe program supplied on the CD Rom.

If you are using a windows PC and something other than COM1, you can use HyperTerminal that is supplied with windows. Double click the DigiSnap.ht file on the CD Rom, and it will set up the HyperTerminal program for you... you may have to select the correct COM port however. If you don't know which COM port your computer is using, you may have to 'disconnect', select a different port number, 'reconnect', and then cycle the DigiSnap power each time.

If you are using a Mac, you can use a program called ZTerm, or you may already have a terminal program installed with your particular OS. The particular COM settings needed are listed in the DigiSnap 2000 manual.

Once you have your terminal program running, and 'connected', cycle the power on the DigiSnap, and you should see it present a menu on the screen. You can select the different menus or particular commands. Once you have configured the DigiSnap via a terminal, the settings are saved forever, or until the next time you change them using this same procedure.

### **Configuring for Advanced Time-Lapse**

The majority of outdoor monitoring applications will use the Advanced Time-Lapse (ATL) feature of the DigiSnap controller. With ATL, the camera can be made to take pictures only during daylight hours, or take pictures only at specific times of the day.

Please note that the DigiSnap controller does not have an internal clock. When used with a Nikon Coolpix camera, it can get the time of day directly from the camera, but when used with an SLR camera, such as the Pentax K110D which is standard with the Time-Lapse Package, the DigiSnap does not know what time it is; when you power it up, it will presume that it's midnight. This doesn't mean you can't use ATL, it just means you have to be a bit more clever. You can set up the ATL start times with an offset, anticipating what time of day you are going to start the system, or you can simply have configure the DigiSnap to start taking pictures at 00:01 (1 minute after midnight), and power up the system when you want it to start taking pictures. The DigiSnap will then start keeping time, and taking pictures on a daily schedule.

We would be happy to pre-configure the DigiSnap for your particular application, to ease your project by one more step.





Zoom in for details...

## System Components

### **Digital Camera**

The Time-Lapse Package can be used with a wide range of cameras, from point & shoot, to SLR's. Most customers prefer that we supply the camera, and this is our preference as well, but we can also provide the system without a camera, if you already have a camera that you'd like to use.

There are a host of considerations to evaluate when choosing a camera model for time-lapse photography, particularly in the field. The ultimate goal of your project is to collect a series of images over a long period of time, regardless of the environmental conditions. Shutter life, image quality, power consumption, and of course reliability are major concerns. We have done this research for you, and believe we have a good recommendation.

As in many endeavors, "details count!". For instance: some customers have asked to use their own Nikon SLR camera. While the cameras would certainly be perfectly suited to capturing images, there are some difficulties accommodating most Nikon SLR's in time-lapse. Most Nikon SLR cameras have an external power connector... they are proprietary to Nikon, so we would have to buy their expensive AC adapter, simply to cut off the connector. When powered externally, we have found that Nikon SLR's never shut off the metering... the camera continues to draw some power all the time, which is a battery killer! If powered via the battery compartment, this isn't an issue. However, getting power to the battery terminals is not easy either, and Nikon now has a proprietary battery sensor, to ensure that only their batteries are used. Shutter release is another issue. The latest small Nikon SLR's are sized perfectly for the housing, but they do not have a shutter release connection. While we can modify a camera to add such a connector, it's not cost effective in most cases. Those SLR's that do have a shutter release jack use proprietary connectors... again, making the system more expensive. Nikon makes fine cameras, but they make it very difficult to use their cameras in this application!

We have less experience with Canon SLR's. The Digital Rebel series use an industry standard connector for the shutter release, but their 'professional' SLR cameras use a proprietary connector. Many Canon SLR's do not have an external jack for power, but most have some dummy battery pack accessory with an AC adapter. If you have a camera you would like to use, we may need to borrow your camera for a day, to see if we can come up with the proper connections.

Time-Lapse Package  
Revision D

Again, given some extra effort and cost, we may be able to use your current camera, but we'd like to suggest using a Pentax SLR. These cameras use industry standard connectors, draw negligible power between pictures, and yield equivalent image quality to Nikon and Canon cameras.

**Pentax K100D/K110D**

The standard package will include the latest generation Pentax Digital SLR camera. Currently we install a K110D (6 MPixels, APS sized sensor), with the standard 'kit' lens from Pentax, providing a good range of usable zoom. We have word from Pentax that the K110D is going to be eliminated in favor of the K100D. This is the same camera, with the addition of image stabilization. We will supply the K110D as long as they are available, as they cost slightly less.

We install a 2 GB memory card in the camera, as well as a set of AA Alkaline batteries. These are not the best batteries to power the camera under normal conditions, but will work nicely here. The external battery pack will power the camera, so the internal batteries are only needed to maintain the camera settings and clock when the external power is disconnected, such as in shipping, or storage.

A second 2 GB memory card is also included, to allow 'hot swapping' of cards during long-term applications. The card access door on the camera must be closed to operate, and the space is limited in the housing, so the camera must be removed to swap cards. Given the quick release head, this is a very easy operation, and the camera will be re-installed with essentially an identical orientation each time. If you desire, you can attach the supplied USB cable, and leave it attached in the housing. This would allow you to download the images directly to a laptop computer, in the field, without touching the camera.

Note that the operating temperature of the K110D/K100D is specified for 0C – 40C. This is the same range as most other digital SLR cameras. While there is no guarantee of operation beyond this range, you may well find that it works fine! We have anecdotal word from a customer testing the Time-Lapse Package in a chamber, that they have not had any problems, operating to as low as minus 60C.

For the lowest power consumption, please configure the following camera settings. Refer to the camera manual for more details on these settings. Instant Review : Off Auto power off : 1 minute Manual focus

As far as photographic settings are concerned, we only have basic suggestions. For most applications you may find that using the Program mode (P) is perfectly adequate. The camera will adapt the aperture and shutter speed to suit the lighting conditions. This does mean that there may be visible variations in the exposure from frame to frame. If your project requires consistent exposures from frame to frame, accurately reflecting the changing light conditions, then you may need to set the camera up for manual exposures. This could take a few days of experimenting to determine the proper settings however! There may be some advantage to setting the camera for a fixed white balance, rather than using the camera's auto white balance. We also suggest setting the ISO to the lowest setting (200), for the minimum noise.

Our standing recommendation is to take pictures at high resolution, and take several times as many pictures as you think you will need. It's very easy to downsize or discard images, but you can't get more of them after the fact.

Ideally, you would set up the system a week or two ahead of time, collect lots of test images, and adjust the exposure before the 'event' you are monitoring actually occurs. If you have this luxury, congratulate yourself for thinking ahead... you are in a minority!

## Enclosure

The housing uses a very strong molded fiberglass construction. Gaskets make the unit airtight and water tight, and stainless steel hardware further eliminate any concern for corrosion. The door is hinged, and quickly removable. The housing is a perfect size to accommodate digital cameras, including many SLR's. Unlike plastic units, you can successfully paint this enclosure if you want to hide it in the field.

Triangular headed screws, and a matching key are used to 'lock' the door. While not completely theft-proof, we've found that even with tools, it's awfully difficult to open the door without the key!

Some customers have wanted to buy the housing alone, to package their own equipment.

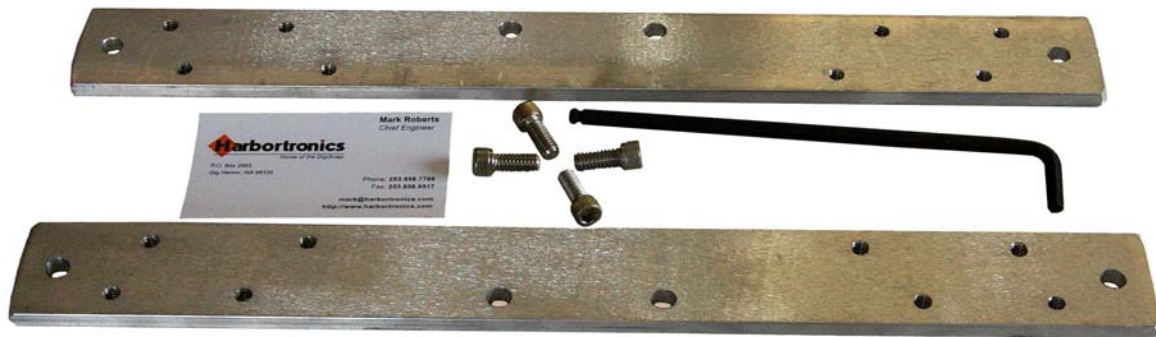
We can provide the enclosure with door locks and a key, for \$191.88.



## Mount Assembly

Thick aluminum brackets were developed for mounting the housing and attaching the solar panel. The brackets can be attached to the housing in horizontal or vertical orientation for flexibility. The brackets be used with 'U-Bolts' to directly attach the housing to a standard size chain link fence pipe (1.67" diameter pipe). You can get fence post pipe and U-bolts at most any hardware supply (i.e. Home Depot). You will find that the housing can be attached to other sizes of pipe with minimal modification.

The mounts can attach to the housing in vertical or horizontal orientation. If you need these components to retrofit a housing, the price is \$83.65.



## Mechanical Package

We can also provide the enclosure with mounting hardware. This package includes the external mounting bars as well as an internal stainless steel mounting plate with right angle bracket, desiccant pack, felt and tools, for \$422.63.

The internal stainless steel panel provides a solid base to mount the camera and all other components. The panel can be easily removed for service, and then just dropped back in place. The panel doesn't need to be removed for typical use.



## Battery Pack Assembly

We can supply a high capacity Lithium-Ion Polymer (LiPoly) rechargeable battery pack, having a nominal voltage of 11.1V, and 12.3AH capacity. A 'universal AC' battery charger is included. The battery pack assembly is priced at \$375.86.

The most common battery chemistry for long term, remote applications is lead-acid. Unfortunately, lead-acid batteries have a number of drawbacks. An equivalent capacity lead acid battery would add about 8 pounds to the system, and would be almost as large as the housing itself. ALL Lead acid batteries (even the sealed ones) can vent gasses during charge and discharge, making them inadvisable to install within a sealed housing. Most other secondary (rechargeable) battery chemistries have high self-discharge, meaning that they won't work well in a long term application. LiPoly batteries however, have low self-discharge, are very light-weight, and quite compact. Good stuff, but not cheap!

The advantages of the LiPoly battery pack for this application outweigh the significantly higher price, and allow the high capacity battery to reside inside the housing, making the entire unit quite portable.

In order to save some money, one customer ordered the housing without the internal battery, for connection to a large, less expensive battery outside the housing (i.e. motorcycle battery). We have a report that this worked well, up until the time that arctic foxes chewed through the cable!



Actually we've heard from a number of researchers over the years that electrical cables are a big attraction to a variety of wild animals. If you really want to hike in a big heavy lead-acid battery, that's fine, but you may want to also bring some armoring for the cable!



## Camera Mount

The camera is mounted on a high quality tilting head, with a quick release plate. You can easily remove and re-install the camera, without having to re-align it! Of course a quick release head may not give you perfect pixel alignment, but for most applications it should work quite well.

The camera head is attached via a bracket to the mounting plate. The head can be adjusted front and back on the bracket, as well as rotated on the bracket. We suggest you locate the lens near the glass window, to minimize internal reflections.

The head can be tilted and rotated to orient the camera independently of the housing.

## Time-Lapse Controller

The 'brains' of the time-lapse system is the DigiSnap 2100. This device, designed and produced at Harbortronics, is a digital camera controller, developed to work with a variety of digital camera models. The DigiSnap can be configured to take pictures at any interval desired, or to operate on a daily clock.

The DigiSnap series of controllers have been in continuous production since 1999, and many thousands of units are in use around the world.



## Solar Panel

The fully charged LiPoly battery pack has enough capacity for up to 3 months of operation between charges, depending on the details of the application. Most photographers prefer to augment the battery with a solar panel, allowing for unlimited duration, and less worry about the battery status.

A high quality 5 watt solar panel is a standard feature with the Time-Lapse Package. This is sufficient to keep the battery charged in almost any situation. We have a couple of suppliers for these panels, so yours may not exactly match the one in the pictures. If your installation site does not get frequent full sun exposure, or you have other power concerns, please contact us. We can supply long cables to re-locate the solar panel, or work with you to develop other options, such as external AC or DC power.



Custom aluminum brackets are used to mount the solar panel to the housing. The brackets may be further formed by hand to suit your particular needs. You may want to consider a couple of things when orienting the panel. If the panel is located over the housing, it can serve as a shade to the housing, reducing the internal temperature when in the sun. The panel can also serve as a rain shield to minimize drops on the front window of the housing.

A high quality 'gland' is used to pass the solar panel cable into the housing, maintaining the watertight integrity of the housing. The price for the solar panel option (which includes the above, and the solar charger) is \$267.25, installed.

### Solar Charger

While many solar panels can be connected directly to Lead Acid batteries, LiPoly batteries must be charged carefully, monitoring the voltage and temperature.

Harbortronics has developed a custom charger to adapt the solar panel to the LiPoly battery pack. This device is installed between the solar panel and the battery, and provides connections for the battery converter. Other external power sources can be used in place of the solar panel, as long as the voltage is between 12 and 20V.



also

### Battery Converter

While the battery pack provide 10 – 12.5 volts, the DigiSnap controllers operate from 5 volts, and the Pentax K110D/K100D requires 6.5V. Harbortronics designed and produces a device to efficiently convert the higher battery voltage to those required by the DigiSnap 2100 and the digital camera. If a different model camera is going to be installed, we can adjust the voltage accordingly.

The cables that connect the battery converter to the other components have unique connectors, so you won't have to worry about misconnecting power.



### Tools and Accessories

Tools are provided with the Time-Lapse Package, to allow reconfiguration of the camera position, the solar panel, the mounting brackets, and to open / lock the door

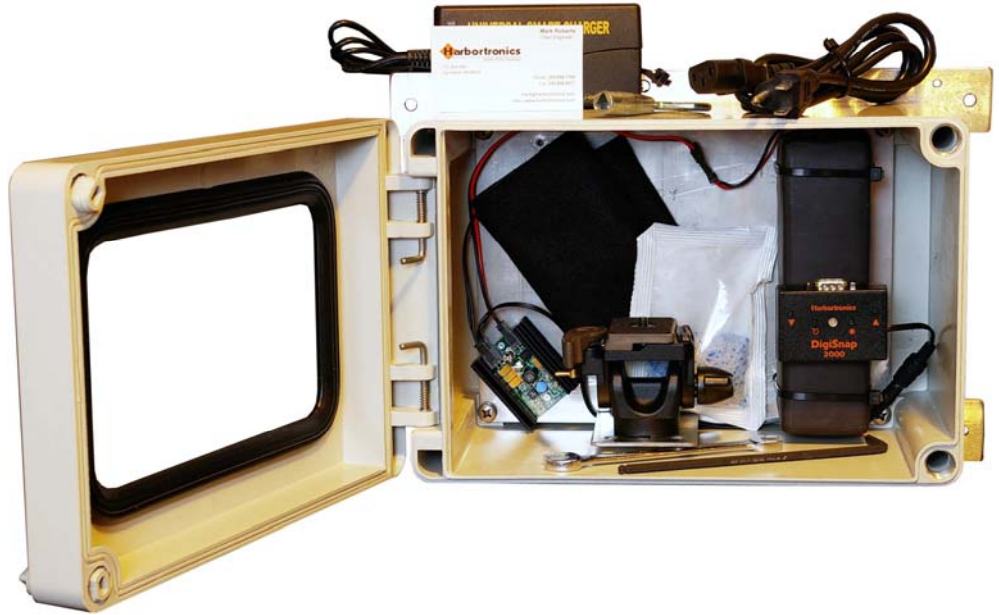
A desiccant pack is included in the housing to minimize internal moisture, which can cause condensation during temperature extremes. If the crystals eventually turn pink, bake the pack in an oven at 150C / 350F for an hour or so, until they turn blue again. Be careful!

We also include a sheet of black felt, in case you need to absorb any other stray internal light reflections.



### **Base Package**

Another available package is a minimum configuration for long term time-lapse photography. In addition to the mechanical items of the previous assemblies, all electronics (the battery pack, battery converter, and the camera controller) is added. This package does not include a camera, memory cards, nor a cable between the controller and the camera. This package is available for \$1169.31. If you'd like to add the solar panel option, the price is \$1474.06.



### **Pentax Package**

For applications that don't need more than a month or so of operation in the field, we can provide a system without the solar panel assembly. This package includes the K110D/K100D camera, memory cards, and cables and is available for \$2011.19.





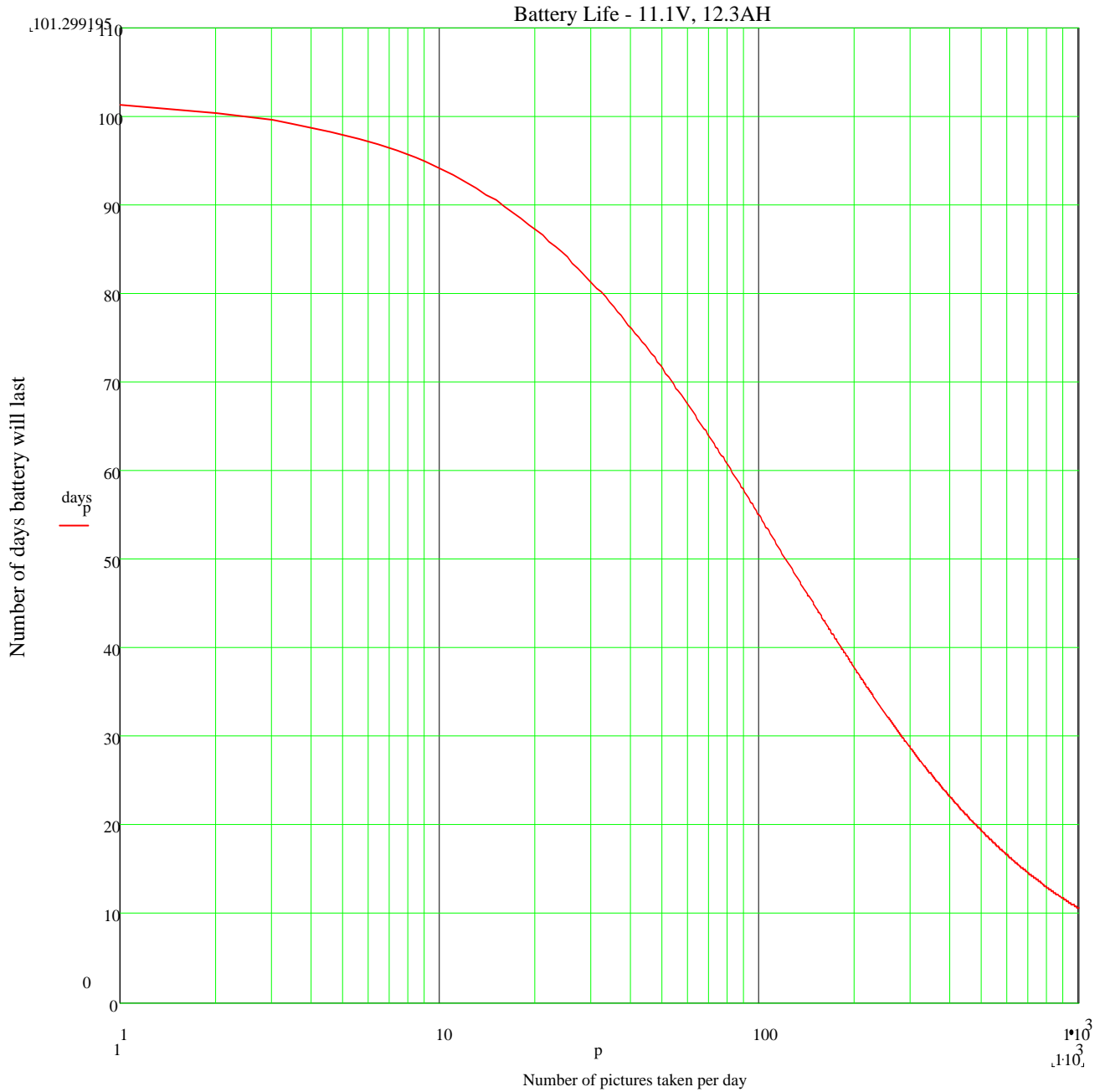




## Battery Life Estimates

We have made some very detailed measurements of the battery current, when powering the Battery Converter, the DigiSnap 2100 controller, and the K110D camera. Given this current vs time profile when taking pictures, we are able to project how long a battery pack will last, without a solar panel. Using the solar panel, the battery life is essentially unlimited. Please note that this projection is based on the measurements of one set of equipment, presuming a perfect battery pack, at room temperature. There are a host of things that can reduce the actual battery life, so please plan accordingly!

In summary, if configured to take 15 pictures or less per day, the battery may last as much as 3 months. At 100 pictures per day, the battery can last as much as 50 days. See the following chart for more details.



## Specifications

Standard Package	[Includes all items described above]
Weight	16 lbs
Housing Dimensions	12" wide, 8" tall, 7" Deep
Overall Dimensions	16" wide, 13" tall, 11" Deep
Shipping Dimensions	18" x 15" x 13", 21 lbs
Price as shown	US \$2300

### Approximate Shipping Costs (not including customs fees where applicable)

Continental US	USPS Priority (2-3 Days)	US \$84
	USPS Express (1-2 days)	US \$100
	Fed-Ex Standard Overnight	US \$144
Canada	Postal Service	US \$90
	Fed-Ex	US \$225
Europe	Postal Service	US \$130
	Fed-Ex	US \$225
Japan	Postal Service	US \$130
	Fed-Ex	US \$225
Australia/ NZ	Postal Service	US \$150
	Fed-Ex	US \$285

## Service / Warranty

All Harbortronics products are warranted against any manufacturing defects for a period of one (1) year from the date of purchase. Defective products should be returned prepaid to Harbortronics. Harbortronics will at its discretion, repair or replace such products without charge, and will return to the customer prepaid. Except as mentioned above, no other warranty expressed or implied, applies to this Harbortronics product. All other claims, of any nature, including but not limited to camera damage are not covered. This warranty does not cover damage caused by misuse, accident, or abuse. This warranty does not cover consequential damages or other incidental damages. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusions may not apply to you. Contact Harbortronics at [www.Harbortronics.com](http://www.Harbortronics.com) for service instructions. Please note that used cameras are not provided with any warranty.

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