

Wing Tips: Tricky door tricks

By Dennis Wolter, Cincinnati, Ohio

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Two previous articles covered mechanical adjustments necessary for our cabin and baggage doors to close properly. The next step is to get these doors to seal correctly. Unlike automobile doors, sealing systems for aircraft doors are minimal at best, and the process of installing new seals has always been a challenge to solve: How do we get the doors to close easily as well as seal completely?

This article covers the installation, maintenance and adjustment of the main cabin door seal. In subsequent articles, I will address baggage door seals and opening window seals. Each type of seal comes with its own unique issues. We've learned some tricks over almost 40 years of working on Beech aircraft to get these doors and windows as water- and air-tight as possible.

Beech uses a two-seal system to control air and water leaks for their cabin and baggage doors. The black rubber seals are designed to keep water leaks under control and the leather or vinyl covered 3/4-inch diameter inner seal (windlace cord) is designed to control air leaks.

Many owners have replaced a rubber door seal in the hope of eliminating an air leak only to discover that the problem was a worn or maladjusted windlace cord. In this article we will deal with the rubber seals used for water leak prevention, beginning with the main cabin door. We have had the best luck installing the original teardrop-shaped rubber seal (P/N 115155-12000). We've tried many after-market seals, and we still prefer the original. But a seal is only as good as its installation, so this is a step-by-step description of the process we use to remove, prep and install a new door seal.

Main cabin door seals

Remove old seal and all old glue. Removal of glue is absolutely essential to get the new seal to properly bond to the door. We use two methods to accomplish this tedious task. If there isn't too much glue buildup on the door, we'll use mineral spirits or enamel paint thinner to soften and remove the old glue. The trick lies in repetitive application of the solvent using a one-inch paintbrush.

Allow the solvent to soak in for about 15 minutes. If the glue isn't soft after the first application, repeat the process until it is soft enough to scrape off with a plastic or wooden scraper. We use paint stirring sticks that

we sharpen on a belt sander; they work great and don't damage the aluminum door.

Your door may have years of thick hardened glue build-up caused by multiple efforts to re-attach a seal or the installation of a new seal without removing old glue. If so, a rotary wire brush and electric drill must be used to remove existing glue. If using this method, three considerations must be taken into account.

(1) If there are more than two layers of old glue, don't bother using the solvent removal method first. In fact, it's important not to apply solvent to the old glue since the glue is hard and applying solvent will only partially soften it, making it very difficult to remove with the wire brush. The heat created by the friction of the wire brush will soften the glue, turning the whole affair into a gooey mess. If you have any doubt at all about the potential success of the solvent method, go directly to the rotary wire brush procedure. We often test a small spot on the old glue and decide accordingly.

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(2) Use a medium-weight stainless steel wire brush about four inches in diameter. Never use a plain steel brush; it will leave micro-particles of steel imbedded in the surface of the aluminum door that can later cause the aluminum to corrode.

(3) Don't try to remove all the glue in one pass. Keep moving the rotary brush, allowing the glue to stay cool, so you can remove it in layers. When the glue is down to a thin coat, get a little more aggressive; apply more pressure to remove the last of it. We use a reversible drill. Occasionally reversing the drill helps prevent the bristles of the wire brush from bending over, and the brush can more efficiently remove the old glue. Don't use too much pressure as hard stainless bristles can damage soft aluminum, so be patient and you will get the job done! A final wipe with solvent will make the door ready for a new seal and glue.

Read instructions on adhesive - Apply contact adhesive to both the clean door and the new door seal. Take time to read the label on the can or tube of adhesive. Contact cements are sensitive to temperature and humidity. A few minutes of reading can save hours of re-work.

Several contact adhesives do a great job of bonding these rubber seals to the doors. Many are available at

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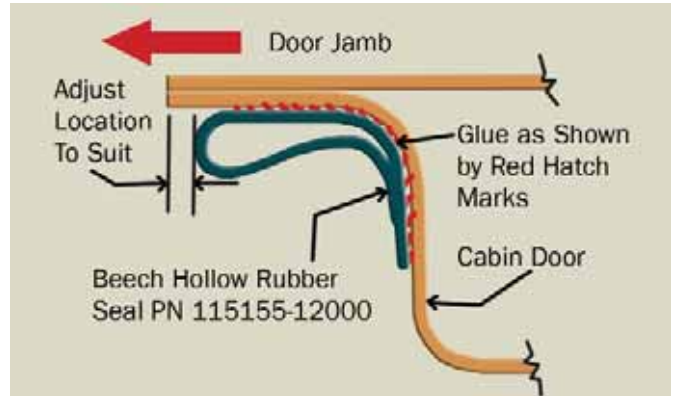
■ WING TIPS

automotive parts stores. Follow instructions to get good results. A couple products to try are 3M 8046 top and trim adhesive and DAP Weldwood contact adhesive. Apply one good coat per surface to both the aluminum door and the new seal.

After a prescribed cure time, the seal is ready to bond to the door. One important but often omitted step is to clean the rubber seal before applying the layer of contact adhesive. The new seal comes from the factory with a thin coat of a powder-like lubricant on it. We use lacquer thinner and a soft rag to remove all traces of this substance prior to applying adhesive.

Positioning and bonding the seal requires help of a second person. With one person holding the seal, the other applies it to the door, beginning at the upper door hinge working clockwise. This type of adhesive bonds instantly, so be sure to locate the seal accurately before pressing it down. (See sketch). Remember, the round end faces out. We often have a Bonanza or Baron come in our shop with a seal on backwards.

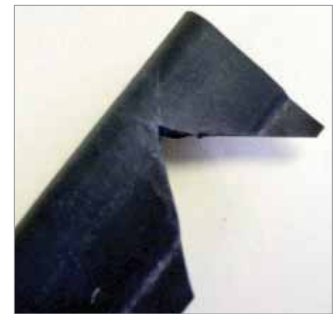
At the top of the door, the seal must go around a fairly tight radius, so we make a very conscious effort to



Positioning and bonding the seal to the door.

not stretch the seal in these areas. We actually lightly push the new seal back on itself as we bond it down. This technique ensures the seal is slightly compressed, allowing it to stand up as much as possible so it can seal against the doorjamb when the door is fully latched.

Another tricky spot is the lower forward corner of the door where the seal must go around a 90-degree corner and end abruptly at the lower hinge. We make a 90-degree V-cut from the pointed edge of the seal about three-fourths of the way in, stopping short of the round edge. (See photo). It's important to get a good fit between the seal where it meets the door hinges; any gap can mean a water leak. Beech supplies a thin rectangular rubber strip to apply between the door hinges. This must also be applied to a clean surface with contact adhesive.



Approximate geometry of a 90° V-cut allows for a neat installation at the lower front corner of the cabin door.

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Check out your work

Once the new seal is installed, you can verify there are no gaps between the new seal and the doorjamb by closing and latching the door and see if you can freely slide a business card between the jamb and the seal. You should feel a noticeable resistance as you slowly slide the card around the door. No resistance means no seal. Mark spots of no resistance, remove seal at those places, apply new



The old business card trick does a pretty good job of finding potential leaks.

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adhesive, and reposition the seal until obtaining desired resistance.

The final leak test is with a garden hose. Start at the bottom and work your way up, marking any leaks with tape. Reposition the seal as necessary.

We still need to address door hinge seals and adjustment of windlace cords, but those seem like good topics for the next article. Until then, fly safe! —Dennis



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