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Adding DC/DCC Sound to the Athearn UP Gas Turbine!

By Larry Maier

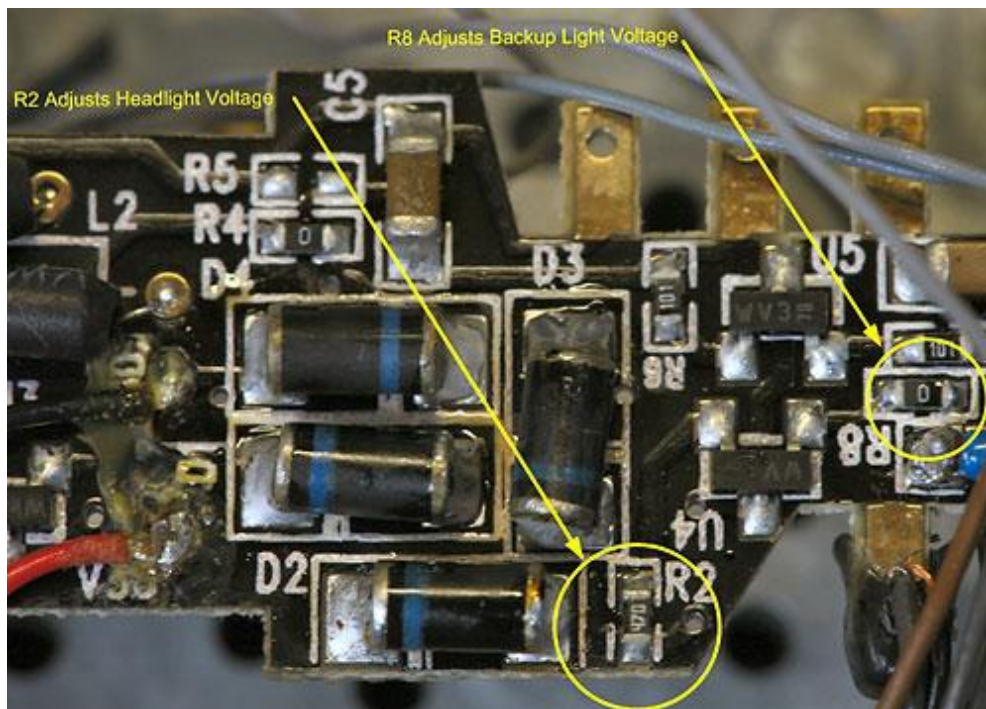
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Our staff engineer, Larry Maier, details his installation and tells how to brighten the lights of the Turbine with a decoder installed.

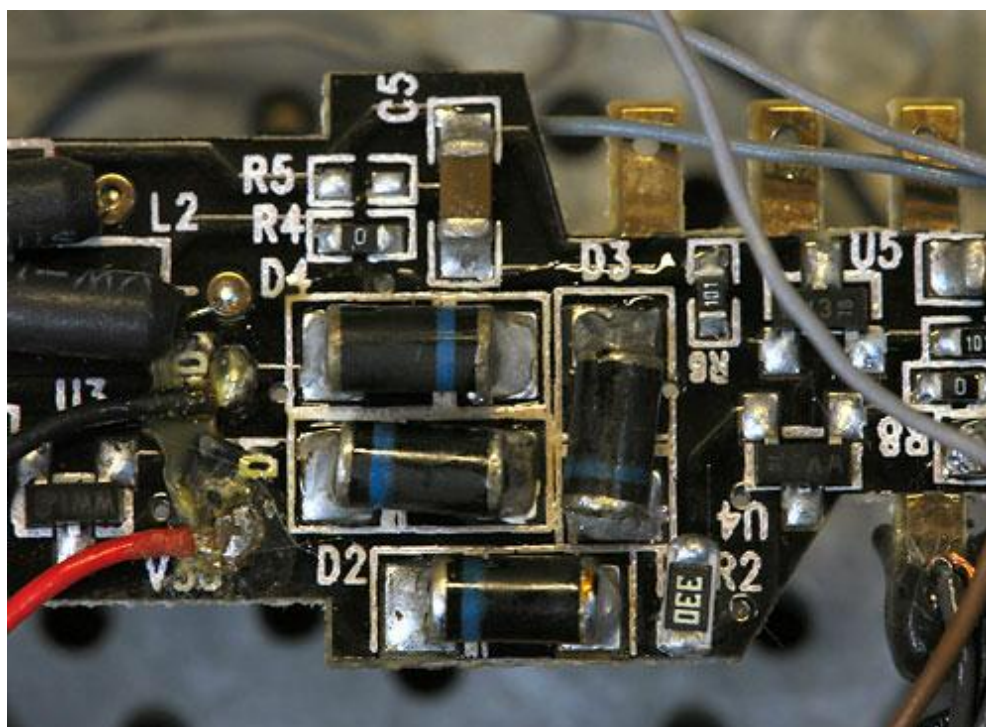
The new Athearn Union Pacific Gas Turbine model arrives ðDCC Readyö. This means that it has no sound and will operate on DC only. To convert to DC or DCC Sound a DC/DCC sound decoder must be added. The unit comes pre-equipped with both an NMRA 8-pin and an NMRA 9 pin socket. You can use either at your option. In either case, make sure you remove the shorting jumper on the 9 pin socket.

While the addition of the decoder is easy, the resulting lighting is somewhat dis-appointing. The headlight and rear backup lights are very dim under Decoder control. There are two options to fix this problem: you can either use a Quantum Revolution decoder and connect the 1.5 volt lamps directly to the outputs designed for these lamps, or you can modify the Athearn boards to increase the voltage to the lamps. The first option will add a couple more wires to an already crowded chassis. The second option will work with the Quantum Revolution and other decoders on the standard 12 volt lighting output through the NMRA sockets, and is thus much easier to install.

For DC, if you are using the Quantum Revolution-U, the Quantum Engineer will give you access to all sound effects.

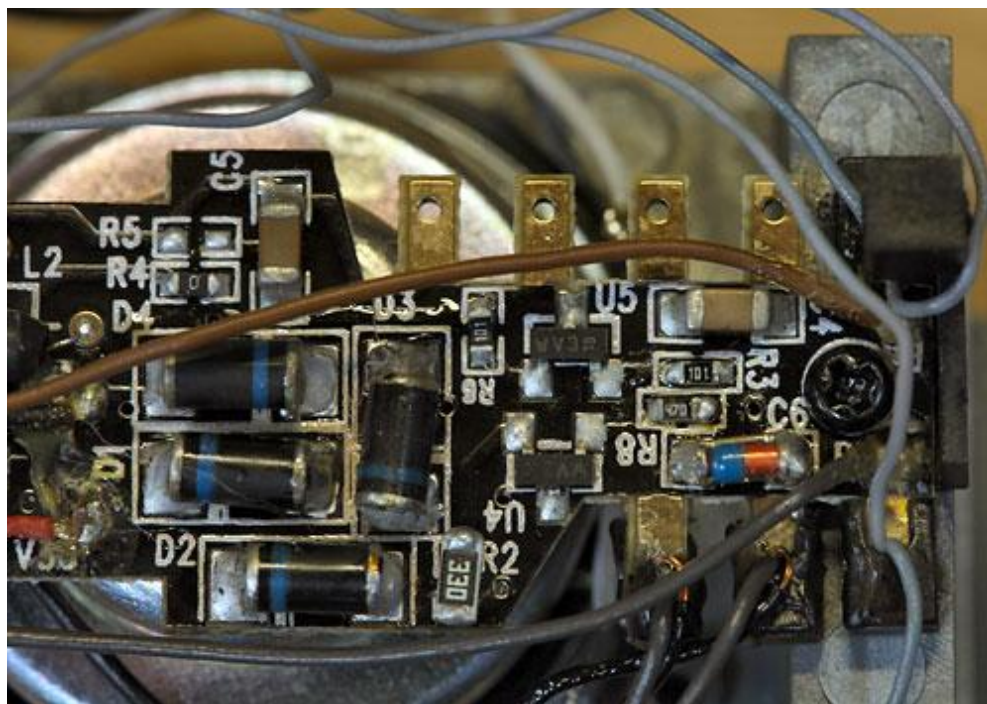


The figure above shows the location of R2 and R8. R2 is a 47 ohm resistor that controls the current to the pair of headlights. It was selected by Athearn to operate the headlights at 1.5 volts when the DC track voltage is a maximum. As a result, with normal decoder lighting outputs, the headlights operate at only about 1.1 volts. This results in a rather dim headlight under decoder control. Changing R2 from 47 to 33 ohms will cure this problem. Digikey has a suitable resistor under the part number P33ACT. You can also use a P33ECT. The first is an 0805 size resistor, and the second is a 1206. The 1206 is a little larger, so it is easier to handle and will just fit on the pads. The 0805 is actually the correctly sized part. The figure below shows the rear board with the P33ECT installed. The new voltage to the headlight bulbs is 1.49 volts.

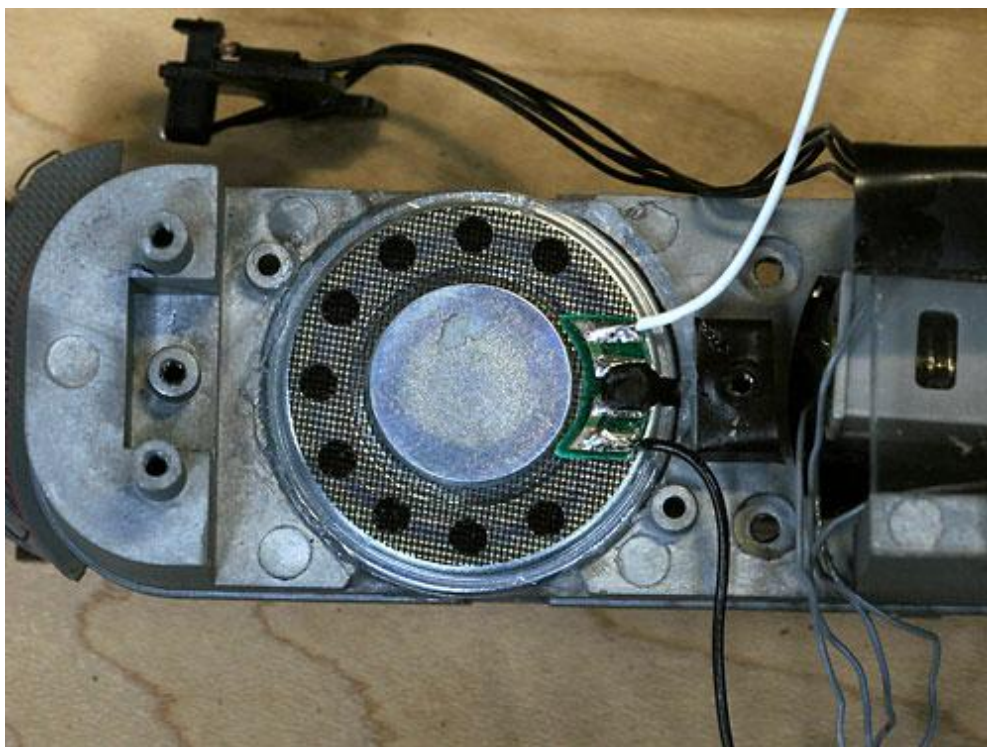


In the first figure, R8 is also identified. R8 controls the current to the rear backup light. Athearn has set it to 0 ohms (no resistance). This results in about 2.54 volts at the rear light bulb. While this is

more than the specified 1.5 volts, the rear light is still rather dim. You can elect to leave it alone. If you do this, it will give a brighter light output but will shorten the bulb life. Since the rear light is not on very often for any length of time, this may be acceptable. If you want to lower the voltage a bit, simply take the resistor you removed from R2 (47 ohms) and replace the 0 ohm R8 resistor with the 47 ohm resistor from the headlight. This will give you about 2.01 volts at the rear light bulb. While this is still high, I don't think you want the light output much dimmer. The figure below shows both resistors replaced:



The next step is to install speakers to enable sound on the unit. I found that a TDS 1.22ö HB Speaker would just fit in the rear speaker cutout (already part of the Athearn chassis), and a TDS 1.25ö standard speaker would fit in the front location. The two different sizes are necessary to fit under the installed Athearn printed circuit boards. They also work together to give a better response than a single speaker of one type or the other. I used a ring of Silicone RTV adhesive around the circumference of each speaker to glue it to the Athearn chassis. This also has the benefit of providing an air-tight seal of the speaker to the chassis. I added wires to each speaker to allow connection to the sound decoder. Note in the pictures below which terminal has the white wire and which has the black wire on each speaker. This is important so that both speakers will be in phase and act to re-inforce each other's sound. The pictures below show the two installed speakers wired in parallel. The parallel wiring gives the maximum power output as opposed to series wiring. Fortunately, the Revolutions output, in contrast to other sound decoders, can drive the speakers in parallel without the risk of overheating!

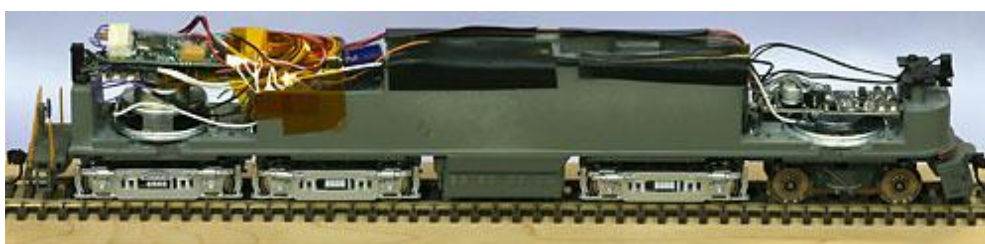


These two speakers work very well together to provide realistic sound for this model. I temporarily installed the shell on the model and ran a frequency response with the microphone about at the side logo (the optimum sound location) and at an angle of about 45 degrees off the top, about where your ears would be as the model rolls by. The frequency response graphs are shown below:



The combined speakers have a low frequency limit below 600 Hz. This is extremely good low frequency response for an HO model and will help produce convincing engine sounds. The remainder of the response is acceptably smooth and flat. The flat response will give excellent horn sounds and convincing reproduction of air let-off and other high frequency sounds.

Once the speakers and light modifications are installed, the model is ready for the decoder. I installed a Quantum Revolution U model 5050-481. This sound decoder has the specific sounds of the UP Gas Turbine and incorporates all of the other standard features of a Quantum Revolution decoder. These features include excellent low speed control. When finished, I was able to run this model at speed step 1 and watch as it took several seconds to move the train the distance between two ties. This was right out of the Revolution box with no programming at all to trim the decoder performance. Installation is very easy. Connect the decoder to the 9-pin NMRA socket, connect the two white speaker wires together and tie to one of the decoder speaker outputs (purple wires), tie the two black speaker wires together and tie to the other decoder speaker wire. The finished installation is shown in the figure below:



In the finished installation, note the use of the orange kapton tape. This tape is very thin (1 mil = 0.001 inches), is tough, and will provide thousands of volts of electrical isolation. It is perfect for making sure that there are no unexpected shorts in a tight decoder installation while not taking up too much space on its own. The original vinyl electrical tape used by Athearn appears thick and clumsy compared to the Kapton tape.

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