



629 (X10) PIC CHIP

Always On - Operating Instructions (Revision 2)



This manual is a living document, therefore it will change when needed to clarify and explain the operation of the 629 (X10) PIC chip and any and all updates that may occur. Please refer to the revision date to verify if your copy is the latest edition. Any updates will include an update to the revision date.

Revision Date 1/20/04

The 629 (X10) PIC chip is a custom programmed micro controller chip. It is one of the PIC chips that can be used in the [X10 Sensor w/ X10 DIP Opto Board - Assembly Instructions](#) along with the [X10 Kit - Assembly Instructions](#). All operating features will be identical **except for the sensitivity settings**. (SEE NOTES BELOW)

The 629 (X10) PIC chips are reprogrammable; therefore the settings can be altered if so desired. The standard programmed settings will be described in this document with notation at possible alteration points.

The 629 (X10) PIC chip and X10 Kit control the following cameras:

[Olympus D370 / D380 Digital Camera modification](#)

[Canon Sure Shot Owl PF 35mm Camera modification](#)

629 (X10) PIC Chip Features:

1. Initial Delay: The **On-Off Slide Switch** control features listed below.

The initial delay will last approximately 10 seconds.

After you have installed the 629 (X10) PIC chip per the installation instructions, and added a 9-volt battery to the battery holder, turn the On-Off Slide Switch to on and you will see the LED blink once as a signal the board started it's initial delay and everything is okay. If you do not see a blink then cycle the power again. When the initial delay is complete, the LED will blink again to signal the board is now in **normal operating mode**. The built in initial delay allows the sensor to stabilize, and avoid a false picture from an errant trigger pulse.

2. Test Function: The **Test Button** control features listed below.

24Hr / Day / Night Mode - The 10-second delay time during initial delay is used for the selection of the 24hr / Day / Night Mode.

When you power the 629 (X10) PIC chip it will blink the LED once to signal the start of the initial delay. After this blink you can push the Test Button once and the LED will come on for three seconds, this tells you that you are now out of 24hr mode. If you push the Test Button again it will blink once for day mode (sensor only triggers during daylight) and twice for night mode (sensor only triggers in the dark). You can push the button over and over and toggle the day and night modes by watching the LED blink accordingly. Once you are satisfied that you are in the correct mode, stop pushing the button and the 629 (X10) PIC chip will

wait the remaining initial delay time and then blink the LED once more to let you know that the initial delay is over and the X10 is now in normal operating mode. You have 20 seconds worth of time to toggle back and forth between day mode and night mode before the 629 (X10) PIC chip will timeout the initial delay and return to normal operating mode.

If you do not push the test button during initial delay, the 629 (X10) PIC chip will default to 24 hr. mode automatically after the second initial delay timeout blink.

NOTE: If you power the 629 (X10) PIC chip on and off, you will have to reset the day/night setting again. If you do not want to change the day/night setting then do not power off the chip, but simple put the 629 (X10) PIC chip in walk test mode to check your pictures.

Walk Test Mode - You cannot activate the walk test mode until the initial delay has timed out.

In **normal operating mode**, activate the walk test mode by pressing the Test Button and releasing it. The LED will light solid and then go off. The 629 (X10) PIC chip is now in walk test mode. Every time the sensor triggers, the LED will blink. It will continue to do so until you press and release the Test Button again. When you do press and release the Test Button again you will see eight short blinks from the LED signaling return to normal operating mode. The walk test mode is a visual confirmation of the distance and area the sensor is detecting from its current position. Simply walking in front of the sensor will trigger the 629 (X10) PIC chip to activate the LED.

NOTE: The 629 (X10) PIC chip is programmed to return to normal operating mode from walk test mode after 5 minutes of inactivity. The 5-minute countdown is reset after each trigger in walk test mode.

3. **Delay Functions:** The **Delay Button** control features listed below.

Delay Mode Change Feature - You cannot activate the delay mode until the initial delay has timed out.

There are nine different time delay modes you can access with the delay button. The different delay modes set the delay time between possible pictures. The LED will blink the respective number for each delay mode below. Example: Delay 1 would blink once, delay two would blink twice and so forth.

1. Delay 1 - 10 Seconds (minimum)	1 blink
2. Delay 2 - 30 Seconds	2 blinks
3. Delay 3 - 1 Minute	3 blinks
4. Delay 4 - 3 Minute	4 blinks
5. Delay 5 - 5 Minute	5 blinks
6. Delay 6 - 10 Minute	6 blinks
7. Delay 7 - 20 Minute	7 blinks
8. Delay 8 - 30 Minute	8 blinks
9. Delay 9 - 1 Hour	9 blinks

In **normal operating mode**, press the Delay Button. The LED will blink according to the new delay mode it is in. Consecutive press of the Delay Button, **with a 3 second delay between the presses**, will advance the delay mode to the next level. After delay 9 the sequence returns to delay 1.

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

Checking Delay without Changing It - In **walk test mode**, push the DELAY Button and the LED will blink the delay mode you are currently in without changing it. When the last blink for which delay you are in has finished, the 629 (X10) PIC chip returns to walk test mode and a trigger from the sensor will blink the LED just like before.

Double Picture Mode Feature - To change from single picture mode to double picture mode you have to press the delay button right after the blink indicating which delay mode you're in. **Do not wait the 3 seconds between the button presses.** From delay mode 1, when you press the delay button you will see two blinks telling you that you went from delay mode one to delay mode two. Right after the last blink, which indicated delay mode two, you have a two second window in which to press the delay button again. The LED will now flash eight times indicating that you are now in delay mode two and double picture mode. Another press of the Delay Button will advance the delay setting to delay three and back to single picture mode. You would only see three LED blinks. Another press of the Delay Button, within 3 seconds of the last LED blink, would yield another 8 short blinks from the LED indicating double picture mode in delay 3. The double picture mode is set the same way through all 9 delays.

The double picture mode setting automatically activates the camera to take a second picture 10 seconds after the initial picture, with or without a second trigger. The 629 (X10) PIC chip will activate the delay countdown after the second picture.

The 629 (X10) PIC chip has to be manually set to Double Picture Mode each time the board is powered up. This prevents accidentally leaving the board in Double Picture Mode.

Adjustable Refresh Feature - **You cannot activate the adjustable refresh until the initial delay has timed out.**

In **normal operating mode**, hold the Delay Button in until the LED comes on solid, then release. The LED will stay on solid for 4 seconds and then blink 8 times. By pressing and releasing the Delay Button you can toggle through the three refresh delay settings indicated by LED blinks.

- 1 LED blink indicates 2.5 minute refresh setting
- 2 LED blinks indicates 2.5 hour refresh setting
- 3 LED blinks indicates 7 minute refresh setting

Pressing and releasing the Test Button will take the 629 (X10) PIC chip out of adjustable refresh mode. You will see 8 short blinks to indicate return to normal operating mode.

Refresh is a timed interval pulse to the camera to keep it in a "ready" mode. The refresh recharges the flash capacitor in 35mm cameras and shortens the delay between the trigger of the sensor and the actual picture. The 7-minute refresh is the preferred setting for 35mm cameras.

In appropriate digital cameras the refresh keeps the camera awake, and does not allow the camera's auto shut down to occur. The digital is able to reach "sleep mode" with the 2.5-hour refresh setting, which in turn uses less power and still refreshes soon enough so the digital does not auto shut down.

The digitals do not reach "sleep mode" with the 2.5-minute refresh. The 2.5-minute refresh uses more power, but faster shutter response is realized, after the sensor is triggered, which captures faster moving animals.

* **NOTE:** Alternate refresh settings are available with custom programming.

Day / Night Sampling: - "Why Does My LED Blink In Normal Operating Mode?"

The red LED will blink occasionally for a 10ms pulse during daylight only. This is the 629 (X10) PIC Chip sampling the day and night port. The circuit for the LED and the day/night are tied together on one pin. When the port is changed to input, whatever state the day/night circuit is in determines whether the LED blinks or not. When the port is released or changed to input the day/night takes over. It samples what the day/night is, high or low, for 10ms and then forces the port back to a high state to keep the LED off. When the port is checked and the day/night circuit is low, or daylight, then the LED tries to come on for the 10ms. Then the port is let go. It is something that cannot be helped but only occurs in the daylight.

Taking a Picture:

When the X10 sensor senses motion, it triggers the 629 (X10) PIC chip, which will turn both the Refresh and Shutter relays on simultaneously and the camera takes a picture immediately. Another picture cannot be taken again until the Time Delay determined by the Delay Modes expires.

Double picture mode is a little different. Once the X10 sensor triggers the 629 (X10) PIC chip, it will energize the shutter and refresh relays and take a picture, then when the shutter time has timed out (4seconds) it will wait (6 seconds) for the flash to recharge and then take another picture. Once this 2nd picture has been taken and the shutter time has expired, the 629 (X10) PIC chip starts the delay between pictures, depending on the selected delay mode.

Explanation of Terms:

629 (X10) PIC Chip - Programmable Integrated Circuit Chip (the IC Chip itself)

DELAY TIME - This is the time delay configured by you using the delay settings 1- 9. It is the time measured from when the relay for taking a picture turns off to when you can take another picture.

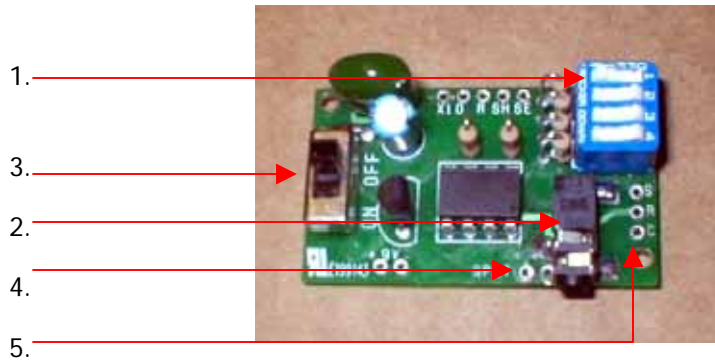
REFRESH TIME - This is a 500millisecond pulse generated by the 629 (X10) PIC chip to help the camera remain in a "ready" mode. In appropriate digital cameras the refresh keeps the digital camera awake, and does not allow auto shut down to occur. The digitals are able to reach sleep mode with the 2.5-hour refresh, which in turn uses less power and still refreshes soon enough so the digital does not auto shut down. The digitals do not reach sleep mode with the 2.5-minute refresh, which in turn uses more power, but faster shutter speeds are realized to capture faster moving animals.

SLEEP MODE - This is when the 629 (X10) PIC chip is shutdown except for a low power internal oscillator, which keeps up with the timing or interrupts generated for the 629 (X10) PIC chip. By shutting down the main oscillator the 629 (X10) PIC chip draws less current. (4 to 5uA in sleep mode.)

NORMAL CAMERA MODE - This is when nothing is happening except the refresh countdown of the set refresh time. The 629 (X10) PIC chip is ready to be triggered by the X10 sensor so it can take a picture. It is also ready to receive any button commands from the test button or the delay button.

"ALWAYS ON" - This refers to the state of the camera itself while operating as a trail camera. The camera is always on and controlled by the programming of the 629 (X10) PIC chip.

X10 DIP Opto Board Notes:



The X10 DIP Opto Board from Hags House is equipped with the following features.

1. **4 Position Sensitivity DIP Switch** -The square blue 4-position sensitivity DIP switch changes the sensitivity of the X10 sensor. It's recommended to lower sensitivity during colder weather and raise sensitivity during warm weather. Switch #1 is highest sensitivity; switch #4 is lowest sensitivity.

SENSITIVITY NOTES: - The sensitivity resistors on the DIP Opto Board are in parallel circuit to each other. Because of this, you can use the following switch combinations to achieve other sensitivity settings. (*Use only the listed switch settings to avoid false triggers from the X10 sensor.)

From top to bottom the sequence is as follows:

Switch 1 (on) - highest sensitivity

Switch 2, switch 3, switch 4 (on)

Switch 2, switch 3 (on)

Switch 2, switch 4 (on)

Switch 3, switch 4 (on)

Switch 2 (on)

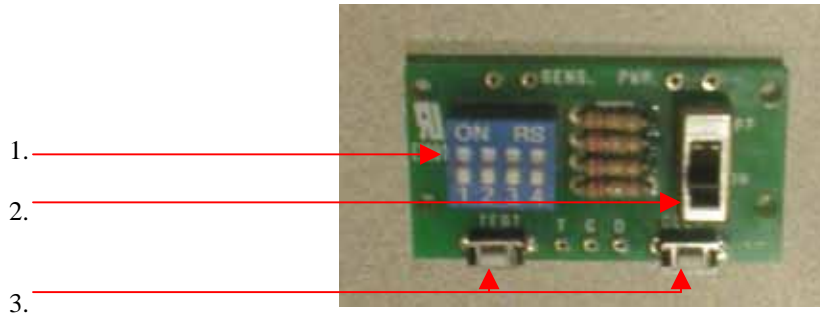
Switch 3 (on)

Switch 4 (on) - lowest sensitivity

At least one switch MUST be on at all times when operating the X10 sensor with the X10 DIP opto board.

2. **2.5mm Stereo Camera Jack** - On board camera connector used with a 2.5mm stereo plug wired to the camera. Camera must be wired with refresh wiring. Wiring for the plug to match jack is: **Tip is shutter / Middle ring is refresh / Base is common.**
3. **SPDT Slide Power Switch** - On board slide power switch for X10 sensor and X10 DIP Opto Board power. ON/OFF direction etched on X10 DIP Opto Board. Supply power option is 6V to 12V. Recommended supply power is 9V. Idle power draw of X10 sensor combined with an X10 DIP Opto Board is **55 to 60uA**. Battery life of a single 9V alkaline battery is **6 - 9 months**. *
(*Dependent on temperature, initial battery life and amount of sensor activity.)
4. **SPST Switch Solder Pads for Camera** - Remote SPST toggle switch recommended for exterior control of camera connection. This allows user to turn camera on after setup of 629 (X10) PIC chip is completed and the enclosure is closed. The SPST toggle switch should be located on the outside of the enclosure and access should be available from behind trail camera. The final step in setup would be to turn the camera on with this switch from behind the X10 sensor. This will eliminate false pictures from errant triggers while setting up the 629 (X10) PIC chip with the camera on and plugged in. It also allows a way for the enclosure to be closed after the 629 (X10) PIC chip is returned to normal operating mode. It is recommended that the exterior toggle switch be mounted so that "down" is on. Squirrels and raccoons are known for pushing switches down when "investigating" trail cameras. SPST etched on X10 DIP Opto Board to denote solder pads.
5. **Alternate Camera Connection Solder Pads** -Solder pads provided for alternate camera connectors. **Shutter (s), refresh (r), and common (c)** etched on X10 DIP Opto Board to denote solder pads.

X10 Kit Notes:



The X10 Kit (Control Panel) from Hags House is equipped with the following features.

1. **4 Position Sensitivity DIP Switch** -The square blue 4-position sensitivity DIP switch changes the sensitivity of the X10 sensor. It's recommended to lower sensitivity during colder weather and raise sensitivity during warm weather. Switch #1 is highest sensitivity; switch #4 is lowest sensitivity.

SENSITIVITY NOTES: - The sensitivity resistors on the Control Panel are in series circuit to each other. Because of this, you can only have one switch on at a time to achieve the sensitivity settings. (*Use only the listed switch settings to avoid false triggers from the X10 sensor.)

From top to bottom the sequence is as follows:

- Switch 1 (on) - highest sensitivity
- Switch 2 (on)
- Switch 3 (on)
- Switch 4 (on) - lowest sensitivity

At least one and only one switch MUST be on at all times when operating the X10 sensor with the control panel of the X10 Kit.

2. **SPDT Slide Power Switch** - On board slide power switch for X10 sensor and X10 Kit Opto Board power. ON/OFF direction etched on Control Panel. Idle power draw of X10 sensor combined with an X10 Kit Opto Board and X10 Kit Control Panel is **55 to 60uA**. Battery life of a single 9V alkaline battery is **6 - 9 months**. *
(*Dependent on temperature, initial battery life and amount of sensor activity.)
3. **TEST / DELAY Push Button Switches** - On board N.O. push button switches to delivery test and delay feature commands to the 629 (X10) PIC Chip.

Troubleshooting:

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

- You have installed the X10 sensor with the IR sensor located behind the fresnel lens. The IR sensor is the ¼" round component with the rectangular glass window on top. The fresnel lens focuses the detection field into the IR sensor, so the sensor must be behind the fresnel lens.
- 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 properly. 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 per the fresnel lens centering position. Double check alignment of the fresnel lens to the IR sensor.
- The sensitivity setting on the X10 sensor is at its highest sensitivity. Locate the sensitivity controls and make sure the sensitivity is at its highest setting for test purposes. Adjust the sensitivity to the desired range once the detection field and range is observed.
- The 629 (X10) PIC chip has returned to normal operating mode. Check to make sure the walk test time hasn't expired. Inactivity of 5 minutes returns the X10 sensor back to normal operating mode. This is a precaution so the sensor is never left in test mode. Press and release the test button and reactivate the test mode.

<p><u>Initial Delay</u> (Start from Power Up) Turn Power ON – 1 LED blink (initial delay started) 10 Second Delay – 1 LED blink (initial delay complete) (X10 in Normal Operating Mode after initial delay)</p> <p><u>24Hr / Day / Night Mode</u> (Programmed during Initial Delay) Do Not press Test Button - wait for initial delay to complete (X10 is now 24 hour active) Press Test Button & Release - before initial delay completes LED lights for 3 seconds – (X10 is out of 24 hour mode) 20 second period to toggle between day (1 LED blink) or night (2 LED blinks) with press of test button (initial delay will timeout after last test button press, (1LED blink) to indicate timeout)</p> <p><u>X10 Walk Test Mode</u> (Start from Normal Operating Mode) Press Test Button & Release - LED lights for 3 seconds (X10 now in Walk Test Mode) (LED will blink with each motion trigger) Press Test Button & Release - LED blinks 8 times (X10 returns to Normal Operating Mode)</p> <p><u>Check Current Delay</u> (Start from Normal Operating Mode) Press Test Button & Release – LED lights for 3 seconds (X10 now in Walk Test Mode) Press Delay Button & Release –LED will indicate current delay setting by blink count (1 thru 9) Press Test Button & Release – LED blinks 8 times (X10 returns to Normal Operating Mode)</p>	<p><u>Change Delay</u> (Start from Normal Operating Mode) Press Delay Button & Release -LED will indicate new delay with blink count (Delay setting will advance by 1) Wait 3 seconds Press Delay Button & Release -LED will indicate new delay with blink count (Delay setting will advance by 1) (1 thru 9 total delay settings present)</p> <p><u>Double Picture Mode</u> (Start from Normal Operating Mode) Press Delay Button & Release -LED will indicate new delay with blink count (Delay setting will advance by 1) Within 2 seconds press Delay Button & Release again - LED blinks 8 times (Denotes double picture mode in present delay mode)</p> <p><u>Adjust Refresh Setting</u> (Start from Normal Operating Mode) Press & Hold Delay Button –LED lights solid Release button – LED solid then blinks 8 times (X10 now in Refresh Adjust Mode) Press Delay Button & Release –LED will indicate refresh setting by blink count (1 blink – 2.5 min. refresh) – fast shutter – digital camera setting (2 blink – 2.5 hour refresh) – regular shutter –digital camera setting (3 blink – 7 minute refresh) –35mm camera setting Press Test Button & Release – LED blinks 8 times (X10 returns to Normal Operating Mode)</p>
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Cut around outside border and fold over, place in camera enclosure for quick reference.

Additional Notes: