THE MYSTERY BUG

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So many bugs were made by so many makers over the past hundred years that we sometimes come across one with no maker's marks and that nobody can identify with absolute certainty. Such was the case when John, VE3CSJ, attended an estate sale in southwestern Ontario. The bug that he purchased was a long sought-after Wilson SA-100 that was manufactured by the Wilson Manufacturing Company in Toronto for the RCAF during WW2. The Mystery Bug, as he called it, was considered to be a "junker" by the individual running the estate sale and was thrown in as a "freebie" along with the purchase of the Wilson bug.

Who Made it?

Upon examination of the "junker" bug , John was struck by the quality of workmanship that had obviously gone into its making, but was disappointed by the fact that there were absolutely no markings of any sort on it to indicate who might have made it. Neither was there any indication that any identifying marks had been removed, like a nameplate. So right off the bat he became curious as to its origin and age. Several pictures of the bug were sent to a few well-known Morse key experts with whom he had been in contact over the years, including Tom, W1TP, and Lynn, N7CFO, in addition to some other well-known names in the *Morsecode@mailman.qth.net* group and the *CW_Bugs* Yahoo group[1]. Chris, F9WT, made the only viable guess, saying that it looks like a clone of a Canadian Xograph made by Rolf H. Brown in Toronto in the 1920s (Chris has one in his collection). It's a good match, but with some differences including the main frame and circuit closing arm. Not having a full history of various Xograph models, it's hard to say for sure if this is in fact one of them. So at this point, it remains somewhat of a... Mystery Bug. If anyone else can help identify it, please contact John.

Even before the suggestion that it might be a Xograph, John concluded that the bug was quite old, based on the design of many of the components and also that it was commercially made judging from the high quality of workmanship on most if not all the components. Plus, the base was cast brass as opposed to machined and all components were nickel plated. The dash contact, dot contact, terminal posts, and pivot screw all have nicely rounded and polished tops. The design of the various posts, specifically the two terminal posts, indicate an older design.

Unusual Features

This bug has several unusual features (Figure 1). First, the main pivot frame is attached to the base from above, with two nickel-plated screws (as opposed to from underneath the base). Second, the bottom pivot is fixed to the base and is not adjustable. To set the pendulum height, the entire assembly slides vertically on the main pivot shaft and is fixed in place with a setscrew. Third, the pendulum protrudes over the end of the 6 in. long base by about 1/2 in. (most bases we have experienced are about 6-1/2 in. long). Finally, the moving dash contact is unique in that it is a separate screw with a slotted head and associated jam nut that protrudes through the arm from the right hand side, and is adjustable. The dash gap can therefore be adjusted two ways, the other being with the conventional dash contact screw in the adjacent post.

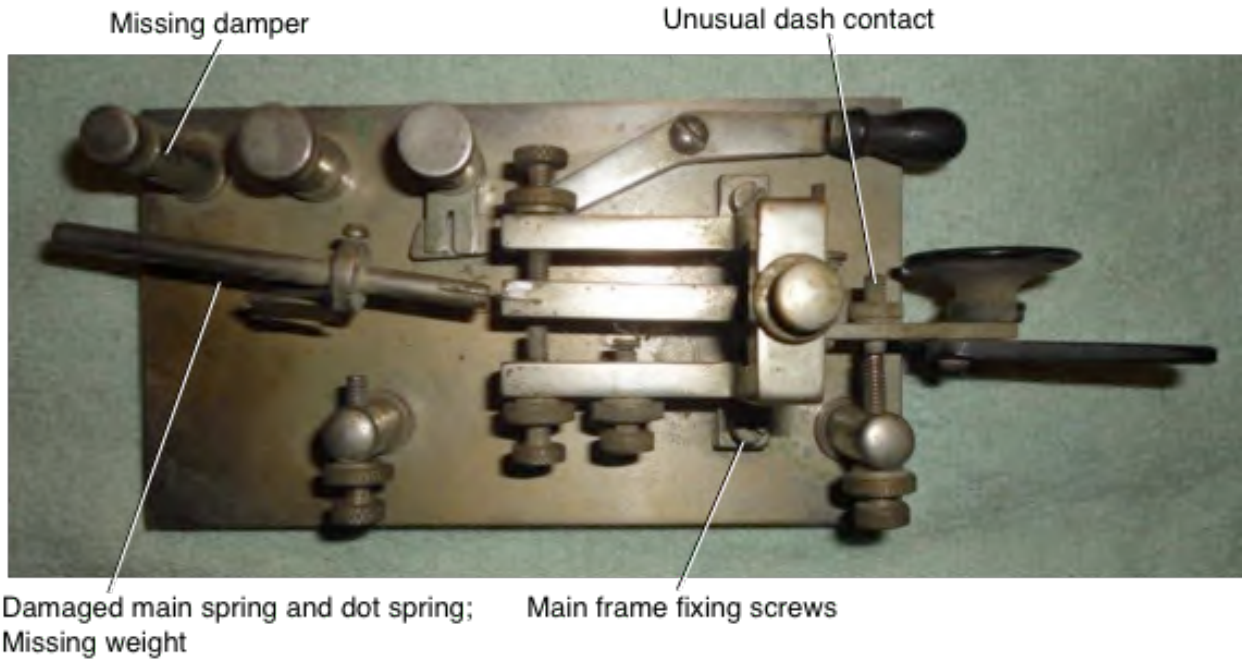

Figure 1. Overview of the mystery bug, as received.

Some Repairs Needed

The bug was missing its damper and weight(s), and it was obvious that the main spring and the dot contact spring had seen better days and needed replacement or repair if the bug was ever to operate properly again. It was also very dusty, dirty and adorned with a few cobwebs on the parts under the main frame. But there was apparently no rust or significant corrosion of any sort on any of the parts. Based on John's initial examination, he decided that the bug could be restored to working condition once again and decided to seek advice on how need parts could be replaced or repaired. In the interim he decided to strip the bug completely and clean the grunge off all the parts using a solution of warm water and Mr. Clean, thoroughly drying all parts once they were cleansed. Then he re-assembled the bug and wondered about the missing and damaged parts.

John posted a comment on QRZ.com Swapmeet asking how he might obtain a new main spring, not really understanding the complexity of repairing an existing one, installing a new commercially manufactured one or manufacturing one out of stock spring steel material. By luck, Gary, NA6O, happened upon John's post and suggested the use of spring steel from a set of feeler gauges. After several back and forth emails on the bug in general and the main spring in particular, we agreed that John would send the pendulum assembly to Gary for an assessment.

Gary Does a Restoration

On receipt of the parts, Gary looked over the "remains," decided it was do-able, then volunteered to refurbish the whole assembly. This would include a new main spring, new dot contact spring and, from scratch, a damper from a design we mutually agreed best suited the bug in question, as well as a weight that would produce an operating range of approximately 17-30 WPM, which was John's preference. Gary has a complete machine shop and experience in Morse key repair and scratch-building. An excellent guide to bug technology and the methods used for restoration are available in a book by W4PAL (SK) [2].

Figure 2. Pendulum assembly, as received.

Unlike many bugs where the main spring is riveted or bolted in place, this one is soldered. As received (Figure 2), it was clear that a repair had been attempted and the spring was soft-soldered in a sloppy fashion. The wreckage was easily disassembled and cleaned for restoration. Based on the mass of the weight rod and the geometry, the spring dimensions of a Vibroplex Original were chosen for the new parts. Both the main spring and dot spring were cut from 12-mil feeler gauge stock and then silver soldered in place (Figure 3). An experiment was performed beforehand to verify that the mechanical properties of the steel were not altered at the soldering temperature (750 C).

Figure 3. Silver soldering the main spring in a simple fixture.

The dot spring sub-assembly was merely a remnant of its former self and was easily desoldered and prepared to accept the new spring. Gary made a new dot contact from Sterling silver, which was then staked in place. After silver soldering, the spring was easily formed into the desired arc (Figure 4). One of the tricky parts of this project was determining dimensions. Since Gary didn't have the complete bug on hand, he went back and forth via emails with John, sharing photos and notes to verify all the important spatial relations. For instance, exactly where should that bend be in the dot spring?

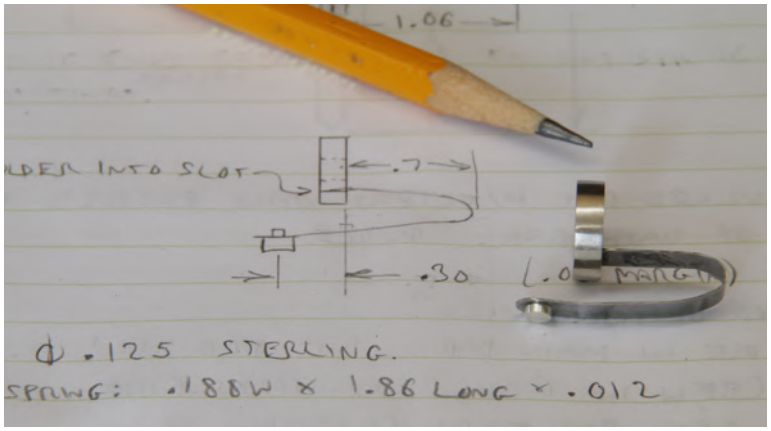

Figure 4. Dot spring sub-assembly.

A design for the damper was needed. After looking at photos of a number of older bugs, we decided that the Vibroplex Model X looked like the right design. It consists of the familiar round metal weight installed on a horizontal rod. Gary fabricated the parts from brass in short order.

Lastly, a weight was designed to meet John's desired speed range. Gary took the weight from his Vibroplex and placed it on the newly-assembled pendulum which was held in a vise. A small springy wire was placed near the weight rod and this was used to cyclically complete a circuit as the pendulum was set in motion. By measuring the frequency of oscillation, speed in WPM can be calculated (WPM = 2.4 * F) , and in turn, the required mass of the weight is determined. Weights are super-easy to make on a lathe, using brass bar stock. A knurled thumbscrew was also machined.

All brass parts were polished and then nickel plated. Original parts of the assembly were not stripped first nor were they re-surfaced, in order to maintain most of the original manufacturing features and flaws. The steel pivot shaft was cleaned and then blued with Brownell's Oxpho Blue. The steps Gary uses for nickel plating are as follows:

1. Final sand with P1200 silicon carbide paper.
2. Power buff as required.
3. Clean and degrease with chlorinated solvent (Brakleen 05089)
4. Activate the surface in 2M sodium hydroxide, about 1 min.
5. De-smut in 5% hydrochloric acid, about 30 sec.
6. Rinse with distilled water.
7. Electroplate in Krohn Bright Nickel solution (2.0 VDC, stirred), about 10 min.
8. Final buff with white rouge.

After a final portrait (Figure 5), all the parts were mailed to John. But would it all fit? Would it work well enough?

Figure 5. All the parts, ready to ship.

Back Together Again at John's QTH

The bug was reassembled and set up very quickly as all pieces fit like a glove. The bug was now operational once again and had its first contact with Bill VE3CSK near London Ontario on Wed 1 Mar 17 on 40 meters. John says it felt like his old 1921 Vibroplex Original. Unlike most of the other bugs in his modest collection, the Mystery Bug with its new main spring, dot contact spring and weight, when operating at approximately 20 WPM, was able to send a steady string of solid, crisp dots for 12 seconds before petering-out. Bill, being a very senior ham and seasoned CW operator, commented most favourably on how good the bug sounded: "Like music to my ears," he said. That is what we needed to hear to bring this restoration project to a most satisfying and successful conclusion. This was a fun and interesting project for both of us and shows what happens when a couple of old hams get together over a piece of classic equipment. What remains now is to positively identifying the old bug's manufacturer, model and age—things that will likely never be known.

References

1. *CW Bugs* Yahoo group. https://groups.yahoo.com/neo/groups/cw_bugs/info

2. *How to Restore Telegraph Keys*, 2nd Ed., 2006. William. R. Smith, W4PAL (SK). Formerly available from the author's website but now only on the used book market.