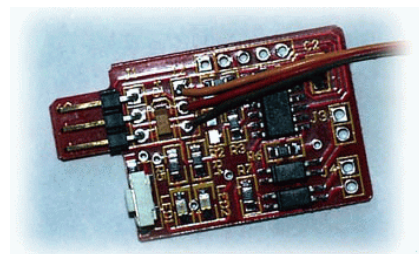


ShutterBug Pro is a tiny accessory that helps take digital or film camera snapshots. It is ideal for photographers that need to remotely snap photos or require an intervalometer timer. Despite its tiny size, it is packed with features.



FEATURE SUMMARY

- Remote shutter activation using a model hobby R/C receiver (not included).
- Standalone intervalometer operation using a flexible internal timer.
- Auto-Sequence shutter control for continuous snapshots.
- Supports two-stage (focus/snapshot) shutter operation.
- Compatible with R/C servos for mechanical shutter operation.
- Direct connect shutter interface uses safe solid state switches.
- Digital camera “keep awake” function.
- Operates on 3.3VDC to 5.4VDC (typical R/C servo voltage).
- Low current draw. 2mA idle, 35mA (plus servo) during snapshot.
- Weighs ~four grams, size 0.9" x 1.2"

WHAT IS IT?

ShutterBug Pro is a convenient accessory for expanding a camera’s shutter features. It precisely operates the focus and shutter stages upon a timed event or remote control signal. It can even auto-repeat the shutter for a rapid series of shots. It also can be used to prevent a digital camera from turning itself off, which is a real lifesaver in some applications.

A hobby R/C servo (not included) is used to activate the camera’s shutter button. Direct wire interfacing is possible too. For wireless remote photography, ShutterBug Pro is compatible with many popular model hobby R/C systems.



The photo on the left shows a small blue servo installed on a digital camera. In this installation the R/C servo was mounted using double sided foam tape (so it can be removed without damaging the camera). The servo’s rotating arm is carefully positioned above the shutter button.

Please keep in mind that each camera will be different. So some mechanical trickery is often needed to accommodate the servo. Just use your creativity to devise a reliable mounting arrangement.

Figure 3, Shutter Servo

SHUTTER ACTIVATION FEATURES

The shutter cycle can be configured to partially depress the shutter button, wait for the camera to focus, then snap the photo. At the end of the shutter action, it can be configured to [1] release the shutter until the next snapshot event, [2] rapidly auto sequence the shutter, or [3] hold the shutter button down continuously.

SHUTTER TRIGGER METHODS

There are four ways to take a snapshot.

TIMED EVENT (STAND-ALONE INTERVALOMETER OPERATION):

A user-programmable timer is available for time lapse photography. The timer has three ranges: 1-120 seconds, 1-120 minutes, or 1-120 hours. Please see Figure 4 for battery connections.

PUSH BUTTON SWITCH:

The onboard pushbutton switch can be manually pressed to snap a photo. This is ideal for testing your camera setup. It is available in all modes of operation.

WIRELESS REMOTE CONTROL:

ShutterBug Pro's 3-wire cable can be plugged into a spare channel of a model R/C receiver (not included). Brands such as JR, Futaba, Hitec, and Airtronics are compatible.

You may use a stick, knob, or switch on your R/C transmitter. Of course, the R/C receiver's unused servo channels are available to you, too.

Note: If you are using an R/C transmitter with Dual Rates or End Point mixes, set them to $\pm 100\%$.



Figure 4, ShutterBug works with model R/C systems.

WIRED REMOTE CONTROL:

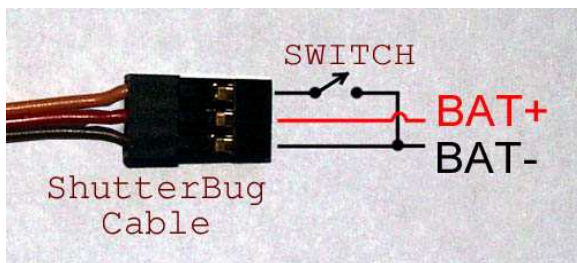


Figure 5, Battery and External Trigger Switch Wiring

Some applications may need to externally trigger a snapshot using a simple switch interface. ShutterBug Pro's 3-wire cable can be controlled by a switch, relay, or electronic logic signal. The photo on the right shows how an external switch is wired. When the orange wire is "grounded," the shutter is triggered.

INSTALLATION

ShutterBug Pro is compatible with R/C servo-activated shutters and direct (hardwired) connections. The servo method is the most popular because it does not require camera disassembly or modification.

SERVO METHOD

As mentioned, a standard R/C servo can be controlled from ShutterBug Pro's timer feature or it can be remotely activated using a model R/C system. Servos are available from R/C model hobby shops. For example, the tiny Hitec HS-55 is low cost and a popular choice. How you mount it is up to you.

To install the servo on ShutterBug Pro, simply plug it into the 3-pin connector. The servo cable's Signal (yellow, or white) wire is positioned so that it is closest to the outside edge. The servo is then mounted on the camera with adhesive or double sided foam tape. The goal is to have the servo arm press the shutter button, so your installation should allow that.

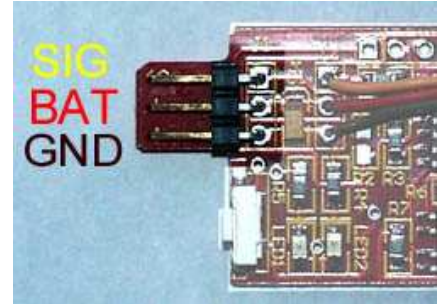


Figure 6, Servo Connector

DIRECT CONNECT METHOD

Note: The direct connection method requires delicate electronic soldering, and difficult modifications to your digital camera that will void the warranty. You, and only you, are responsible for any damage that may occur in your attempt to modify your camera. Do this installation at your own risk. Please note that we are unable to offer specific instructions on how to modify your camera.

The ShutterBug Pro can electronically connect to some digital photo cameras. Its direct connect interface uses two solid state "switches." The Stage-1 switch is for focus and Stage-2 is for shutter (snapshot). The switches are optically isolated, which provides electrical protection to your camera.

ShutterBug Pro's direct connection provides the electrical closure to the contacts on your camera's shutter button. Stage-1 (focus) is switched-on first, followed by Stage-2 (shutter). All switches are turned off after a short final delay. Total focus/shutter activation time will depend on the settings you have chosen (please see System Programming section).

The photo on the right shows how the two camera stages are identified on ShutterBug Pro's circuit board. The connections must be made by soldering your custom made wiring cable to the indicated pads. Use a temperature controlled soldering iron set for delicate soldering work.

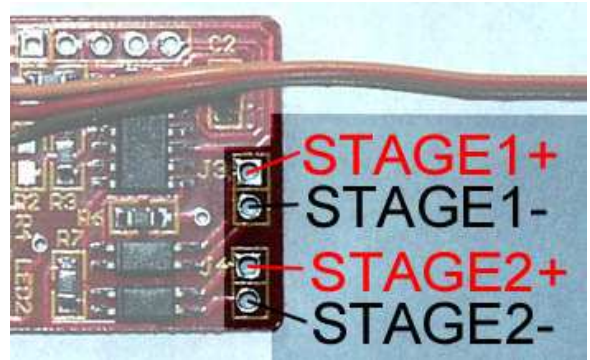


Figure 7, Basic Direct Connect ID

The Stage-1 and Stage-2 switches are polarity sensitive. So, they must be wired to match the polarity of your camera. This can be determined by using a voltmeter across the camera's shutter button (switch) contacts during its resting state.

Direct Connect Method: 2-Wire

Not all cameras do a focus when the shutter button is depressed. Or perhaps you do not want to use the cameras auto focus feature. If so, only two wires are needed.

N/A	Not Used
SHUT+	Shutter Positive
SHUT-	Shutter Negative

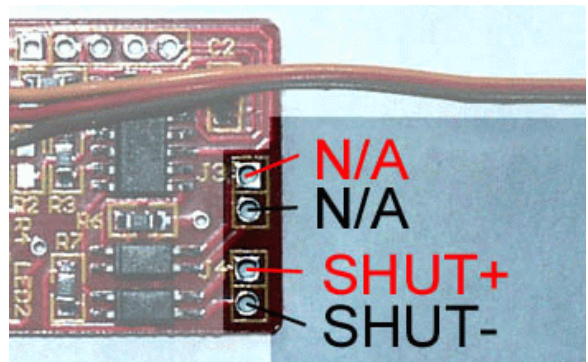


Figure 8, 2-Wire Layout

Direct Connect Method: 4-Wire

Typical wiring for a camera that has an auto focus stage is accommodated with the 4-wire scheme.

FOC+	Focus Positive
FOC-	Focus Negative
SHUT+	Shutter Positive
SHUT-	Shutter Negative

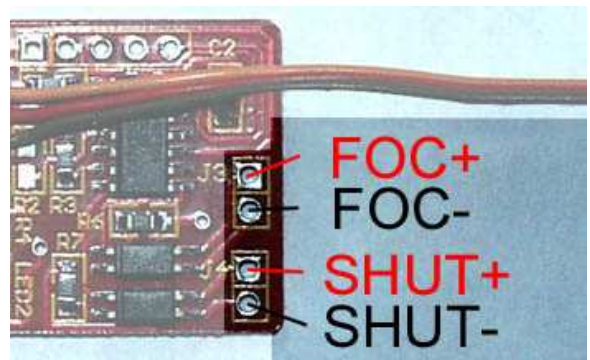


Figure 9, 4-wire Layout

SYSTEM PROGRAMMING

ShutterBug Pro's flexibility is due to its user-programmable features. In other words, it can be configured to your special requirements.

The system programming feature allows you to set the following features:

- Camera wake-up interval.
- External Trigger mode (R/C or external switch).
- Shutter mode.
- Shutter repeat (auto-sequence) interval.
- Focus duration.
- Home servo position.
- Focus servo position.
- Shutter (snapshot) servo position.

ShutterBug Pro is factory configured with the following settings. Of course, any of these settings can be changed to suit your application.

CONFIGURATION TYPE	DEFAULT VALUE	RANGE OF VALUES
Wake-up/Standalone Interval Period	60	2 to 120
Wake-up/Standalone Interval Units	Seconds	Sec, Sec10X, Min, Hr
Shutter Repeat Interval	Four Seconds	1 to 30 seconds
Shutter Dwell Time	One Second	½ to 10 seconds
Shutter Repeat/Hold Mode	Repeat	Once, Repeat, Hold
Focus Dwell Time	Two Seconds	1 to 10 seconds
External Trigger Mode	R/C Signal	R/C or External Switch
Servo Home Position	Full Left (1.0mS)	Any servo rotation position
Servo Focus Position	Center (1.5mS)	Any servo rotation position
Servo Snapshot Position	Center Right (1.7mS)	Any servo rotation position

PROGRAMMING INSTRUCTIONS

“Programming” ShutterBug Pro involves pressing the push button switch while observing the red and yellow lights. If you are installing a servo then you will also need your R/C radio (or servo signal simulator) to program the servo position settings.

Each programming step involves a blinking Yellow LED. The blink pattern indicates the programming step that you are on. There are ten steps, so there are ten unique LED patterns that will be seen by the time programming is complete.

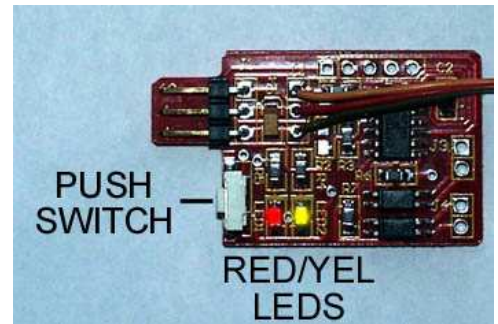


Figure 12, Push Button Switch

At each step you will respond by pressing the push switch. The number of presses will program the feature. For example, during the “Shutter Repeat Interval” programming step, pressing the switch four times will set the shutter repeat time to four seconds. Once you are done with the step, just wait three seconds for the Red LED to wink once. ShutterBug Pro will then move to the next step. If desired, programming can be exited by removing power after the Red LED winks, which will leave the remaining values unchanged.

If your entry is illegal, the Red LED will rapidly flash for several seconds as a warning. You will then be allowed to try again. During steps one through seven, if you do not enter your value within seven seconds, ShutterBug Pro will move to the next step. This allows you to skip the steps you do not want to change.

The LED patterns are arranged as simple patterns of short and long blinks. The following table outlines the blink codes (● = short blink, ■ = long blink, ■ = Red LED On).

STEP	RED LED	YEL LED	DESCRIPTION
1	Off	●	Camera Wake-up/Standalone Interval
2	Off	●●	Wake-up/Standalone Interval Units
3	Off	●●●	Shutter Repeat Interval
4	Off	●●●●	Shutter Dwell Time
5	Off	● ■	Shutter Repeat / Hold Mode
6	Off	●● ■	Focus Dwell Time
7	Off	●●● ■	External Trigger Mode
8	■	●	Servo Neutral (Home) Position
9	■	●●	Servo Stage 1 (Focus) Position
10	■	●●●	Servo Stage 2 (Snapshot) Position

START OF PROGRAMMING

Programming begins by holding down the pushbutton switch while you apply power to ShutterBug Pro. Continue to press the switch until the Red LED is on. When you are ready start programming, release the switch. Now the fun begins!

Step 1: ● Camera Wake-up/Standalone Interval.

Range: 1 = Turn Off, else 2 - 120

Depending on the operating mode, the Wake-up/Standalone interval is used to prevent the camera's power save feature from putting the camera to sleep or to determine the time between snapshots.

WAKE-UP

While in the R/C or external trigger mode (see Step 4), this is the delay time before the next shutter "Keep Awake" movement. At the time interval you choose, the Stage 1 (focus) position will be active for a moment, which keeps the camera awake. So, to prevent your digital camera from falling asleep, set this time to be less than the camera's maximum allowed inactivity duration. For example, if your camera turns itself off in five minutes, then enter four presses and choose "Minutes" in Step-2 (for four minutes). If it turns off in 60 seconds, then enter five presses and choose "10X Seconds in Step-2 (for fifty seconds).

STANDALONE

When in the Standalone mode, this is the time delay before the next snapshot. If you want to take a photo every five minutes, enter five presses and choose "Minutes" in Step-2 (for five minutes). If you want a photo every two hours, enter two presses and choose "Hours" in Step-2.

Step 2: ●● Camera Wake-up/Standalone Interval Units.

Range: 1= Seconds, 2= 10x Seconds, 3= Minutes, 4= Hours.

This entry is a companion to Step 1. It sets the time units (resolution) for the Camera Wake-up/Standalone Interval. For example, press three times for minutes.

Step 3: ●●● Shutter Repeat Interval

Range: 1 to 30 seconds.

This entry configures the shutter repeat time. It is only observed when ShutterBug Pro is used in the “Repeat” mode (see Step 5). Each press is one second, with a maximum of thirty seconds. For example, for a rapidly repeating two second shutter period, press twice. The timer begins at the end of each snapshot.

Step 4: ●●●● Shutter Dwell Time

Range: 0.5 to 10 seconds (with half-second resolution).

This entry configures the Shutter (Stage-1) dwell time. Each press is one-half second, with a maximum of ten seconds (twenty presses). For example, to set a 1.5 second Shutter time, press three times.

Step 5: ● ■■■ Shutter Repeat / Hold Mode

Range: 1= Once, 2= Repeat, 3= Hold.

The shutter can be configure to operate in three different ways. They are as follows:

- Once: Press and release the shutter button once. Do not press again until the next external trigger (R/C or external switch).
- Repeat: Cycle the shutter to take rapid sequence of photos. Continue repeat until the external trigger is released.
- Hold: At the end of the snapshot, continue holding the shutter active until the external trigger is released. Once the external trigger is removed, the shutter will continue to stay active until the expiration of the Shutter Dwell Time period. During the Standalone mode, the shutter will remain active until the pushbutton switch is pressed.

Step 6: ●● ■■■ Focus Dwell Time

Range: 1= Off, else 1 to 10 seconds (with half-second resolution).

This entry configures the focus dwell time. One press will disable Focus (Stage-2) operation. Beyond that, each press is one-half second, with a maximum of ten seconds (twenty presses). For example, to set a 1.5 second focus time, press three times.

Step 7: ●●● ■■■ External Trigger Mode

Range: 1= R/C Signal, 2= External Switch.

This entry configures ShutterBug Pro for the type of external snapshot trigger you need. For example, if you will be using it with an R/C receiver, press once for "R/C Signal." To use the external switch method, press twice.

Important Note: Standalone mode users must set this feature to "R/C Signal."

NOTES ON SERVO POSITION PROGRAMMING (STEPS 8 - 10):

(1) During programming steps eight through ten, the Red LED will be on. This serves to warn you that servo position programming is active. **(2)** If you are using the direct connect method these steps can be ignored. **(3)** There are no time limits to setting the servo positions; a key press selection must be made to continue to the next step. You may press twice to reload the factory defaults or press three times to skip the entry with no change. **(4)** When setting the servo position, the Red LED will urgently flash for several seconds if the R/C signal is missing. If this occurs please check your R/C equipment and try again.

Step 8: ■●● Neutral (Home) Servo Position

Range: 1= Store servo position, 2= Load factory default, 3= Skip (no change).

This entry allows you to precisely set the neutral (home) servo position. Use your R/C transmitter (or servo signal simulator) to position the servo arm away from the camera's shutter button. Once it is where you want it, enter one press.

Step 9: ■●● Stage 1 (Focus) Servo Position

Range: 1= Store servo position, 2= Load factory default, 3= Skip (no change).

This entry allows you to precisely set the Stage-1 (focus) and Wake-up servo position. This is a half-pressed shutter button on cameras that support this. Use your R/C transmitter (or servo signal simulator) to position the servo arm so that it half-presses the shutter button. Once it is where you want it, enter one press.

Step 10: ■●●● Stage 2 (Snapshot) Servo Position

Range: 1= Store servo position, 2= Load factory default, 3= Skip (no change).

This entry allows you to precisely set the Stage-2 (snapshot) servo position. Use your R/C transmitter (or servo signal simulator) to position the servo arm so that it GENTLY provides a fully depressed shutter button. Do not allow it to press too hard or the servo will wear out very quickly. Once it is where you want it, enter one press.

LED STATUS INDICATORS

The Red and Yellow LED indicators provide status information during normal operation. A quick glance can determine the operating mode, external R/C signal condition, and snapshot activity.

- While idle, the Red LED will periodically blink the operational mode. The blink code is defined as follows:
 - One Blink = R/C Trigger mode.
 - Two Blinks = Standalone mode.
 - Three Blinks = External Trigger Switch mode.

- If the R/C servo signal becomes corrupt (or is no longer detected), the Red LED will constantly blink until the R/C servo signal is restored. Note: This applies only to the R/C trigger mode.

- During a snapshot, the Yellow LED will operate as follows:
 - Rapid Flash = Stage-1 (Focus) active.
 - Solid Yellow = Stage-2 (Shutter) active.



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90 Day Limited Warranty

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1. Malfunctions due to improper installations, non-authorized repairs, tampering, misuse, dropping impact or modification.
2. Possible incompatibility with other A/V equipment.
3. Damage due to acts of God, lightning or accident.
4. Incidental or consequential damages, including damages from delay or loss of use, or equipment damage to other customer owned equipment .
5. Any product whose serial number has been altered, defaced or removed.
6. Batteries, cords, wall mounted transformers, cosmetic parts or routine maintenance.
7. Adjustment of customer-operated controls and features as explained in the instruction guide.

WHEN SERVICE IS NEEDED DURING THE WARRANTY PERIOD:

1. Contact DPC using the "contact us" link instructions found at www.dpcav.com. Please provide the model name, serial number, purchase date, and specific details to the problem. If DPC determines that service is required, they will issue a Return Authorization (RA) number and they will request that you return the unit.
2. Pack the unit in its original packing materials (or suitable equivalent) with all accessories. Place this in a larger shipping carton and include sufficient filler to protect the unit from shipping damage. DPC is not responsible for shipping damage due to poorly packaged units.
3. Write the RA number on the outside of the shipping carton. Include inside the carton a note describing the problem, your name, return shipping address (PO boxes not accepted), the RA number, and a photocopy of the sales receipt.
4. Ship the instrument prepaid and insured to **Digital Products Company, 134 Windstar Circle, Folsom, CA 95630 USA**. Your unit will be returned to you using DPC's preferred shipping method.

WHEN SERVICE IS NEEDED AFTER THE WARRANTY PERIOD:

1. Try to resolve the problem by contacting DPC's technical support department. Please provide the model name, serial number, and a description of the problem. You must provide your fax number or e-mail address if you are outside the USA.
2. If the technical support agent determines the problem requires service then DPC will issue an RA number and provide payment and return shipping instructions.

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DIGITAL PRODUCTS COMPANY

FREQUENTLY ASKED QUESTIONS

Q: *I want to use four 1.5V rated alkaline batteries to operate ShutterBug Pro. But that will give me six volts, which I understand is too high. Will I be OK? Also, how long do you think they will last during use?*

A: Don't use four alkaline cells since the voltage will indeed be too high with a fresh set. Instead, use only three of them (4.5V). Battery duration depends on how often the snapshots are taken and other factors. But, generally speaking, three D-size alkaline batteries should last several days.

Q: *I'm setup for the Standalone mode and my ShutterBug is using a R/C servo to activate the camera's shutter button. However, I don't want to buy a R/C system to set the servo positions. The instructions mention that a servo signal simulator can be used. What is that?*

A: A servo signal simulator (sometimes called a servo tester) is a small battery-powered box that is used to bench test model R/C servos. Prices range from \$25 on up, depending on the brand. Just check your local R/C hobby store to see what they offer. You don't need fancy features, so a simple low-cost design is fine.

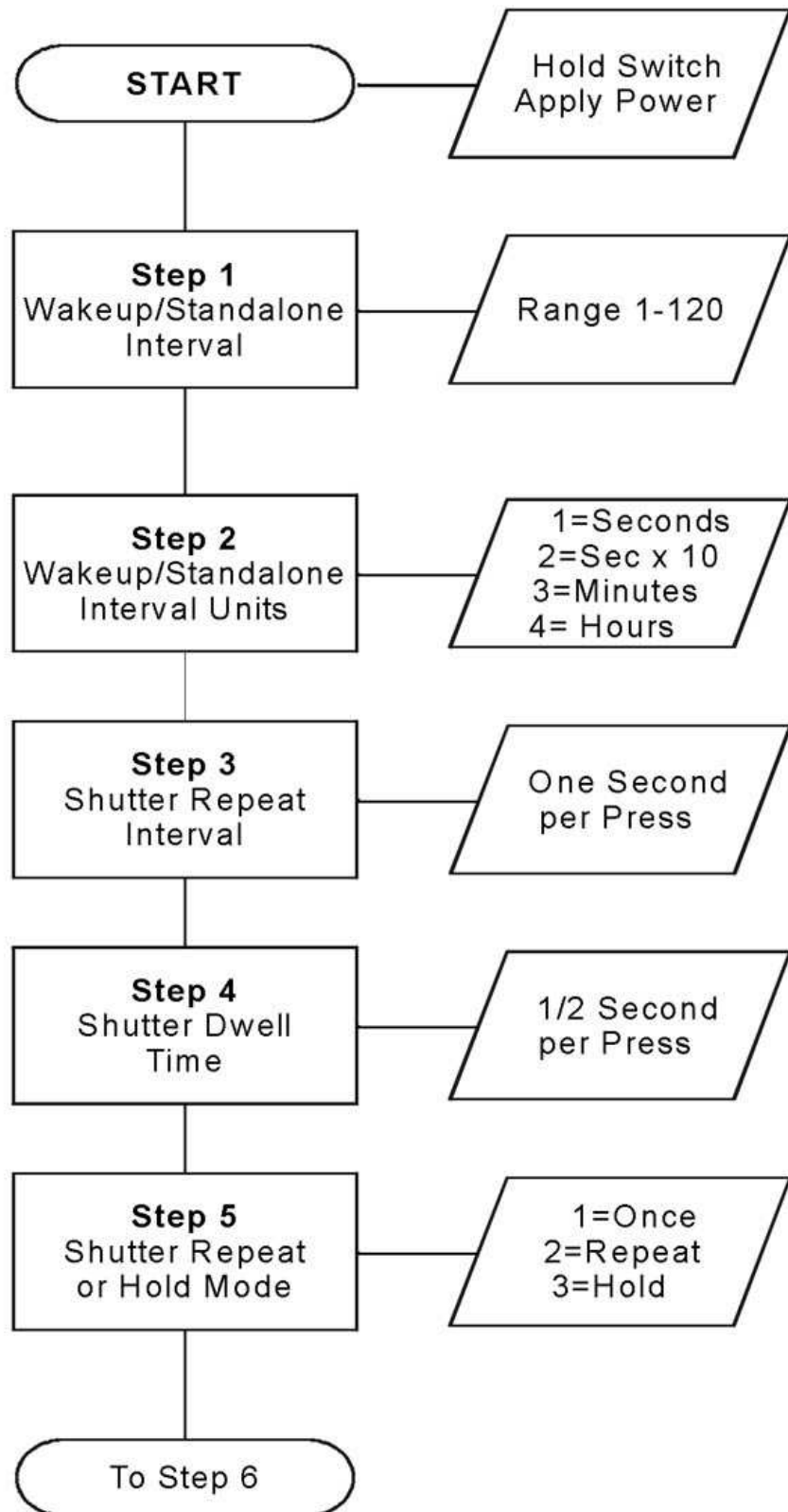
Q: *I'm using the Standalone mode with very long time delays. The problem is that my camera turns itself off when it is idle for more than five minutes. What can I do?*

A: Unlike the R/C and External Switch trigger methods, the Standalone mode does not have a camera keep-awake feature. For long duration timed snapshots, the servo's Stage-1 position can be used to turn the camera on (instead of focus). This has the advantage of maximizing the camera's battery duration. On some cameras this can be done with one servo and a cleverly mounted two-sided servo arm. If the power switch is too far away from the shutter button, then two servos can be used together. Just install them in parallel with a servo "Y" cable (available at the R/C hobby store). Not all cameras can be adapted for this, but with some imagination, such tricks are possible.

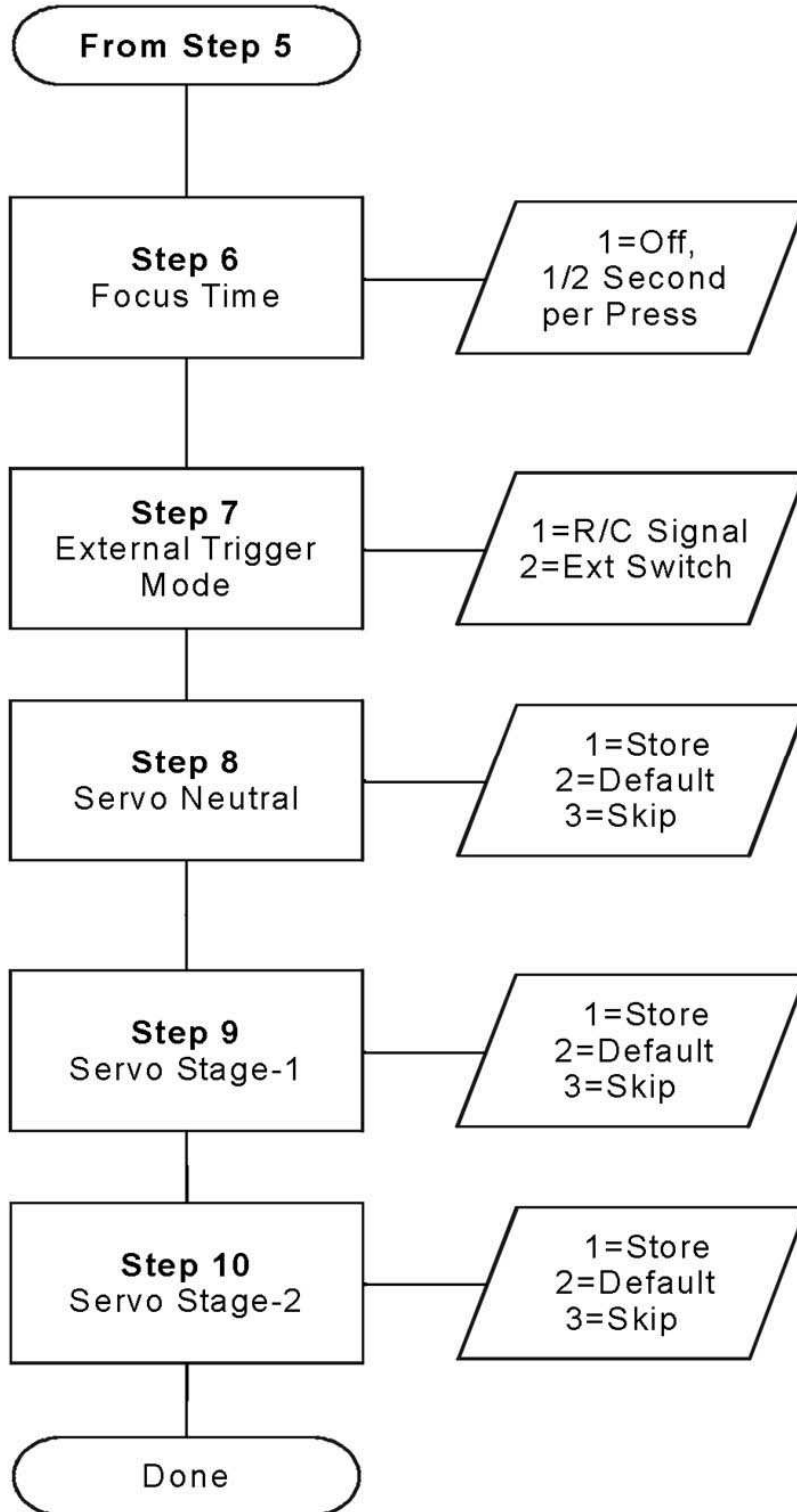
Q: *I have a special application where I need to connect ShutterBug's Direct Connect Interface to a battery powered relay. How much voltage and current can the interface handle?*

A: The recommended maximum voltage is 30V and the maximum current is 35 milliamps. The voltage/current combination must not exceed 100mW or damage may occur. A low voltage relay (with a high-sensitivity coil) is recommended. Be sure to add the typical diode protection on your relay's coil.

SHUTTERBUG PRO PROGRAMMING SUMMARY



SHUTTERBUG PRO PROGRAMMING SUMMARY



Programming Summary

SHUTTERBUG PRO MENU SUMMARY

- Camera Wake-up/Stand alone Intervals:
0=Skip, 1=Off, 2-120.
- Wake-up/Standalone Interval Units:
0=Skip, 1= Sec, 2=Sec10X, 3=Min, 4=Hr.
- Shutter Repeat Interval:
0=Skip, 1-30 seconds (one second per press).
- Shutter Dwell Time:
0=skip, 1=0.5S, 2=1S, 3=1.5S, ... 20=10Sec (500mS per press).
- — Shutter Repeat / Hold Mode:
0=Skip, 1=Once, 2=Repeat, 3 = Hold.
- — Focus Dwell Time:
0=Skip, 1=Off, 2=1S, 3=1.5Sec, ... 20=10Sec (500mS per press).
- — External Trigger Mode:
0=Skip, 1=R/C Signal, 2=External Switch.
- Servo Neutral Home Position:
● 1= Store, 2=Default 1.0mS, 3=Skip.
- Servo Stage 1 Position:
●● 1= Store, 2=Load Default 1.5mS, 3=Skip.
- Servo Stage 2 Position:
●●● 1= Store, 2=Load Default 1.7mS, 3=Skip.