

## Summary

The Time-Lapse Package is a product originally developed in 2003, using a mix of off-the-shelf components and custom designed electronics and mechanical pieces. The design was intended to satisfy the need for an autonomous time-lapse camera system that would endure the outdoor elements all over the world. The design is straightforward and minimalistic, yielding a compact, utilitarian system, of which about 4000 have been produced, and found to be durable and reliable.

The Cyclapse product line is a completely new design driven by the knowledge gained over the last 11 years of production and customer feedback. The housing is custom designed with rugged use and attractiveness in mind, along with a strong attention to mounting flexibility. The housing is only slightly larger in volume than the Time-Lapse Package, but is shaped in a way to maximize the size of cameras and lenses that may be used.

Both systems are in production at and available from Harbortronics Inc. The Time-Lapse Package 'standard' package is USD \$2700, while the Cyclapse Classic -Standard system is USD \$3376.25. The Cyclapse Classic -Standard system uses a higher 'spec' camera and solar panel than the Time-Lapse Package, and support to power accessories such as a small WiFi router are already included. When those differences are factored in, the prices are identical.

## Mounting

The Time-Lapse Package includes a ball head mount, bars attached to the housing, and u-bolts for attachment to pipe. While these multiple options are quite helpful, the box shape of the housing and attachment points requires more customer thought and effort to figure out how to mount the system. The mounts extend from the rear of the housing.

The Cyclapse design considers the many structures that the system may be mounted on, such as walls, poles, parapets, posts, scaffolding, etc. A complete set of mounts for the housing and for solar panels are available, as well as for the final structural attachment. The Cyclapse housing provides three screw mount points on the bottom, as well as one on each side. The inclusion of multiple mounts for the housing and solar panel and consideration for the variety of mounting structures to which the system will eventually be attached should prove to ease the task of installation.

## Weather

The Time-Lapse Package uses a door with a seal pressed into a groove around it's perimeter, and a window inserted into the center. The Time-Lapse Package window seal sometimes leaked, and is difficult to address. Grit in the door seal is difficult to see, and has caused leaks. The Time-Lapse Package is constructed from compressed fiberglass and has proved to be completely reliable in the field, but it's surface finish fades over the years.

The Cyclapse uses a single elliptical seal on the housing, and the window is adhered in place (yet easy to replace). The seal of the Cyclapse is formed within an easily inspected groove in the lid, and is

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oriented so that dust and debris will naturally fall off of the seal, rather than collect within it. The design of the Cyclapse is likely suitable for long-term submersion in water, but this has not been evaluated yet. The lid is made from fiberglass using a white gel-coat finish. The housing is made from aluminum, and powder coated with a 'Hammertone' white finish.

The Cyclapse latches are adjustable, allowing the customer to compensate for the eventual 'denting' on the seal. If there is a problem with moisture ingress, the latches can be tightened, whereas the force on the seals of the Time-Lapse Package are not adjustable.

We believe that the Cyclapse is shaped to shed rain, snow, dust, and ice better than any other camera equipment on the market. The material choices and construction are designed to withstand long term operation anywhere in the world.

## Wind

With ever increasing camera resolution, there is more sensitivity to wind induced movement which creates pixel shifts among images. The solar panel has a large area, and is a major factor. In the Time-Lapse Package, the solar panel is mounted directly to the housing. We have heard of a few instances of the mounting bars for the solar panel on the Time-Lapse Package failing, due to high winds... particularly in arctic environments.

The Cyclapse uses an independent mount for the solar panel, eliminating it's impact to the camera from the wind. The Cyclapse is shaped with mostly curved surfaces, and should be less sensitive to the wind than the Time-Lapse Package.

## Solar Panel Placement

To prevent lens flare, the camera should be oriented with sun behind the camera. Many applications require the camera be placed in areas that are in shade, such as the side of another building.

The Time-Lapse Package solar panel is mounted to the housing, which is quite convenient! However, when the housing is mounted to a structure from the rear of the housing, this can put the solar panel in the shadow of the structure so it doesn't receive optimum sunshine. Most customers don't use the flexible metal arms to best orient the solar panel, as they can be difficult to bend into the best position.

The Cyclapse system includes mounts for different solar panel sizes, and different structural attachments which should suit most conceivable site installations. The ball-head connection allows for very easy orientation to the mid-day sun, and should withstand the wind in most places on the planet.

## Appearance

The Time-Lapse Package was designed to be a compact, efficient assembly, and it has worked well for over a decade. However, it was not designed with an attractive, professional appearance. This has noted by some customers, and we have lost some sales for this reason.

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The Cyclapse was designed with appearance in mind, and we think it will be well accepted on any site. There will be no embarrassment about the choice of equipment used to document even the most visible construction projects!

Each item in the Cyclapse product line has a white 'hammertone' finish which should endure for the life of your project, and beyond.

### Camera selection

While the smaller SLR camera bodies using APS-C sized sensors work quite well for the majority of customers, we quite frequently are asked if full-frame cameras, most frequently the Canon 5D, will fit in our system.

The Time-Lapse Package shape does not allow for use of full-frame cameras, but the Cyclapse was designed to optimally fit larger camera bodies.

Cameras are designed wide bodies and relatively long lenses offset from the center of the camera. After deliberation and exploration of various shapes, a circular housing proved to be the optimum shape. The spaces to the sides of the camera lens are used to place the time-lapse control electronics and wiring for the system.

The housing has been found to be suitable for use with medium format cameras as well, which was quite a surprise as the housing is not at all large.

### Lenses

Most applications are well served with the standard 'kit' lens that are commonly included with the low-end SLR cameras. In many sites, a wider angle lens is required, which are normally relatively short, and can be accommodated in the Time-Lapse Package. However shape of the housing does not permit lenses longer than 100mm.

The shape of the Cyclapse housing, which not much greater in volume than the Time-Lapse Package, permits the use of much longer lenses.

### Camera Screen

Installation of any camera requires one to view the scene from the perspective of the camera for fine adjustments in orientation, zoom, and focus. The fastest way to provide the feedback to the installer is to see the image on the back of the camera screen. Some manufacturers do not provide access to the camera, except through connection to a computer connected to the camera system, which can complicate installations on ladders or up in the air on a lift!

The Time-Lapse Package places the camera against the rear wall of the housing, and the housing is designed to mount from the rear, so there is no practical way to see the screen on the back of the camera. Instead, it incorporates a pivoting plate system for the camera, allowing the installer to see the

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camera screen when it is swung out. When snapped into the housing, a picture is taken, the camera pivoted out, and the image reviewed. This allows for a repetitive but reasonable fast alignment process.

The Cyclapse housing opens from the top, but the housing is constructed with the top lip cut at an angle, allowing the installer to see the back of most cameras while firmly mounted in the housing. This can speed up the alignment of the system in many cases.

### Camera Access

The Time-Lapse Package provides access to the camera from the front, through a door that swings in a fixed direction, normally opening to the right. The camera is attached to a pivoting arm assembly, which snaps in place when folded back into the housing, and yields good repeatability. The camera cannot be completely removed from the system (dis-mounted from the pivoting arms) without losing photographic alignment.

The Cyclapse lid opens from the top, and can be quickly hinged on either the right or left side to provide best access from the point of view of the installer. The hinge pin can also be removed entirely to remove the lid.

Within the Cyclapse, the camera is mounted to a sled, which slides in a track permanently mounted to the housing. The camera may be removed and replaced as needed without losing photographic alignment. As the sled is moved forward, it will catch under a circular stop, which forces the front of the sled against the track, and the rear is retained using a captive screw. The captive screw requires a few seconds of wiggling to catch or release from the rail, but the process is very simple and highly repeatable.

Memory card access is faster with the Time-Lapse Package, as the camera may be pivoted out and the card accessed from the bottom of the camera, using a single hand. The camera must be removed from the Cyclapse housing to access the memory card slot on the bottom, or on a camera with a side access slot. Two hands must be used. This feature is perhaps the only distinct drawback of the Cyclapse when compared to the Time-Lapse Package.

### Electronics

The Time-Lapse Package uses the DigiSnap 2700, the Solar Charger, and Battery Converter circuits developed by and manufactured by Harbortronics since 2003. These circuits have remained in production because of their proven reliability and power efficiency. The Time-Lapse Package includes an aluminum circuitry panel to hold those circuits, as well as their interconnection wiring. Accessory power can be provided, through the use of a second Battery Converter attached to the panel, with different wiring.

The Cyclapse Classic system also uses the DigiSnap 2700 time-lapse controller, but introduces the Cyclapse Power Module. This new circuit incorporates all of the power needs for the system, including battery charging, camera power, power to the DigiSnap, and power for accessory devices via a USB cable. Test points are provided on the case of the Cyclapse Power Module, allow quick measurement of

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the voltages in the system. All of these circuits are implemented on a single circuit board, and are housed in a custom aluminum case, with embedded magnets to hold the module against the wall of the Cyclapse housing.

### Window

The Time-Lapse Package window is a standard safety glass construction, with two layers of 'float' glass sandwiched with a plastic layer. The glass has proved durable and we have had only a few comments about negative optical properties. The window is sealed to the fiberglass door using a spliced rubber gasket, which has proved watertight in most installations, but there have been leakage issues with some housings, causing great frustration in those particular customers, as well as creating additional costs to us for replacement equipment.

The Cyclapse housing uses glass designed for optical and mechanical properties, and will allow use of a polarizing filter on the camera lens, while the Time-Lapse Package will not. The window also includes an anti-reflective coating on the inside, to reduce ghosting from reflections within the housing.

The Cyclapse window is round, and sized to accommodate wide angle lenses. The window is attached simply, but very securely, using a rubber sealant. There is no fear of leaks through this window design.

Our customers experience with the Time-Lapse Package leads us to believe that having the window somewhat exposed to the elements will keep the window quite clean. Wind and rain wash the window, and while there are periods of rain drops on the window, this is the case with most designs.

When a window is recessed under a hood of some sort, that hood creates turbulent air which can deposit dust, snow, and ice on the window, requiring additional maintenance to clean. The Cyclapse lid does provide some overhang to shield it from some rain, but an additional circular flange is used to hold the window which should address dust and snow deposition.

### Security

The Time-Lapse Package door uses a pair of recessed plastic screws with a triangular head for security. In most applications this amount of security is perfectly adequate. The screws cannot be opened with a typical tool assortment without damage. However, they may be drilled out quite easily, or the large window may be broken to extract the camera and other equipment.

The Cyclapse incorporates a pair of lever-operated latches. There are no plastic pieces in the design of the closure. These latches include holes which can be used with small padlocks. Once locked with a padlock, the housing cannot be opened using a typical tool assortment. Even if the window is broken and cleaned out, there is no room to access the interior and remove any equipment. Only extreme effort will allow access to the inside of the housing.