

Operation Manual for the Wee Little Talker
Driver Software Version 5.2.3 8/3/2017
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This document is for the Wee Little Talker PC board. The three digits of the version number (X1.X2.X3) are for the following information...

X1 - PC Board's version number
X2 - Driver Software Code version number
X3 - Driver Update version number

Scope of the controller software:

The goal of the software is to create a Lip-Sync for the Jaw Servo. By using an audio prompt menu system, the user can set the limits of the Servo and input the board's operational parameters.

The controller board uses the Picaxe 20X2 to handle all functions of the controller board. It's main job is to read data from the Audio Spectrum Analyzer to sync the jaw servo to the audio that is playing. The Picaxe controller also looks for input from a PIR sensor and drives the Left and Right LED eyes. The Show Output use to the outside world know that the Wee Little Talker is currently playing a talking track.

This driver program uses both the Red Status LED and Voice via output audio jack to communicate with the user. Please make sure a set of amplified speakers or headphones are used to hear the vocal commands of the setup system.

Main Power Connection:

A regulated 5 Volt with 2 amps or more power supply is used to the drive the board. (4 amps if you are using the speaker terminal.) Please note the center pin of the 2.1 mm power jack is the positive input of the power supply. Reversing the power or using greater Voltage will damage the Wee Little Talker.

Sound Jumpers:

The eight-pin header (JP2) is used to configure the sound system on the Wee Little Talker. This program is designed for 3 jumpers on pins 1-2, 5-6 and 7-8.

Using the Lip-Sync option will use the Audio Jack as an input to the Audio Spectrum Analyzer system. The jumper setting used with this option is one jumper on pins 2-3. See Lip-Sync section under Setup Menu for more details.

Mono Speaker Terminal:

The DFplayer Mini can drive single (mono) 8-ohm speaker of a maximum of 3 watts.

Audio Output Jack:

The audio level of the output jack is that of any other Smart Phone or MP-3 player. While headphones will work, a set of amplified speakers are needed to hear the audio output of the Wee Little Talker.

Jaw Servo Connection:

The Jaw servo is connected to pins 1, 2 and 3 on the main connection header. These are ...

Pin 1: Ground connection to servo
Pin 2: 5 Volts power to servo.
Pin 3: Signal line to servo.

The black or brown wire of the servo connector should go to the ground (1) pin. On the other side of the servo connector is for the Signal line. (White or yellow in color.) Hooking up the Servo backwards can damage the Servo or the Wee Little Talker.

Left and Right LED Eyes Connection:

Pins 4-7 are used to drive the LED eyes. Pins 4 and 5 are used to drive the Right LED with Pins 6 and 7 for the Left LED. Pins 5 and 7 supply the positive power noted by the (+) mark.

R7 and R8 on the PC board are the current limiting resistors for the LED Eyes. So the LED can be directly connected to the Header pins without the need for extra circuitry.

PIR Sensor Input.

The PIR input is used to connect an optional Passive Infrared (PIR) sensor to trigger the playing of a vocal track.

Pin 8: Ground
Pin 9: PIR sensor input.
Pin10: +5 volts to power the PIR.
Pin11: Ground

I2C Bus:

Pins 12-15 are used to connect future projects (like video eyes) to the Wee Little Talker via the I2c Bus.

Pin 12: +5 Volts.
Pin 13: Clock Line.
Pin 14: Data Line.
Pin 15: Ground

Hardware Diagnostic:

When power is applied, the Red Status LED (LED1) will pulsate for about four seconds while the DFPlayer Mini embedded MP3/Wave module boots-up. Then the software will test functions of the audio module and verify that it's been installed and working. If the DFPlayer Mini is not found or is bad, the Red Status LED will flash slowly. A quickly flashing Red Status LED indicates an error with the micro SD-Card's files system.

At this point, the Wee Little Talker will announce its name and version number of the program via the audio output jack. If the announce is not heard, please verify that the sound system connected to the audio output jack is working.

The last system check is the MSGEQ7 Audio Spectrum Analyzer chip. The program will play 7 tones to verify the chip can analyze them. (You will not hear the tones during the test.) If there is an issue with the MSGEQ7 chip analyzing the tones, the board will announce that the chip is bad and flash the Red Status LED.

Operations modes for the software:

The controller software operates in two modes, RUN and SETUP. RUN mode will play the Vocal tracks and move the jaw in sync. A trigger input device can be used to start the show cycle. See the RUN section for more information.

Please Note: To protect the servo, the controller software will only select the SETUP Menu mode till the Servo Setup has been completed. See the section on Servo Setup for more information.

Once the servo limits have been set, the board will automatically start in RUN mode when power is turn on. To enter the SETUP Menu mode, press the Red Select button while the Red LED is pulsating during power up. The board will also enter the SETUP mode if the servo limits have not been set by the Servo Setup Menu.

Using the SETUP Menu.

The SETUP menu system uses vocal prompts so a headphone, set of amplified speakers or other sound system must be connected to the audio output jack.

Each menu item has two or more options. Use the green up and blue down buttons to change the input option and press the red select button to select it.

Each menu vocal prompt will repeat itself after being idle for a minute to remind you what menu is requesting an input on.

The Main Setup Menu has seven selections for:

Servo Limits
LED Eyes Style
Prop Cycle Delay
Prop Trigger
Adjust Volume Level
Startup Announcement
Lip-Sync
Exit Setup

As you press the up and down buttons, the program will "speak" one of the Menu Items. To select the menu item, press the Select button.

Servo Limits

This selection walks the user through setting the Jaw servo limits. The (Green) up and (Blue) down buttons are to change the Jaw's position the (Red) select button to record the position.

(It's important not to force the servo to the full limit of its range. Better to leave a bit of room between the full limit and the final limit selected.)

The servo limits prompt is set the Jaw closed position. Use the (Green) up and (Blue) down buttons to move the jaw servo to the nearly closed position and then press the select button. Then, do the setting for the jaw's open position.

With the servo limits completed, the controller will return to the main setup menu.

LED Eyes Style Option:

This option set the style of the LED used for the Left and Right Eyes. The options are eyes always off, on during the show (talking) and eyes always on.

Prop Cycle Delay Option:

This option sets the minimal time delay from zero seconds to ten minutes before the next prop (talking) cycle can be triggered or auto-started.

Prop Trigger Option:

This option configures the type of trigger used to start the next talking cycle. The options are Auto-Start, Positive or Negative trigger input. The PIR input (Pin 9) on the Wee Little Talker PC board is used to trigger the next prop cycle.

Auto-Start (Default) will always trigger the next prop cycle regardless of the state of the PIR input and design for use when there is no PIR or trigger input connected to Pin 9.

The other two trigger options use the PIR input. The Positive option waits for high on the input line to trigger the next cycle. The Negative option waits for a low (ground) to trigger the next cycle.

Adjust Volume Level:

This option sets the output volume level. There are five levels to select from: Quiet, Low, Normal, Loud and Over-Driven. The last item, Over-Driven is not recommended because of the audio distortion.

Startup Announcement Option:

The Startup Announcement of the program's name and version number can be turned on and off with this menu item. As before, used the up and down buttons to select the new option and press the select button to record it.

Lip-Sync Option:

This option let an audio input (via the Audio Jack) to be used to drive the jaw motions in place of the build-in audio system. A small speaker must be comment to the speaker terminal to head the audio prompts since the Audio Jack is no longer used for output.

Use the up and down buttons to change this option and the press the red select button to record it.

Please note the first jumper of the "Sound" header will need to be changed. When the Lip-Sync option is off, the first jumper must be on pins 1-2. (The Audio Spectrum Analyzer test will fail if not on the right pins.) When the option is turned on, the first jumper must be on pins 2-3 for the Lip-Sync to work currently.

Exit Setup Menu:

Use this option to exit the Setup Menu and restart the Wee Little Talker.

The Audio Player's Sound System

The DFplayer Mini uses a Micro SD or SDHC card to hold the source files to play. The RUN mode audio files are in folder "01" starting with "001" are the Vocal tracks. The Ambient tracks are in folder "03" that play between Vocal Tracks. The menu system used sound files are in the "04" folder.

The "xxx" are a three-digit number starting with "001" and range up to "255". The files can be "Wav" or "MP-3" type files. While "wav" files are larger than "MP-3", they have a better quality of sound.

Main Operation of the Driver Software

The RUN mode will sync the Jaw servo with the vocal tracks. This motion is handled automatically by the driver and there is no need to do any adjustment. The operator only needs to set the servo limits and other options via the SETUP menu. The software will also control the LED eyes and use the input from the PIR.

Triggering the Start of a Vocal Track

The driver will play the vocal tracks in the order stored on the SD card. A Maximum of 10 Vocal track files can be used. (001 to 010 of either mp3 or wav type files.)

There are three trigger mode types, Auto-Start, Positive or Negative trigger input.

Auto-Start (Default) will always trigger the next prop cycle (talking) regardless of the state of the trigger input and is design for use when there is no trigger input connected to the prop.

The other two trigger options use the PIR input as the source of the trigger. The Positive option waits for high on the input line to trigger the next cycle. The Negative option waits for a low (ground) to trigger the next cycle.

The Red Select button can be used to simulate a trigger while waiting for an input.

The Time Delay option of the SETUP menu will adjust the minimal delay till next prop cycle. This can be from zero seconds to ten minutes.

Making your own audio Files for the Vocal Tracks:

Use Audacity or another audio editor to make the MP-3 and wave files used by the DFplayer Mini module. The right channel from the audio player is fed directly into the Audio Spectrum Analyzer and used to position the Jaw servo. The Left channel is feed to the audio out headphone. By having the two stereo tracks split this way, you can add music and sound effects to the Vocal track without effecting the Jaw sync track.

(Note: This option of using two track is not available when using the mono speaker output.)

To make a vocal (talking) track, start by just recording the audio of someone talking. Next, split the left and right channels. Run a Compressor filter on the right (jaw) channel to fix some of the highs and lows on the jaw control channel.

At this point, add any music or sound effects to the left channel only. (Adding them to the right channel will affect the jaw servo.)

Now export the MP-3 or wav file to the filename start with 001.mp3 (or .wav) and up to 010.mp3 (or .wav).

Once all the files have been created, transfer the files over to the SD-card. Don't forget the files in folder "04". (They are used by the menu system.)

Use of Ambient Sound Tracks

Ambient Sound Tracks are play when the Banshee is waiting to start the next Vocal Prop Cycle track.

To active the Ambient sound tracks option, first install the sound files tracks in the "03" folder starting with "001" to a maximum of "010" on the micro SD-Card. On power up, the number of Ambient sound files is automaticity check and used by the software.

Ambient Sound tracks will play one after another till it's time to play the next Vocal Track. When this happens, the volume will fadeout and the next vocal track will start.

When in the Auto-Trigger mode, the board will only play the Ambient tracks while waiting for the Delay to end and start the next Prop Cycle. In other words, none of the Ambient tracks will play if the

Delay to the next Prop Cycle is set to the default of one.

Please note that the number of Ambient Tracks does not need to match the number of Vocal Tracks.