



# Camcorder Time-Lapse Control

## Description

The ELM303 is a specialized circuit for creating time-lapse videos on suitably equipped camcorders. The camcorder to be controlled must have a Control L (LANC) port, and also be capable of responding to power control signals. This is usually only available with the mini DIN connectors, and not the 2.5mm stereo plug interfaces.

The ELM303 provides intervals of 10 minutes to 24 hours between recordings, without requiring any external timing components. Recording durations of either 1 second or 10 seconds is also selectable.

One additional feature allows manually triggered recordings to be initiated when all three interval inputs are at a low level. Recording will begin immediately and will continue as long as the inputs remain low. This combination is fully debounced, simplifying the interface to mechanical switches.

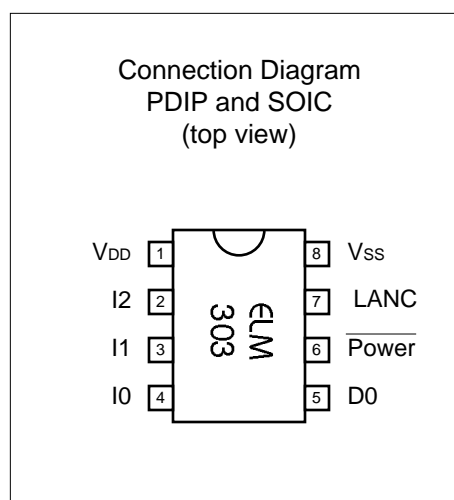
The ELM303 has been 'hard-coded' to send the Control L hex command '33' (word 1) to device '18' (word 0), and cannot be modified. Be sure to verify that these are appropriate for your camera before committing to any designs.

## Applications

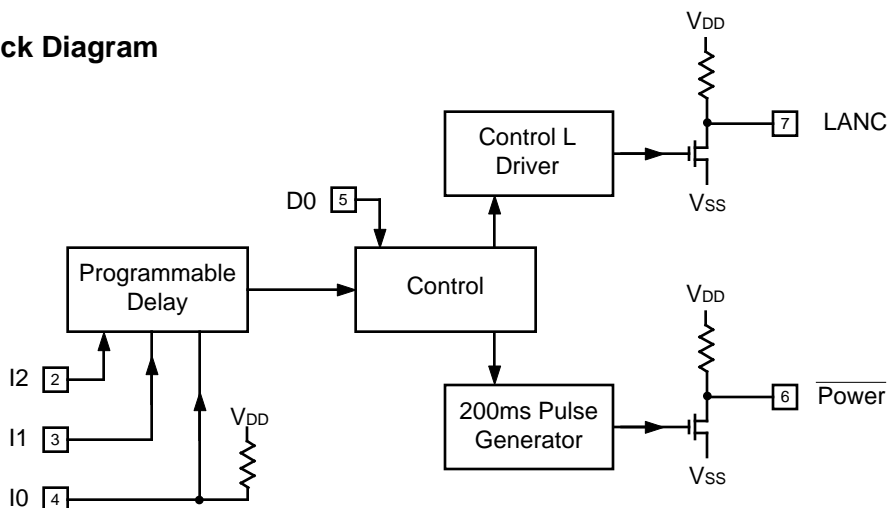
- Time-lapse video recording
- Security monitoring
- Long period time delay circuits

## Features

- Delays of 10 minutes to 24 hours with no external timing components
- Recording durations of 1 or 10 seconds
- Low power CMOS design - typically 1mA at 5V
- Security feature allows on demand recording
- Initial recording after 1 minute to verify system operation and connections
- Pulsed power output to control camera power



## Block Diagram



I2	I1	I0	Interval
L	L	L	continuous
L	L	H	10 min
L	H	L	30 min
L	H	H	60 min
H	L	L	3 hrs
H	L	H	6 hrs
H	H	L	12 hrs
H	H	H	24 hrs

Table 1



**Pin Descriptions**

**V<sub>DD</sub> (pin 1)**

This pin is the positive supply pin, and should always be the most positive point in the circuit. Internal circuitry connected to this pin is used to provide power on reset of the microprocessor, so an external reset signal is not required. Refer to the Electrical Characteristics section for further information.

**I2 (pin 2), I1 (pin 3) and I0 (pin 4)**

The time interval between each recording is determined by the logic levels at these pins, as shown in Table 1. The I0 input on pin 4 has a high value pullup resistor to simplify wiring in some instances (see the Example Applications).

**D0 (pin 5)**

This input is used to select the recording duration (time between start and stop commands). A high

level results in a nominal time of 10 seconds, and a low level provides 1 second.

**Power (pin 6)**

This is an open drain output that is driven low at the beginning and end of each recording cycle in order to toggle the camcorder power on and off. This output is generally connected to pin 3 of the mini DIN Control L connector. An internal pullup resistor is provided for a nominal drain load.

**LANC (pin 7)**

This is the open drain Control L (LANC) interface pin. An internal pullup resistor is provided for a nominal drain load.

**V<sub>SS</sub> (pin 8)**

Circuit common is connected to this pin. This is the most negative point in the circuit.

**Ordering Information**

These integrated circuits are available in either the 300 mil plastic DIP format, or in the 200 mil SOIC surface mount type of package. To order, add the appropriate suffix to the part number:

300 mil Plastic DIP..... ELM303P

200 mil SOIC..... ELM303SM

**Absolute Maximum Ratings**

Storage Temperature..... -65°C to +150°C

Ambient Temperature with Power Applied..... -40°C to +85°C

Voltage on V<sub>DD</sub> with respect to V<sub>SS</sub>..... 0 to +7.5V

Voltage on any other pin with respect to V<sub>SS</sub>..... -0.6V to (V<sub>DD</sub> + 0.6V)

**Note:**

Stresses beyond those listed here will likely damage the device. These values are given as a design guideline only. The ability to operate to these levels is neither inferred nor recommended.

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## Electrical Characteristics

All values are for operation at 25°C and a 5V supply, unless otherwise noted. For further information, refer to note 1 below.

Characteristic	Minimum	Typical	Maximum	Units	Conditions	
Supply voltage, $V_{DD}$	3.0	5.0	5.5	V		
$V_{DD}$ rate of rise	0.05			V/ms	see note 2	
Average supply current, $I_{DD}$		1.0	2.4	mA		
Input low voltage	$V_{SS}$		$0.15 V_{DD}$	V		
Input high voltage	$0.85 V_{DD}$		$V_{DD}$	V		
Internal pullup resistances (see note 3)	300	500	600	$K\Omega$	Pin 4 (I0)	
	20	30	50	$K\Omega$	Pins 6 ( $\overline{\text{Power}}$ ) and 7 (LANC)	
Output low voltage			0.6	V	Current (sink) = 8.7mA	
Circuit timing	Power Pulse	180	200	220	msec	$V_{DD} = 5V$ (see note 4)
		Control L bus	9600		baud	$V_{DD} = 5V$ (see note 4)

### Notes:

1. This integrated circuit is produced with a Microchip Technology Inc.'s PIC12C5XX as the core embedded microcontroller. For further device specifications, and possibly clarification of those given, please refer to the appropriate Microchip documentation.
2. This spec must be met in order to ensure that a correct power on reset occurs. It is quite easily achieved using most common types of supplies, but may be violated if one uses a slowly varying supply voltage, as may be obtained through direct connection to solar cells, or some charge pump circuits.
3. The value of the internal pullup resistance is both supply and temperature dependent.
4. Circuit timing is affected by supply and temperature variations as shown in Figure 1 below. Results shown are average values that can be expected.

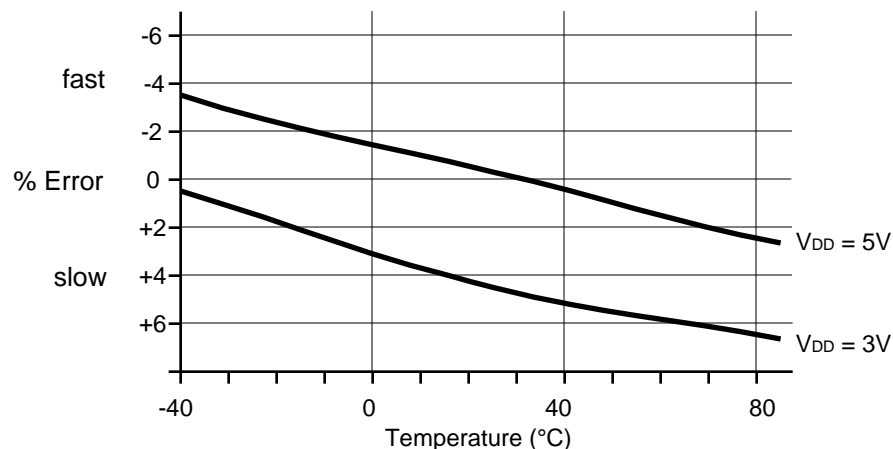
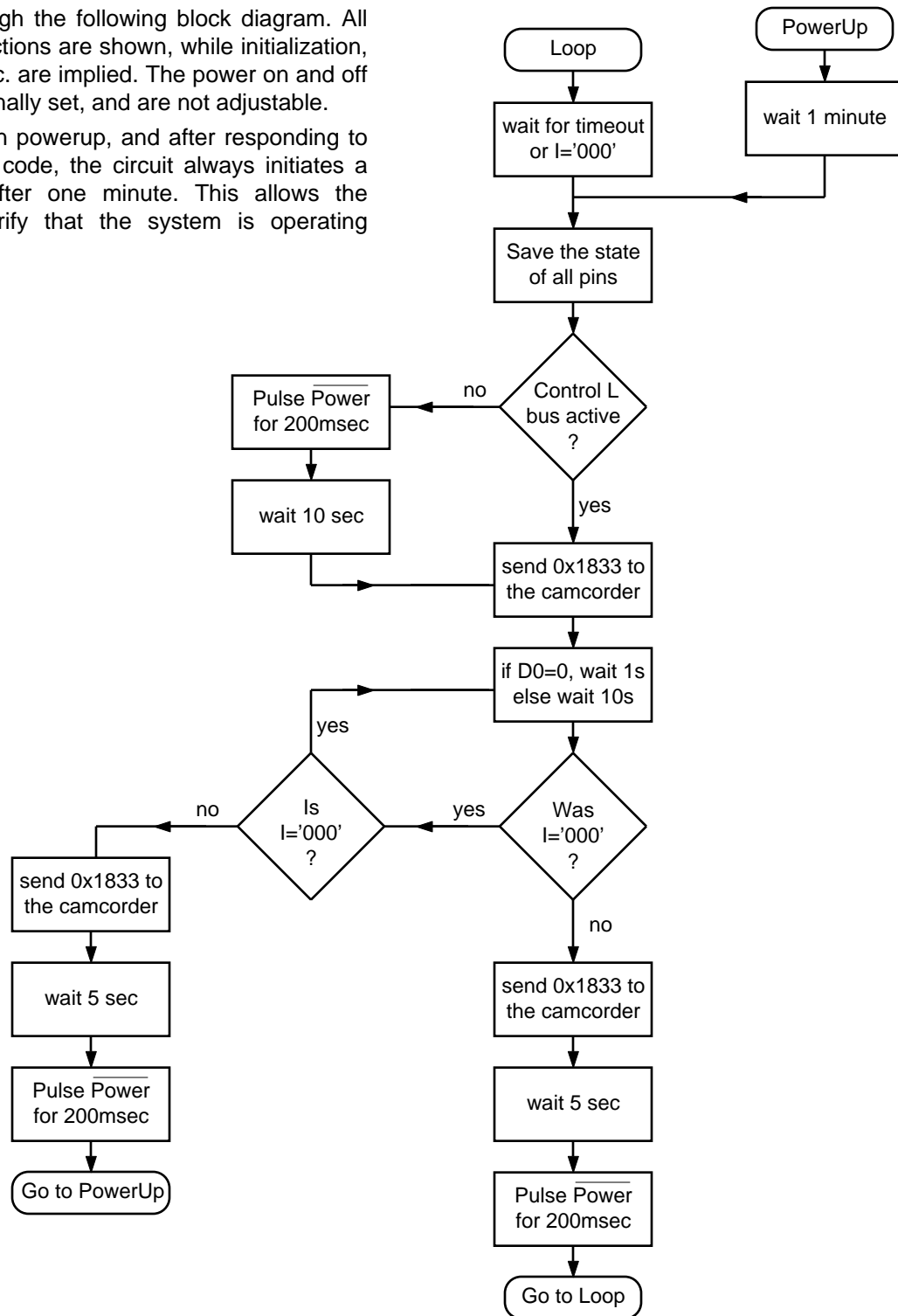


Figure 1. Average Timing Error

## Functional Block Diagram

The operation of the ELM303 can best be described through the following block diagram. All of the main functions are shown, while initialization, timekeeping, etc. are implied. The power on and off delays are internally set, and are not adjustable.

Note that on powerup, and after responding to a '000' interval code, the circuit always initiates a record cycle after one minute. This allows the operator to verify that the system is operating properly.



## Example Applications

The circuits on this page show two different configurations for the ELM303. In each case, one should keep in mind that these are experimenter circuits that require some extra care to protect against electrostatic discharge, etc. The other concern is the possibility of backfeeds from the two different power supplies (camcorder and ELM303). To prevent damage to the ELM303, always make sure that it is powered up before connecting to the camcorder.

Figure 2 at the right shows the ELM303 in a typical security configuration. The internal pullup resistor on pin 4 is used to advantage to keep I0 and I1 at high logic levels while the alarm contact is open. With I2 at a low level and D0 at a high, this configures the circuit for 10 second recordings every hour. Note that all three resistors shown are for ESD protection, and aren't necessary for circuit operation.

When the alarm contact closes, the three 'I' inputs are all at a low level, causing recording to start and continue until the contact is released.

Figure 3 is a programmable system using 'DIP' type switches to allow the settings to be changed as needed. Power is from three AA size alkaline cells, which give approximately 4.8V when fresh. Strictly speaking the supply should be at 5V to be consistent with the Control L (LANC) system, but in practice, this works quite well. Three cell battery holders are available for this type of application, but if one can't be found, shorting out one position in a four cell holder will accomplish the same thing. Of course, a regulated 5V supply would be preferable if one were available.

Operation of either circuit is similar. The ELM303 circuitry is powered up before connecting it to the

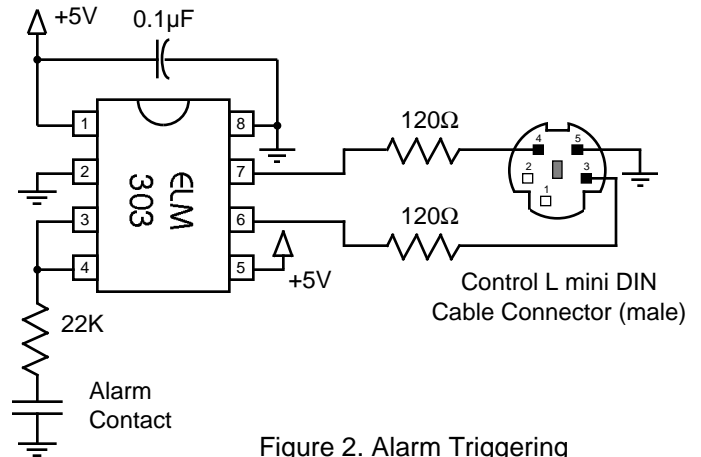


Figure 2. Alarm Triggering

camcorder, and the camcorder is powered and placed in the camera / standby state. The cable between the two is then connected and approximately one minute later, the camera will record one sequence, and will power down. After the duration set by the Interval pins, recording will be initiated again.

Some cameras do not have power control inputs, so will require additional circuitry in order to take advantage of the power control capabilities. A toggle type circuit (driven from the power output pin) could be constructed for this purpose by the more adventurous experimenter, but is beyond the scope of this document to describe.

Experimentation will determine the best settings to use for each of your applications. For plant growing experiments, try using the 60min / 1sec setting. You will find that 1 second is a little long for creating your own animations, but may be just right for others...

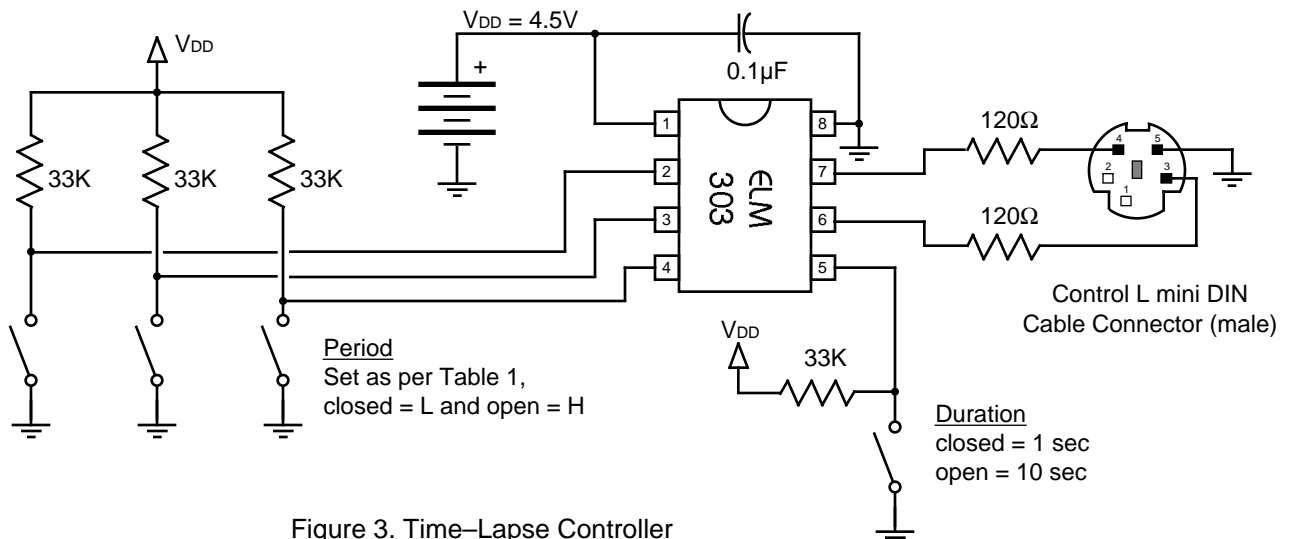


Figure 3. Time-Lapse Controller