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Repair of the Signalling Bell
in
VEVA's 1913 Detroit Electric

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Introduction

As part of the project to replace the batteries in the Vancouver Electric Vehicle Association's (VEVA's) 1913 Detroit Electric, the wiring was also repaired. During that repair, the vehicle wiring was checked for shorts and leakage to the vehicle's chassis. The bell was identified as one of the points where there were leakage currents and the bell was therefore removed for investigation.

The bell was made by Edwards and Company, as it was called then. The company was founded in 1872 by Robert Edwards & David Rousseau to manufacture, sell, and install battery-operated gas-fixtures. Ironically, in a few years the company began making signalling equipment for applications such as doorbells and fire alarms. In 2005, Edwards was acquired by General Electric, which was subsequently acquired by United Technologies in 2010. Edwards and Company is now called Edwards Signalling and is a unit of United Technologies. Edwards Signalling is still a major manufacturer of fire alarm and other signalling devices.

The bell in VEVA's Detroit has the word "Recti" embossed on the front. Recti may have been the model name of the bell, and a quick Internet search shows similar examples of the bell exist, usually as fire alarm signalling devices.

Taking advantage of the opportunity presented by the bell being removed from the car, the cover over the bell electronics was removed, revealing that the carbon brushes were at end-of-life. Both brushes were badly damaged, and one was loose in its holder and ready to fall out.

Figure 1: Old and New Carbon Brushes

In VEVA's example of this signalling bell, the body of the bell is connected to one end of the actuating coil and thus the body is live. Edwards no doubt made 120V versions of the same bell, but these likely had an isolated body. To solve the problem of the uninsulated body, Anderson installed rubber bushings and washers to isolate the bell body from the vehicle chassis.

The leakage was likely from contaminants in this insulation system or could have been from the deterioration of the rubber insulation.

The Repair

To repair the carbon brushes, the carbon portion needed replacement. Carbon brush material was purchased in the form of carbon electrodes. These electrodes were readily available for a low price in a 10mm diameter. No doubt the original brushes were 3/8" (9.525mm) in diameter.

Figure 2: 10mm Carbon Electrodes

Originally the brushes were likely installed in the holders, which are shaped like a cup, and then crimped in place. However, the new brushes, after being cut to length, were pressed into the holders using a vice. The 10mm diameter was oversized, but excess material scraped off as the brushes were inserted into the holder.

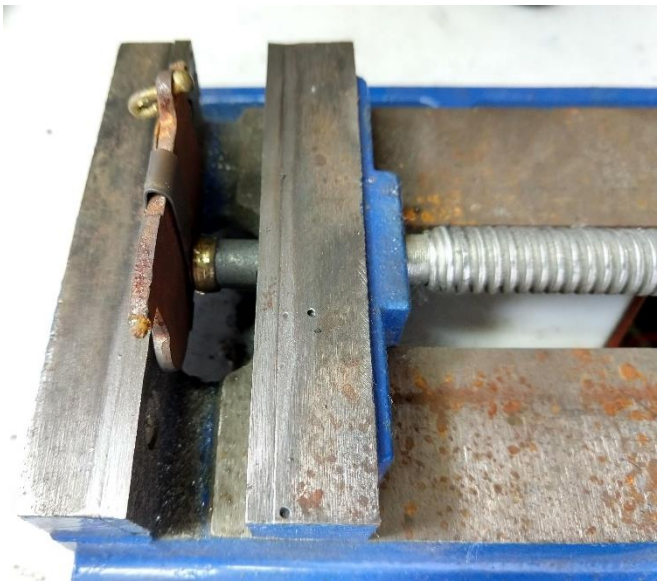

Figure 3: Pressing In New Carbon Brushes

Once the new brushes were installed the bell mechanism was re-assembled. After assembly, the surfaces of the brushes were filed to properly mate, and the mechanism was greased.

Keen eyes will notice the yellow insulation in the picture. This yellow insulation replaced the old, stiff, cracking insulation that covered the wire from the coil to the brushes. During the repair, the coil end of this insulation was also affixed with hot-melt glue – visible in the picture – to reduce the chance of the wire breaking at the coil end. This was not strictly as the bell was originally manufactured but considered a good way to preserve its life.

Figure 4: Re-Assembled Bell Mechanism

A quick coat of paint and the bell was ready for new insulating bushings. The picture shows the insulation components: a rubber shoulder washer and a rubber washer. The original components are shown with a mounting bracket at the top of the photo – new at the bottom. It turned out that the rubber shoulder washer was identical in all dimensions but the inside diameter to those that

VEVA had manufactured for mounting the 1st speed resistor – these shoulder washers were also used to isolate the body of the resistor from the vehicle chassis. A nylon tube was used to correct the ID. A rubber washer nearly identical in dimensions of the original is used in Galt brand faucets and was readily available at plumbing and builders supply stores.

Figure 5: Signal Bell Insulation System, Old (top) and New (bottom)

There is an adjustment screw on the end of the body of the bell. This screw adjusts the rate at which the bell is struck (the frequency). Therefore, the screw is adjusted to give the bell a moderately urgent note and locked with the lock nut. Adjusting the supply voltage does not affect the bell frequency but affects only how hard the bell is struck.

Figure 6: Painted and Assembled Signal Bell