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## History Rocks

Posted by [REDACTED] @ 2009-10-09 21:57:48

Tags: wwii, ecm-134-c, ecm, sigaba restoration, sigaba

Mood: calm

**(U) SIGABA (ECM-134-C) Ser No. 140 Restoration Project**

(U) It is amazing what removing a few parts does to a machine. Take your car engine for example. You pull off the intake manifold and the heads and all of a sudden it looks a whole lot less crowded under the hood. And you start to see things that were hidden before.

(U) The same is true here. Remove the motor and the upper plate holding the fuses and plug from the side of the SIGABA and you get a big empty space in the side that reveals hidden pieces inside of the machine.

(U) The motor is out of the machine. There is a steel plate on the base of the motor. I removed that plate and used it as a template to mark where the mounting hardware should go on the test platform. Interestingly enough, the inside of the plate has some funny marks on it on one side. It is hard to tell if the marks are from oil or if they are burn marks from running the motor. I'm going to get our resident photographer, [REDACTED] to take some pictures of the plate before I clean it up. I've also discovered some dust and grease in and around the motor casing. These machines probably ran in some pretty harsh environments in the field. I don't know the history of SN 140 nor what it was exposed to when operating.

(U) I think before test running the motor, I'm going to take some time to break it down a little further and do some cleaning (and re-oil as necessary) and some refurbishment on it as a unit.

(U) So it looks like it will be pushing the motor test run out a couple of weeks.

(U) But in the meantime I've placed [REDACTED] for the project (SIGABA SN 140 RESTORATION PROJECT - is the name of the page). We'll try that mechanism to get photos and other media files out.

317 [REDACTED] @ 2009-10-13 16:13:01

**(U) SIGABA (ECM-134-C) Ser No. 140 Restoration Project**

Hi again,

(U) One of my hobbies is antique radio restoration, and this certainly would qualify. A common failure point in old radios are the capacitors, typically wellowish tubular or "Black Beauties." They used paper

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as the dielectric and in those times they didn't use acid free paper. Even though the SIGABA is mostly mechanical, the electrical portions may use these caps. Also, Electrolytic caps usually dry out causing a hi internal resistance. Both types may also fail as a SHORT, having terrible consequences. Mica caps (Brown rectangular with color dots on the side) and Oil types (Drawn rectangular steel case bolted to chassis) are usually much less of a problem. The paper and electrolytic caps are normally replaced to prevent problems down the road. In Hi End Restorations (this is obviously one), the insides of the old caps would be removed and a modern equivalent placed inside. Modern plastic caps should last forever and electrolytics should last a long time (multiple decades).

(U) About the Motor, what kind is it, induction, synchronous, shunt, series? If it has brushes, they may need replacement.

3177 re 3173 [redacted] @ 2009-10-13 17:04:04

Re: (U) SIGABA (ECM-134-C) Ser No. 140 Restoration Project

(U) [redacted] thanks for the capacitor information - you just saved me a bunch of research! While I was aware of the different types of capacitors, I certainly was unaware of their faults and failures.

(U) The SIGABA has one main capacitor (as far as I know right now it is the only one - at least the schematic only has one. We'll see if there are any surprises). I do not know what kind of capacitor it is, but I can tell you how it is used. The schematic has it labeled as a "filter" and it sits across the hot and neutral lines going to the 2 fuses.

(U) Since I only fused the hot side of the circuit on the test platform, I did not duplicate that portion of the circuit (that and my dad pointed out to me that today's power is probably much cleaner than they had 60 years ago). But I will certainly have to address it before I put the motor back into the machine. Which is probably the next step. Since I started with the motor, I'll probably just continue and verify the electrical first and save the mechanical as the second step.

(U) BTW - the machine also has two large resistors in addition to the one capacitor. The resistors are ceramic, wire wound (I assume around a carbon center) and are tapped near the center. The schematic has the end-to-end resistance marked as 300 ohms and the tap as 175 ohms. I'm assuming that these do not suffer from similar deterioration problems as the capacitors? I would think that the resistors would be fairly long lasting and stable.

(U) The motor is a synchronous motor and is designed to run at a constant 1750 RPMs.

3181 [redacted] @ 2009-10-13 17:48:57

You're on the right track it the resistor

[redacted]

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I have been fixing electronics down to the component level for nearly two decades, five of which have been for the Air Force. I enjoy reading about your adventures in this restoration and can't wait to hear more about it. Back to the point at hand: You are right on both accounts. The resistor will only need to be cleaned. Oxidation builds up on the wire and changes the resistive value of the rheostat. The cap on the input line is most definitely a filter cap. I would agree that replacing it with a current era cap is best and hide it beneath a period-correct shell of a cap. Though it may not be necessary to have a filter cap on the line anymore, it would not hurt (especially if the noise level doesn't reach the cutoff value of the cap).



3182 re 3177 [redacted] @ 2009-10-13 18:01:35

*Re: (U) SIGABA (ECM-134-C) Ser No. 140 Restoration Project*

You are correct about the wire wound resistors, in that they are very long lived. They are designed to "survive" very high temperature (+350 Degrees C!!). They are still made by Ohmite, although the tapped version may be a special order. I assume they are brown and mounted with a bolt through the tube, which was common in military equipment of that era.

(U) Is there a DC supply for the data signal through the rotors? It would have capacitors and might have a selenium rectifier. I would recommend never powering up the rectifier, as this one is well beyond its expected lifetime AND the fumes emitted are highly POISONOUS.

3184 re 3173 [redacted] @ 2009-10-13 21:04:29

*Re: (U) SIGABA (ECM-134-C) Ser No. 140 Restoration Project*

(U) More info on the capacitor and resistors (he intones as he realizes that he could get up from his desk and walk 20 paces to the machine).

(C//REL) [redacted]

(U) The capacitor is a metal container that has the leads on the top. The wires are attached via two nuts on screw posts on the top of the capacitor. It has the following markings on the side:

Cornell Dubilier  
NF 1B 049  
ER

(U) The resistors are mounted with a bolt through the center as suggested. And they appear to be in good shape (I mean they look clean).

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(b) (3) -P.L. 86-36

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(U) And finally, yes, the machine is designed to operate off of battery power as suggested. There is a hand crank lever to take the place of the motor during battery powered operation. However, the schematics show no other capacitors in the system. Of course some \*may\* be physically found when the bottom of the machine is opened up. But for now, the only known capacitor is across the fuses.

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