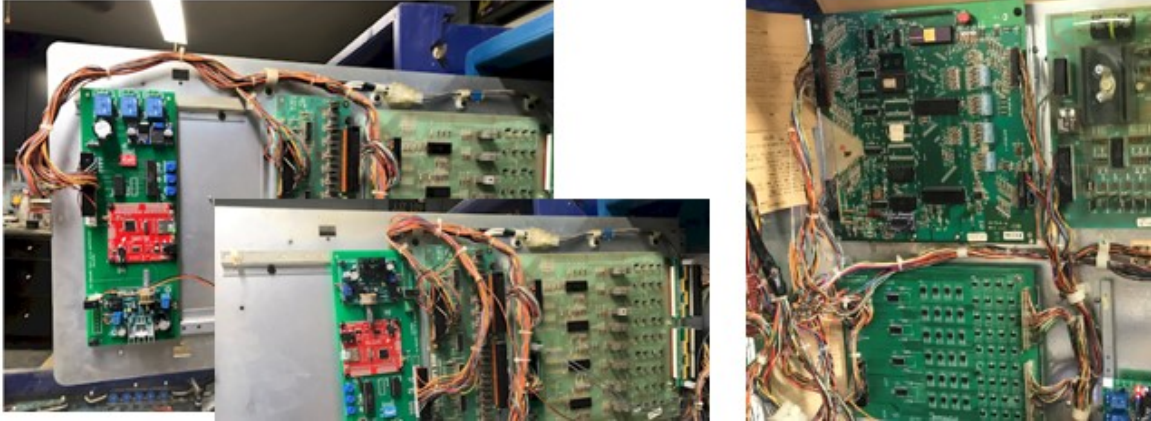


Squawk and Talk Replacement Sound Board (geeteoh.com)

I. BASIC INSTALLTION AND OPERATION

Install using the two screws in the holes in the corners of the board near the connectors.



Example mounting for Mr & Mrs Pac-Man Pinball on the door (left) and Elektra (right)

1. J1: Connect to the 15-pin keyed connector for the control and power supply. If yours is 18-pin, it's okay to leave the last 3 pins unconnected.
J2: Connect the speaker to the two-pin connector. Either direction will work.
2. When the board is powered, it will say the name of the game automatically. The pinball machine CPU may also send other sound commands at power up.
3. Adjust with potentiometer on the power supply between 4.95 and 5.05 volts.
4. Adjust the three volume knobs while playing a game. Adjust the amplifier volume on the board as well. You can press the test button to help with adjusting the volume. If you want the background sounds off, turn that volume knob all the way down.

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II. OVERVIEW

This is a new design of the old Bally pinball Squawk & Talk sound board (AS-2518-61). This design uses current technology to replicate the old sound board. Although the board will work with many different machines, the sound files in the root directory of the MicroSD card is will only work with one machine. After moving files on the card, it will work with others.

This board has the following stock features:

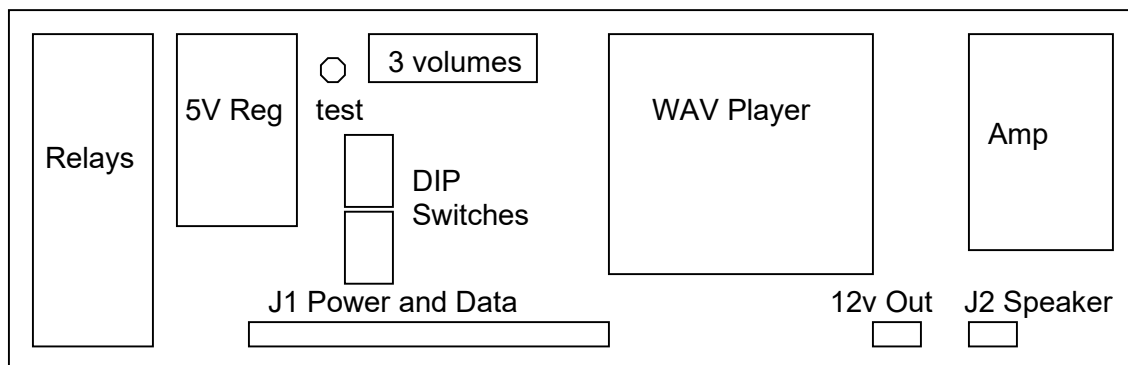
1. It utilizes the same machine mounting. Although half the size, it uses the same connector locations.
2. It is a direct replacement, utilizing the same power and ground provided to the stock S&T board.
3. It contains volume knobs to adjust the sounds and voices separately.

This design has extra features:

1. Extra volume knob to adjust the only the background sounds.
2. The background is always playing. It is not turned off momentarily when sounds or voices play.
3. There is a MERGE switch to allow the merging of sounds so they don't turn off when others start.
4. The board only uses the +12v full bridge rectified unfiltered power line. It does not use any of the other power line present at the connector.
5. All the sounds, voices, and backgrounds are customizable as they are WAV files on a MicroSD card.*
6. There are 8 sets of customizable sound banks available.
7. You can specify a custom attract sound file on some games.
8. Three relays can control external lighting modifications which are set to different game play situations.

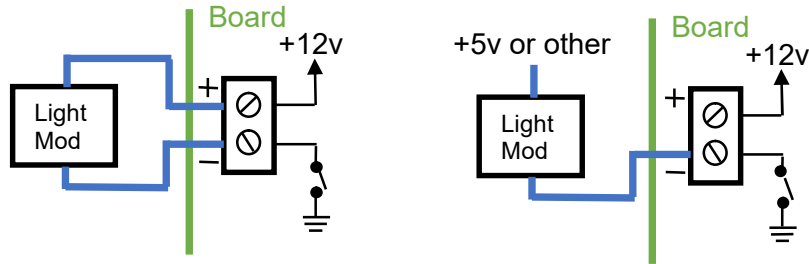
* Durations for each of the sounds is stored in the program. If you change their lengths, you should also reprogram the ATMEGA CPU on the board with the durations. This may not be noticeable. I recommend trying first.

III. CONTROLS ON THE BOARD



RELAYS: There are three relays on the board. See the end of this document for specifics about your game.

The + screw terminal is always 12v. The – screw terminal is switched by a relay on the board. Relays are disabled with DIP switch 5. For 12v lighting modifications, connect the power directly to the screw terminals as shown below to the left. For other voltage mods, only connect the ground to the – screw terminal like the drawing below to the right. Careful, the grounds between your lighting mod power source and the machine must be the same.



5V REGULATOR: 5 volts is generated by an on-board adjustable switching power supply. This is connected to the voltage meter on the board. Adjust the voltage to 5.0 volts. Be careful! If the voltage gets too high (5.3v+), you run the risk of damaging U1 (processor), U2 (input inverter), and the WAV player.

TEST BUTTON: Press it to play the background and alternate between sounds and voices. This will allow you to adjust the volumes.

THREE VOLUME KNOBS: There are three volume knobs on the board to adjust the level of the different sound sets. Setting these too high can cause distortion when more than one sound is playing. I recommend keeping them at about 2 o'clock – see diagram.

1. Background: This is the background sound that is always playing when the ball is in play. Adjust this knob all the way down to turn off the background sound.
2. Sound: This is all the sound effects which are not voices (words).
3. Voice: This is all the spoken words and phrases.

DIP SWITCHES: The tens DIP switches are used to control various options on the board. They may be switched at any time.

- DIP1. **Merge:** turn off to have the sounds stop when others start. This is how the stock S&T board worked – in the OFF setting.
- DIP2. **+1:** sound bank bit 0 (add the ON switches - see below)
- DIP3. **+2:** sound bank bit 1
- DIP4. **+4:** sound bank bit 2

	DIP4	DIP3	DIP2	
	+4	+2	+1	Types of Sounds
Bank 0	OFF	OFF	OFF	Default
Bank 1	OFF	OFF	ON	Identical for Custom
Bank 2	OFF	ON	OFF	Alternative recording



Bank 3	OFF	ON	ON	empty
Bank 4	ON	OFF	OFF	empty
Bank 5	ON	OFF	ON	empty
Bank 6	ON	ON	OFF	empty
Bank 7	ON	ON	ON	Numbers

- DIP5. **Relays:** Turn OFF to disable the relays.
- DIP6. **Attract:** Turn on to play custom attract mode sound at sound file 0001_xxx.WAV for some games. Sound can be any length. But try to keep under one minute in length.
- DIP7. **+1:** game title bit 0 (add the ON switches - see below)
- DIP8. **+2:** game title bit 1
- DIP9. **+4:** game title bit 2
- DIP10. **+8:** game title bit 3

	DIP10	DIP9	DIP8	DIP7	
	+8	+4	+2	+1	Game Title
Title 0	OFF	OFF	OFF	OFF	Mr & Mrs Pac-Man
Title 1	OFF	OFF	OFF	ON	Elektra
Title 2	OFF	OFF	ON	OFF	Flash Gordon
Title 3	OFF	OFF	ON	ON	Eight Ball Deluxe
Title 4	OFF	ON	OFF	OFF	Vector
Title 5	OFF	ON	OFF	ON	Embryon
Title 6	OFF	ON	ON	OFF	Xenon
...					NA
Title 14	ON	ON	ON	OFF	NA
Title 15	ON	ON	ON	ON	Numbers

WAV PLAYER: This board uses a Robertsonics WAV Trigger board. All the sounds are in WAV files on the MicroSD card. The MicroSD card must be 32GB or less. All sounds (WAV files) are numbered 0000 through 0255 (for sound bank 0 sounds) and are contained in the root directory. The CPU on my S&T board knows the lengths of each sound. If you change any sounds, they should be the same or shorter duration. See later in is document for more about the sounds. Basic setup:

1. The RUN/LOAD switch needs to be on RUN.
2. Solder blob on 5V SJ2 jumper to allow 5V to power
3. Red LED will be on solid when playing a sound
4. Button by MicroSD card will play lowest numbered sound.
5. Small speaker can be touched to SPKR+/- pads to check output.

AMPLIFIER: This is a small mono amplifier. If you want to add your own amplifier, connect it to the headphone jack on the WAV player.

12V OUT: These screw terminals will supply 12v to an external device. This is intended to power the reverb board available in Centaur pinball machines.

J1 POWER AND DATA CONNECTOR: This is the 15-pin connector that connects the S&T board to the pinball machine power and data lines. Some of the S&T boards have 18-pins. I populate mine with 15-pin as the extra 3 pins are repeated power lines.

1. S0: sound data bit 0
2. S1: sound data bit 1
3. S2: sound data bit 2
4. S3: sound data bit 3
- 5.
6. GND
- 7.
8. SI: sound interrupt
- 9.
10. +12v unfiltered (full bridge rectified)
- 11.
- 12.
- 13.
14. +12v unfiltered GND
15. Not on Header - Unregulated GND
16. Not on Header - +12v unfiltered (full bridge rectified)
17. Not on Header

J2 SPEAKER CONNECTOR: This is the 2-pin connector that connects the S&T board to the pinball machine speaker. The wires first go to the volume knob on the coin door, then to the speaker. If you want to send the audio to an external reverb board with the other pins, add a 4-pin header to the end of J2 and remove the NO_REVERB JP1 solder jumper next to the amplifier.

1. Speaker GND
2. Speaker Positive
- 3.
- 4.
- 5.
- 6.
7. Audio_In
8. GND
9. Audio_Out
10. GND

IV. WAV PLAYER AND WAV FILES

All the sounds, voices, and backgrounds are contained in WAV files on the MicroSD card provided in the WAV Player board. I used Audacity to create all the sound files. They are saved (exported) as individual WAV files. They are Stereo (same sound on both tracks), 44.1Khz, and 16-bit PCM.

The CPU on my sound board knows the length of each sound. It is hard coded in the software. You have two options for making your own sounds.

1. Keep the duration about same or shorter for your replacement sound.
2. Reprogram the CPU with different durations. Contact me for the code if you want to try this and I will give you the latest sound code. But, give it a try without changing the duration first. You may not notice the difference.

The sound files start with a 4-digit number. This is the sound number from the pinball machine MPU. Your custom sounds must also start with a 4-digit number. Valid numbers are 0000 through 2047.

SOUND BANKS: Sound banks are defined by the first 4 digits of the file name. 0001 through 0255 are for sound bank 0. 0257 through 511 are for sound bank 1. I recommend retaining the bank 0 sound name in the higher bank file names. (e.g. 0510_0254_background.wav)

When selecting GAME15 – “Numbers”, sound bank 7 is always used. I have loaded sound bank 7 with the numbers WAV files. You can overwrite these files if you want to utilize this sound bank for your game title. If you change them, GAME15 will no longer call out sound command numbers.

SOUND TYPES: Each sound is assigned a sound type depending on the game title. This is one of the reasons why you must select the game title with DIP switches 7-10. Here are the rules associated with each sound type. 0, 1, 2, and 4 are most used.

0. **Nothing:** no sound at this location.
1. **Background:** will respond to background volume. This one will repeat when game is started. It will stop on another background or stop sounds.
2. **Sound:** will respond to sound volume. It will stop playing when a voice starts.
3. **Sound Hold:** will respond to sound volume. It will hold until other sounds done.
4. **Voice:** will respond to voice volume. It will hold on other playing voices and stop any sounds currently playing.
5. **Sound Low Priority:** will play sound only if nothing playing. Otherwise ignore.
6. **Sound Hold 1:** holds only one of this sound in the queue.
7. **Sound No Merge:** same as #2 but will not merge if DIP1 is set on.
8. **Background Off:** will turn off background sounds.
9. **15 Sec Temp Background:** will only loop for 15 seconds then back to original.
10. **Voice Hold None:** will not hold another voice if a voice is currently playing.
11. **EBD Alternating Voice:** special alternating 4-file voice
12. **Xenon Alternating Tone:** special alternating 20-file sound

See specific details about your machine’s sounds at the end of this manual.

MicroSD Card Contents: Your MicroSD card has been configured for your game. All the WAV sound files in the root directory are for your game.

- Sound files 0001-0255 are for Bank0.
- Sound files 0257-0511 are for Bank1.
- Sound files 0513-0767 are for Bank2.
- Sound files 1793-2047 are for the Game15 – Numbers.
- wavtrigr.ini (required in root directory)

I have included directories which contain the files for each of the games supported by this card. To change games: erase the files in the root directory and copy the files from the appropriate game directory to the root directory.

V. TROUBLE SHOOTING

Common Issues:

- Speaker not connected.
- Control lines – specifically J1-4 intermittent.
- Empty sound bank selected (try sound bank 0) SND0-2 DIP all OFF.
- Wrong game title selected. Verify game against DIP7-10.
- Sound files in wrong format. Go back to sound bank 0 which you should try not to modify.
- Missing MicroSD card.

No Sound:

- Verify you have a speaker connected to J2.
- Verify you have J1 pins 1-4 electrically connected in your machine harness
- Turn up the volume knobs. Start with the one on the S&T amplifier. Then try the coin door volume. Then try adjusting the three volumes.
- Verify you have 12v to the board and 5v is generated on the S&T board.
- Verify you have the MicroSD card present, 32MB or less, and seated correctly.
- Go back to sound bank 0. DIP switches SOUND BANK +1, +2, and +4 all OFF.
- Look for broken wires between the S&T board and the WAV Player board.
- Look for broken wires between the S&T board and the Mono amp (if separate)
- The wavtrigr.ini file must be on the MicroSD card
- Are you trying your own sounds, check filename and file format?
- Try a different MicroSD card. Needs to be a good one.

Distorted Sounds when more than one playing:

- Turn down the three volumes (sound, voices, background) by same amount.
- If this is a custom sound, try reducing the amplification (peek to peek) in your sound file editor. Compare to a stock sound and use a similar level.
- Get a faster MicroSD card.

Missing Sounds:

- Verify that volume knobs are not blown.
- Go back to sound bank 0 and verify that they are called. Then check for file naming or file format issues.
- Verify that J1 pins 1-4 wire harness in your machine is getting to the board.
- Go into audit mode on machine (button on coin door). Audit item #18 should be 03 for all sounds.
- Missing attract sound? Verify format if using custom. Make sure MPU DIP switch setting for attract is on. See individual instructions for each machine.

Quite Sounds:

- Turn up the volume. Start with the one on the S&T amplifier. Then try the coin door volume. Then try adjusting the three volumes.
- Try lower ohm speaker.

Wrong Sounds:

- Did you change the sounds on the MicroSD? Are they named correctly?
- Verify sound bank selection.
- Verify order of S0-S3 wiring on J1 (pins 1-4) from machine to S&T board.
- Is the Game title set correctly? DIP7-10.

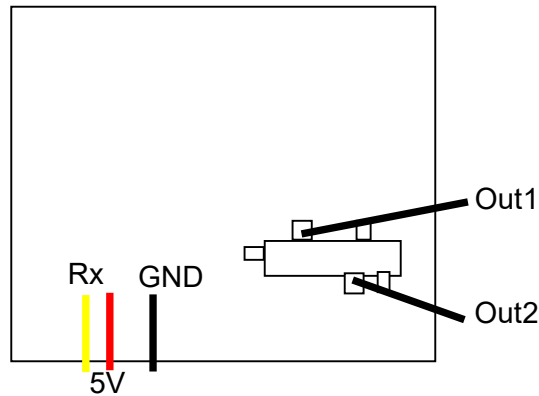
Relays not working:

- Is DIP-5 turned on?
- Game must be played for relays to fire.

- Is accessory connected to relay drawing too much power?
- Is the Game title set correctly? DIP7-10.

VI. FLY WIRES ON THE BOARD

There are currently wires on the board connecting to and from the WAV Player and the Amplifier. The following Diagram is for the WAV Player.



The following Diagram is for the Mono Amplifier, if you board has this amplifier as a separate component. The IN1 and IN2 signals are connected to resistors on some amplifiers or to screw terminals on others. Note: Speaker may be reversed (+ to +, - to -)

