

SilverWing 3-Space Reed Replacer System Instructions

August 3, 2018

1) Introduction.

Thank you for purchasing a SilverWing 3-Space Reed Replacer System (RRS). The RRS is designed to assist in the precision removal and replacement of reeds in harmonica reed plates. It consists of a 3D-printed frame with its embedded oil-impregnated bronze bushing to act as a precise guide for custom hardened tapered and flat punches, and a 1" square cold rolled steel anvil with a special slot milled into it. (Figure 1) [Not supplied is the 1" diameter flashlight* that fits into the angled port in the plastic frame.]

The bushing positions the punches directly over a slot that continues left-right through the legs of the frame and the anvil. This slot accommodates the row of rivets on the top of the reed plate (which is turned upside down when positioned on the anvil to remove a reed). The anvil is made from a 1" bar of square cold-rolled steel that weighs 18 oz. This has two benefits; it increases the mass of the assembled RRS unit making it ultra-stable on your workbench, and it provides a mass against which the punches can exert their full force when struck by the hammer, even on a kitchen table. The tapered punch is used with the anvil positioned so that the taper of the punch is directly over the slot. The flat punch is used over a flat section of the anvil. The flashlight fits into a port that extends through the neck of the frame at an angle focusing on the point where the tapered punch strikes the slot in the anvil.

2) Non-Assembly

No assembly is required. The anvil is positioned sandwiched between the legs of the plastic frame and the punches stowed as shown. You may have to pry the frame's legs apart to admit the anvil into the opening between them. It is designed so the anvil is held tight to unite the plastic frame and metal anvil masses into a cohesive, stable unit. The shorter dimension from the slot to the end of the steel bar goes inward so that the slot is positioned directly under the centerline of the bronze bushing. We'll call this anvil position A. When the anvil is pulled out a half inch or so, such that a flat area is now under the bushing, we'll call that anvil position B. It is in position B that the flat punch is used. (N.B.: the red tape on some punches marks the non-hardened end of

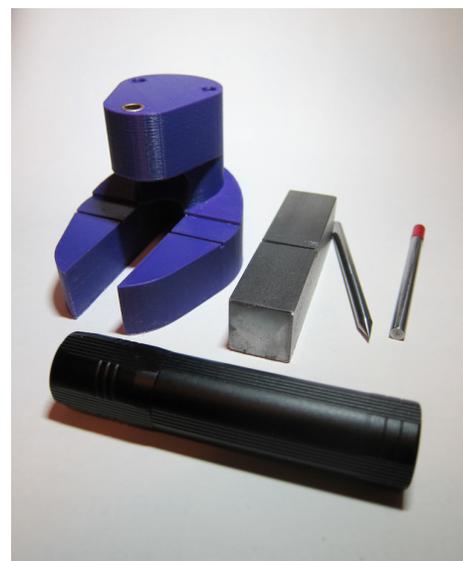


Figure 1: The Reed Replacer System, showing the 3D-printed plastic frame with its embedded bronze bushing, the slotted anvil, the two punches and the flashlight (not included).

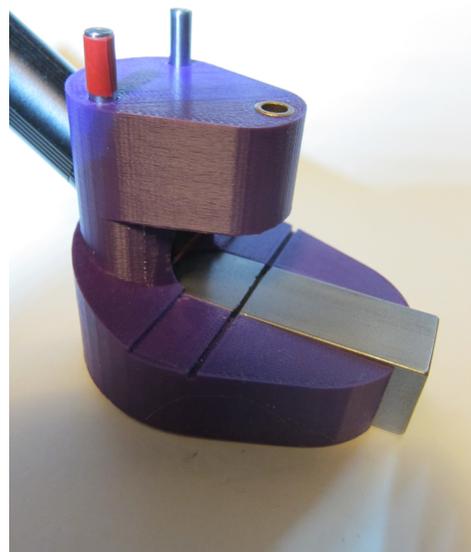


Figure 2: The assembled Reed Replacer, shown with the anvil in position A, for reed removal.

* Any 1" diameter flashlight should work such as this one from Amazon: [Coast LED Flashlight](#).

the to be struck with a 1-2 oz. Jeweler's hammer – also not provided. I don't want to support a component that is ubiquitous and readily available elsewhere. Plus, you probably already have such a hammer.) The punches can be stowed for convenience in the vertical channels in the post of the plastic frame. The flashlight is inserted into the port that goes through the neck of the frame. The RRS is now ready for use.

3) Reed Removal

Removing a reed with the RRS is quick and easy. With the anvil in position A, place the reed plate with the rivet heads and reeds facing down, so that the row of rivet heads fits into the slot running through the legs and anvil (the reed plate itself will be at an angle with respect to the slot; see Figures 3 and 4). Then insert the tapered punch point side down into the bushing (Figure 4). Gently allow the punch to descend downward until its point is just above the target rivet. [Please note that these punches are handmade and that some punches fit slightly looser in the bushing than others – perfectly OK. Each punch is tested to ensure that its fit is neither too loose or too tight and that the rivet aligns perfectly well with the slot.] Now slide the reed plate left or right until the point of the punch is centered directly over the underside of the rivet. Ease the punch downwards until it touches the center of the underside of the rivet. [N.B., There is enough freedom to the left/right position of the reed plate that the user can and should always assure him/herself that the point of the tapered punch hits the target rivet dead center or that the rivet head is positioned properly under the center aspect of the flat punch.] A light strike or three with the jeweler's hammer should pop out that broken reed. Of course, the donor reed will either be a brand new Hohner reed or a reed harvested from a donor harmonica. If the reed is harvested, careful attention must be paid to removing it from the donor instrument (see below). Also, if you plan on using a new rivet or replacing the rivet with a screw, do flatten out the donor reed's rivet pad with the flat punch to remove the mushrooming and decrease the hole back to somewhere near its pre-removal diameter.



Figure 3: The reed plate in position.

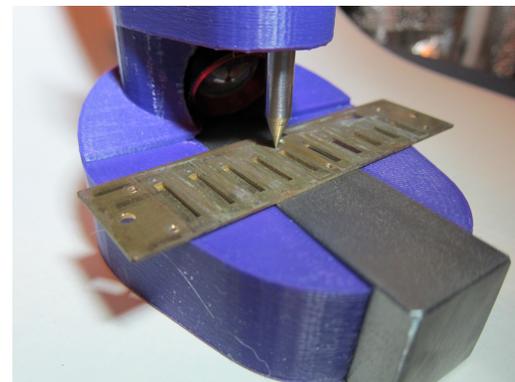


Figure 4: The tapered punch is centered on the underside of the rivet.

4) Reed Replacement Methods

There are many methods to replace a reed. The most popular ones include (in no particular order): 1) using the donor reed's rivet still attached to the donor reed; 2) using a new rivet from a manufacturer's rivet stick; 3) replacing the rivet with a screw and nut; or 4) replacing the rivet with a screw tapped into the reed plate. Experts disagree which is the best. Sometimes circumstances dictate which to use, e.g., if the rivet hole in the reed plate becomes too distorted or enlarged and a new rivet can't get enough of a bite on the remaining “meat” of the reed plate to anchor the rivet, one *must* use a screw, and maybe even a nut as well. The RRS can be used in conjunction with any of these methods insofar as removing

the rivet is concerned. It is only useful, however for flattening any deformations in the recipient reed plate or donor reed and for setting rivets (new or old), not for replacing them with screws. Look for the near future release of a SilverWing 3-Space sister product to the RRS, designed specifically to aid in the precision replacement of rivet with screws that are tapped into the reed plate.

5) New rivet or old or just screw it?

You need to decide whether you are going to use a new rivet, to re-use the donor rivet, or to replace the rivet with a screw. If you want to use a new rivet or a screw you will want to remove the rivet from not only the reed plate but the donor reed itself (Figure 5, left). If you want to re-use the donor rivet, you will want the rivet to be separated from the reed plate but **not** the donor reed (Figure 5, right). The difference between removing the rivet from just the reed plate but not the reed and removing the rivet from both is a but a tiny amount of force in your hammer strike(s) on the tapered chisel. Place and lightly support the punch with one hand so that the point of the tapered punch is dead center on the rivet end. If you want to remove the rivet from both the reed plate and the donor reed you can use a heavier hand when you strike the punch with a (1 – 2 oz.) jeweler's hammer with brass head or plastic insert. If not, you need to use a lighter hand, gently tapping the tapered punch *very* lightly with the hammer. You will soon develop a feel for just how light the hammer strikes need to be and when to stop just shy of driving the rivet out of the donor reed.

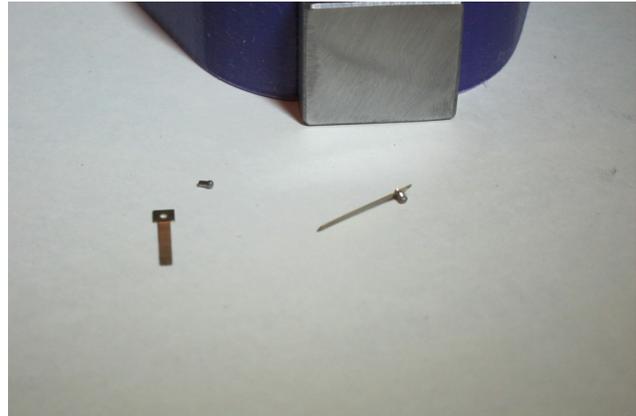


Figure 5: the rivet removed completely from the reed (left), and the rivet still attached to the donor reed (right).

If you choose to use a new rivet be aware that single loose rivets are tiny and very difficult to work with. This is one reason why many technicians prefer to use the old rivet or to replace the recipient reed plate's rivet with a screw. A properly prepped and set used rivet can be every bit as effective as a new one but there are many ways this method can fail. As a result, many pros opt to remove the uncertainty by going directly to replacing the rivet with a screw.

Since there are excellent resources on this topic available on the web, I'm not going to re-do them here. Both Andrew Zajac and Richard Sleigh are recognized experts by anyone's reckoning. Each offers tools to replace reeds manually and Richard has offered a jig of some kind as well. Their web sites contain links to their tools and many useful resources. I own a number of each of their tools and can attest to their high quality and utility.

<http://harp.andrewzajac.ca>

<http://hotrodharmonicas.com/>

Each of these expert harmonica technicians have made superb videos that are directly applicable to using the RRS. Since they can't be improved upon on, I'll just refer you directly to these excellent resources.

Richard's video on using the donor rivet still attached to the donor reed:

[Richard Sleigh Reed Replacement Video](#)

Andrew's video featuring two methods, one using a new rivet on a rivet stick and the other replacing the rivet by enlarging and tapping the rivet hole to accept a screw:

[Andrew Zajac Reed Replacement Video](#)

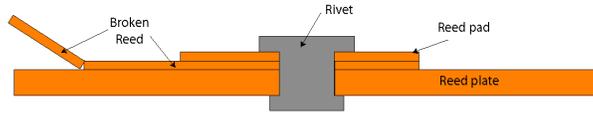
The remainder of this guide details how to use your RRS to replace a reed using a donor reed with its rivet still attached, much like Richard's video. Once the rivet is placed through the reed and into the rivet hole ready to be seated, the process for using a new rivet is the same as using a donor reed/rivet pair. So I'll refer you to Andrew's video for guidance on getting to that point using a manufacturer's rivet stick.

6) Replacing a broken reed using a donor reed/rivet pair

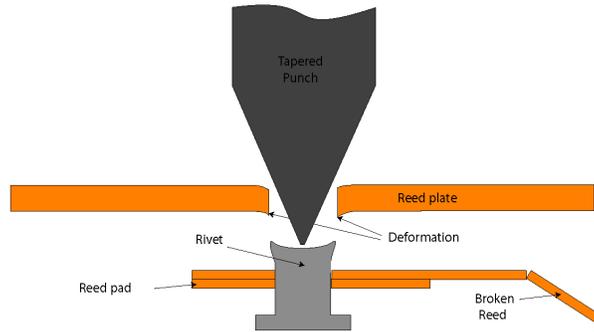
This section assumes that you want to transplant using the donor rivet, that the donor rivet is still attached to the reed, and that the pair has been separated from the reed plate as in Figure 5, right.

The main issue associated with using a donor reed is the “mushrooming” around the leading edge of the donor rivet and around the rivet hole from which the recipient reed plate's broken reed has been removed. The best way to deal with this mushrooming deformation is to first use the flat punch on the rivet hole to flatten the surrounding mushrooming and shrink the size of the hole. Then, put a slight chamfer (45 degree edge) on the entry side of the rivet hole by hand using a larger, say, 3/16” drill bit or a countersink bit, as Richard suggests in his video. Like Richard's method, the next thing to do is remove the mushrooming on the end of the donor rivet. This can be fiddly work so make sure to do it over a table or bench top with something such as a towel or sheet of felt to keep tiny dropped parts from bouncing into the unknown never to be found again. You will need to use a quality flat needle or diamond file to carefully dress the circumference of the mushroomed rivet head to make it cylindrical again and to put a slight chamfer on its edge. Take your time, use light forward-only strokes with the file and be very careful not to damage the connected reed. [Continued on page 6]

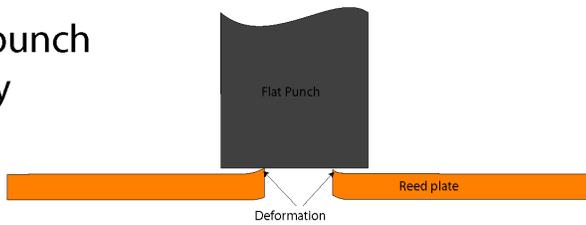
1) Broken Reed



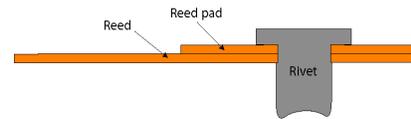
2) Donor Rivet punched out



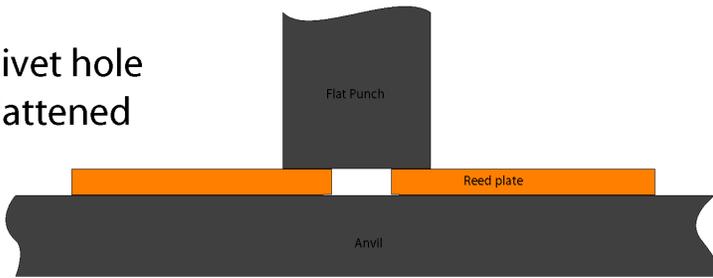
3) Flat punch ready



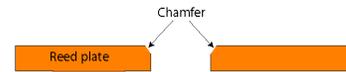
4) Donor rivet prepped



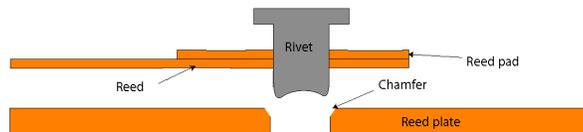
5) Rivet hole flattened



6) Rivet hole chamfered



7) Reed/rivet pair positioned



8) Rivet re-set

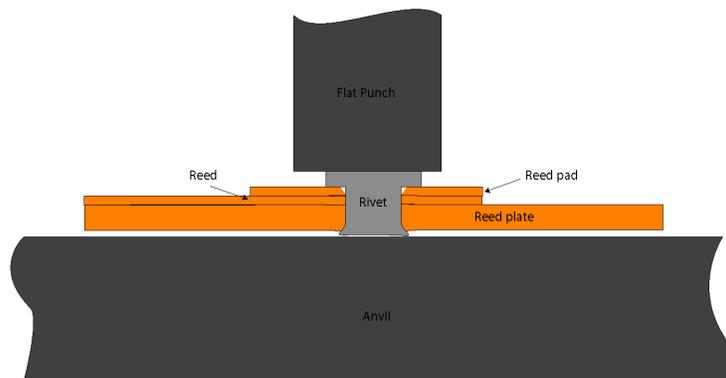


Figure 7: Graphical representation of the process of removing and replacing a broken reed with the donor rivet still attached to the donor reed.

As shown in Step 7 of Figure 6, the next operation is to register the donor reed/rivet pair in its proper position over the rivet hole and reed slot in the recipient reed plate. If the entry to the rivet hole and the rivet properly have been properly dressed, the end of the rivet should just fit inside the dressed rivet hole in the donor reed plate. In order to keep the reed as close to the center of the reed slot as possible, I recommend taping it down with as small a piece of tape that you can get away with. Once the reed and rivet are registered with their hole/slot the only things left to do are to seat the donor rivet (Step 8), and ensure that the reed has remained centered in its slot. Ideally, and often it is the case, one good whack with the jeweler's hammer on the flat punch will seat the reed and expand its distal end to a diameter greater than that of the hole in which it resides. On occasion this won't be the case and the bottom of the reed won't touch the reed plate. If this happens, you can use one or more of several methods to correct it. One is to return the anvil to its position A and place the reeds along the slot in the anvil and plastic frame's legs. But this time, have the head of the rivet facing up. This will allow you to use either the tapered or the flat chisel (or both) to drive the rivet further into the hole in the reed plate. Experience will show you which chisel to try first on any particular instance.

7) Final reed adjustments and tuning

You will need to verify that the root of the reed is seated firmly on the reed plate. The desired result is to have the root of the reed in solid physical contact with the reed plate. All mushrooming and other impediments to such contact have been removed so there should be no "daylight" between the reed and reed plate. None. When this condition is met, Return the anvil to its non-slotted position B and give the rivet one last whack with the flat punch just to ensure the reed is seated as firmly as possible and the rivet end expands sufficiently to lock it (and the reed) in place. Finally, the reed will have to be centered in its slot using a reed wrench. The reed should be the correct length, either because you used an identical donor reed or because you trimmed the end of a too-long donor reed to be the right length.

Of course the reed's gap (offset) and intonation will need to be adjusted to bring the donor reed to the correct pitch and reed gap that is concordant with the player's style.

Congratulations! You've successfully transplanted a reed with the SilverWing 3-Space Reed Replacer.

Questions or problems? Feel free to contact me via email at mlefree@silverwingleather.com

Thanks!