Repairing Frozen Ceramic Trimmers In Collins S-Line / KWM-2

by

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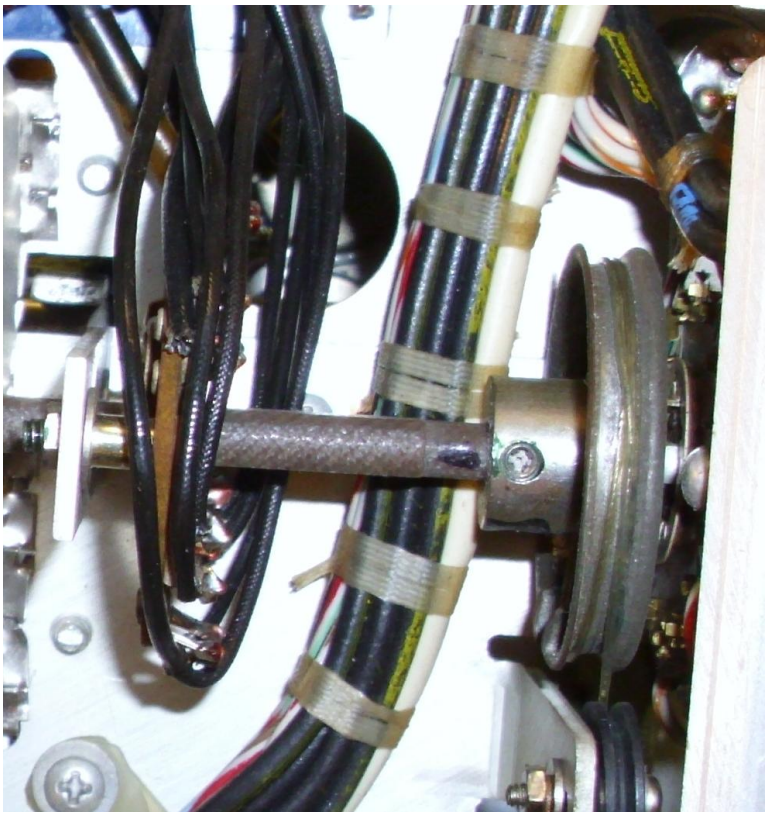
Probably, the weakest link in the Collins S-Line and KWM-2 series equipment is the ceramic trimmer capacitors used throughout the units. Unfortunately, those capacitors tend to "freeze" over the years making alignment of the equipment very difficult, if not impossible. Replacing these ceramic trimmers is a real "pain in the posterior". Fortunately, it is usually possible to repair these capacitors and, thusly, make it possible to again align the units.

The first step, after removing the cabinet, is to remove the fiber shaft that operates the various wafers of the band switch. This shaft is secured by two Bristol setscrews placed 90-degrees apart. It does not matter which setscrew is loosened first. However, before loosening the second setscrew, CAREFULLY mark the fiber shaft right next to the second setscrew. This is to enable replacing the shaft when the repairs are complete. Next, CAREFULLY slide the fiber shaft out through the hole in the back of the chassis making sure not to rotate the shaft at all. Using a pair of needle nosed pliers makes this task very easy.

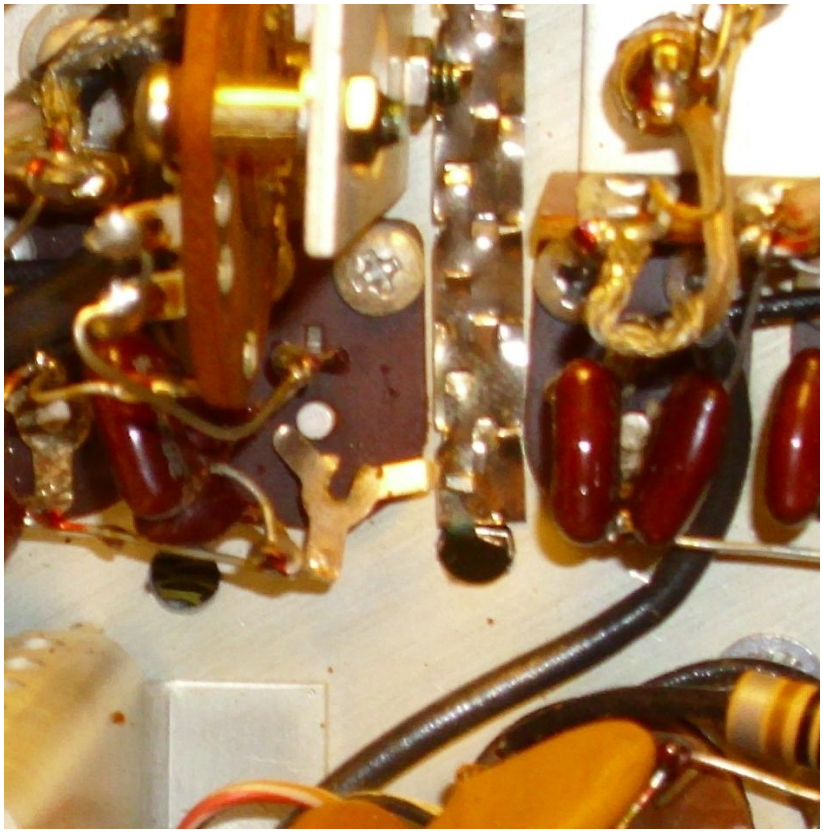


Marking the shaft

After removing the shaft, the shields over the band switch wafers must be removed. If the frozen trimmers are confined to just a single stage then it may not be necessary to remove all of the shields. However, by removing all the shields there is definitely more room to work. Three of the shields are identical and the fourth shield is different. The three shields to the rear of the unit are secured with 6-32 nuts on the top of the chassis and the front shield is usually secured with two 4-40 machine screws accessed from the top of the chassis. Usually, the machine screw nearest the PTO is a flat head (without lock washer) and the other machine screw is a "round head" with a lock washer.

The rotating portion of the ceramic trimmers is secured on the underside by a "clip" to which various components are attached. It is NOT necessary to unsolder any components. This "clip" can be slid from the center post of the trimmer using a pair of needle nosed pliers. Just slide this clip only far enough that the center post comes free. Push the center post through the hole in the fiber portion of the capacitor that is secured to the chassis with two screws.

This is the "clip" that needs to be loosened



Here the “clip” has been loosened

Carefully remove the ceramic capacitor component from the top side of the chassis. A pair of narrow needle nosed pliers makes this easier. If only the rotating portion of the capacitor comes loose, then one is very lucky. All that will be required is to carefully clean the rotating portion and the ceramic disc that remains. This disc is VERY fragile and care must be taken not to break it! When the rotating portion and disc are cleaned, put the post of the rotating portion back through the hole and then, holding the rotating portion with one hand, carefully slide the “clip” back into position.

Unfortunately, the disc, and, sometimes the “rubber” holding piece, usually come out as one unit. At this point it is necessary to get the disc free from the rotating portion. Some people, including myself in the past, use either a new single edged razor blade or an Xacto knife with a #11 blade to VERY CAREFULLY separate the disc from the rotating portion. However, doing so is risky and there is a good chance of fracturing the disc and that means replacing the components. Fortunately, there is a method that eliminates almost any chance of destroying the disc and that involves using an ultrasonic cleaner.

I was fortunate in that Harbor Freight was having a sale on their small ultrasonic cleaner at basically 25% off. That is, it was on sale for $29.99 instead of the regular $39.99. Since there is a Harbor Freight outlet just a few miles from me, I purchased a unit along with a bottle of cleaning agent.

The ultrasonic cleaner

The cleaning agent

This ultrasonic cleaner requires two cups (one pint) of water and one-fourth of a teaspoon of cleaning agent.

Measuring spoons

Inside of ultrasonic cleaner

The "frozen" parts of the ceramic trimmer are placed in the ultrasonic cleaner and the cleaner is activated. This particular machine runs for three minutes and then automatically shuts down.

Parts in ultrasonic cleaner

Usually, the parts will separate making restoration of the ceramic trimmer easy. If the parts are not actually separated, use an Xacto knife with a #11 blade (or new single edged razor blade) and barely touch between the rotating portion and the disc. The parts should then separate. If not, run the parts through another cleaning cycle.

When the parts are separated, they will look like the following photos:

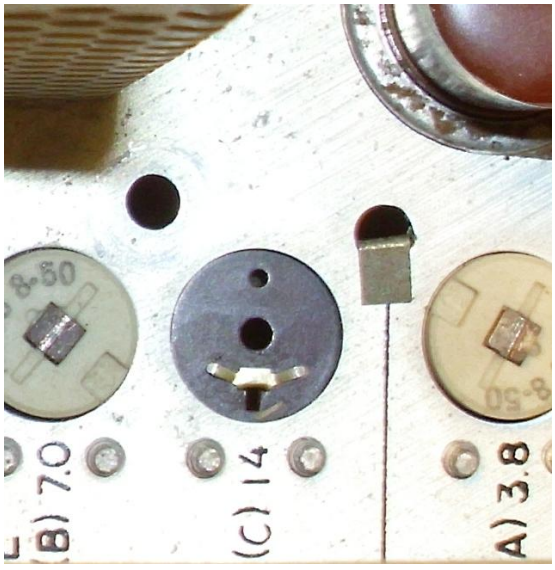
The three basic parts of the ceramic trimmer

Close up of rotating portion

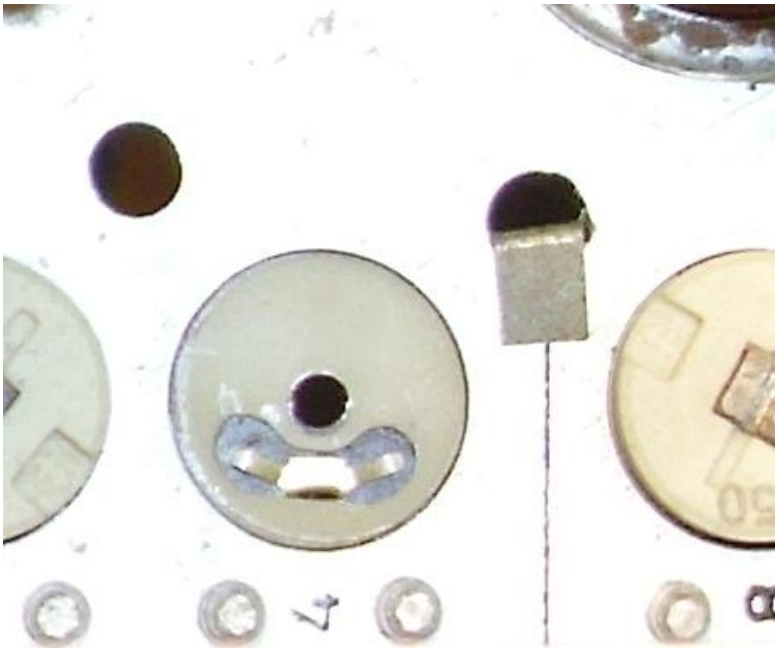
Disc and rubber holder

It will then be necessary to clean the parts. I use "Goddard's Silver Dip" which is the same basic solution as Tarn-X. Dip the components in the solution for around a minute and then rinse in clear water. Finally, VERY CAREFULLY dry the components. Actually, be VERY CAREFUL with the disc because the other two parts are definitely not fragile!

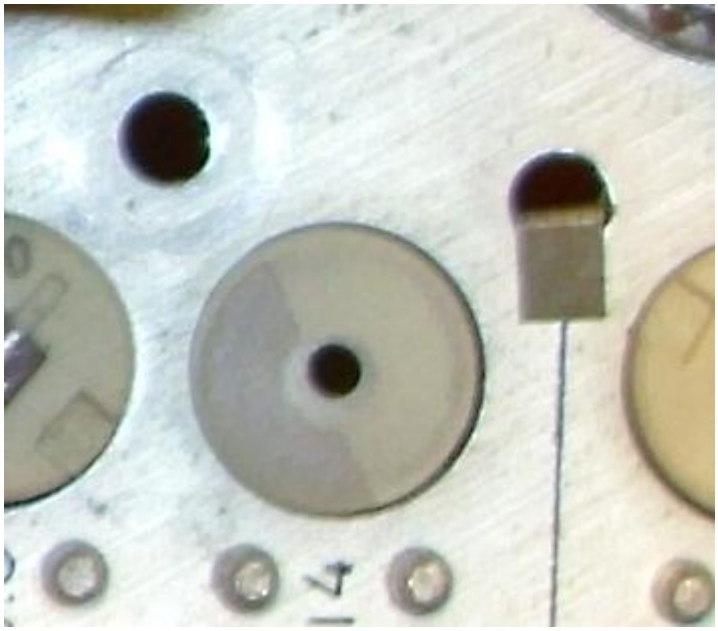
Next, start reassembling the ceramic trimmer. First, put the rubber holder back on the fiber holder.



Fiber holder



Rubber holder in place



Disc in place
(The “shadow” of the rotating portion appears on many of the discs but poses no problems)

Place the rotating portion back through the hole in the disc and then hold the rotating portion in place with one hand and then slide the "clip" on the bottom of the chassis back in position.

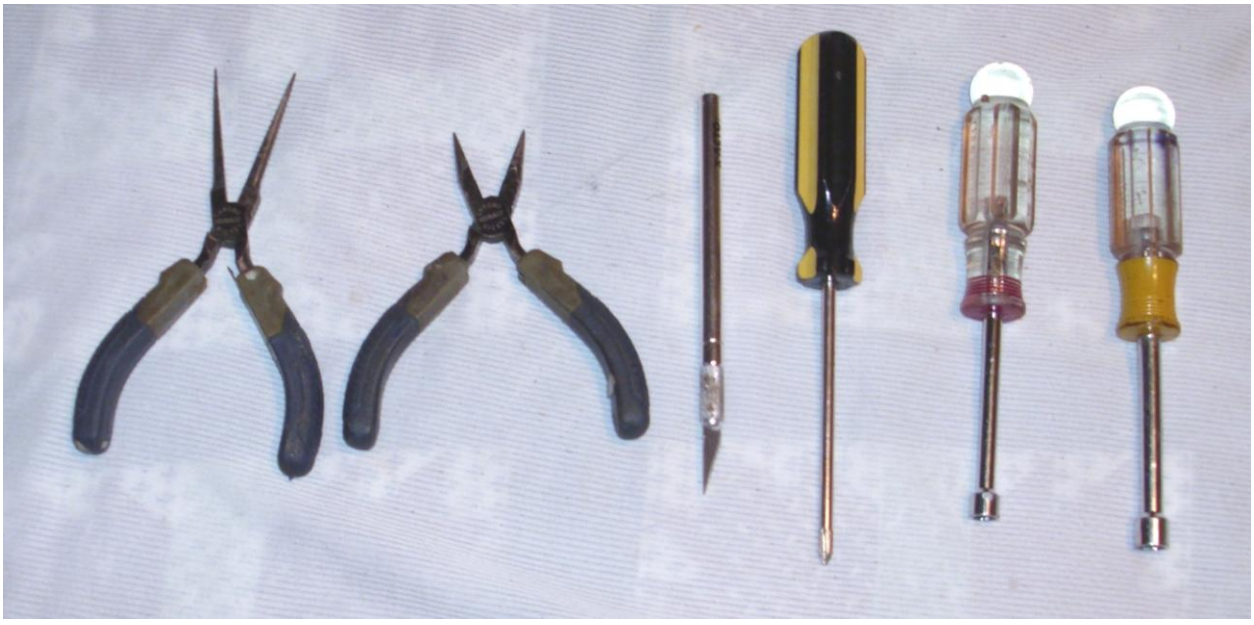
Next, replace the shields that have been removed. The three identical shields can go either way. However, the shield that is held in place by machine screws has a "notch" on one side and that notch has to be aligned for wires to pass.

Most shields are held in place with nuts that fit a 5/16th-inch nut driver. However, I have seen shields that are held in place with nuts that fit a 1/4th-inch nut driver.

After the shields are in place, CAREFULLY slide the fiber rod back into the band switch making sure that the "mark" on the rod will align with the setscrews on the switching mechanism. Sometimes it is necessary to use needle nosed pliers through the holes in the shields to gently move the rod up or down so that it slides easily. Tighten the setscrew by the mark. Then, apply power to the unit and then rotate the band switch to all positions verifying operation. It is easy to slightly rotate the rod so that it does not properly align the contacts. If the unit does not operate, carefully rotate the band switch knob between the "stops" to make proper connection. Then, loosen the original setscrew and rotate the rod slightly in the necessary direction to make the proper connection. When everything is working, tighten the second setscrew.

At this point, the unit is ready for realignment.

Since there are several values of ceramic trimmer capacitors (the values are printed on the rotating portion), I strongly suggest, that if more than one trimmer capacitor needs repair, that only capacitors of one specific value be cleaned at a time. Otherwise, there is a good chance that the discs can be switched to another value capacitor and, then, things definitely will not work correctly!



Suggested tools for making the repairs