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Modular Covert IR Flash User Manual

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October 25, 2023

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2 Overview

The Covert Infrared (IR) flash (Figure 1) is an IR flash for use with outdoor game cameras with built in IR Flashes. The WilliamsRDM IR Flash attaches to a tree to provide additional IR lighting to extend the nighttime range of existing deployed game cameras. The IR flash consists of the IR flash Control Box, IR Emitter, and IR sensor. The IR Emitter is placed on a tree facing the direction where additional IR lighting is needed. The IR sensor is connected to the IR flash Control Box and placed in a location where it can detect the flash from the game camera(s) that will be used to trigger it. The IR Flash Control Box is small and can be hidden somewhere typically near the base of the tree where it can be easily connected to a covert solar power source. The IR Emitter incorporates a light sensor so that during the day it enters a low power mode to conserve power and does not activate until nighttime. During the day the IR flash can be recharged by a WilliamsRDM covert solar device for uninterrupted remote operation. The IR Flash Illumination duration can be adjusted by an internal adjustment dial and can rang from 2.5s to 60s to support video capture if desired but the included IR Emitter only supports durations up to about 5 seconds.



Figure 1: Covert IR Flash System

IR Flash System Component

- IR Flash Control Box
- IR Emitter with 15ft cable
- IR Sensor with 15ft cable

Key Features

- Covert Enclosure designed to blend in with the environment.
- 180-degree sensor allows multiple cameras to trigger the IR flash from different angles.
- Covert IR flashes can trigger each other to illuminate larger areas.
- Quickly Installs to a tree using included screws.

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- 940nm IR Illumination for covert operation
- 30W IR Emitter included.
- Works with off the shelf 12V, 33W IR and Visible Emitters using an adapter cable.
- Adjustable Flash Duration 2.5s to 60s (5s Maximum with included IR Emitter).
- Approximately 300 flashes per battery charge
- Compatible with WilliamsRDM Covert Solar Devices to provide continuous uninterrupted operation.
- Replaceable Rechargeable 18650 Lithium-Ion Batteries

3 IR Flash Control Box

Figure 2 shows the IR Flash Control Box. The unit is powered on by pressing the power button indicated by the power symbol. The unit is "ON" when the button is depressed and "OFF" when it is not depressed. The Status indicator is a red LED and is used to indicate the battery status when the unit is powered on as well as to perform an alignment/walk test at night. To keep the IR flash unit concealed the LED Indicator is only active for the first 10 minutes after the unit is powered on.



Figure 2: IR Flash Control Box

The IR Sensor (SENSOR) and IR Emitter (OUT) Connectors are shown in Figure 3. The SENSOR connector is used to connect the IR sensor to the Flash Control Box while the OUT connector is used to connect the IR Emitter to the control box. When the IR sensor and Emitter are not connected, for instance when the IR flash is stored or being transported, the waterproof cap should be inserted to keep out water and other contaminants.



Figure 3: IR flash Control Box Sensor and Emitter Connectors

Figure 4 shows the Solar Input Connector which is used to connect a WilliamsRDM covert solar panel to the IR flash unit to recharge the batteries for uninterrupted operation. Alternatively, an 8173-2 AC Wall adapter can be connected to this input to charge the unit from AC power.



Figure 4: Solar Power Input Connector

4 Battery Indicator

When the IR Flash Control Box is turned on the red status indicator on the front of the unit blinks to indicate the battery level. With a Full charge the IR flash will generate approximately 300 flashes with a 2.5s duration. If the IR flash is blinking rapidly this means that the unit will not flash and is in a low power mode waiting to be recharged. In this state the IR Flash Control Box will reactivate once the battery charges to an acceptable level. This is useful when the flash is deployed but has stopped working due to an obstructed or damaged solar device. You can replace or unobstructed the solar device and the flash will resume operation once its batteries are sufficiently recharged.

Number of Blinks	Battery Charge
5	80% - 100%
4	60% - 80%
3	40% - 60%
2	20% - 40%
1	3% - 20%
Rapidly Blinking	< 3% Battery Needs Charging
1 Long 3 Second Blink	Control Box Fault
None	Batteries Exhausted or Not Installed

5 Flash Duration Adjustment

The On Duration of the IR Flash Can be Adjusted from 2.5s to 60s by opening the enclosure and turning an adjustment dial with a small precision screwdriver. Figure 5 shows the location of the adjustment dial while Figure 6 shows a close-up view of the dial. As indicated on the circuit board turning the dial clockwise increases the flash duration while turning the dial counterclockwise reduces the flash duration. The dial only turns ¾ of the way around so care should be taken not to force the dial beyond its limits. When performing an alignment test discussed in section 11 the status duration corresponds to the selected flash duration.



Figure 5: Duration Adjustment Dial



Figure 6: Duration Adjustment Close Up

By default, the IR Flash has a default setting of 2.5s which has proven to work well with most cameras including those from Spartan and Buckeye. The longer 60s duration may be useful when using a camera to collect video or use the live streaming feature of a camera at night. There is a tradeoff between flash duration and power consumption. When using the default flash duration of 2.5s the IR Flash unit can support 300 flashes on a fully charged battery. Increasing the flash duration will reduce the number of flashes. It is recommended to use a covert solar power source to recharge the batteries during the day for sustained operation.

The IR Emitter included with this kit has an internal timer that shuts it off after about 5 - 10 seconds so increasing the flash duration beyond this limit will not keep the IR Emitter on longer. For additional IR Flash Emitter options contact Williams RDM or see section 6 for off the shelf options.

5.1 Spartan Ghost, GoLive and GoLive2 Camera Configuration Mode Flash Duration

From testing with the Spartan Ghost, GoLive and GoLive2 cameras the default flash duration of 2.5s works well when deployed. If testing the cameras by using the camera configuration menu to take a test picture the flash duration may be too short. When the camera is in its configuration/test mode the flash comes on a few seconds before the camera actually takes a picture which means the flash turns off before the picture is taken. We recommend setting up the camera and waiting for it to exit setup mode then perform a walk test to test the IR Flash. If the user does wand the IR Flash to work when the camera is in setup mode, the flash duration needs to be increased to about 5 seconds.

6 Off the Shelf IR Emitter Options

In some circumstances the user may want to use the IR Flash with an off-the-shelf IR Emitter or IR Floodlight instead of the included IR Emitter. This may be because there is not a covert requirement, or the user has existing

off the shelf IR Emitters they wish to use. The IR Flash Control Box can power most off-the-shelf IR Emitters or IR Floodlights as well as other floodlights provided the light is powered from 12V and uses a maximum power of about 33W. Figure 7 depicts some examples of off-the-shelf IR Emitters available from websites such as Amazon.



Figure 7: Off-The-Shelf IR Emitter Examples

Most commercial 12V floodlights use a standard 2.1 mm barren jack as shown in Figure 8. AS along as the floodlight uses the standard 2.1 mm barrel jack and is powered from 12V and uses less than 33W it can be used with the IR Flash Control box.



Figure 8: Standard 2.1mm Barrel Plug Used on many COTS 12V IR Emitters/Floodlights

To connect the off-the-shelf floodlight the WilliamsRDM 8158-1-31 off-the-shelf adapter cable (Figure 9) can be used. This cable connects with a standard 12V floodlight barrel jack and provides 20ft of cable to connect with the IR Flash Control Box.



Figure 9: 8158-1-31 Off-The-Shelf IR Flash Adapter Cable

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7 IR Flash Installation

The IR Flash Equipment can be installed on a tree using the included 1 5/8-screws 7 screws are included with the IR Flash. Figure 10 shows the included mounting hardware and mounting holes used to attach the IR Sensor and IR Emitter to a tree. The IR Sensor has 3 pre-drilled mounting holes for use with up to 3 screws (typically only 2 are used) and the IR Emitter has 2 predrilled mounting holes for use with up to 2 screws. The IR Emitter is positioned to illuminate the area of interest. Typically, the Emitter is facing away from the camera that is taking the picture to minimize glare. The IR Sensor is mounted in a location where it can detect the flash from the camera using the 1 5/8-inch screws.



Figure 10: IR Sensor and IR Emitter Screw Locations

The IR Control Box can be mounted up to 15ft away from the IR Emitter and Sensor and is typically mounted near the base of the tree as shown in Figure 11. The box has mounting holes at the top and bottom for easy attachment with the included screws. Placing the IR Flash near the bottom of the tree allows a covert solar rock to be easily connected to the control box for sustained long duration deployments.



Figure 11: IR Flash Control Box Mounting

Warning! The IR Flash Control Box Should be powered off before connecting any cables.

Once the Covert IR Emitter is mounted its cable is then connected to the IR Flash Control box OUT connector. Once the IR Sensor is mounted the connector can be inserted into the IR Flash control Box "SENSOR" connector. The IR Flash Emitter and IR Sensor have different color tips (see Figure 12) on the ends of the connectors to help insure they are inserted into the correct connectors. The connectors are also different sizes, in particular IR Sensor connector can only be inserted into the "SENSOR" connector on the control box. When connecting the IR Emitter and IR Sensor connectors to the IR flash control box Ensure that the connectors are fully inserted into the mating connector and that the retaining ring is threaded onto the mating connector. If this is not done the equipment may not function properly and may not be waterproof.



Figure 12: IR Emitter (Black Tip) and IR Sensor (White Tip) connectors.

The IR sensor has a 180-degree left-right field of view and about a 60-degree field of view in the up-down direction if it is oriented vertically as shown in Figure 13. The sensor's 180-degree field of view allows multiple cameras with direct line of site to the sensor to trigger the IR flash, a WilliamsRDM covert solar device can be connected to the IR flash control box to provide continuous uninterrupted operation. Once the IR sensor is mounted and the optional solar panel is attached the IR Flash Control box can be camouflaged.



Figure 13: IR Emitter Unit Left and IR Sensor Right

See Figure 14 for an example of a complete installation. In the example installation no attempt was made to camouflage the components for illustrative purposes.



Figure 14: IR Flash Complete Installation

8 Painting

The convert IR flash Sensor and Emitter come pre-painted with a light dusting of paint to help camouflage them. If needed, additional paint can be added to provide additional camouflage. To maximize performance the amount of paint added to the unit should be minimized. Paint added to the IR sensor will reduce the trigger range of the IR flash while paint added to the IR Emitter will reduce the IR light output of the flash. If too much paint is applied to the IR Emitter Light Sensor then the unit may activate when there is still daylight which may impact battery life. If needed, you can apply a light dusting of spray paint to the IR flash unit and IR sensor. The

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IR flash unit and IR Sensor were painted at the factory with a light dusting of Krylon Camouflage spray paint. Care must be taken when applying additional paint, excessive paint may reduce performance and could possibly void the IR flash warranty.



Figure 15: IR Equipment Paint Location

Figure 15 shows the location of the lens and Ambient Light Sensor on the IR Emitter and the location of the internal IR sensor on the IR Sensor unit. If painting the IR emitter, care must be taken to ensure these areas are not over painted as it may affect the IR flash brightness and battery life. The sides near the tree when mounted as well as bottom and top of the equipment can be painted more heavily. Care should be taken when painting the IR sensor to minimize impact to the trigger range. Only a light dusting should be used on the IR sensor but be especially mindful not to overpaint the area near the internal IR sensor. If paint needs to be removed, we have had good results using mineral spirits on standard spray paint, but the paint may be difficult to remove due to the texturing.

9 IR Flash Unit Positioning

The IR Flash Unit should be positioned to illuminate the area of interest. Ideally, the flash should be mounted on a tree facing away from the camera to minimize glare from the covert IR flash. Figure 16 shows the enhanced illumination with the covert IR flash when positioned facing away from the camera. As you can see the image is significantly brighter with no excessive glare.



Figure 16: IR flash Ideal Positioning

If the IR flash is positioned such that the camera can see the illuminated portion of the flash, some glare in the image is possible. Figure 17 shows an image where the camera is positioned such that it can see the side of the IR flash. This causes a bright spot to appear in the image, but the image is still very useable. The glare from the flash may affect different models of cameras in different ways so it is something to keep in mind when positioning the camera and covert IR flash.



Figure 17: IR flash With Glare

10 IR Sensor Positioning and Triggering Range

The Covert IR Flash triggering range varies based on the deployment environment, alignment, camera model, camera flash power setting, camera battery levels etc. Figure 18 depicts a typical trail camera IR Flash Illumination pattern. The IR sensor must be placed somewhere inside the illuminated area. Since IR sensor is triggered by the flash from the trail camera, the brighter the flash from the trail camera the further away the IR sensor can be placed. The maximum distance from the camera will be obtained when the sensor is aligned in the center of the trail camera IR flash illumination area as depicted in Figure 18. The IR sensor will still work when not aligned in the center of the trail camera illumination area but, at a reduced range. The maximum range can be determined by the user in the field using the alignment test discussed in the next section. For ease of installation, we recommend placing the sensor closer to the camera than the maximum trigger range.

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Figure 18: Typical Trail Camera Illumination Pattern

The trigger range for most cameras is around 100ft. WilliamsRDM has performed tests with Spartan and Buckeye cameras to determine the maximum triggering range under ideal conditions when the IR sensor is positioned in the center of the trail camera's flash illumination area and the trail camera flash is set to maximum brightness. Table 1 depicts the ideal ranges when aligned and should only be considered as an approximate maximum triggering range for the camera type listed. For ease of installation, we recommend placing the IR sensor closer than the maximum range.

Camera Model	Maximum Range Under Ideal Conditions
Spartan GoCam	100ft
Buckeye X80	150ft

Table 1: Trigger Range under Ideal Conditions.

11 Alignment test

If the Trail Camera is not triggering the IR flash, an alignment test can be performed to test and align the position of the trail camera and IR sensor and ensure they work as desired. The test must be performed in a dark area or at night, so the Covert IR flash is active and not in its low power daytime mode. The Alignment mode is always active for 10 minutes after the IR flash unit is powered on. When in alignment mode, the red status LED indicator on the front of the IR flash unit illuminates along with the IR LEDs each time the IR flash is triggered. This allows the user to easily see that the flash is active since the human eye is unable to see the IR light emitted from the convert IR flash. The status LED can also be used to determine the flash duration since during alignment mode the status LED illuminates for the same duration as the IR flash. When performing the alignment test, the positions of the camera and/or the IR sensor can be adjusted to ensure the system works as expected. The alignment mode is automatically exited after 10 minutes from the time IR flash unit is powered on.

12 Batteries

The Covert IR flash is powered from two internal lithium-ion 18650 batteries and fully charged batteries will provide about 300 flashes. The batteries can be charged by connecting a WilliamsRDM Covert Solar Power system or alternatively they can be removed and charged in a standard 18650 lithium-ion battery charger.

12.1 Solar Charging

To ensure the IR flash can operate for long durations in remote locations it should be connected to a WilliamsRDM covert solar panel. The solar panel will ensure that the flash is recharged during the day and is ready to take additional pictures at night. The covert solar panel attaches to the 3-pin connector on the IR flash unit.

12.2 Non-Solar Charging

If the Covert IR Flash is used without a solar power source, then the batteries can be removed and charged via a standard lithium Ion 18650 battery charger available from various retailers. See section 12.3 for removal and replacement instructions. Alternatively, a separate 8173-2 AC power adapter is purchased from WilliamsRDM to allow the IR Flash Control Box to be charged form AC mains power.

12.3 Battery Replacement

The batteries in the Covert IR flash are rechargeable but, can wear out over time as is typical of rechargeable batteries. They can be replaced with standard flat top (NOT Button Top) 18650 Lithium-Ion rechargeable batteries. We recommend Molicel INR-18650-P26A which is a 3.7V 2600mAh flat top battery. Additionally, if the IR flash is being used without a solar power source or an AC power adapter then, then they batteries will need to be removed for charging.

The batteries are replaced by removing the four screws on the front cover of the IR Flash Control Unit (see Figure 19). The batteries can then be removed from the unit and replace with new or charged batteries. Pay careful attention to the battery polarity to ensure they are properly installed and pushed down into the battery holder. Additionally, ensure that both batteries are in same charge state either new and uncharged or fully charged and of the same brand. Don't mix and match batteries of different charge states or brands as these can damage batteries and impede the function of the IR flash. The following steps explain how to change the batteries.

- 1) Ensure the Power Switch is in the off Position (not depressed).
- 2) Remove the 4 Phillips screws from the front of the IR Flash Control Box and remove the lid.
- 3) Remove the old batteries.
- 4) Install the new batteries ensuring they are installed in the correct orientation.
- 5) Ensure batteries are completely seated in the battery holder.
- 6) Ensure the Desiccant packet is present in the enclosure.
- 7) Replace the Lid and Install the 4 Phillips head screws that were removed in step 2.



Figure 19: Battery Installation

13 Component Part Numbers

Part Number	Description
8158-1	Remote IR Camera Flash Kit
8158-4-1	IR Flash Control Box
8158-2-1	IR Emitter
8158-1-33	IR Sensor
INR-18650-P26A	Rechargeable Batteries
8160-1	Solar Rock for Sensor Node, Cluster Node, and IR Flash
8173-2	AC Charging Adapter

14 Specifications

Below are the specifications for the covert IR flash:

- 1) System Weight with batteries: 2.1lbs
- 2) IR flash Control Box Dimensions: 5.75" x 2.75" x 2.5"
- 3) IR Sensor Dimensions: 5.5" x 2.5" x 1"
- 4) IR Emitter Dimensions: 5.25"x2.5"x1.5"
- 5) IR Sensor cable Length: 15ft
- 6) IR Emitter cable Length: 15ft
- 7) Solar Power Input Voltage range: 12V 38V
- 8) Batteries: 2x 18650 flat top Lithium-Ion Batteries
 - a. Recommended: Molicel INR-18650-P26A
- 9) Compatible with WilliamsRDM Covert Solar Devices