DIY Repair to RX7's Tachometer Solder Joints

The repairs described herein are some that I did to my own '95 PEP. In my case this definitely improved my tach's behavior, but like all things your mileage may vary.

General statement of problem:
My RX7's tachometer began to occasionally have a bouncing needle. By this I mean while driving at a constant engine RPM the needle would sometimes begin bouncing around by 500 RPM's or more. After a few weeks I recognized that it only happened after the car had set out in the hot sun for several hours. It made no difference what gear I drove in or if the A/C was running, but it generally did require a brief period of acceleration (like an on-ramp) to get the needle to start bouncing. And once bouncing, it would only stop when I slowed way down, at idle, or briefly while I accelerated too much higher RPM's, but then it would resume bouncing when I returned to 'normal' driving. It seemed most prone to bounce when the engine was running at a steady RPM between 2,500 and 3,000 RPM.

The FIX:
The process turned out to be straightforward and easy. If you've had your instrument cluster out before you could probably complete this in less than 2 hours start to finish. In reality it took me several attempts because I made my repairs in a series of steps; simply replacing the capacitors first, then re-soldered more connections, and then later re-soldered the surface-mounted components.

The basic procedure is:
1. Remove the instrument cluster from the dash,
2. Separate the gauge assembly,
3. Remove the tachometer from the gauge assembly,
4. Remove the tachometer's needle,
5. Remove the face,
6. Dismantle the tach motor from the clear plastic light guide,
7. Then re-solder the connections and replace two capacitors.
8. And finally the old re-assemble using the reverse.

Tools needed for the tach repair only:
1. 15/30 watt dual heat-range soldering iron available from Radio Shack.
2. Solder wick or other means of un-soldering connections; Radio Shack.
3. 1/32-inch diameter rosin-core solder.
4. One sheet of note-pad paper about 4x5 inch.

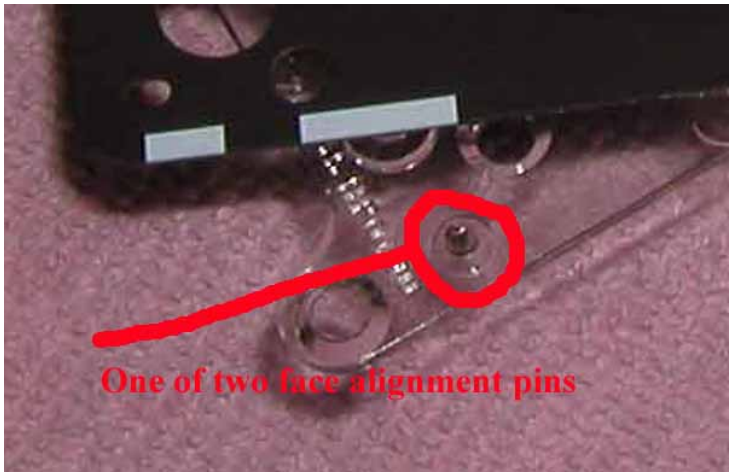
Parts required:
1. One 1 uF 50-volt electrolytic capacitor preferably rated for 105 degree C or higher.
2. One .015 uF 50-volt polyester capacitor preferably rated for 105 degree C or higher.

If you're not familiar with removing the instrument cluster, I recommend you check out http://www.geocities.com/MotorCity/Garage/8255/Instructions.pdf for instructions, and if you need/want to linearize your OEM water temp gauge, too, this is an excellent write-up. One other point, on my car there is one more screw holding the cluster than shown in the MotorCity write-up.

Aside from locating the above parts and removing the cluster, the single REALLY BIG issue is to ensure that the needle is re-installed in the correct position. This is where I found several 'tricks' as outline below.

Critical points:
I'm assuming that you have the cluster out and the tachometer assembly removed. That means you're almost ready to begin disassembly of the tach itself, but before you start this step you should carefully plan out how to maintain the needle's alignment.

Marks for alignment:
I discovered that you could lift the outer edges of the tachometer's face off of the two raised plastic pins that are molded in to the clear backing, and then **rotate the face counter-clockwise**. I assume this is the reverse of how the tach was originally assembled, but I didn't find any other references to this.



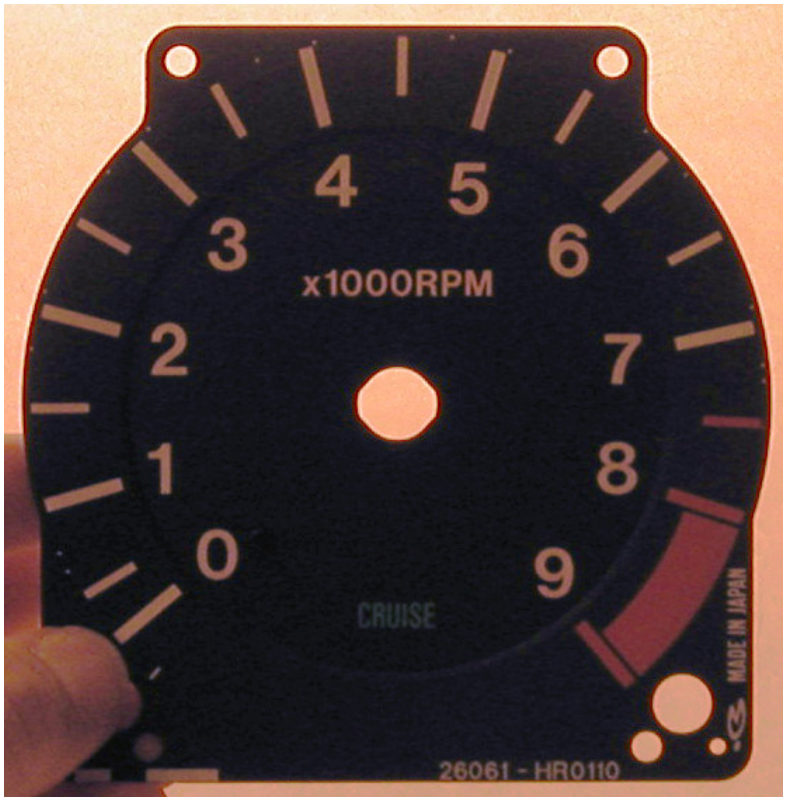
The ‘stop’ pin attached to the face that normally limits the needle’s CCW rotation at the zero RPM line moves too allowing the needle to follow. But as you continue to rotate the face CCW the needle itself stops after about 45 degrees of rotation.

At that point some type of internal limit inside the motor assembly stopped the needle’s CCW rotation. It became an easy task to simply scratch alignment marks into the plastic.

One of my marks in the shape of an upside-down ‘V’ is straight across from the needle. No magic in that I choose a convenient RPM mark. Not showing well is a second mark I made across from one of the small white dots around the outer edge of the face. I found this second mark to be the most help in aligning everything during re-assembly. Having several marks is cheap insurance.

Removing the needle and protecting the face:
The flat black paint on the face shows *everything*, so be sure to wash your hands before you touch it. I used a sheet of paper around the shaft for more protection. It was easy to pull the needle off by gripping the red portion on both sides of the black hub and pulling. But don't pull on the black hub itself, as it is easily broken. Measure the spacing between the needle and the face before you start so you can match this spacing during re-assembly.

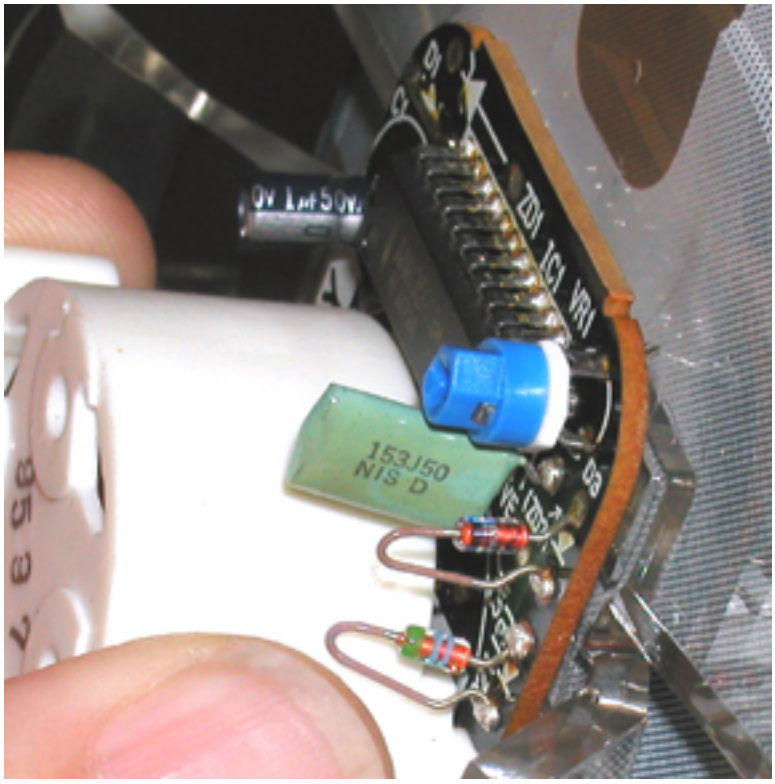
Removing the face:
With the needle removed you continue to rotate the face CCW to about 90 degrees, and at that point the center 'hole' releases the two tabs on the clear plastic backing. When replacing the face just align these tabs, press the face's center hole over them, and rotate CW.



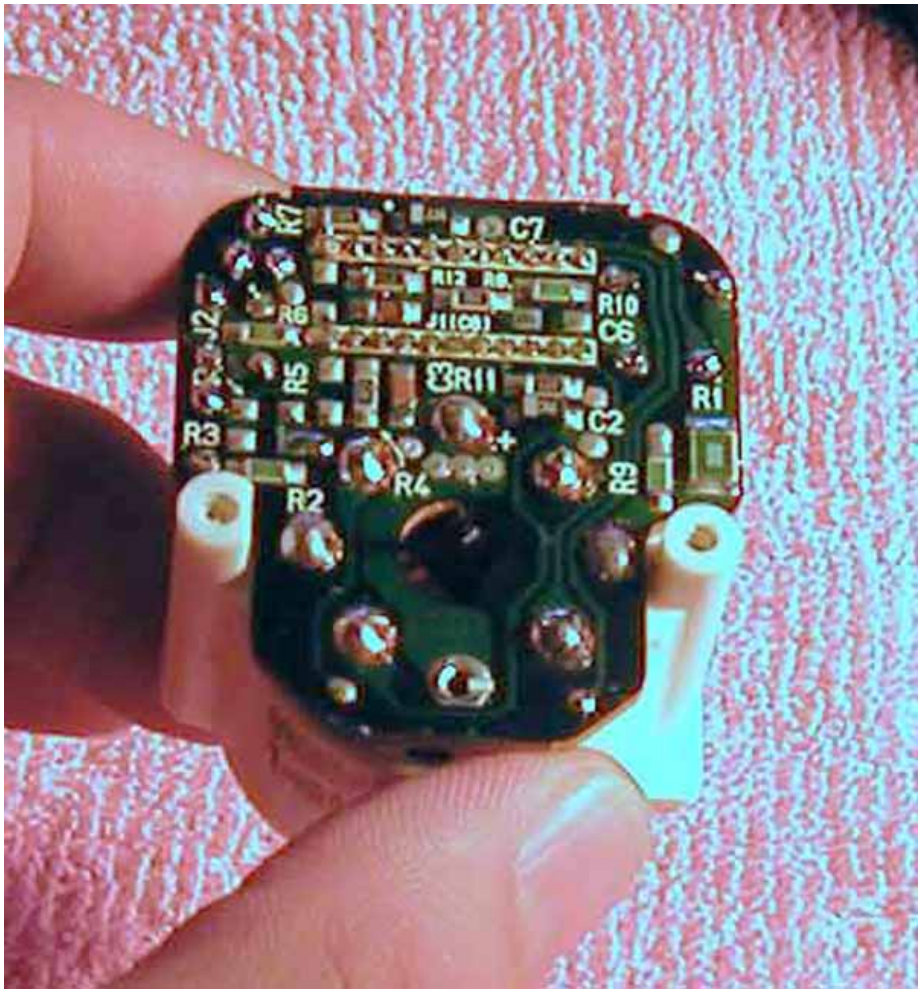
Re-soldering the connections:
I used a small 15/30-watt soldering pencil with a fine pointed tip that could be switched between the two heat settings. The second reason I selected this one was because it had the smallest tip I could find; an advantage because many of the pins are very close together. I also got the smallest diameter rosin core solder to help minimize the heat of soldering.

Un-like some previously write-ups I found, I choose to re-solder almost all of the connection including most of the surface-mounted components. The 15w setting seemed to work well for these, but proceed carefully. If you have a magnifying light you'll find it helps, too.

I recommend that you remove and replace the two capacitors first, and then simply re-solder everything else. Note that the electrolytic capacitor is polarized. It's the black colored cylindrical part with a silver stripe just above center in the following picture. Be sure that you insert the replacement in the same orientation.



Watch out that you don't create a solder bridge where it's not supposed to be. If that happens you can use the soldering pencil to melt the solder away. You can't tell much, but below is a picture of the circuit –side of the tach motor after re-soldering. The circuit board is less than 2 inches across.



Re-assembly:
Straight forward. Re-attach the motor to the clear plastic light guide, and then position the face so that its center hole tangs are aligned, press down and rotate. Next re-align the marks you made and press the needle back on to the shaft to the correct height. Rotate the face back in to its original position and assemble the tach into the cluster. I think the hardest part is getting the cluster installed back in to the dash while reconnecting all the wires. Fortunately, each connector is designed so that it only plugs in one way and to the correct spot.

One more observation:
On the back of the tach motor is a small blue-colored potentiometer that I suspect the factory used to calibrate the tach. There are only three wires that attach via the tach motor's mounting screws; power, ground, and signal. I did NOT attempt to make any changes, but thought I'd point out the possibility for future explorers. Someone would need to determine the type and amplitude of signal the tach expects; square wave or pulse for example.


D1
C1
ZD1
IC1
VR1
D3
C3
95 3 7


x1000RPM
BOOST
MPH
OFF