



BG2 Complete Board

(Revision 1)

LANC Operations Manual



This manual is a living document, therefore it will change when needed to clarify and explain the operation of the BG2 Complete Board. Please refer to the revision date to verify if your copy is the latest edition. Any document updates will include an update to the revision date.

Revision Date 12/2/06

The BG2 Complete Board is designed to control various film cameras, digital cameras and video camcorders (LANC or hardwired). The BG2 Complete Board can also control up to two IR lights and one servomotor, when used as a video camcorder controller. One light output can control an IR light with Pulse Width Modulation (PWM) and the other can control a light bulb or IR array without PWM. The BG2 Complete Board can only be programmed to control one camera or camcorder at a time (LANC or hardwired). The BG2 Complete Board retains its name if programmed as a trail camera controller and adopts a new name if programmed as a video camcorder controller, the BG2 LANC Complete Board. You will be required to specify this when ordering. Updates are available to the BG2 Complete Board by shipping back the complete board for reprogramming. Please keep this in mind when building your system and utilize separable connectors for flexibility. The standard LANC video camcorder programmed settings for the BG2 LANC Complete Board will be described in this document with notation at possible alteration points.

An Energizer or Duracell 6-volt battery power source is recommended when using the BG2 LANC Complete Board. Battery power over 6.5 volts can cause erratic behavior of the servomotor. Battery power less than 6 volts can also cause erratic behavior and battery voltage should be carefully noted if rechargeable batteries are used. You will need 5 NiMH rechargeable batteries to run the BG2 LANC Complete Board due to the lower voltage of the individual rechargeable batteries.

The idle current draw of the BG2 LANC Complete Board is 130uA, so AA battery power is sufficient for the BG2 LANC Complete Board.

BG2 LANC Complete Board Features:

1. Day / Night / 24-Hour / Record Time / Delay Selection:

The **6 Position DIP Switch** control features listed below.

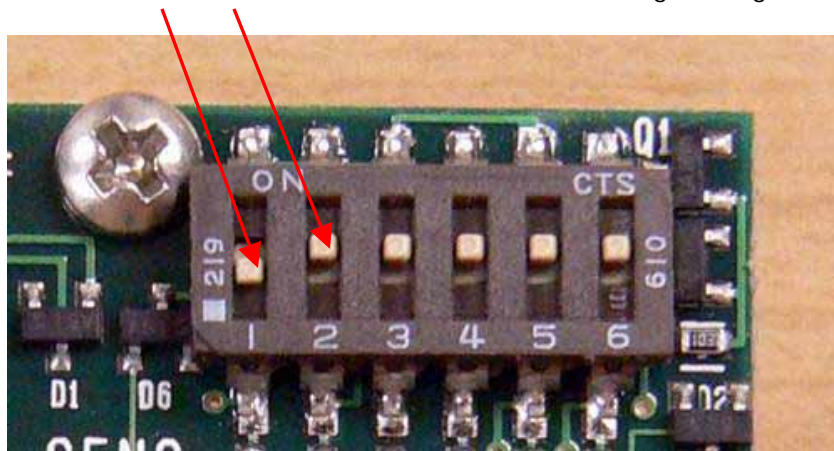
The BG2 LANC Complete Board reads the settings of the 6 Position DIP Switch on power up. To select or change settings you have to power the BG2 LANC Complete Board off, make your selection or changes, and power it back up. The brown out setting is enabled on the BG2 LANC Complete Board, so the board can be powered off and back on instantly after any DIP Switch settings are changed. You must have the LANC camcorder powered up before turning the BG2 LANC Complete Board on.

Day / Night / 24 Hour Selection (Switches 1,2)

The BG2 LANC Complete Board contains programmed code for 4 selectable periods of active recording operation when used as a video camcorder controller. There are two 24-hour record modes, day only record mode, and night only record mode. With the two 24-hour record modes you can select either to have the record period only as long as the selected record time, or [continual record with record periods as long as there is continual motion in front of the sensor](#).

Switches 1 and 2 control the **Day / Night / 24-Hour Record Selection** listed below:

On / off combinations of the two switches determine which setting is being used.



Day / Night / 24-Hour Record Selection (Switch 1, 2)
<i>1 / 2 (Switch Position)</i>
on / on = 24-Hour / Continual Record
on / off = Day Time Only Record
off / on = Night Time Only Record
off / off = 24-Hour Record

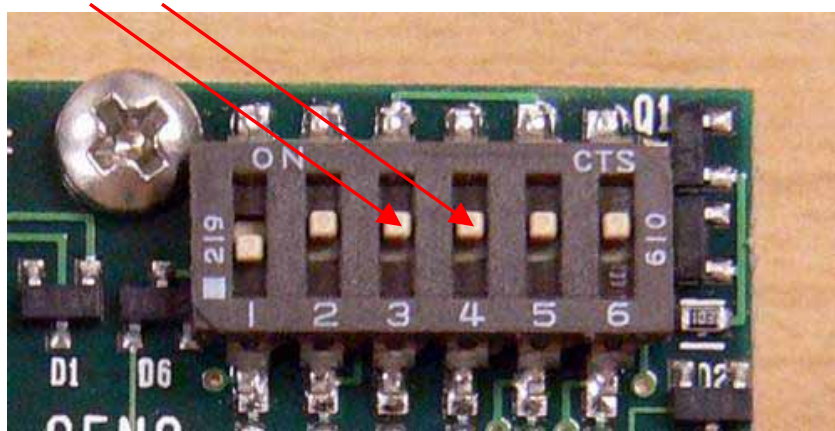
Record Time Selection (Switches 3,4)

The BG2 LANC Complete Board contains programmed code for 4 selectable record time periods.

* **NOTE:** Alternate record times are available with custom programming. They must be in 30-second intervals for continual record to work properly.

Switch 3 and 4 control the **Record Time Selection** listed below:

On / off combinations of the two switches determines which setting is being used.



Record Time Selection (Switch 3, 4)
<i>3 / 4 (Switch Position)</i>
on / on = 30 Second Record Time
on / off = 1 Minute Record Time
off / on = 3 Minute Record Time
off / off = 5 Minute Record Time

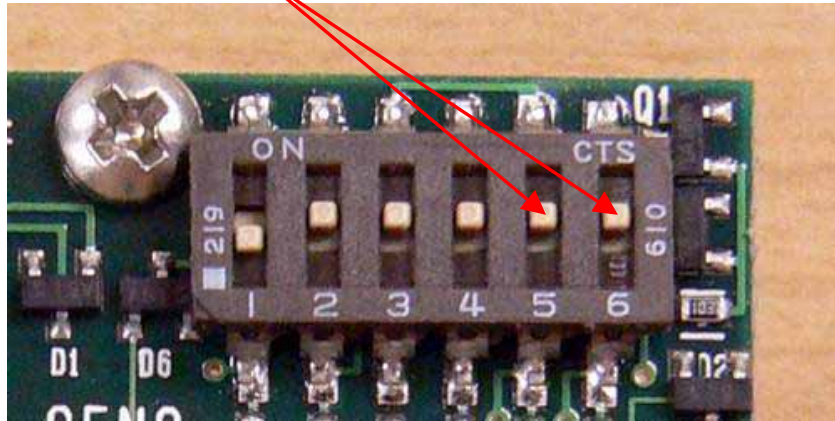
Delay Selection (Switches 5, 6)

The BG2 LANC Complete Board contains programmed code for 4 different delay periods between possible record times.

* NOTE: Alternate delay times are available with custom programming.

Switches 5 and 6 control the **Delay Selection** listed below:

On / off combinations of the two switches determine which setting is being used.



Delay Selection (Switch 5, 6)

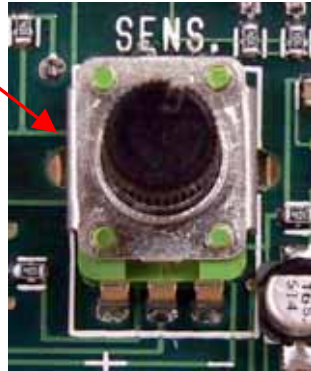
5 / 6 (Switch Position)

on / on = **1 Minute Delay**
on / off = **5 Minute Delay**
off / on = **10 Minute Delay**
off / off = **15 Minute Delay**

2. Sensitivity Adjust: The **Sensitivity Potentiometer** control features listed below.

* **NOTE:** DO NOT SET THE POTENTIOMETER AT THE FULL CLOCKWISE OR FULL COUNTERCLOCKWISE SETTING.

The sensitivity potentiometer is actually a voltage divider and requires an amount of voltage on each side of the divider. A maximum clockwise or counterclockwise setting of the potentiometer cancels this effect.

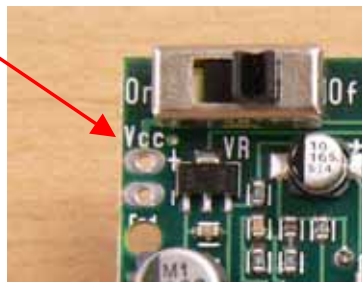


- Slightly back from full Clockwise is the **lowest sensitivity** setting.
- Slightly back from full Counterclockwise is the **highest sensitivity** setting.
- At highest sensitivity the sensor will detect out to 70'. (With proper lens alignment)
- At lowest sensitivity the sensor will detect out to 30'.
- A mid point setting is recommended for a starting point.
- Further tuning of the sensitivity may be needed to match your video game cameras nighttime record distance to the BG2 LANC Complete Board's detection range.

3. Power / Camcorder (LANC) / IR Lights (PWM and non PWM) / Servo Motor Connections:

* **NOTE:** We recommend using separable connectors so the board can be easily disconnected without damaging the solder pads. This will allow you to send the board in for updates, as they become available in the future, without having to unsolder your connections.

Power supply to the BG2 LANC Complete Board is applied at the VCC+ connection. The positive lead from the battery holder is applied at the VCC+ solder pad and the negative lead is applied at the GND solder pad. There is also a strain relief hole to route your battery holder wires thru, or tie them down to the board with a small zip tie.

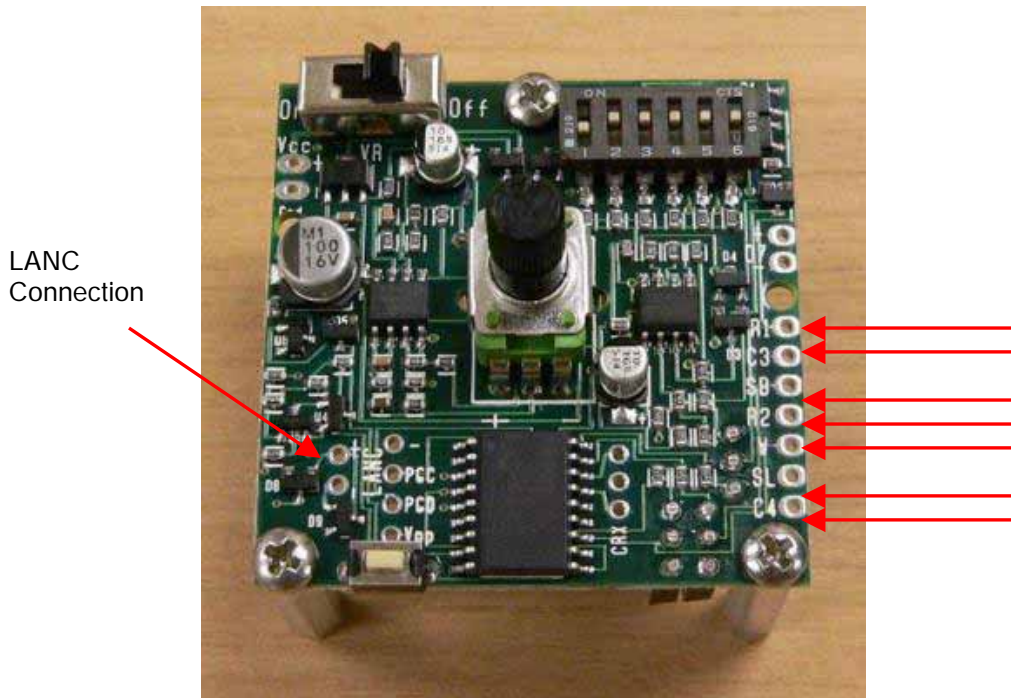


Camcorder (LANC) connection to the BG2 LANC Complete Board is applied at the **LANC** connection. **A + and minus sign on the board indicate the LANC signal and ground for the connection.**

Servomotor connection to the BG2 LANC Complete Board is applied at the **SB, R2** and **W** connections. The lettering corresponds to the black (SB), red (R2), and white (W) wires that come from the servomotor. We recommend the Futaba S3003 Servomotor. Other servomotors will work as well.

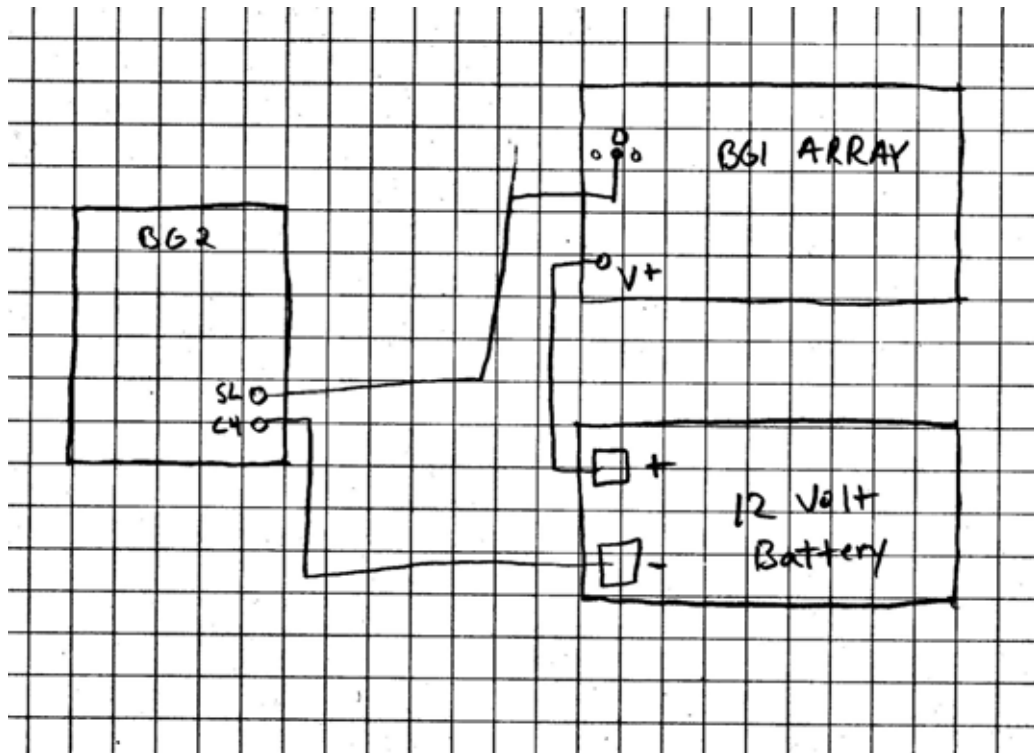
Pulse Width Modulation (PWM) IR Light connection to the BG2 LANC Complete Board is applied at the **SL** and **C4** connections. NOTE: The mosfet control of this connection has a max. current capacity of 3 Amps.

Non PWM IR Light connection to the BG2 LANC Complete Board is applied at the **R1** and **C3** connections. NOTE: The mosfet control of this connection has a max. current capacity of 3 Amps.

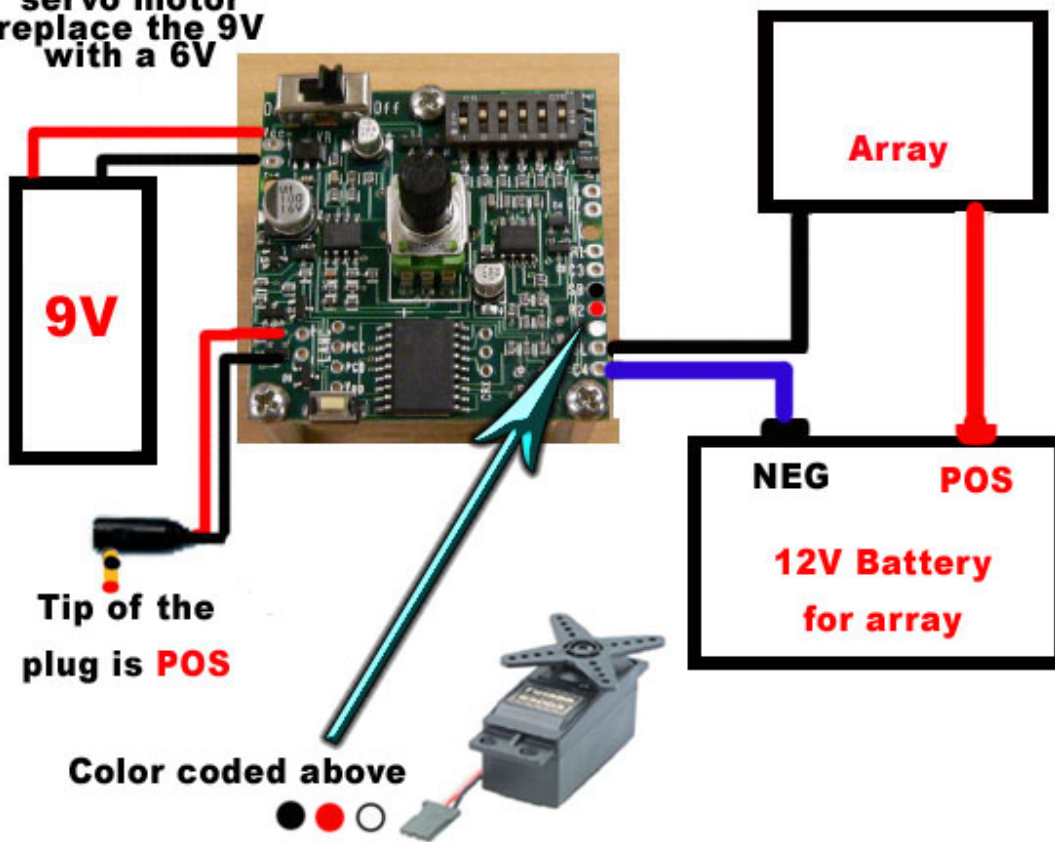


4. BG1 IR Array and Light Bulb Connections:

The ground (D) location is in-between the three holes on the BG1 IR Array. The BG1 IR Array was designed for more options that have not come out yet. The bulb option that connects to the other ports, R1 and C3 on the BG2 LANC Complete Board, would wire the same except the array would be the bulb. The bulb is not directional so either terminal can connect to either wire.

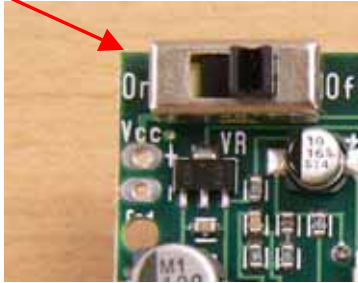


If you use a servo motor
replace the 9V
with a 6V



5. Power Up Operation / Fast PIR / Walk Test Mode / Normal Operating Mode:

The **On-Off Slide Switch** control features listed below.



After you have selected your DIP Switch settings, set your sensitivity per the instructions above, wired the LANC connector to the LANC solder points, connected the LANC plug to the LANC jack on the camcorder, connected the servomotor wiring to the servo solder points, turned your video camcorder to camera mode, powered your camcorder on, and added 6-volt battery power to the BG2 LANC Complete Board. Turn the On-Off Slide Switch to on and you will see the LED blink once as a signal the board started and everything is okay. The BG2 LANC Complete Board will then move the servo to the night position and then back to the day position. If you do not see the initial LED blink, recheck your connections. If you see a series of LED blinks over and over double check your LANC connections. The BG2 LANC Complete Board will continue to try and 'talk' to the camcorder for 10 tries before shutting down. This will also keep the LED from blinking once the battery in the camcorder gets too low for communications.

The BG2 LANC Complete Board has an almost instant PIR trigger or cycle, so the board goes into **walk test mode** immediately. You may even see a second blink on power up. This second blink is the BG2 LANC Complete Board catching the PIR trigger early. The PIR trigger will cycle as you trigger the sensor and the LED will blink to denote the trigger event.

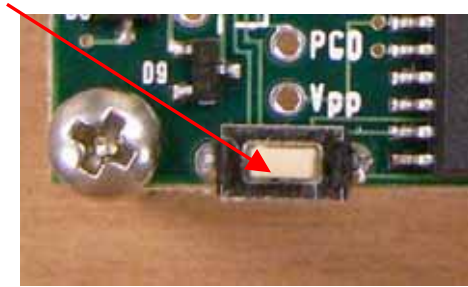
The **walk test mode** is a visual confirmation of the distance and area the sensor will detect, from its current position. Simply walking in front of the sensor will trigger the BG2 LANC Complete Board to activate the LED.

The BG2 LANC Complete Board is programmed to automatically switch to **normal operating mode** from walk test mode after 3 minutes of inactivity. The 3-minute countdown is reset after each trigger event during walk test mode. The only way to reach normal operating mode is to wait for three minutes until walk test mode can time out.

To return to walk test mode from normal operating mode; turn the power switch off and then turn the video camcorder power switch off and then back on so the camcorder is powered up again, after this you can power up the BG2 LANC Complete Board and it will move the servo accordingly and power the camcorder off and then go into walk test mode.

6. Count Feature / Servo Position:

The **PB-1 Push Button Switch** control features listed below:



- Pressing the PB-1 Push Button Switch during **normal operating mode** will trigger the LED to count the total number of triggered events of the BG2 LANC Complete Board while it was in normal operating mode.
- The count is a sequence of LED flashes of different time duration, to denote the total count.
 - Hundreds place will be denoted with a 3 second LED pulse for each number.
 - Tens place will be denoted with a 1 second LED pulse for each number.
 - Ones place will be denoted with a 300 millisecond LED pulse for each number.
(Example: 125 events would count as one (three second pulse), followed by two (one second pulses), followed by five (300 millisecond pulses)
- Pressing the PB-1 Push Button **within 2 seconds** of the last LED flash of the current count will clear the present count total. 4 quick flashes of the LED will denote the cleared count. The BG2 LANC Complete Board will then power up the camcorder and clear the camcorder's internal counter, power off the camcorder, and return to walk test mode.
- Not pressing the PB-1 Push Button within 2 seconds of the last LED flash of the current count will not clear the present count total. The BG2 LANC Complete Board will remain in normal operating mode if the count is not cleared.
- The count total will remain even if the power is turned off to the BG2 LANC Complete Board.

7. Adjusting and Testing Servomotor Position / Linkage to Camcorder:

After testing and confirming the above-mentioned operations between the BG2 LANC Complete Board and your LANC camcorder, connecting and adjusting the linkage between the servomotor and night shot switch is required. The BG2 LANC Complete Board can test the servomotor's rotation and position while in walk test mode. Power off the BG2 LANC Complete Board and return all 6 DIP-switches to the off position. Go thru the power up sequence listed above until you reach walk test mode.

Pushing the PB-1 pushbutton right after the LED visual indication of a walk test trigger will interrupt walk test mode. The board will then go into a 1 second blink routine for showing the day night calibration setting(This is preset and not adjustable). Once in this mode push and hold the PB-1 push button until you see the servomotor move and then release the PB-1 push button. You can keep pushing the PB-1 pushbutton and moving the servomotor for setting the linkage between the camcorder and the servomotor arm. You can only get out of this mode by powering the BG2 LANC Complete Board off. Once your linkage is correct and the nightshot switch on the camcorder moves accordingly, you can reset your DIP-switches to the

desired settings and go thru the power up sequence listed above noting the proper movement of the servo and nightshot switch in sync with the operations of the BG2 LANC Complete Board.

During normal operating mode, the BG2 LANC Complete Board will power the servomotor to move the nightshot switch at dawn and dusk for daytime color video and nighttime IR video. If the BG2 LANC Complete Board is triggered before the automatic move, the board will power the servomotor and move the nightshot switch at that time so the camcorder is in the proper video mode per the daylight or dark conditions. The CdS photocell on the BG2 LANC Complete Board can be removed and remotely located closer to the lens hole of the enclosure for better day / night detection by the BG2 LANC Complete Board.



Taking Video:

When the BG2 LANC Complete Board sensor senses motion, it triggers the PIC chip, which will turn both the camcorder and IR array on simultaneously and record video for the specified record period selected by the user. The board will then power off the camcorder and IR array and begin the count down of the selected delay setting. Once the delay has expired, the BG2 LANC Complete Board is ready for another record session, if the sensor is triggered.

Explanation of Terms:

PIC Chip - Programmable Integrated Circuit Chip (the IC Chip itself)

WALK TEST MODE - This is when the PIC chip signals all the sensor's activity by lighting the onboard LED of the BG2 LANC Complete Board. There is no delay after the sensor is triggered before it can be triggered again. The walk test mode will time out after 3 minutes of inactivity and the PIC chip returns the BG2 LANC Complete Board to normal operating mode. Walk test mode is only accessible from power up, and after clearing the count

DELAY MODE - This is the time delay configured by you using the delay settings of the 6 Position Dip Switch. It is the time measured from when the relay for taking video turns off to when you can take additional video.

NORMAL OPERATING MODE - The PIC chip is ready to be triggered by the BG2 LANC Complete Board sensor so it can take video. It is also ready to receive any button command from the PB-1 Push Button. Normal operating mode is only accessible after time expires in walk test mode. Normal operating mode is the default mode the PIC chip will return the BG2 LANC Complete Board to, when all time outs expire.

SLEEP MODE - This is when the PIC chip is shutdown except for a low power internal oscillator, which keeps up with the timing or interrupts generated for the PIC chip. By shutting down the main oscillator the PIC chip draws less current. (4 to 5uA in sleep mode.) Sleep mode is inaccessible and automatically switched to by the PIC chip.

LANC CONTROL - Local Application Control Bus port linking communication between the LANC camcorder and the BG2 LANC Complete Board via a 2.5mm plug wired to the BG2 LANC Complete Board.

PULSE WIDTH MODULATION (PWM) -

BROWN OUT -

SERVOMOTOR - A small motor or alternator that has an output shaft with arm attached. This shaft can be positioned to specific angular positions by sending the servo a coded signal. As long as the coded signal exists on the input line, the servo will maintain the angular position of the shaft. As the coded signal changes, the angular position of the shaft changes.

CONTINUAL RECORD - A 24-hour active record period in which additional motion and trigger of the BG2 LANC Complete Board will result in continual record by the camcorder even if the selected record time is elapsed.

ACTIVE RECORD PERIOD - This is the selectable period of day that the BG2 LANC Complete Board will activate the camcorder to record video. Day / Night / 24-Hour record periods are selectable.

RECORD TIME - This is the selectable time period setting of the BG2 LANC Complete Board controlling the duration of record time to the camcorder.

DAY / NIGHT CALIBRATION SETTING - This is the preset light values for day (light) and night (dark) of the BG2 LANC Complete Board. The CdS photocell determines the current light level present at the BG2 LANC Complete Board and automatically adjusts to daylight or nighttime control dependent on light levels.

Troubleshooting:

If the LED does not signal during a walk test check the following.

- You have installed the BG2 LANC Complete Board with the IR sensor located behind the fresnel lens. The IR sensor is the ¼" round component with the rectangular glass window in the middle. The fresnel lens focuses the detection field into the IR sensor, so the sensor must be behind the fresnel lens. The longer sides of the rectangular window of the IR sensor must be horizontal in orientation.
- You have the fresnel lens at the correct focal distance from the IR sensor. The distance between the IR sensor and fresnel lens is critical in that the focus of the lens is determined by the distance it is located from the IR sensor. Changing the distance from what the lens is designed for will affect the focus to the IR sensor.
- The fresnel lens is in the right orientation and centered. The fresnel lens is designed to be installed with the groove side of the lens facing the IR sensor and the lens centered over the IR sensor. Double check alignment of the fresnel lens to the IR sensor.
- The sensitivity setting on the BG2 LANC Complete Board is at a proper sensitivity. Locate the sensitivity potentiometer and turn the sensitivity to the mid-point sensitivity setting.
- The Day / Night / 24-Hour switch is set incorrect. Check the day / night / 24-hour switch combinations on the 6 Position DIP Switch. The BG2 LANC Complete Board will not trigger if the switches are set to night and the walk test is performed in daylight. The BG2 LANC Complete Board will not trigger if the switches are set to day and the walk test is performed in the dark. The BG2 LANC Complete Board will trigger during the walk test in both daylight and dark if the switches are set to one of the 24-hour modes.
- The PIC chip has returned to normal operating mode. Check to make sure the walk test time hasn't expired. Inactivity of 3 minutes returns the BG2 LANC Complete Board back to normal operating mode. This is a precaution so the sensor is never left in walk test mode. Power down the BG2 LANC Complete Board and power it back up to return to walk test mode.

To change settings: **Power down BG2 LANC Complete Board; make new selections, power up.**

Day / Night / 24 Hr. Selection (Switch 1, 2) <i>1 / 2 (Switch Position)</i> on / on = 24 hour / Continual Record on / off = Day Time Only Record off / on = Night Time Only Record off / off = 24 hour Record
Record Time Selection (Switch 3, 4) <i>3 / 4 (Switch Position)</i> on / on = 30 Second Record on / off = 1 Minute Record off / on = 3 Minute Record off / off = 5 Minute Record
Delay Selection (Switch 5, 6) <i>5 / 6 (Switch Position)</i> on / on = 1 Minute Delay on / off = 5 Minute Delay off / on = 10 Minute Delay off / off = 15 Minute Delay

Cut around outside border and fold over, place in enclosure for quick reference.

Additional Notes: