

Appendix B: Digisnap 2300 (firmware upgrade from Digisnap 2000)

DigiSnap 2000

User’s Guide



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Overview

The DigiSnap 2000 is an electronic shutter release compatible with many digital cameras. The DigiSnap 2000 can be configured to take a single picture, or to take a series of pictures at precise time intervals (Time-Lapse photography). Appendix B outlines the differences between the DigiSnap 2X00 models.

Items included:

- DigiSnap 2000
- AAA Battery, Alkaline (already installed)
- Cable Assembly, Null-Modem, DB9-F / DB9-F, 6 Ft
(for connection to a terminal or computer)
- Screwdriver, #1 Philips
- Users Guide (this document)

Quick Start

- 1) Connect the DigiSnap to your digital camera via the serial cable adapter made for your camera. Turn the camera on... most cameras can simply be switched to the normal position for taking pictures, others may need to be set to their communication setting.
- 2) Wake up the DigiSnap. This is done by pressing any of the four buttons on the top of the case until it lights up yellow. Release the switch. The DigiSnap and camera will exchange some data to get set up, which may take a few seconds.
- 3) You may then press one of the four buttons on the top of the case to control the camera.
 - ▼ Zoom Out (Wide Angle) Press and hold to zoom out.
 - ↻ Time-Lapse Control
 - Press quickly to start and stop the Time-Lapse sequence.
 - Press and hold to set the Time-Lapse interval.
 - * Take Picture Press to take a picture.
 - ▲ Zoom In (Telephoto) Press and hold to zoom in.

Applications

Consider the following potential applications for the DigiSnap 2000 with a digital camera.

Single Snap

Minimize Vibration

Studio photography - Camera on tripod.

Macro Photography - Camera on tripod.

Astrophotography - Camera mounted on telescope.

Simple Time-Lapse

Plant or flower movement - reaction to sunlight, etc.

Nature - light changes over the course of a day

Astrophotography - movement of stars or other celestial bodies

Human Activities - whimsical or artistic montages

Advanced Time-Lapse

Animal feeding areas - watering holes at morning and evening

Parking Lot Monitoring – monitor activity at morning, noon, and evening

Long term nature monitoring (i.e. crops)

Remote Operation

Camera placed in hidden location, with operation from a distance.

Camera on a pole or boom, extended into a hazardous or inaccessible location (i.e. a fuel tank or well), activated via a long serial cable.

Camera in a remotely controlled helicopter, activated via serial commands through a radio modem.

Multiple cameras installed at various remote locations, all commanded to take pictures at the same time, possibly via internet.

Camera mounted near a birdfeeder, capturing close-up images of birds.

Note that many cameras have a video output allowing you to remotely view what the camera sees.

More Info

There are several variations within the DigiSnap controller family, optimized for different applications. Please refer to Appendix B for an outline of the different models, and Appendix C for detailed application recommendations.

Connection to Camera

Cameras compatible with the DigiSnap 2000 are sold with, or have optional serial cables for connection to a PC type personal computer (typically for picture download). The DigiSnap 2000 provides the same interface connector as a PC computer (DB-9 male), permitting the DigiSnap 2000 to be connected directly to the cable that is compatible with the camera.

Extending the cable

It is quite easy to operate the DigiSnap at distances much farther than that of the serial cable supplied by the camera manufacturer. The DB-9 serial interface is industry standard, permitting use of additional cables to extend the distance between the DigiSnap 2000 and the camera. All that is required is a DB-9 Male / Female cable, with straight through connections. These cables are commonly available in computer and electronics stores. For those wishing to make their own cables, only three wires are required, connecting pins 2, 3, and 5. The data rate of the DigiSnap is intentionally kept to 19.2 Kbaud, allowing the use of very long cables. The maximum distance is dependent on the particular camera model, and the quality of the cables used. The DigiSnap has been successfully tested with a 700 ft cable, with no suggestion of any problem.

Connection to Terminal

The DigiSnap 2000 can be connected to a computer or 'dumb terminal' to configure the less often used settings. The terminal may be a personal computer running a terminal emulator program (such as HyperTerminal on a PC), or any other device operating as a simple terminal, such as a palmtop computer.

A null-modem cable is supplied with the DigiSnap 2000 to facilitate connection to a terminal or computer. The data rate is 19.2 Kbaud, and the RS-232 format is N-8-1 (no parity, 8 data bits, 1 stop bit). A HyperTerminal file is available on the Harbortronics website, simplifying the configuration for those not familiar with terminal programs.

Please refer to the FAQ section of the Harbortronics website for additional information about connection to Macintosh and palmtop computers, and terminal emulator setup.

Standard Operation :

Status Indicator

The light on the top of the case indicates how the DigiSnap is working.

Waking the DigiSnap

When any switch is pressed and held briefly, the DigiSnap will turn on, and the indicator will flash yellow briefly, indicating that the DigiSnap is awakened and starting to communicate with the camera. Once the DigiSnap 2000 has established communication with the camera, the indicator will flash Green to indicate success, or Red to indicate failure.

Taking a single picture

A single picture may be taken at any time by momentarily pressing the * button. The images captured are retained in the camera, exactly as if the camera were used without a remote control. If the button is held down continuously, additional pictures will be taken for as long as the button is pressed.

After each picture has been taken, and stored to the memory in the camera, the DigiSnap will briefly flash green, to indicate success. If there was a problem, the indicator will flash red, and the DigiSnap will shut down. The number of times it flashes red indicates the error it encountered.

When configured for Single Snap operation, the DigiSnap will flash green once every twelve seconds, to indicate that it is still operating normally.

# Flashes	Error	Note
1	Low Battery	The battery in the DigiSnap may need to be replaced
2	Timeout	There was a problem communicating with the camera. The camera or cables may not be compatible.
3	Internal	There may be an internal program glitch, or a hardware problem.
4	Response	The camera did not return the anticipated responses to the commands. There might be some problem with the camera or it may not be compatible.
5	Camera	The camera may be out of image memory.

6	Checksum	A data packet was corrupted.
7	Mode	Check the configuration
8	Protocol	The DigiSnap was not able to communicate with the camera.
10	Unknown	If this occurs regularly, contact Harbortronics.

Simple Time-Lapse Photography

The DigiSnap can be easily configured for Time-Lapse photography, where the number of pictures, as well as the time between each picture can be controlled.

There are three ways to initiate a Time-Lapse sequence.

1. If the DigiSnap 2000 is configured for Simple Time-Lapse mode (see configuration), then when the DigiSnap is awakened, it immediately starts the Time-Lapse sequence.
2. If the DigiSnap is configured for Single Snap mode, then the ↻ button may be used to start and stop a Time-Lapse sequence.
3. If the DigiSnap 2000 is configured for Advanced Time-Lapse mode (see configuration), then when the DigiSnap is awakened, it immediately starts the Advanced Time-Lapse operation, which will trigger a Time-Lapse sequence at particular times of the day.

Once a Time-Lapse sequence is started, a picture is taken immediately and then again at a defined time interval, repeating until the desired number of pictures have been taken.

While waiting between taking pictures, the DigiSnap will flash green once every four seconds, to indicate that it is still operating normally in simple Time-Lapse mode.

At the end of a Time-Lapse sequence, the DigiSnap will flash yellow to indicate that it is shutting down.

If an error occurs when taking a picture during Time-Lapse operation, the Time-Lapse process will stop, and the DigiSnap 2000 will shut off.

Advanced Time-Lapse Photography

The DigiSnap can be also configured for Advanced Time-Lapse photography, where a set of Time-Lapse sequences can be programmed to occur at particular times of the day.

Up to eight sets of sequences may be programmed to start at particular times of the day (per the camera’s internal clock). Each sequence consists of a number of pictures to take, and an interval between them.

While waiting between taking pictures, the DigiSnap will flash the green LED once every eight seconds, to indicate that it is still operating normally in advanced Time-Lapse mode.

When in advanced Time-Lapse mode, if the button is pressed again a picture will be take immediately, without affecting the Time-Lapse operation.

The advanced Time-Lapse operation is intended for multi-day unattended applications, and as such will run until either the DigiSnap or Camera batteries wear down.

If an error occurs when taking a picture during Time-Lapse operation, the Time-Lapse process will stop, and the DigiSnap 2000 will shut off.

Configuration

Simple Time-lapse Intervals may be re-programmed at any time by pressing the  button (see the Time-Lapse control function, under the switch configuration menu).

In order to configure the other many settings and options, the DigiSnap 2000 is designed to communicate directly to a terminal (or terminal emulator). Once the terminal is set up, and the cable connected between the DigiSnap 2000 and the terminal, pressing the button on the DigiSnap 2000 will display a menu of available commands. There are a wealth of features, so several independent menus of configurations are presented.

Example menus for version 1.30 of the firmware are duplicated below, with descriptions of each command. The green LED will also flash every six seconds to indicate that it is working normally in terminal mode.

All menu options are presented, while not all will be available at any one time. Some menus may be disabled, and specific menu items hidden, depending on the configuration of the DigiSnap and optional features installed.

***** www.Harbortronics.com *****
DigiSnap 2500 Firmware : Oct 10, 2001, Version 1.30

Main Menu

Operating Mode : Single Picture

Simple Time-Lapse Settings

of Shots : 004

Interval (HHH:MM:SS) 000:00:15

Commands (enter a single letter)

M - Set Operating Mode

T - Configure the Simple Time-Lapse settings

A - Advanced Time-Lapse Configuration Menu

C - Camera Configuration Menu

O - Operation Menu

S - Switch Menu

F - Special Features Menu

Q - Quit (Save Changes, Shut DigiSnap off)

Note that the menu header displays the internet address of Harbortronics, as well as the firmware version number and date. To enter a command, the letter is entered (upper or lower case) followed by the return <CR> key. If the <CR> is entered without a command, the menu will be refreshed.

- **M – Set Operating Mode**

This command will ask which mode to use... There are three operating modes available for the DigiSnap 2000;

(S) Single Snap Most commonly used mode. Does nothing until a button is pressed.

(T) Simple Time-Lapse (start a Time-Lapse sequence immediately upon wakeup)

(A) Advanced Time-Lapse (start Advanced Time-Lapse operation immediately upon wakeup)

- **T – Simple Time-Lapse settings**

A Time-Lapse sequence is defined by the number of pictures to take, and the interval between them. This command will ask the number of pictures to take, and the number of hours, minutes, and seconds between pictures.

The number of pictures may be set to any number between 0 and 255. If set to 0, then this indicates to the DigiSnap to take an infinite number of pictures. Effectively this means that the DigiSnap will request pictures as long as the

batteries in the camera and DigiSnap are charged, and there is memory left in the camera.

If the camera is turned off during a Time-Lapse sequence, the DigiSnap will detect this the next time it tries to take a picture, and will shut down. If the interval is set to a very long period, the * button can be pressed again to request an immediate picture, to allow the DigiSnap to recognize that the camera is turned off, and shut itself down more quickly.

The maximum interval between pictures is 255 hours, 59 minutes, 59 seconds. The minimum delay can be set to 0 hours, 0 minutes, and 0 seconds, which will essentially tell the DigiSnap 2000 to command new pictures be taken as soon as the camera signals that the picture has been stored (will operate as fast as possible). Depending on the firmware in the particular camera used, an error might occur if operated in this way, causing the DigiSnap 2000 to abort the Time-Lapse operation.

- A – Advanced Time-Lapse settings

This command leads to the Advanced Time-Lapse Menu

- C – Camera specific configurations

This command leads to the Camera Configuration Menu

- O – Operation settings

This command leads to the Operation Menu

- S – Switch settings

This command leads to the Switch Menu

- F – Special Features

This command leads to the Special Features Menu. The special features are optional extensions to the base firmware adding additional capability, and this menu will not be present unless some features are installed.

- Q – Quit

This command is used to disconnect the DigiSnap 2000, saving the changes made during the session. If the Q command is not entered, the DigiSnap 2000 will automatically save any changes and shut off after 3 minutes, if no activity is detected.

Advanced Time-Lapse Menu

The DigiSnap can be configured to take a series of Time-Lapse sequences at specific periods of the day.

ATL Period # 1 Disabled 005 Shots, Starting 03:30 PM, Interval 00:00:20
ATL Period # 2 Disabled 005 Shots, Starting 04:50 PM, Interval 00:00:15
ATL Period # 3 Disabled 006 Shots, Starting 04:55 PM, Interval 00:00:20
ATL Period # 4 Disabled 010 Shots, Starting 05:00 PM, Interval 00:02:10
ATL Period # 5 Disabled 050 Shots, Starting 12:00 PM, Interval 00:00:20
ATL Period # 6 Disabled 050 Shots, Starting 01:00 PM, Interval 00:00:20
ATL Period # 7 Disabled 050 Shots, Starting 02:00 PM, Interval 00:00:20
ATL Period # 8 Disabled 050 Shots, Starting 03:00 PM, Interval 00:00:20

Commands (enter a single letter)

1..8 : Configure Period 1..8

Q - Quit (Return to Main Menu)

- 1..8 Select a sequence to configure.

Each sequence is independently defined. There is no error checking performed on the sequences, so it is possible to define sequences which overlap each other, and overlap the 24 hr period, creating undefined behavior.

Each sequence may be enabled or disabled. If disabled, it’s settings are effectively ignored.

The number of pictures may be set from 1 to 255.

The starting time (per the camera’s internal clock) may be set to any minute of the day or night.

The interval may be set from 0 seconds to 12 hrs, 59 min, 59 sec.

- Q – Quit

This command returns control to the Main menu.

Camera Configuration Menu

Reduced Feature Set : Disabled

Newer Nikon Coolpix cameras have additional remote control features, via an extended protocol.

Nikon Coolpix Extended Protocol : Enabled

Half-Press Option : Enabled

Bulb Option (Single Shot) : Disabled

Bulb Option (Time-Lapse) : Disabled

Time-Lapse Bulb Duration (secs): 003

Camera LCD between single shots : Enabled

during Time-Lapse : Disabled

Commands (enter a single letter)

F - Change Reduced Feature Set

E - Configure Extended Protocol

L - Change LCD settings

Q - Quit (Return to Main Menu)

This menu is used to select features specific to various camera models. Depending on the camera model, these settings may or may not have any affect on operation. The camera configuration menu does not actually change anything within the cameras, but modifies the commands sent to the camera.

- F – Reduced Feature Set

Some cameras only support a few of the features of the standard protocol, and none of the extended protocol. If a camera fails to respond or locks up when the LCD or Zoom is controlled, then a reduced feature set can be enabled, where the only function used is to take a picture.

- E – Extended Protocol Options

Some cameras (i.e. later model Nikon Coolpix series) utilize an extension to the standard protocol, providing additional features. The protocol extension allows for somewhat better control of some camera features from the remote control, but precludes some of the features offered in the standard protocol. For instance, when taking single pictures, the protocol extension may provide finer zoom control, and reduced shutter delay, but in Time-Lapse, the standard protocol offer a very significant reduction in power drain on the camera, and may be preferred.

When these Extended Protocol Option is enabled, the DigiSnap will communicate to the camera using the extended protocol.

The Half-Press option is only used for Single Snap operation. When enabled, pressing the button on the DigiSnap will effectively ‘half-press’ the shutter release on the camera, allowing it to pre-focus and set the exposure. When the button is then released, the camera will actually take the picture. This provides a way to reduce the shutter release delay dramatically! You can cancel the ‘Half-Press’ by pressing any other button, then releasing them all.

There are two Bulb options.

Single Snap Bulb is similar to the Half-press option. If the camera is set to fully manual, with the shutter time set to bulb, and the DigiSnap set in Single-Snap mode, then this feature can be used. When enabled, pressing the button on the DigiSnap will open the shutter on the camera, and keep it open for as long as the button is held. When released, the shutter will close.

The Time-Lapse Bulb feature is completely unique, allowing the shutter to be held open for a programmable period of time during Time-Lapse photography. The most obvious application is for astrophotography. Again, the camera must be set to fully manual, bulb shutter, and the DigiSnap to Time-Lapse. When this feature is enabled, the duration to hold the shutter open is defined as well, and may be set from 1 to 255 seconds. The camera itself may limit this time to a shorter interval.

Note that only zero or one Single Snap option should be selected.

- L - LCD Display

The default mode of operation for cameras under remote control using the standard protocol is to leave the LCD display off, reducing power draw. Some models permit the LCD to be turned back on under remote control, which is very useful in a number of applications, particularly single snap studio work, where the DigiSnap is simply used as a remote shutter release. In more remote applications, it may be desired to use the video output from the camera, which is typically enabled only when the LCD display is on.

The LCD may be enabled independently for Single Snap and Time-Lapse operations. Many single snap applications may require the LCD on, while most Time-Lapse operations may want minimum power draw.

Note that when the extended protocol is used, the LCD monitor is normally on, and can be turned off manually, but not by the DigiSnap.

- Q – Quit

This command returns control to the Main menu.

DigiSnap Operation Menu

DigiSnap Operational Constants
Baud Rate to Camera : 19200 Baud
Baud Rate to Terminal: 19200 Baud
Wait Time : 019
Short Count : 001
Medium Count : 020
Long Count : 158
Max Attempts : 003
Max Discards : 003
Power Up Delay : 060
Comm Gap Delay : 020
Ext Protocol Delay : 012
Post-Save Delay : 000
Camera Check Period : 003
Power Savings : Disabled
Commands (enter a single letter)
F - Reset everything to Default
B - Change Baud Rates
W - Change WaitTime constant
S - Change ShortCnt constant
M - Change MediumCnt constant
L - Change LongCnt constant
A - Change MaxAttempts constant
D - Change MaxDiscards constant
P - Change PowerUpDel constant
C - Change CommGap constant
E - Change Ext Proto Delay const
V - Change SaveDel constant
X - Change CamChkPer constant
Y - Change Power Savings Enable
Q - Quit (Return to Main Menu)

This menu provides some control over how the DigiSnap performs detailed internal operations. Discussion of these constants is left for a separate application note. There are cases where specific camera models benefit from using different time constants. For instance, the Coolpix 950 seems to be more prone to locking up when the LCD is enabled. Increasing the CommGap value seems to mitigate this nicely.

- **F – Factory Defaults**
This command restores all configurations to their factory default settings.

- **B – Baud Rate**
The communication baud rate may be set independently for communication to a terminal and camera.

- **Y – Power Save**
This command sets the Power Save option. By enabling this option, the DigiSnap consumes the least amount of power, by shutting down the serial interface between commands. Some cameras detect this and presume that the remote control has been disconnected, so the power save feature should be disabled when using these cameras.

- **Q – Quit**
This command returns control to the Main menu.

Switch Menu

Switch 1 Function : Out : Zoom Out
Switch 2 Function : Time : Time-Lapse Control
Switch 3 Function : Snap : Take Picture Immediately
Switch 4 Function : In : Zoom In
External Switch Function : pRoto : Toggle Protocol
Camera Zoom Step size : 010
Refresh LCD after Zoom : Disabled
Preprogrammed Focal Length : 070

Commands (enter a single letter)
1 - Configure Switch 1 (Far Left)
2 - Configure Switch 2 (Center Left)
3 - Configure Switch 3 (Center Right)
4 - Configure Switch 4 (Far Right)
5 - Configure External Switch
Z - Change Zoom Step size
R - Change Zoom Refresh
F - Set optional Focal Length
Q - Quit (Return to Main Menu)

The DigiSnap 2000 is unique in that the switch functions may be configured by the user. There are a number of potential features that are not currently controlled by the DigiSnap 2000, so there is a possibility for future upgrades to add functionality to the DigiSnap. As more control functions are added, four buttons will obviously not be able to simultaneously control them all. The user may configure the action for each switch independently, allowing for selection of the features most appropriate to the photography task at hand.

Note that the DigiSnap 2000 has the capability to be triggered from an external electrical signal, which could range from a simple switch to a light beam detector. We have the capability to develop custom devices to suit your needs! The DigiSnap 2000 is designed to accommodate a small ‘daughter board’ inside the case, to tailor the DigiSnap to almost any conceivable custom application. Contact Harbortronics if you have a particular custom application in mind! We have already worked with a number of photographers and commercial companies to develop special purpose equipment.

- 1..5 – Configure Switch function

As of version 1.30 there are ten switch functions defined:

- 1) Do Nothing
Pressing the button will not do anything.
- 2) Snap – Take a picture
Pressing the button will cause a picture to be taken immediately, even during a Simple or Advanced Time-Lapse operation. Holding the button down will cause the camera to take pictures as rapidly as it can (depends on the camera model, image resolution, etc.).
- 3) Zoom Out
Changes the focal length of the camera, for a wider angle image. When using the extended protocol (Nikon Coolpix), the action is quick and responsive. When using the standard protocol, the action is much slower, and changes in programmable increments. There are some cameras that do not support this command at all.
- 4) Zoom In
Changes the focal length of the camera, for a telephoto image. When using the extended protocol (Nikon Coolpix), the action is quick and responsive. When using the standard protocol, the action is much slower, and changes in programmable increments. There are some cameras that do not support this command at all.

- 5) Time-Lapse Control
When pressed very briefly (i.e. less than one second), the Simple Time-Lapse sequence will be re-started and stopped, alternately.

When pressed and held for an extended time, the Simple Time-Lapse interval can be programmed in the field! After being held for two seconds, the DigiSnap will flash yellow once a second, allowing the user to count off the desired time interval before releasing the button. The number of pictures is automatically set to infinite. Once programmed, the Time-Lapse operation may be started by pressing the button again briefly. Pressing the button briefly when the time-lapse in progress will halt the time-lapse operation.

The field programmed interval is not retained when the DigiSnap turns off. When the DigiSnap is turned back on, it will use the interval last configured via a terminal.

- 6) LCD Monitor Toggle (On/Off)
Pressing the button will alternately turn the camera’s LCD monitor on and off. Note that when using the extended protocol (Nikon Coolpix), the LCD cannot be remotely turned off.
- 7) Power
When pressed, the DigiSnap will shut itself off, and will command the camera to switch to a low power setting as well.
- 8) Focal Length
This function allows the camera zoom to be set to a repeatable, programmable position. This function is not available when using the extended protocol (Nikon Coolpix).
- 9) Protocol
As touched on previously, the DigiSnap can communicate via two different protocols to digital cameras. The standard protocol is common to many cameras. In the later model Nikon Coolpix cameras, there is a protocol extension which is designed for more responsive remote control of the cameras. The number of features supported by the protocol extension is limited though. Only one of the protocols can be active at a time. When the button is pressed, the camera will toggle between these two protocols, presuming the camera will support the extended protocol.

- 10) **FastSnap**
When pressed, the DigiSnap toggles in and out of FastSnap (see features section).

The DigiSnap 2000 is shipped with a default set of switch functions.

Switch 1 (▼) is set for Zoom Out.

Switch 2 (☺) is set for Time-Lapse Control.

Switch 3 (✳) is set for Snap

Switch 4 (▲) is set for Zoom In.

Switch 5 (External Signal) is set for Snap.

Other DigiSnap models may use a different set of defaults.

- **Z – Zoom Step Size**

This pertains to zoom control using the standard protocol. The zoom is controlled by changing the focal length setting in discrete steps. This command sets the step size used to control the zoom. A large step permits faster zooming from wide to tele, but reduces the precision. When using the extended protocol, the zoom operation is smooth and continuous, and the step size is not used.

- **R – Zoom Refresh**

Some cameras require the LCD to be refreshed after completion of a zoom operation using the standard protocol. This command allows this refresh to take place.

- **F – Focal Length**

This command allows a focal length to be entered, to support the Focal Length switch function. If a focal length of 7.0 mm is desired, a value of 70 is entered. The range of useful values depends on the camera mode. Some camera models may not support this function.

- **Q – Quit**

This command returns control to the Main menu.

Special Features Menu

IR Trigger : Enabled

IR Trigger Action : Snap : Take Picture Immediately

Output Active During Single Snap : Enabled

During Time-Lapse : Enabled

Output Enabled before Snap : 000

Output Disabled after Snap : 000

Serial Camera Control : Enabled

Output Active Low

FastSnap : Disabled

Commands (enter a single letter)

I - Configure Infrared Trigger Feature

O - Configure External Output Feature

F - Configure FastSnap Feature

Q - Quit (Return to Main Menu)

The DigiSnap family of controllers is periodically updated with new features. Some of these features are made available for all DigiSnaps, via firmware updates, and some features are only built-in to specific models of DigiSnap. These features are also optional on all DigiSnaps that can support them.

- **I – Infrared Trigger**

When an IR transmission is detected, the DigiSnap can be configured to perform some action, typically take a picture. Currently the DigiSnap 2500 is the only model that has an IR receiver built-in.

- **O – External Output**

The external output is designed to roughly synchronize to the shutter of the camera. Roughly means that it is certainly not precise enough to synchronize a strobe. The output comes on at a configurable number of seconds before the camera takes a picture, and turns back off again a programmable number of seconds after the shutter closes. The output signal is therefore useable to control some low power lighting, drive a relay to control higher power lights, or perhaps pre-charge a strobe. Other uses might include motion control, etc.

Part of this configuration also involves the serial port of the DigiSnap. The serial port is required to talk to typical digital cameras. If the DigiSnap’s external output is to be used as an ‘electrical contact’ type of controller (see appendix A), then the DigiSnap does not use the serial port, and it should be disabled.

- F - FastSnap

There is typically a significant delay (up to several seconds) between when the DigiSnap is triggered, and when a digital camera actually takes a picture. If the camera uses the extended protocol, it is possible to use the Half-Press feature to preset the exposure and focus. When the camera is then set to Full-Press, the delay is quite short, on the order of 0.1 seconds. When the FastSnap feature is enabled, the DigiSnap will automatically set the camera into Half-Press mode after every picture is taken, so that when it is triggered (button press, IR trigger, external input) it takes a picture with very little delay. Note that it is possible to enable and disable the FastSnap feature using one of the DigiSnap buttons as well (see Switch menu).

- Q – Quit

This command returns control to the Main menu.

Compatibility

The DigiSnap 2000 was developed to use a command protocol common to many of the digital cameras on the market. The DigiSnap 1000 was initially developed using the public description of the protocol exists, per the work of Eugene Crosser. We offer our thanks to Eugene and all others who helped to document this protocol. Since that time, Harbortronics has signed non-disclosure agreements with several camera companies, gaining access to official serial protocol descriptions, permitting the addition of features not described in the public domain.

The DigiSnap 2000 should be compatible with essentially all cameras which share this protocol, which includes multiple camera models from several different manufacturers. Each camera manufacturer may extend the command set to add features specific to various camera models. The latest Nikon Coolpix models are an example of this, and the DigiSnap makes use of this extended command set to offer additional features, such as half-press, and bulb operation. Some features such as the Zoom control may not be supported by all cameras.

Given that the electronic shutter release process is different than that of a switch press on the camera, there very well may be differences in the operation of a particular camera when operated using the DigiSnap 2000 and when operated manually. Given the multitude of cameras that support the protocol, it is impossible for Harbortronics to test each camera model of each manufacturer to isolate the idiosyncrasies of operation with the electronic shutter release.

The Harbortronics web site (www.Harbortronics.com) offers a public domain DOS program for download, which operates on PC compatible computers, allowing any digital camera user to test their camera with the same algorithms (single shot only) used in the DigiSnap series. If the camera is compatible with the PC software, it will be compatible with the DigiSnap 2000.

Battery

The DigiSnap 2000 is shipped with a battery installed, to allow immediate use. The DigiSnap 2000 uses a single AAA size battery. Alkaline batteries are the preferred type, as they will yield the longest life under normal use.

The case must be disassembled to access the battery, which is easily removed and replaced by the user. The two screws on the bottom of the case must be removed to open the case, and a small Philips screwdriver is shipped with the DigiSnap 2000 to facilitate this operation. The battery polarity is indicated by a simple drawing on the circuit board. Installing the battery backwards will not damage the DigiSnap 2000, but the DigiSnap will not work, and the battery will be drained fairly quickly.

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 for service instructions.

Appendix A: Remote Control of Digital Cameras

The fundamental operation of a remote shutter release is to cause a camera to take a picture without having to physically touch the camera, minimizing movement when the shutter is open. Very few digital cameras provide for the mechanical connection of a classic cable release, so some individuals have crafted devices which attach to the camera body permitting use of a cable release. Another class of remote shutter release is that of a remotored switch, whereby the camera manufacturer provides an electrical connector, as well as a switch mechanism on a cable, to simulate the action of the camera switch remotely. The DigiSnaps are electronic shutter release, whereby the camera is commanded to take a picture using a command and response protocol over a serial communication link.

There are some important differences in the operation of an electronic shutter release as opposed to a cable release (mechanical) or remotored switch (electrical). In most cases, the shutter release switch on a camera has three positions (off, half-pressed, and fully-pressed). When half-pressed, the camera may perform some preliminary operations (focus, etc.) in anticipation of the switch becoming fully pressed. Most digital cameras do not provide this two step operation via the remote commands. When commanded electronically, the cameras perform these required tasks in sequence, as if the camera switch were fully pressed in one motion. This can require up to a few seconds to complete. The latest Nikon Coolpix cameras, however, do allow for electronic control of half-press and full-press, allowing the remote control user to more precisely control when to release the shutter, which the DigiSnaps can utilize. Depending on the particular camera model, and firmware version, there may be other performance differences when using an electronic release as well. Another difference is that electronic commands can be transmitted via a number of pathways (i.e. internet, phone lines, radio modems, etc.), without regard for physical distance, whereas a mechanical cable release is quite limited in distance.

The advent of the electronic release adds yet another twist, that of automated control. There are a few programs available via the internet to control digital cameras through the use of a personal computer. The DigiSnaps, being small battery powered devices, eliminates the tie to a computer.

The DigiSnap products also provide sophisticated Time-Lapse image capture. They may be configured to take a number of pictures in a sequence, i.e. take 50 pictures in a row, at an interval of 20 seconds between each, beginning when the button is pressed. Furthermore, there is an advanced Time-Lapse configuration mode, whereby the DigiSnaps can initiate Time-Lapse sequences during particular times of the day, operating unattended over the course of several days or longer.

Appendix B: DigiSnap Family

DigiSnap 1000

This model was the original digital camera electronic shutter release from Harbortronics, and indeed was the first of its type on the market. The DigiSnap 1000 used a single switch, so was not able to provide control of focal length, or other functions. The DigiSnap 1000 also provided simple and advanced time-lapse features. The DigiSnap 1000 is no longer in production.

DigiSnap 2000

The 2000 is a four button release, permitting control of multiple camera functions, such as focal length, shutter release and time-lapse control. The 2000 is design to be extendable to accommodate a huge range of possible control applications. The switch functions may be reconfigured by the user to aid in specific applications. All of the DigiSnap 2xxx models are based on the 2000, having additional connections and sensors.

DigiSnap 2100

The 2100 provides an extra connection for external trigger sources, as well as an output signal to control other equipment, such as lighting. These connections are made through the existing DB-9 connector, which may require a customized adapter to make use of these signals when attached to a camera. The DigiSnap 2100 includes an additional firmware feature to control the output signal roughly synchronized to the shutter.

DigiSnap 2200

The 2200 adds a separate connector (standard mini-phone jack) to more easily connect the DigiSnap from an external signal source. The DigiSnap 2200 includes an additional firmware feature to minimize the time between the time the DigiSnap is triggered, and when the camera actually takes the picture. This feature is only supported by the Nikon Coolpix cameras which utilize the extended protocol.

DigiSnap 2500

The 2500 is intended to support a wide range of technical applications. The 2500 adds a four pin connector as well as a mating cable. This connector provides access to the internal 5V power supply, as well as a trigger input, and a high power output switch which can drive some lighting and relays directly. An additional firmware feature is included with the 2500 to control the output switch.

The 2500 also includes an IR receiver, which is compatible with many remote control devices, including the Cannon and Olympus IR remote transmitters, as well as TV remote controls! An additional firmware feature is included to support IR triggering.

DigiSnap 3000

The 3000 is intended for professional remote control applications, where a digital camera, lighting, and other sensors can be controlled via a serial connection. The initial application for the 3000 is for underwater camera systems, as might be used in deep ocean settings.

Appendix C: Application Specific Recommendations***Portrait Studio***

Many portrait applications require the photographer to manually work with the subject to optimize positioning and poses. Having a way to remotely control a camera on a tripod is essential, and minimizing the shutter delay is also essential.

We recommend a camera that supports the extended protocol, in order to make use of the FastSnap feature of the DigiSnap. In addition, we would recommend IR control to give the photographer the most flexibility. These combination of features may be found in the DigiSnap 2500, with the addition of the optional FastSnap feature.

The Nikon Coolpix 5000 would be a very suitable camera for this application.

Technical Studio / Product Photography

In a technical studio, speed and remote control are secondary to precision.

A camera remotely controlled by a computer might be the optimum setup in this application. Several camera manufacturers have software designed to control and acquire images from their high end digital cameras.

In product shoots, the photographer may be required to set up at the customer plant, and operate quickly to minimize production disturbance. In this scenario, it may be required to abandon the computer for instant review and download, use a more portable camera and simply blast a bunch of shots. To minimize vibration in a standard digital camera on a tripod, we would simply recommend the DigiSnap 2000.

Nature Study – Field

There are many difficulties and specific issues associated with nature photography. Animal photography commonly uses long lens', making the use of an electronic remote such as a DigiSnap very useful for minimizing vibration.

Bird nest studies can be performed either by long range remote control of a camera or by time-lapse photography, both of which the DigiSnap supports nicely. One customer has used DigiSnaps on location to document Puffin nesting habits on a remote island in the far north.

Animals and plant activity both tend to vary on a daily cycle. The DigiSnap products include the ability to perform time-lapse studies using a daily clock schedule.

Some applications involve triggering a camera based on an event, such as an animal triggering a sensor. The DigiSnap 2100, 2200 and 2500 have external trigger inputs which can be integrated with essentially any sensor technique.

Biology Laboratory

Population studies, growth rates and other temporal monitoring is most easily accommodated using time-lapse photography. Long term monitoring may require external power sources. The DigiSnap 2500 is well suited for this application, and are indeed in use by researchers performing insect population studies.

Agricultural Monitoring

Time-lapse photography is an obvious solution to long term monitoring of crops, and other agricultural processes. The DigiSnap 2500 is well suited for this application, and can be externally powered to accommodate unattended long term applications. DigiSnaps are currently in use performing vineyard studies.

Microscopy

There are a number of applications for digital camera use with microscopes. We have several customers using DigiSnaps to control cameras in pathology labs and other medical and industrial applications. In most applications, accessing the camera controls is not a workable option given the positioning of the camera and microscope.

Remote control of a camera tethered to a computer is an attractive option here, except in labs with multiple setups, where a computer must be dedicated to each microscope. The DigiSnap is an excellent solution for these situations.

Panoramas / Architecture

Some photographers require precise knowledge of focal length settings in their work, in order to provide a reasonable estimate of scale in the final image. In many applications, multiple images must be taken from varying angular or linear positions, using a repeatable focal length.

The DigiSnap provides the capability to program a desired focal length, and have the camera repeatably set the lens to that position, making it very attractive for these situations.

Astrophotography

Digital Astrophotography has classically been performed using specially designed actively cooled CCDs to minimize thermal noise, and permit long integrations. With the advent of reasonably low cost consumer digital cameras, digital astrophotography is increasing in popularity. While the integration periods are nowhere near as long as with dedicated imagers, increased resolution, lower cost, ease of use, etc. are providing the impetus.

The DigiSnap has been designed with astrophotographers in mind. The DigiSnap 2000 can be operated in the dark, having switches in positions to aid in finger placement. The time-lapse interval is set by monitoring a flashing light, and most operations are signaled by a light as well.

Digital cameras which support the extended protocol can be operated in bulb mode, and the DigiSnap uniquely provides programmable bulb timing during time-lapse as well as manual bulb operation.

Some applications require repeatable setting of the camera focal length. The DigiSnap provides the capability to program a desired focal length, and have the camera repeatably set the lens to that position, making it very attractive for technical astrophotography.

Sports

Sports involves action, suggesting that a key equipment requirement is speed. The folks who designed the Pocket Wizard RF controller requested a DigiSnap model that could be used with their remotes. One driving application is basketball photography. A camera placed behind the back board needs to be controlled remotely, and with high speed.

The DigiSnap 2200 is eminently suitable for this type of application. The DigiSnap can be triggered by simple cabled connection to a Pocket Wizard controlled from the stands. The FastSnap feature allows the digital camera to recycle to a half-press state immediately after every picture, allowing it to take a picture quite rapidly when triggered into full-press state by the RF remote.

Self-Portraits

Many digital cameras provide IR receivers on the front of the camera to allow a photographer to operate the camera while standing in front of the camera. The Nikon Coolpix cameras among others do not offer IR capability. The DigiSnap 2500 integrates an IR receiver within its case, allowing most any IR transmitter to trigger the camera.

Construction Sites

Time-lapse photography is an obvious solution to long term documentation of construction projects. The DigiSnap 2500 is well suited for this application, and can be externally powered to accommodate unattended long term applications. There are several major construction projects which have DigiSnap controlled cameras already in place.

Surveillance

Human activity typically varies periodically with the time of day, particularly in business environments. Such areas can be monitored by time-lapse cameras, tailored to operate with different intervals at different times of day, to maximize the efficiency of the image collection. Parking lots, office lobbies, etc. can all be monitored with high resolution using digital cameras controlled by the DigiSnap which uniquely provides an 'Advanced' time-lapse operation.

Highly Remote Applications

Some applications for digital cameras involve attended operation at long distances, given hostile environments. The DigiSnap 3000 is designed specifically to address this requirement.

Non-Digital, and Digital SLR Cameras

Many high-end cameras provide a simple contact closure trigger input. The DigiSnap 2500 provides an output suitable to control these cameras in time-lapse and applications.