Scary Terry's Audio Servo Driver™
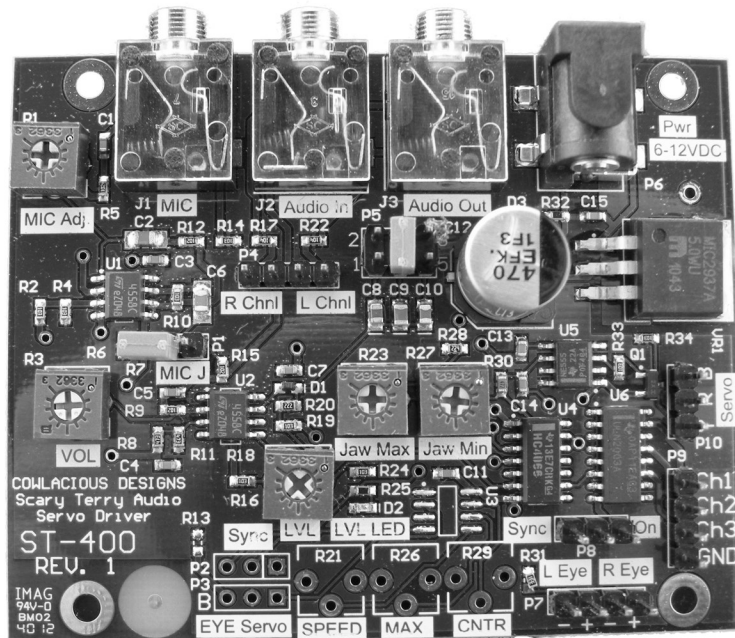
ST-400 Rev.1 Circuit Board

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!
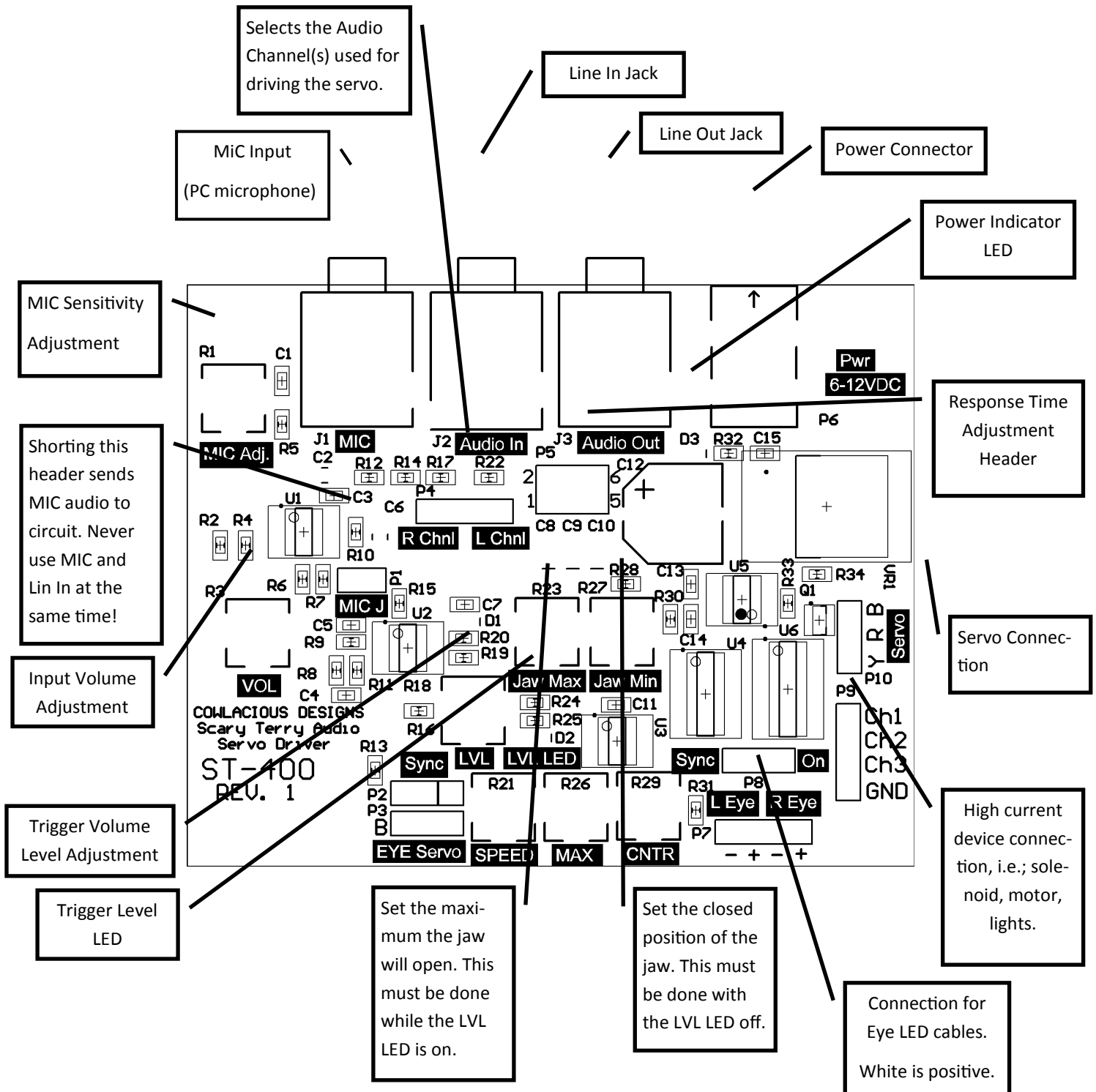
Scary Terry describes the circuit as follows:

"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:

ST-400 Rev. 1 Overview

Selects the Audio Channel(s) used for driving the servo.

Line In Jack

Line Out Jack

Power Connector

MiC Input (PC microphone)

Power Indicator LED

MIC Sensitivity Adjustment

Shorting this header sends MIC audio to circuit. Never use MIC and Lin In at the same time!

Response Time Adjustment Header

Input Volume Adjustment

Servo Connection

Trigger Volume Level Adjustment

High current device connection, i.e.; solenoid, motor, lights.

Trigger Level LED

Set the maximum the jaw will open. This must be done while the LVL LED is on.

Set the closed position of the jaw. This must be done with the LVL LED off.

Connection for Eye LED cables. White is positive.

R1 C1
J1 MIC R5 C2
MIC Adj.
R12 R14 R17 R22
U1 C3 C6 P4
R2 R4
R3 R6 R7 R10
MIC J U2
C5 R9
VOL R8 C4
COWLACIOUS DESIGNS
Scary Terry Audio
Servo Driver
ST-400
REV. 1
R13
Sync
P2
P3
B
EYE Servo

J2 Audio In J3 Audio Out D3 R32 C15
P5 C12
2 6
1 5
C8 C9 C10
R23 R27 R28 C13
R15
C7
D1
R20
R19
R11 R18
R16
R24 C11
R25
D2
LVL LVL LED
R21 R26 R29
SPEED MAX CNTR

Pwr
6-12VDC
P6
U5 R33 R34 VR1
R30 Q1
C14 U4 U6
Sync On
R31 P8
L Eye R Eye
P7
− + − +

Y R B Servo
P10
P9
Ch1
Ch2
Ch3
GND

3

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 (P6) . You should see the "PWR" LED light up as soon as power is applied.

Adjust the threshold level, "LVL" pot (R18) clockwise until the "LVL LED" turns on and then stop the adjustment. Then, adjust the "Jaw Max" pot to set the maximum you would like the jaw to open. Adjust the "LVL" pot back until the "LVL LED" turns off. Then, adjust the "Jaw Min" pot until the jaw closes to desired position when no audio is playing.

Finally, adjust the "LVL" pot until the "LVL LED" is on and then back it off just a little until the "LVL LED" turns back off. **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.

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-400 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 (P9)

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 and/or to control a jaw that is just too big for a servo to be able to control.

Each of the 3 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.

Using A Microphone

You can use a PC or headset type electret condenser microphone with this product to control the jaw movement.

To use a mic:

- Make sure no audio cables are plugged into the Line In jack.

- Power up the board as you normally would.

- Move the red shorting jumper on "MIC J" (P1) so that it shorts (is over) both pins of the "MIC J" header.

- Plug your microphone into the "MIC" (J1) jack and begin to speak.

- You may need to adjust the "MIC Adj" (R1) pot to increase or decrease the microphones sensitivity. You may also need to adjust the "VOL" and "LVL" pots to get the board to react in the desired manner.

NOTE: Please remember to remove the shorting jumper from the "MIC J" position if you decide to go back to using the Audio In jack.

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).

3.5MM TO 3.5MM 6' STEREO CABLE

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 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 a four pin connector with 6" wires for making connections to the circuit board header (P9) easier.

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

We hope you enjoy it!