

Athena to SpeakJet

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Athena to SpeakJet Interface. In this article we will interface the Athena to the SpeakJet Sound Synthesizer.

Before getting started let me point out a few things about the SpeakJet. It is not a true analog sound synthesizer. It is a microcontroller most likely a PIC Chip. It has a single output PWM. PWM has serious limitations and single channel PWM has even more when it comes to synthesizing sound. I would not purchase this chip if you plan on doing a lot of DTMF as I just could not get it to break dial tone.

In order to get the best sound you must create a filter of sorts with a couple of capacitors and resistors. With the recommended filter you will require an amplifier with fairly high gain. I found that a simple .1uf cap works very well at creating nice speech with very little amplifier components.

The chip has some built-in input triggers for triggering pre-staged sounds. However this article will concentrate with the Serial interface.

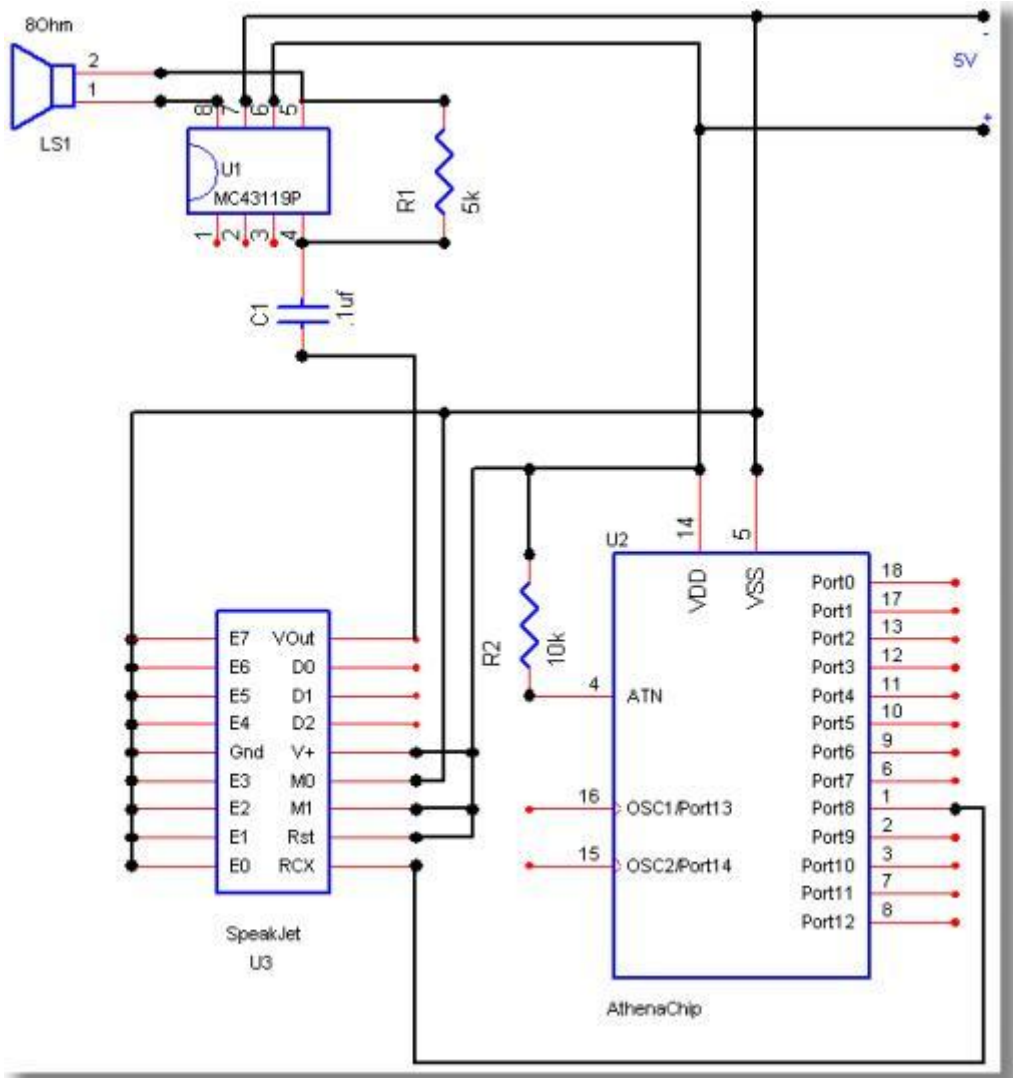
The default baud rate is 9600 baud but this can be changed. Keep in mind that the chip is not crystal or resonator controlled so the baud rate will change as the voltage drops. The documentation states that the chip will operate at 2-5.5 volts. This is the normal operation range of most new PIC chips however below 4 volts the chip really went south. At below 3volts I could no longer communicate with the chip.

All these things said the chip does perform pretty good as a speech and sound effects chip. To create sounds you send serial commands to the chip. These commands tell the chip to play small pre-configured sounds. These commands consist of 72 Phonemes and various sounds affects as well as some control codes that let you control things like volume. There is even a mode that lets you control individual registers that make up the sounds.

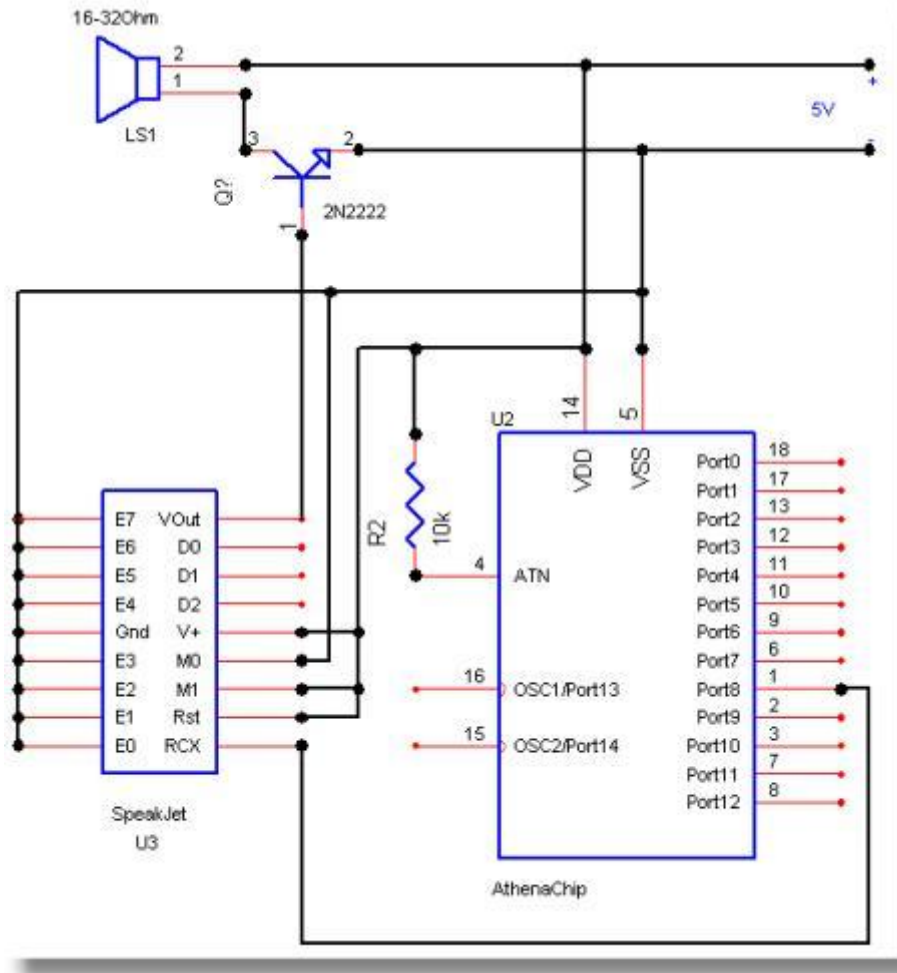
Hookup

The connection between the Athena and SpeakJet is straight forward. The serial interface is asynchronous TTL and can be connected directly to any port on the Athena. You will need some sort of amplifier as the output of the SpeakChip is not enough to drive a speaker directly. If you use the filter design given in the SpeakJet datasheet you will need a multistage amplifier. This will most likely yield the highest quality sounds.

The following two circuits will work well enough for most applications and require very few components.



This circuit shows the Athena connected to the SpeakJet and the SpeakJet connected to a MC34119P amplifier chip. With this circuit you can use a 8-32 ohm speaker with pretty good results.



This circuit will let you use a simple 2N2222 transistor and a 16-32 ohm speaker with about the same results. Note that the speakers will sound better and louder when mounted.

Both circuits will work well enough. It was loud enough that I had many individuals coming into my lab trying to figure out what was going on.

Program

In this first program we just cycle through the sounds 200-239 so you can here the various sound effects.

```
'SpeakJet sound examples

dim x

const SpeakJet 8
output SpeakJet
high SpeakJet

for x = 200 to 239
  serout SpeakJet,8,x
  pause 10
next
```

This next program will set the volume, change the speech pitch and bend. It will then speak “I am Athena” using the supplied Phonemes.

```
'Speak Jet Example
```

```
const SpeakJet 8
output SpeakJet
high SpeakJet
pause 100

serout SpeakJet,20,127 'Set highest volume
serout SpeakJet,22,238 'High voice pitch
serout SpeakJet,23,12 'Bend

'Send Phrase "I am Athena"
serout SpeakJet,8,157,4 'I
serout SpeakJet,132,8,140,6 'AM
serout SpeakJet,134,190,190,190,128,128,8,141,134,134,6,6 'ATHENA
```

Final Thoughts

You’re not going to build a dictation machine but if you want to add some basic speech to your bot this may be a simple way to do it. Getting the words to sound correct could take a while. It took us about an hour to get the “I am Athena” to sound recognizable. The chip is a bit pricey for what it delivers, to be used on every project but may be an answer to those special projects that cry out for basic speech and sound effects.

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