

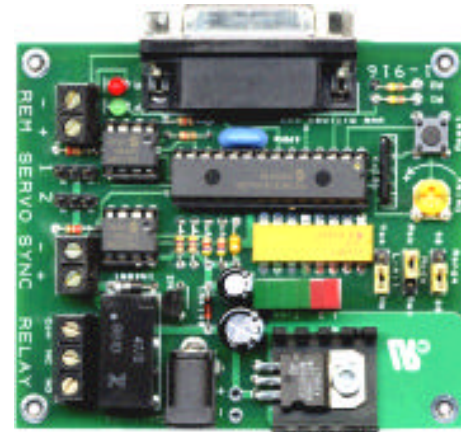
Puppet-3 Joystick-Servo Controller

Controller

Introduction

The Puppet-3 Board is a manual dual channel servo controller and interface capable of recording up to 13 minutes of servo movement and designed to connect with many standard game control joysticks.

It features loop playing with variable delay between loops, synchronized playback of several modules, servo movement limit setting and a single relay digital channel output.



Board Size: 3-1/4" L x 2-3/4" W

- 2 Servo output channels, and 1 digital output channel each capable of recording and playback of up to 13 minutes of action for servos and output relay.
- Digital channel output with relay and wire connection terminal (rated 2 Amp @ 24 VDC)
- Uses standard game joystick to control servos and digital output.
- Manual control and Programmed servo, digital channel control
- Many other features

Connections

Power Connector - The controller module requires between 7.5 and 9V DC (center positive power connection) at 2 Amp to operate standard servos.

Servo Connectors - standard servo connector. Take note of the polarity of the connection. On some servos yellow is used in place of white as the signal control line.

Record LED (R) - Red LED flashes when waiting to start recording and is on continuously during actual program recording.

Playback LED (P) - Green LED indicates playback in operation. Flashes during the delay period for loop operation setting.

Mode Jumper - Move the jumper block to select either **Recording** or **Playback** mode.

Range Jumper - Select servo output pulse to either 1-2 msec (90 degree range) or 0.5 to 2.5 msec (180 degree range). Note that not all servos can rotate a full 180 degrees and if using the 180 degree range take care that the servo is not driven against its mechanical stops. (Servo will shutter, may also hum if driven past available range.)

Limit Jumper - Set to **Yes** if you wish to set the servo end position limits at start-up. In normal play mode set to **No**.

Pupper III Controller

Green LEDs - Elapsed time indication. All green leds ON indicate nearing the end of recording memory time.

Red LEDs - Indicate which servo is active during limit setting and during a pause in recording - light's when the current servo position is the same as the last recorded position -to allows seamless appending to existing programming records.

Sync - Synchronizing pulse and ground connection for multiple controller board links.

Rem - Terminal block connection- will start playback when ever the + REM connection is connected to the - REM ground connection (remote switch activation).

Reset - Resets the controller. The only way to interrupt a playback session or enable recording from the beginning of memory with the power connected. (Used also as a program erase mode when the jumper block is first set to record)

Relay - 2Amp at 24V DC rated relay. Digital output (digital channel 1).

Delay Potentiometer - controls the delay time (0 to 65 seconds) between loops if the controller is set to looping play mode setting.

Joystick Connector - Standard D-15 Analog Joystick connector providing the following control control functions:

- **Joystick Forward** - servo 1 clockwise: backwards, servo 1 counter-clockwise.
- **Joystick Left**- servo 2 clockwise: right, servo 2 counter-clockwise.

- **Trigger switch / button** - control of digital output (relay).
- **Thumb switch** - control of Recording and Playback (depending on Mode jumper setting).

Operation

Manual movement

Connect servos and an analog joystick.

Set the range jumper to 90 degrees.

Set the Limit jumper to No

Set the Mode jumper to Pback (Playback)

Connect a suitable power supply.

The joystick should now be able to control the two servos by moving it forwards/backwards and from left to right. If this is not the case or if the range seems wrong- please refer to the section on Joysticks.

Use the Joystick fine control wheels (if present) to set the neutral (center) position.

Pressing the Trigger switch should activate the digital output (relay).

NOTE:

If you inadvertently press the Thumb switch - and start Playback (single green led lights)-press the reset button to stop Playback.

Setting the Servo Limits

Change the Limit Jumper to Yes and press reset.

The program will restart and the Set servo 1 LED will light indicating the program will record the next 2 positions as the upper and lower limit positions for servo 1.

Move the joystick either forwards or backwards until servo 1 is at the required limit- press the thumb switch once. Move the joystick back to the other limit position- press the thumb switch again. Servo 1 led will extinguish and servo 2 led will light.

Repeat for servo 2 but now moving left and right. The limits are now set and all servo positions will fall within these positions when programming.

Move the Limit jumper back to the No position and press reset.

Recording

Starting a new recording:

Connect servos and analogue joystick.

Set the range jumper to 90 degrees.

Set the Limit jumper to No

Set the Mode jumper to Rec (ord)

Connect a suitable power supply.

Move the servos to the required start position.

Press and hold the Thumb switch to begin recording. The single red recording led will light.

All movements of the servos and the state of the digital output (relay) will be recorded in real time. The maximum record time is 13 minutes. As recording continues, the green leds will light as a visual indicator of the elapsed time.

To stop recording:

Release the Thumb switch. The red recording led will flash.

To play the recorded movement, set the Mode jumper to Playback (Pback) and press the Thumb switch.

Pause during recording

Release the Thumb switch- the red led will flash.

Practice your next moves (or have a cup of coffee!)

When ready to proceed, move the servos to the last recorded position- this is indicated by servo 1 and 2 leds lighting. Doing this will ensure a seamless transition.

Press and hold the thumb switch to continue recording.

Follow on recording

It is possible to add to or amend an existing recording.

At the point where the record is to be amended, quickly remove the Mode jumper and set to the Record position- the red led will flash.

Move the servos to the last recorded position (indicated when both servo 1 and servo 2 leds light).

press and hold the thumb switch and recording will begin as normal.

Playback

Set the Mode jumper to Playback

Set the Limit jumper to No

Press the thumb switch to begin playback. The green P(layback) led will light. To interrupt playback, press the reset button.

At the end of the session, the board will revert to the manual control state. If you wish to engage loop playing, connect a shorting link between the 2 REM connections. At the end of the playing period, the board will read the value of the Delay potentiometer and then wait between 0 and 65 seconds before automatically beginning the playback cycle. This will continue indefinitely until the shorting link is removed.

At the end of the playback cycle when in loop play mode, the servos are automatically returned to their start-up position in a smooth manner to avoid a start-up jerk.

Synchronized Playback

It is possible to synchronize several Puppeteer modules. To do this, one module should be elected to be the master- the remainder as slave units.

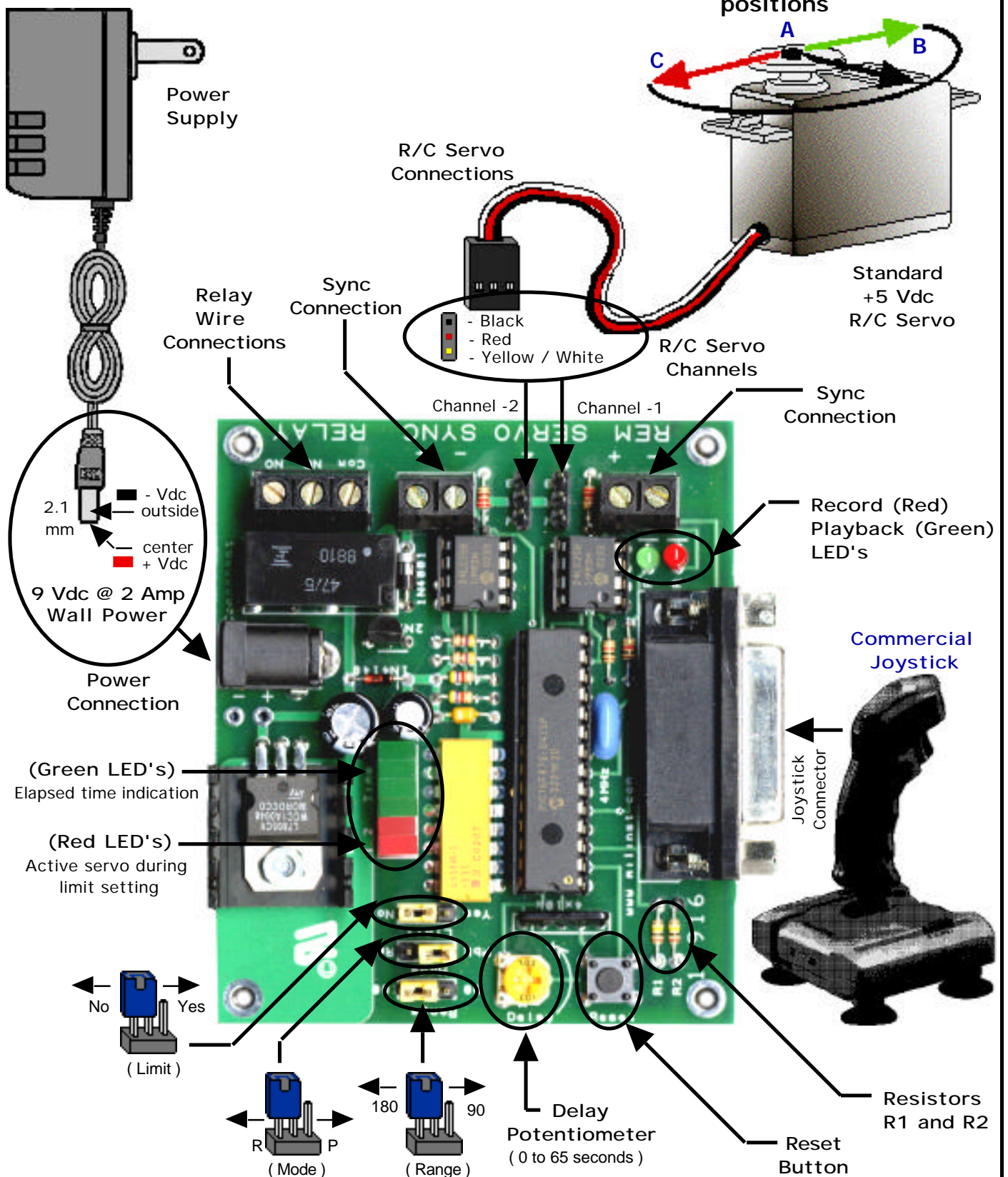
The Sync + connection must be connected to the REM + of the slave unit(s).

Sync + is held high until either a playback or record start condition is initiated. At this point, a 50 msec negative pulse is sent to the slave modules which will initiate playback on slave modules.

Power Supply

The Puppet III board will work with power supplies between 7.5 and 9 Vdc. It is recommended to use a fully regulated 9 Vdc @ 2Amp supply. If you use a power supply larger than 7.5 Vdc, and you find the PCB becoming very hot, reduce the incoming voltage or use smaller servos- the board has been designed for standard R/C servos.

Puppet-3 Joystick-Servo Controller Overview



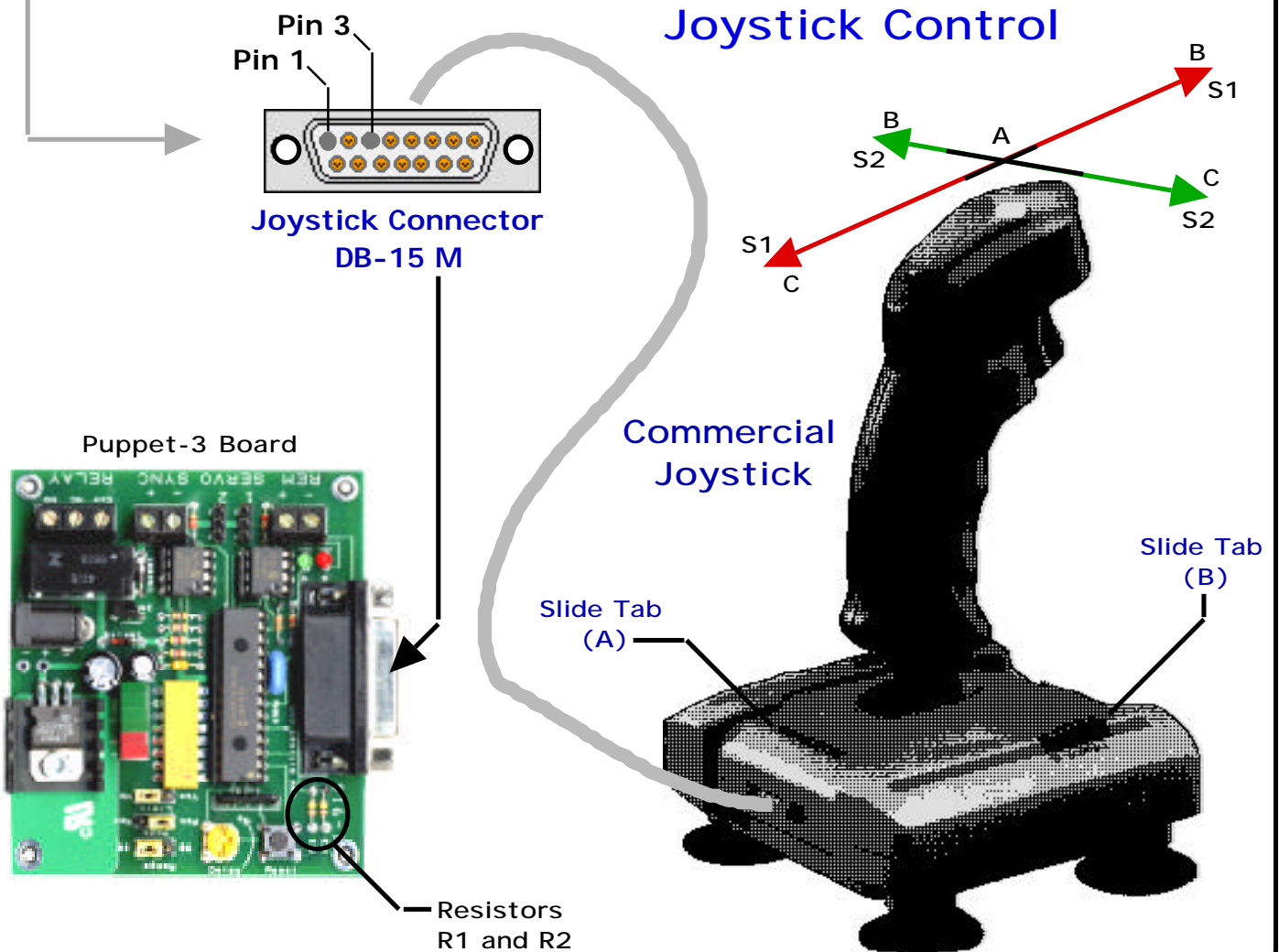
Joystick Controllers

The Puppet -3 is designed for use with many standard **Analog joysticks**, and will usually operate well without any controller board modifications. Try the joystick first, before attempting to make any modifications. Many game joysticks have a nominal resistance of 100k ohms per axis. If you find that the servos are (a) not moving the full 90 degrees, or (b) they move 90 degrees with significantly less than the full movement of the joystick, then it might be that the internal resistance of the particular joystick is significantly different to 100k ohms.

To check this, remove the joystick from the Puppet III and using an Ohmmeter, check the resistance between **pins 1 and 3**. Move the joystick until you read the maximum reading. If it is significantly different from 100k Ohms, then you can adjust the dynamic range by changing out **resistors R1 and R2** (lower left-hand side of the board) for standard values closest to the measured maximum resistance.

Joystick Configuration

Adjust the two slide tabs located on the joystick (top or bottom)to fine tune servo motion, and to control servo shimmer and shake. These slide tabs will need to be adjusted as the joystick handle becomes worn or loose, or will not stay centered.

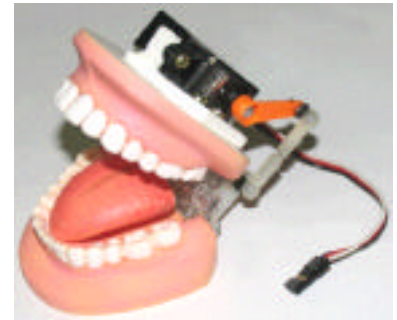
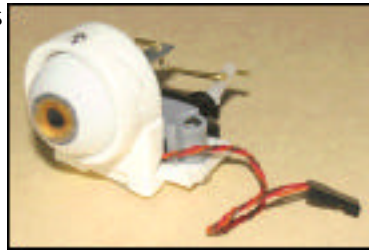


Puppeteer (Puppet-3 Board Example Applications)



X-Y Motion Platform

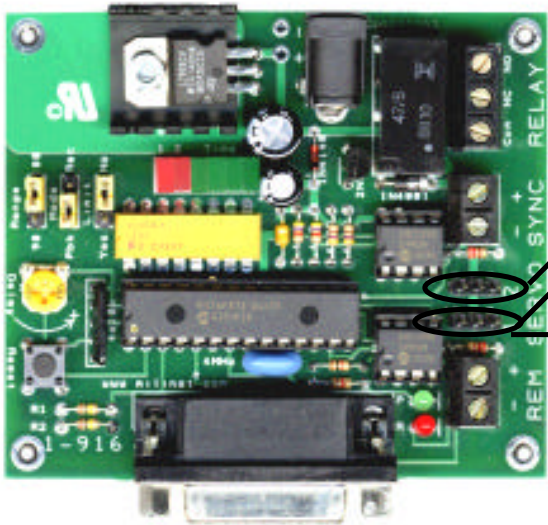
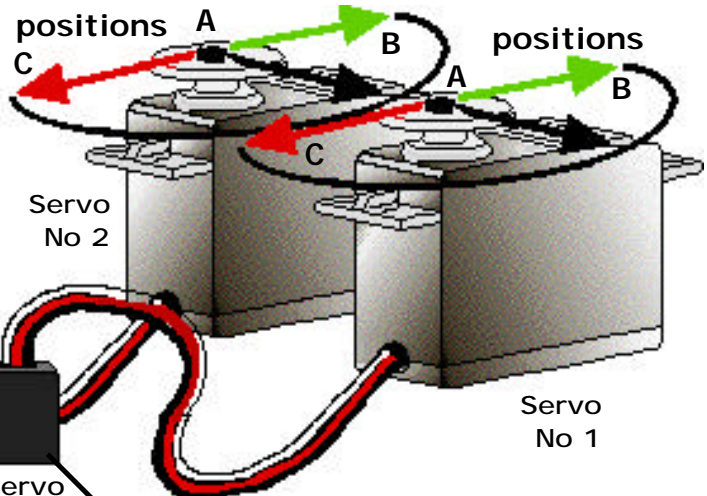
Animatronic Eye Modules



Animatronic Mouth

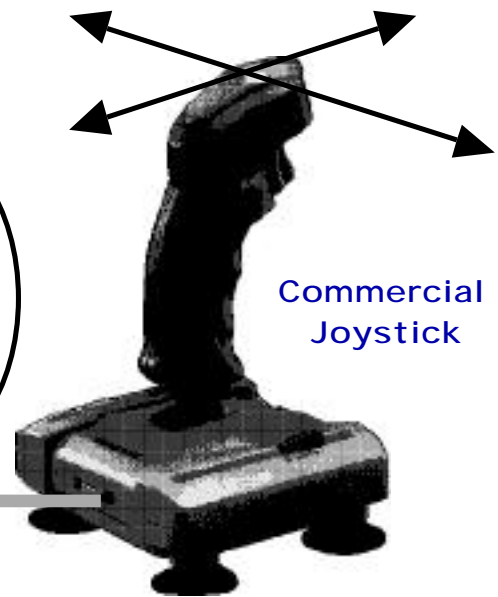
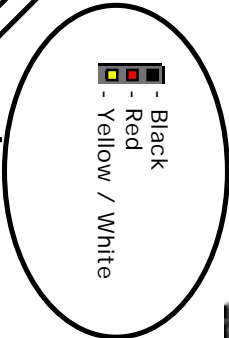
CAUTION:
Observe servo wire polarity

- White / Yellow
- Red
- Black



Servo No 2

Servo No 1



Commercial Joystick

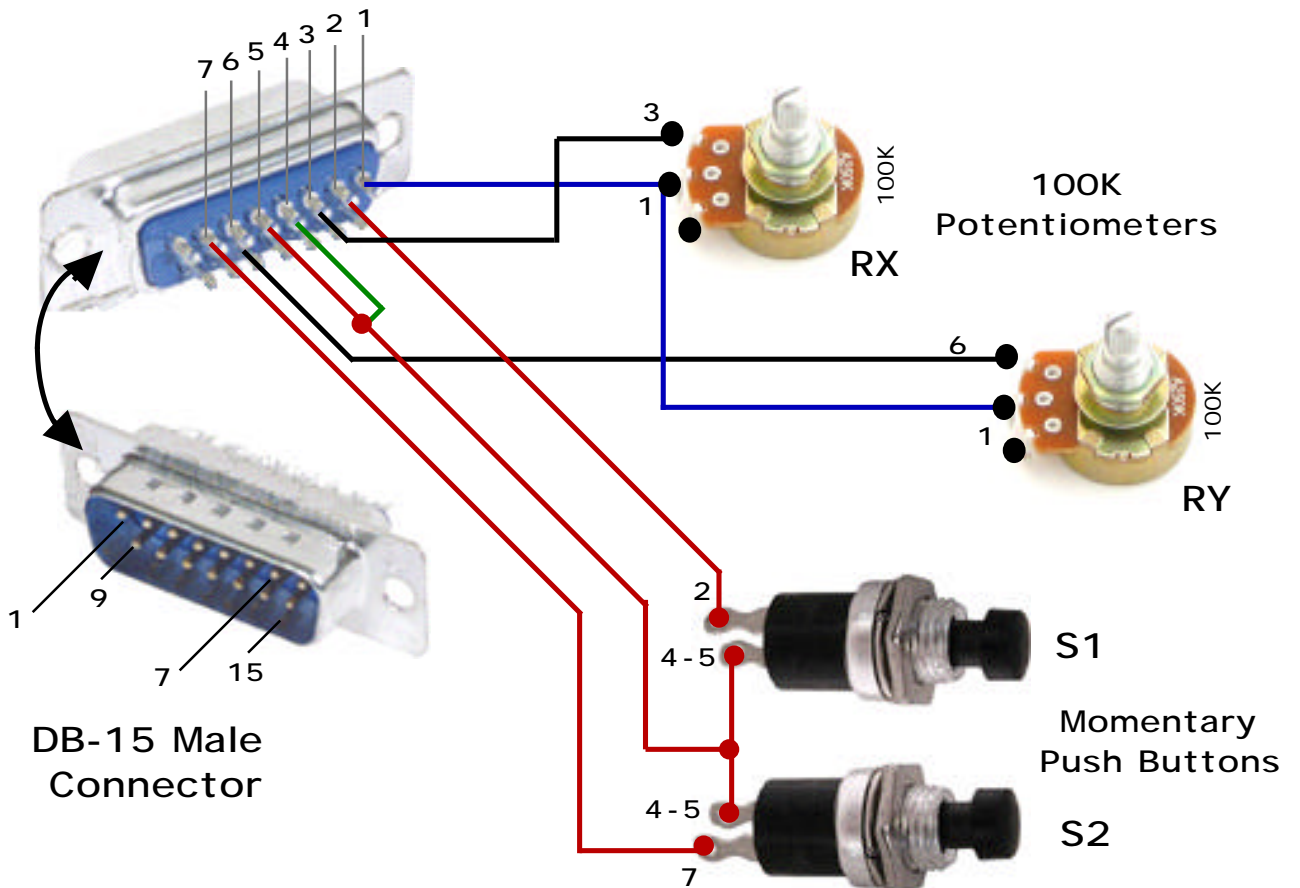
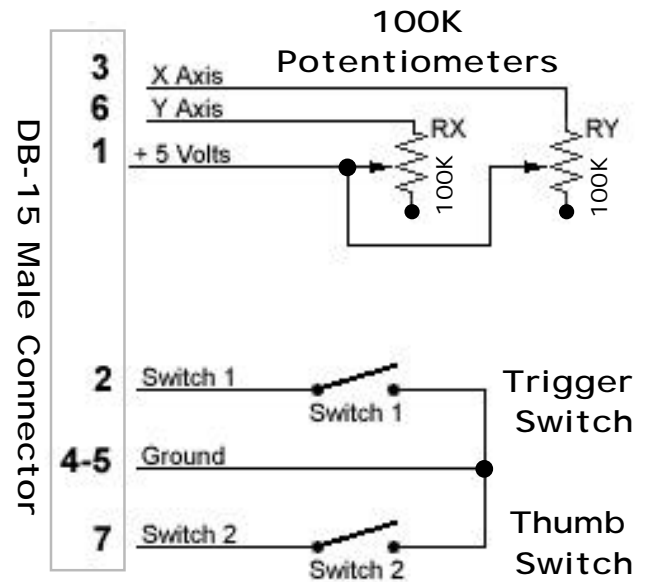
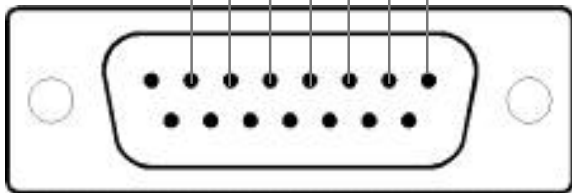
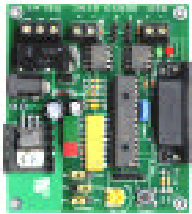
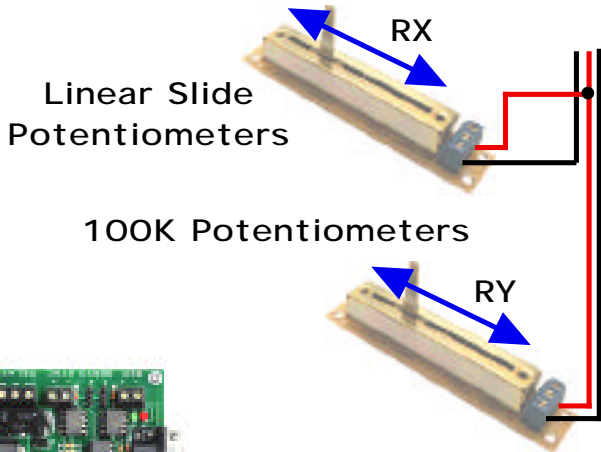
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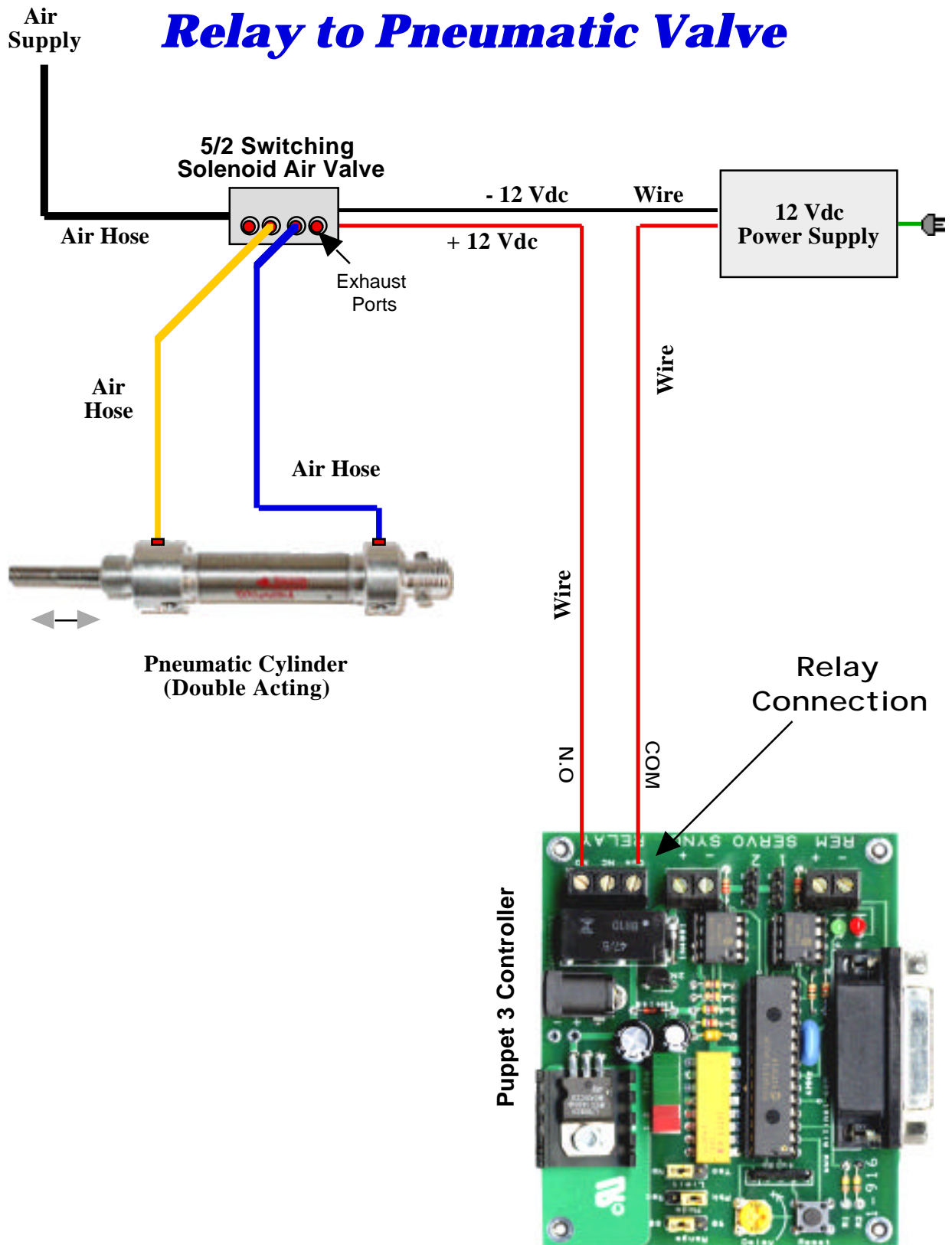
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Puppet 3 Board DB-15 Pin Chart

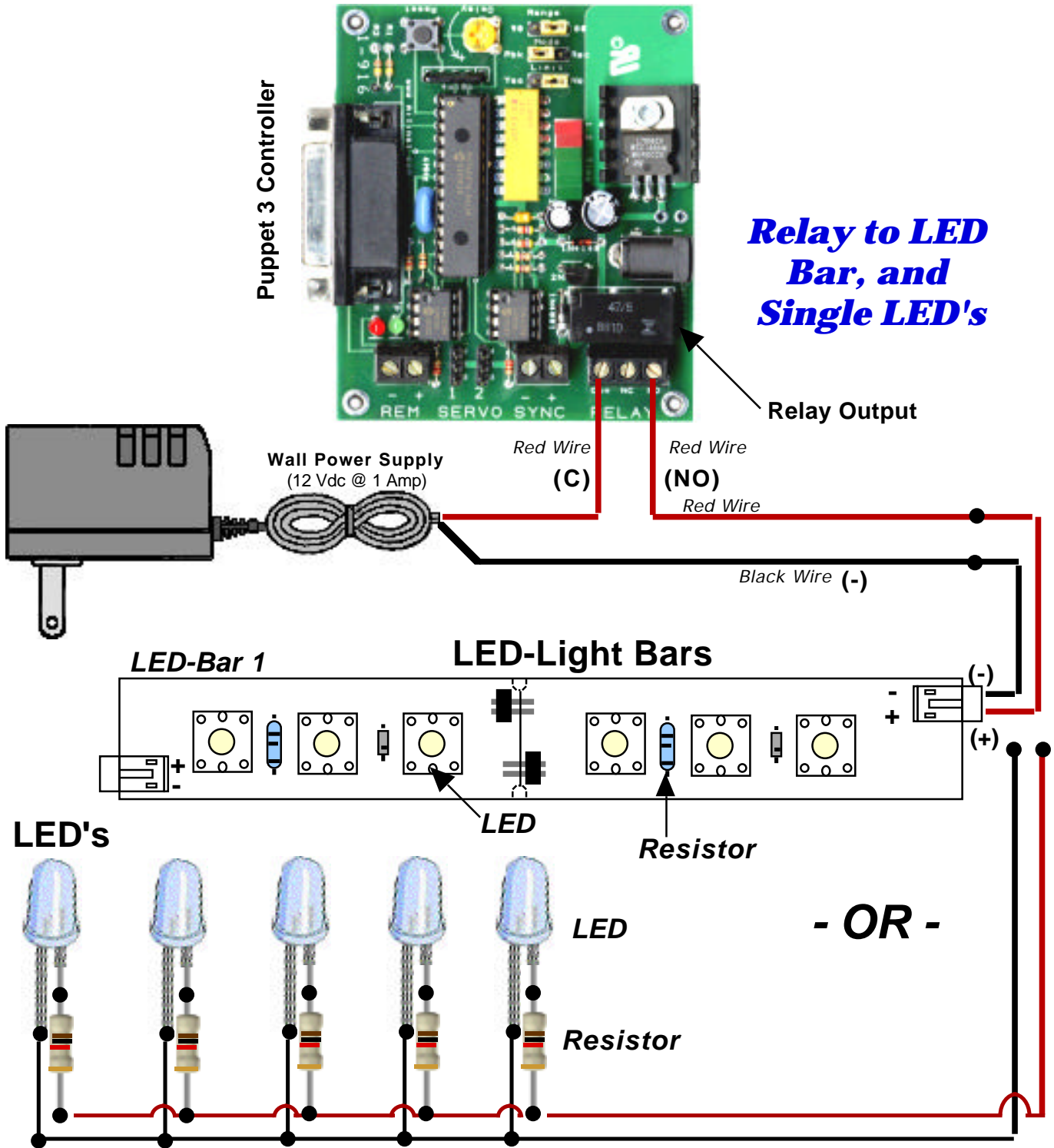


Puppet -3 Controller Relay Application Example

Relay to Pneumatic Valve



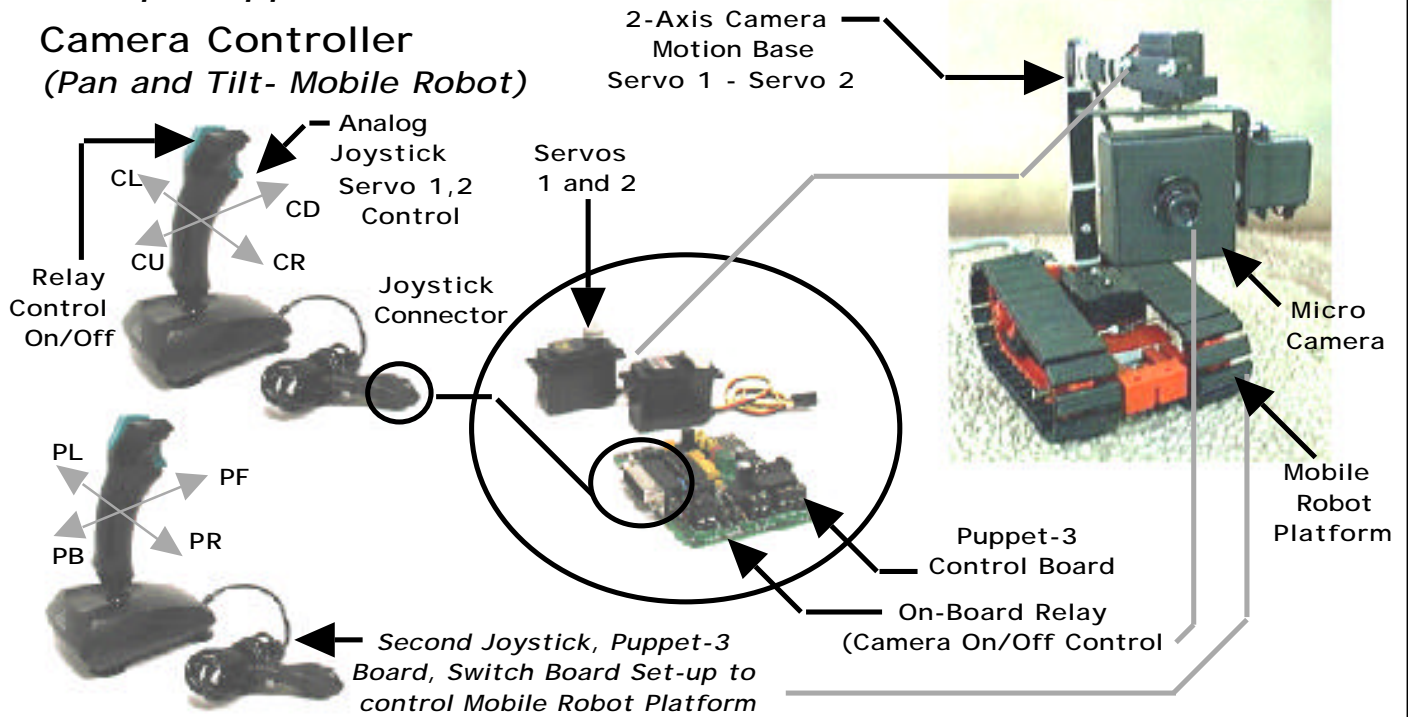
Puppet -3 Controller Relay Application Example



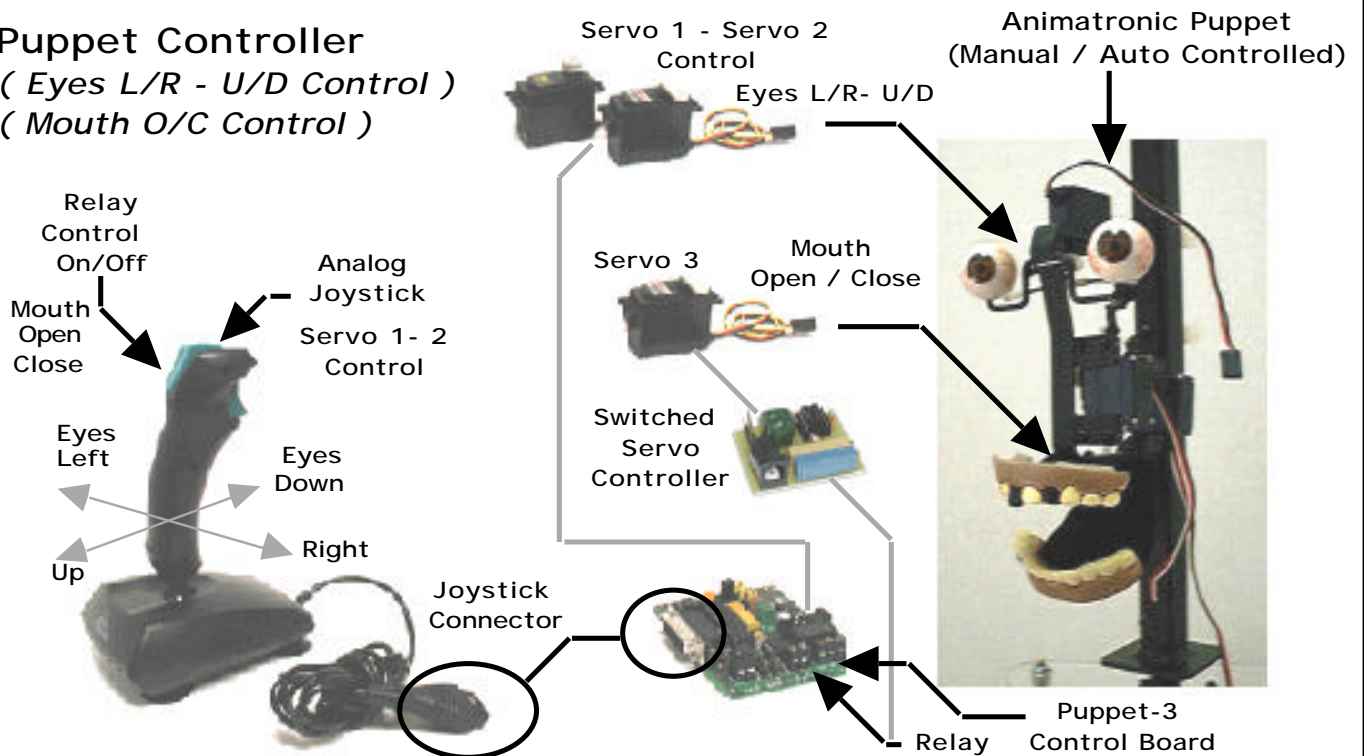
Puppet - 3 Controller (Applications)

Example Applications

Camera Controller (Pan and Tilt- Mobile Robot)

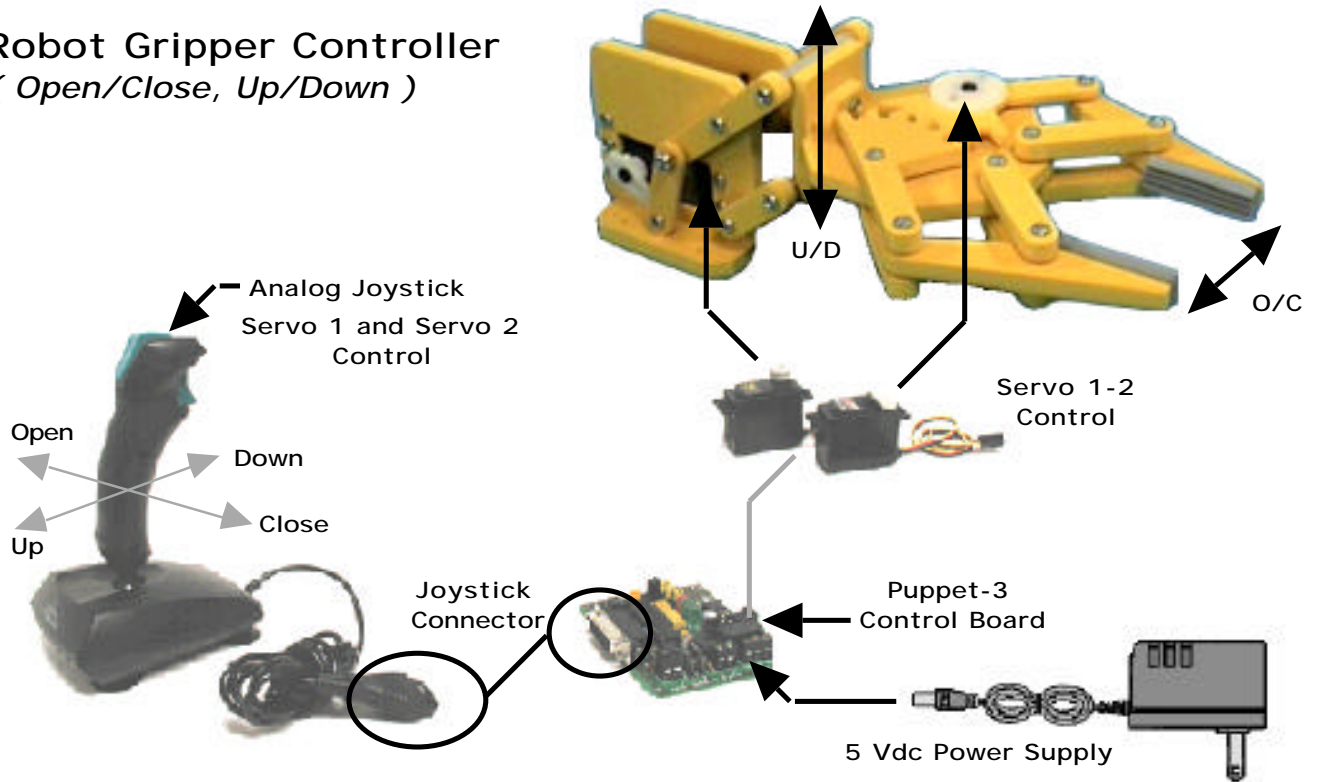


Puppet Controller (Eyes L/R - U/D Control) (Mouth O/C Control)

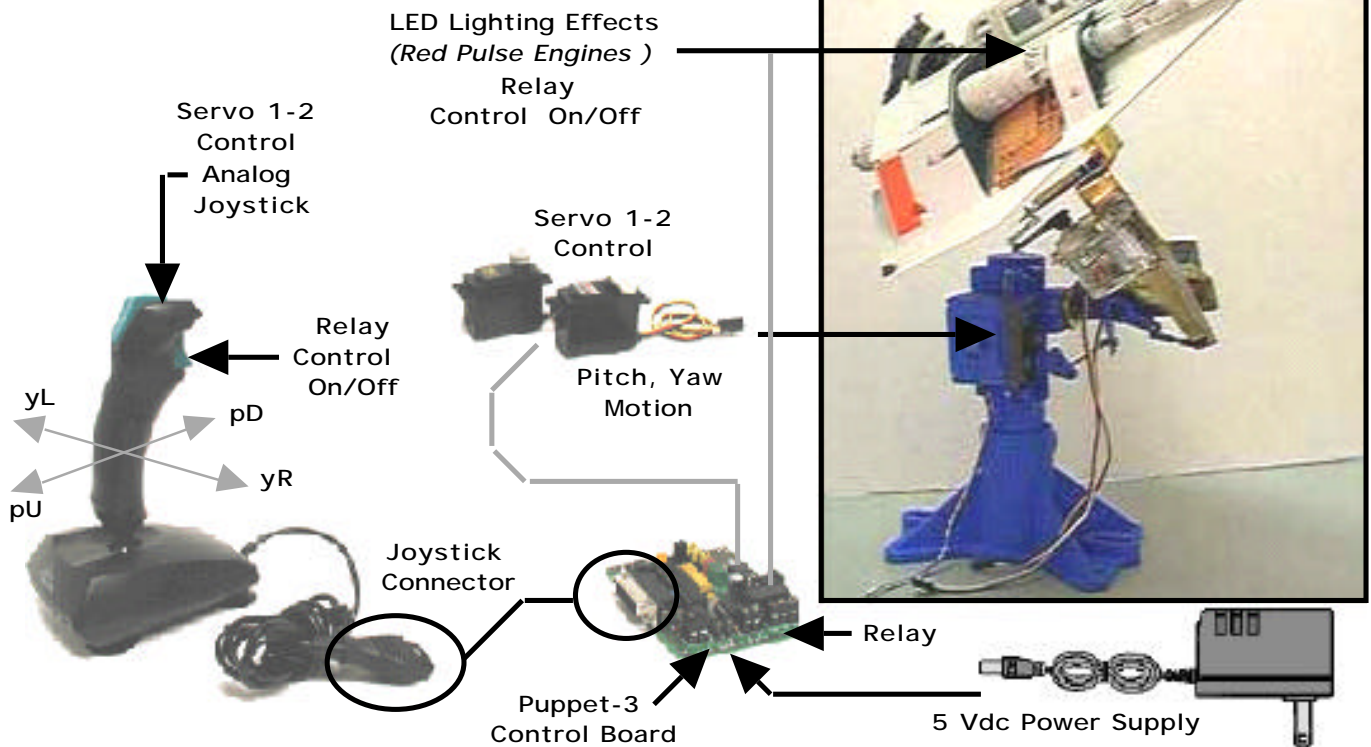


Puppet - 3 Controller (Applications)

Robot Gripper Controller (Open/Close, Up/Down)



Model Prop Controller (Pitch, Yaw, Lighting Effects)



Multiple Puppet - 3 Boards

Rem - Terminal block connection- will start playback when ever the + REM connection is connected to the - REM ground connection (remote switch activation).

Sync - Synchronizing pulse and ground connection for multiple controller board links.



REMOTE SWITCH

- Floor Mat Switch.
- PIR Sensor.
- Manual Operated Switch.
- Relay Contact Switch, etc.

OR

Push Buttons
(Momentary)

Remote Switch

AND

