Scary Terry's Audio Servo Driver™
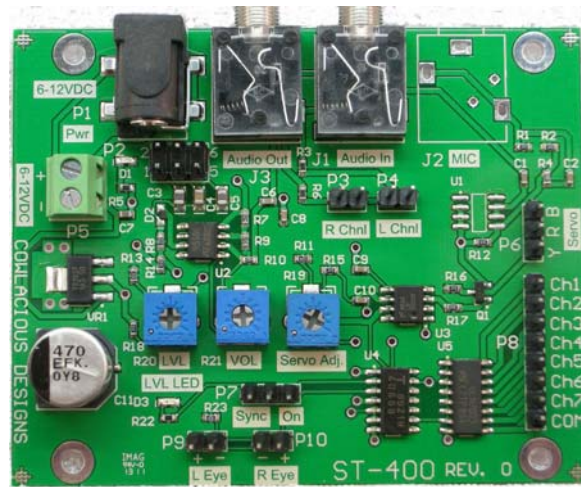
ST-400 Circuit Board

Cowlacious Designs™
By Computer & Electronic Services

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Introduction:

Scary Terry has allowed us at Computer & Electronic Services to produce a Cowlacious Designs circuit board from his original design. Over the years we have changed it a little bit, but the main circuitry is still Terry's! We thank him for the great circuit he designed for everyone to enjoy!

Scary Terry describes the circuit as follows:

"My goal in creating this was for a simple, inexpensive and reliable circuit that doesn't require programming a microcontroller for each individual movement. I've used several of these circuits over the last couple of Halloween's to drive Bucky (skeleton skull) and other animatronic heads, and they worked all night long without fail."
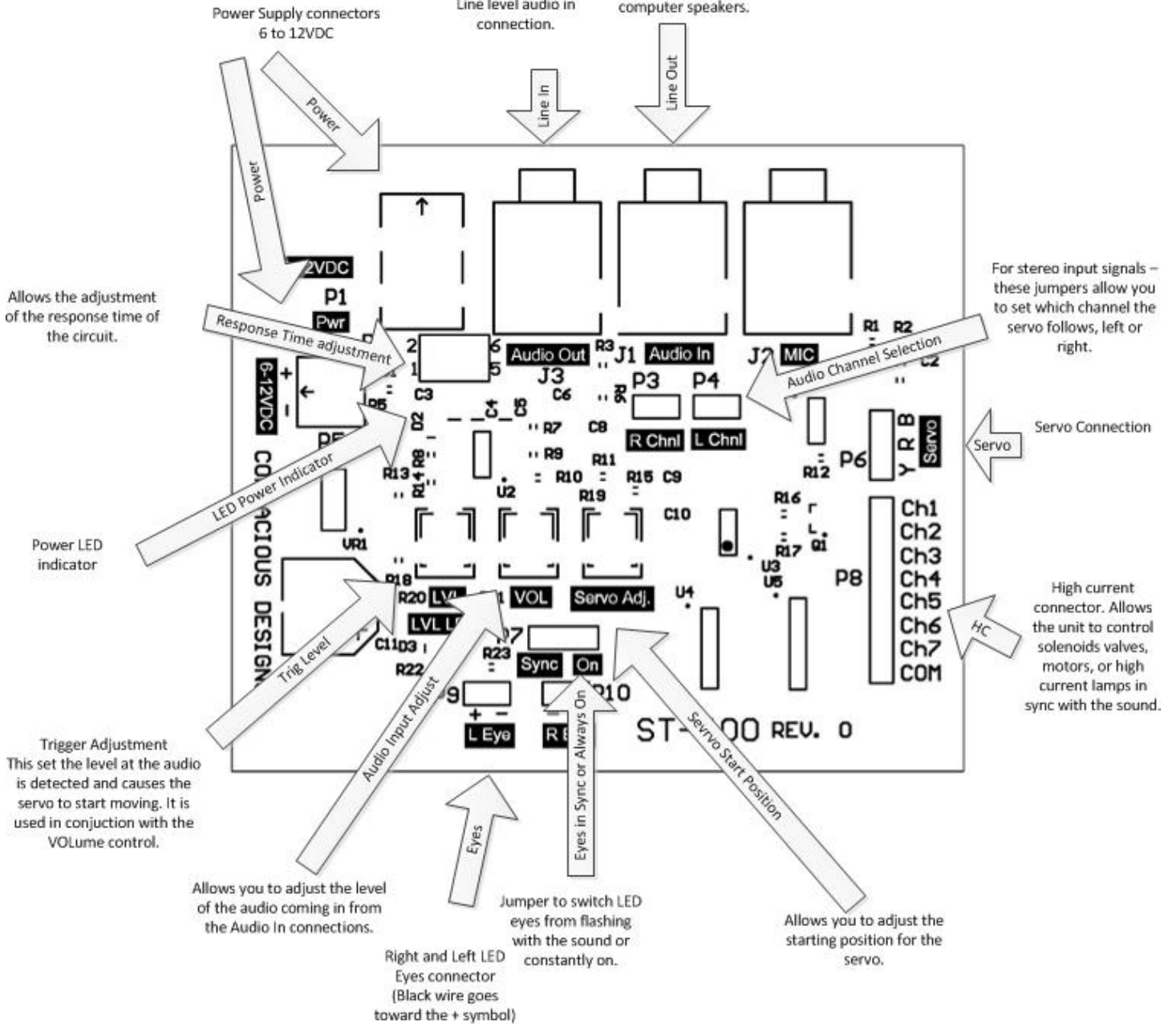
"As long as there is sound present, the servo will drive to its "max" position. If the sound is short in duration, the servo will not have time to drive to "max" but will drive part way and return to "min" position. While this method of moving a mouth is not perfect, it's pretty good and I'm very happy with the effect. It's important to remember that any sound will drive the servo, voice, music or noise, so if you're trying to make a Bucky mouth move to a voice track, you shouldn't have music in the background of that particular track."

Terry's web site is:

http://www.scary-terry.com/

ST400 Overview

Power Supply connectors 6 to 12VDC

Line level audio in connection.

Line level audio out, must be connected to an amplifier for amplified computer speakers.

Line In

Line Out

Allows the adjustment of the response time of the circuit.

Power

Response Time adjustment

2VDC

P1

Pwr

6-12VDC

LED Power Indicator

Power LED indicator

CO... ACIOUS DESIGN

Trig Level

Audio Input Adjust

Trigger Adjustment This set the level at the audio is detected and causes the servo to start moving. It is used in conjuction with the VOLume control.

Allows you to adjust the level of the audio coming in from the Audio In connections.

Eyes

Right and Left LED Eyes connector (Black wire goes toward the + symbol)

Eyes in Sync or Always On

Jumper to switch LED eyes from flashing with the sound or constantly on.

Servo Start Position

Allows you to adjust the starting position for the servo.

For stereo input signals – these jumpers allow you to set which channel the servo follows, left or right.

Audio Channel Selection

Servo Connection

Servo

High current connector. Allows the unit to control solenoids valves, motors, or high current lamps in sync with the sound.

HC

R3 J1 Audio In J2 MIC R1 R2
Audio Out
J3 C6 P3 P4 C2
C3 R Chnl L Chnl
C8 R7 R12 P6 Y R B Servo
R9 R11
R13 R10 R15 C9 R16 Ch1
R19 Ch2
U2 C10 R17 Q1 Ch3
VR1 U3 U5 P8 Ch4
R20 LVL VOL Servo Adj. U4 Ch5
LVL L Ch6
C11 D3 R23 Sync On Ch7
R22 COM
L Eye R

ST-400 REV. O

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Testing and Adjustment

(Note: Please see connection diagrams on the following pages.)

☐ Connect your servo to the servo header. Make sure you properly orient your servo connector with the header. The header is marked with "Y R B", where Y is for Yellow, R is for Red or positive, and B is for Black or Negative. (Colors for the yellow wire will vary by servo manufacturer, but the Red and Black are usually there.)

☐ Supply power to the board through either the barrel connector (P1) or the green terminal block (P5). **Only use one of the power supply connections.** There are two of them to provide you with the greatest versatility in powering the circuit. You should see the "PWR" LED light up as soon as power is applied.

☐ Adjust the threshold level, "LVL" pot (R20) clockwise until the "LVL LED" just turns off and then stop the adjustment. If the "LVL LED is already off, the turn VR2 counter clockwise until the "LVL LED turns on and then rotate VR2 clockwise until the "LVL LED" turns off and then stop the adjustment. **This is a critical adjustment is very sensitive. Turn the pot slowly and in very small increments.**
This control is used to adjust how loud the sound needs to be before the servo will start to move. If it is set too low the servo will remain at its maximum position too much of the time. If it is set too high the servo will not respond to the sound at all or not as much as desired.

☐ Adjust the "Servo Adj" pot (R19) so that the servo moves just a little ways from its 0% starting position. This control is used to set the starting position of servo. If you are using it with one of our skulls, it sets the starting position of the jaw bone (i.e. whether the teeth are clenched tightly or slightly apart before sound is applied).

☐ Audio can be fed to the circuit from a line-level source (MP3 player, CD player, or one of our CAR/P or CAP audio boards).

Using a Line Level Audio Source

Feed audio to the circuit through the 3.5mm stereo "Audio In" jack. If you want both channels of sound to control the ST-300 then make sure that the red shorting jumpers are on RChnl and LChnl. If you want only the right channel to control the ST-400 then remove the shorting jumper from LChanl and make sure a red shorting jumping is on RChnl. If you want only the left channel to control the ST-400 then remove the shorting jumper from RChanl and make sure a red shorting jumper is on LChnl.

PLEASE NOTE: Both channels of the audio are always passed on to the "Audio Out" jack. The "Audio Out" jack can connect to an external set of powered computer speakers, powered MP3 speakers, or it can feed the Aux or Line-In jack of an amplifier that has speakers connected to it.

☐ Adjust the "VOL" pot until you get the kind of response you want. Remember, this circuit is designed to move the servo to its maximum position whenever audio is present. If the audio is too loud it will remain in its maximum position until the "VOL" is adjusted to an appropriate audio level.

If you want the audio level up at a higher level for the output side of things, adjust the audio level to its desired position then adjust the "LVL" until you get the response you want.

The "VOL" adjustment and the "LVL" adjustment work in conjunction with each other, so you may need to experiment a little bit with these controls to get the effect you want from the sound source you are using.

☐ **OTHER AJUSTMENTS AND CONNECTIONS**
There are three header pins on P5 with a red removable jumper across the two middle pins. This header allows you to fine tune how quickly the circuit responds to sounds. In the middle position it is using a 4.7uF capacitor. If you move the jumper up two pins it will use a 2.2uF capacitor, speeding the reaction time up a little. If you move the jumper to the down two pins it will be using a 10uF capacitor which will slow the reaction time down a little.

☐ **High Current Section (P8)**
The high current driver of the Scary Terry board allows the board to control devices such as small DC lamps, relays, and solenoids for air and water. This section can be used to control props that require larger eyes than LED's appear to be and/or to control a jaw that is just too big for a servo to be able to control.

Each of the 7 channels is capable of sinking 500mA of current. We don't recommend pushing it that hard without attaching a heatsink to the chip, but that is what the specs for the device say.

The chip can sink up to 24VDC devices, even though the Scary Terry board is only a 5VDC board.

Please view our online videos for addition help in using this board.

SUPPLIED DEVICES

☐ LED AUDIO EYES
   The L Eye & R Eye connections can be set so that the LED Eyes are always on or so that they flash with the audio. Setting the red shorting jumper of P7 across the middle pin and the "On" pin will make the eyes flash with the audio. Setting the red shorting jumper of P7 across the middle pin and the left pin will make the eyes stay on continuously. The LED eyes attach to the R Eye (P10) and L Eye (P9) headers with the black wire facing towards + symbol. Our LED Audio Eyes can simply be plugged onto these connectors.
   Just about any color LED will work fine with these connections (clear ultrabright red LED's are supplied).

OPTIONS AVAILABLE FOR PURCHASE
Please see our web site at www.cowlacious.com

☐ 9VDC, 500MA, WALL TRANSFORMER THAT PLUGS INTO THE BARREL JACK.

☐ HITECH 425BB SERVO

☐ COMPUTER SPEAKERS

☐ 3.5MM TO 3.55 STEREO CABLE (ONE IS PROVIDED)

☐ 3.5MM TO RCA CABLE

☐ HIGH CURRENT WIRING ASSEMBLY
   The high current section on the board allows for higher current devices to be controlled by the Scary Terry Audio Servo Driver board. This connection allows devices such as small lamps, relays, and solenoids for air and water to be controlled in sync with the audio, just like the LED Audio Eyes. These devices will turn on and off in sync with the "LVL LED".

   The Wiring Assembly provides an eight pin connector with 6" wires for making connections to the circuit board header (P8) easier.

Special Thanks to Scary Terry (Terry Simmons) for letting us use his original design for this product!

We hope you enjoy it!